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One Hundred Years of Bond History Means Bears Fated to Lose

By Daniel Kruger and Liz Capo McCormick - Dec 8, 2014

If you're convinced the plummet in yields of U.S. government bonds is an aberration, it may be because you haven't been in the business long enough.

With the longest-dated Treasuries now yielding less than half the 6.8 percent average over the past five decades, it's not hard to see why forecasters say they're bound to rise as the Federal Reserve prepares to raise interest rates following the most aggressive stimulus measures in its 100-year history. Yet compared with levels that prevailed in the half-century before that, yields are in line with the norm.

For David Jones, the former vice chairman at Aubrey G. Lanston & Co. and a 51-year bond veteran, the notion that Treasury yields are too low is being shaped by traders, money managers and economists who began their careers in the wake of runaway inflation surpassing 10 percent in the 1970s and 1980s. With U.S. consumer prices rising at the slowest pace in five decades and economic growth weakening around the world, today's bond market may now be reverting back to form, he said.

"We have come full circle," Jones, 76, said by telephone on Dec. 1 from Denver. "Rather than decrying how low interest rates are and expecting them to shoot higher, it may be that we're in more normal territory than we thought we were."

Since the financial crisis, yields on Treasuries of all maturities have fallen as the Fed attempted to restore demand in the U.S. by dropping its overnight target rate close to zero and buying bonds to suppress long-term borrowing costs.

Bull Case

The 5.1 percent rally in U.S. government debt this year has pushed down yields even further, surprising everyone on Wall Street who anticipated the central bank's unprecedented stimulus would lead to stronger economic growth, faster inflation and ultimately higher borrowing costs.

Yields on 30-year bonds, the longest-term debt securities issued by the Treasury Department, have fallen a full percentage point this year to 2.95 percent as of 9:25 a.m. in New York today. At the start of 2014, forecasters said they would rise 0.28 percentage point to 4.25 percent.

Economists and strategists in a Bloomberg survey are sticking to their calls that yields will rise and predicting those on long-term Treasuries will reach 3.88 percent next year.

Lacy Hunt, the 72-year-old chief economist at Hoisington Investment Management, says lackluster demand and inflation will likely keep yields low for years to come as the U.S. contends with record debt levels.

Even though the Fed inundated the U.S. economy with almost $4 trillion of cheap cash with its bond buying, growth has averaged 1.8 percent a year since 2009. In the seven expansions dating back to the 1960s, growth averaged almost 4 percent.

History Lesson

Inflation, which erodes the value of fixed-income payments, has failed to reach the Fed's 2 percent target for 30 straight months based on its preferred measure. The U.S. consumer price index has risen an average 1.62 percent over the past five years, the least since the five-year period ended in 1965.

"Over time, what drives the bond yield is the inflationary expectations," Hunt said by telephone on Dec. 2. "If you wring all the inflationary expectations out, you are going down to 2 percent on the long bond over the next several years. That is the path that we are on."

Based on bond yields, inflation expectations over the next 30 years have fallen below 2 percent and reached a three-year low of 1.96 percent at the end of last month.

Those levels are more akin to inflation rates that were prevalent in the five decades after the Fed was established in 1913. Living costs rose an average 2.45 percent annually during that span, versus 4.3 percent in the half-century since, according to data compiled by the Labor Department.

Great Society

Long-term U.S. bond yields were also lower in the earlier period, averaging about 3.1 percent, according to more than 100 years of data provided by Austin, Texas-based Hoisington.

Forecasters have continued to anticipate higher borrowing costs partly because recent history has been marked by periods of elevated inflation, said Ray Stone, a Princeton, New Jersey-based managing director at Stone & McCarthy Research Associates.

"Those of us that grew up in the 1970s and when there were very high interest rates in the early 1980s might think that that is the norm," Stone, who began his career at the New York Fed in 1973, said by telephone Dec. 3. "But it's not. What prevailed before then is probably more indicative of the norm."

Yields on the longest-term U.S. government bonds started to rise to unprecedented levels in the 1960s as government spending increased with the Vietnam War and the social welfare programs of the Great Society under President Lyndon B. Johnson.

Oil Shock

In the 1970s, oil shocks stemming from the 1973 embargo by the Organization of Petroleum Exporting Countries and the Iranian revolution in 1979, as well as the easy-money policies by the Fed during the Nixon administration, caused annual consumer prices to soar as much as 14.8 percent in March 1980.

Yields on 30-year Treasuries followed, surging to a record 15 percent in October 1981.

While former Fed Chairman Paul Volcker was credited with finally breaking the inflationary cycle by raising interest rates to 20 percent that year, at least one bond veteran says the three-decade bull market in bonds that ensued may finally be over as the central bank tightens policy. His name? Bill Gross.

"Prepare for at least a halt of asset appreciation engineered upon a false central bank premise of artificial yields," Gross, 70, who left Pacific Investment Management Co. in September to join Janus Capital Group Inc., wrote in his investment outlook for December.

Less than two months earlier, billionaire hedge-fund manager Paul Tudor Jones said there's a bubble in debt globally that will burst and that "the piper will be paid one day."

Secular Bear

Signs that the trillions of dollars of stimulus by the Fed will lead to a pickup in inflation may already be emerging. Last month, the economy created more jobs than at any time in almost three years, helping trigger a 0.4 percent jump in average hourly wages that was the biggest in 17 months.

Before November, earnings remained flat or rose just 0.1 percent in five of the prior eight months. Economists also anticipate that 3 percent economic growth in the U.S. next year, which would be the fastest in a decade, will compel the Fed to raise rates in the second quarter of 2015.

"We're in a transition period between secular bull and bear markets in bonds," Stewart Taylor, a money manager at Boston-based Eaton Vance Management, which oversees $294 billion, said by telephone on Dec. 4.

Even as the U.S. economy gains momentum, a slowdown abroad may help keep Treasuries in demand as central banks in Europe and Japan step up their own stimulus measures.

No Return

With the inflation rate for the 18-nation euro area matching a five-year low in November and Japan falling into a recession, JPMorgan Chase & Co. estimates their central banks will buy $1.1 trillion of debt in 2015 to support demand.

That's already made Treasuries more attractive on a relative basis, with 10-year German bunds yielding 1.58 percentage points less than similar-maturity Treasuries today, the widest since 1999. The gap between the U.S. and Japan is even greater at 1.88 percentage points.

"It's more of a structural shift related to globally low yields," Jennifer Vail, the head of fixed income at U.S. Bank Wealth Management, which oversees $115 billion, said by telephone. "It's driving a lot of money into our market."

A price war between OPEC and U.S. shale oil drillers is also likely to keep inflationary pressures tied to energy from building. The price of the U.S. benchmark grade has plummeted 33 percent this year and reached a five-year low of $63.72 a barrel on Dec. 1. Since soaring to a record of $147.27 in July 2008, prices fallen by about half. During the oil shock in the late 1970s and early 1980s, crude prices more than tripled.

"Inflation is a non-story, and as long as inflation is a non-story, we're not going back to those elevated yield levels," David Robin, an interest-rate strategist at Newedge, an institutional brokerage firm, said in a Dec. 3 telephone interview in New York. "We're not going back there."

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Unstoppable $100 Trillion Bond Market Renders Models Useless

By Susanne Walker and Liz Capo McCormick - Jun 2, 2014

If the insatiable demand for bonds has upended the models you use to value them, you're not alone.

Just last month, researchers at the Federal Reserve Bank of New York retooled a gauge of relative yields on Treasuries, casting aside three decades of data that incorporated estimates for market rates from professional forecasters. Priya Misra, the head of U.S. rates strategy at Bank of America Corp., says a risk metric she's relied on hasn't worked since March.

After unprecedented stimulus by the Fed and other central banks made many traditional models useless, investors and analysts alike are having to reshape their understanding of cheap and expensive as the global market for bonds balloons to $100 trillion. With the world's biggest economies struggling to grow and inflation nowhere in sight, catchphrases such as "new neutral" and "no normal" are gaining currency to describe a reality where bonds are rallying the most in a decade.

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"The world's gotten more complicated and it's a little different," James Evans, a New York-based money manager at Brown Brothers Harriman & Co., which oversees $30 billion, said in a telephone interview on May 30. "As far as predicting direction up and down, I don't think they have much value," referring to bond-market models used by forecasters.

Flawed Consensus

With the Fed paring its $85 billion-a-month bond buying program this year and economists calling for the five-year-long U.S. expansion to finally take off, Wall Street prognosticators said at the start of the year that yields were bound to rise as central banks began employing tighter monetary policies.

Instead, investors poured into bonds of all types as global growth weakened, disinflation emerged in Europe and tensions between Ukraine and Russia intensified.

Globally, bonds have returned an average 3.89 percent this year for the biggest year-to-date gain since 2003, index data compiled by Bank of America Merrill Lynch show. The advance decreased yields on 10-year Treasuries by more than a half percentage point to 2.48 percent, the fastest pace over the same span since 1995, while borrowing costs for the riskiest U.S. companies tumbled to a record 5.94 percent last week.

Benchmark Treasury 10-year note yields rose six basis points, or 0.06 percentage point, to 2.53 percent as of 3:36 p.m. in New York.

In developed countries, benchmark yields in 24 of 25 nations tracked by Bloomberg have fallen this year, with those in Italy and Spain closing below 3 percent for the first time.

'How Wrong'

"I don't expect the consensus to be right, I'm just surprised by how wrong it has been," Jim Bianco, president of Chicago-based Bianco Research LLC, said by telephone on May 28.

The seemingly unstoppable rally has caused bond-market professionals to reassess whether they're using the right tools.

At the New York Fed, researchers Tobias Adrian, Richard Crump, Benjamin Mills and Emanuel Moench on May 12 released an updated methodology for a metric known as the term premium, which can be used to determine whether 10-year Treasuries are cheap or expensive relative to short-term rates.

After stripping out all human predictions and using only market prices to calculate future expectations, the researchers found the extra yield longer-term Treasuries offered has been "considerably higher since the onset of the financial crisis" than previous models, according to their blog post that included the data. That may be because the metric now suggests the Fed's short-term interest rate may not rise as high as survey-based results predicted, wrote the economists.

Old Model

Based on the old model, last updated on March 31, the term premium on 10-year notes was 0.25 percentage point, versus 0.96 percentage point on the same day using the current methodology. The reading was at 0.67 percentage point last week.

The researchers declined to comment beyond the blog post, according to Eric Pajonk, a spokesman at the New York Fed.

Bank of America's Misra says she stopped looking at the gap between the rate on 10-year interest-rate swaps and yields on benchmark government debt as a measure of risk.

The gauge, which usually widens as investors seek out haven assets in times of stress, is being distorted as those betting on losses in Treasuries have unwound their trades, she said.

Hedge funds and other large speculators cut their net short positions in 10-year note futures by the most since February as of May 27, according to data from the U.S. Commodity Futures Trading Commission. Primary dealers, which had net short positions in March for the first time since 2011, have since reversed those wagers, data compiled by Bloomberg show.

Forced Buying

"Everyone is short and they are forced to cover," Misra said by telephone on May 28.

While economists and strategists have reduced their yield forecasts, they're still sticking to the view borrowing costs will end the year higher as the economy gains momentum.

They now see yields on 10-year Treasuries rising to 3.25 percent by year-end as the economy accelerates 3.1 percent in 2015, estimates compiled by Bloomberg show. At the start of the year, the median yield forecast was 3.44 percent.

Investors risk becoming lulled into complacency by six years of near-zero U.S. interest rates at a time when yields are so low, according to Zach Pandl, the Minneapolis-based senior interest-rate strategist at Columbia Management Investment Advisers, which oversees $340 billion.

Pandl, who developed his own version of the term premium, maintains that U.S. government bonds are too expensive.

"The Treasury market is overvalued," he said by telephone on May 28. "The funds rate has been at zero for so long so it becomes difficult to envision it being higher at all. Monetary policy is closer to exit."

Biggest Mistake

Traditional models are failing to explain the resilience of fixed-income assets as central banks led by the Fed pump trillions of dollars into their economies and suppress short-term rates at historical lows, according to Bianco.

The Fed, Bank of Japan and Bank of England all have quantitative-easing programs in place, while at least two dozen nations have dropped benchmark rates to 1 percent or less.

"The biggest mistake for people is they think interest rates are merely a projection of where the economy is supposed to go," Bianco said. "It's the Fed and the way they have changed the marketplace." He foresees that yields on 10-year notes will end the year at 2 percent to 2.5 percent.

Fed Chair Janet Yellen said on May 7 there will be "considerable time" before the central bank raises its benchmark rate as slack in the jobs market keeps inflation below its 2 percent target.

Household spending declined in April, while the world's largest economy contracted in the first quarter for the first time since 2011, government reports showed last week.

"Given the outlook for the global economy and inflation, bonds are not a bad place to be," Gary Pollack, the New York-based head of fixed-income trading at Deutsche Bank AG's private-wealth management unit, which oversees $12 billion, said in a telephone interview on May 28.

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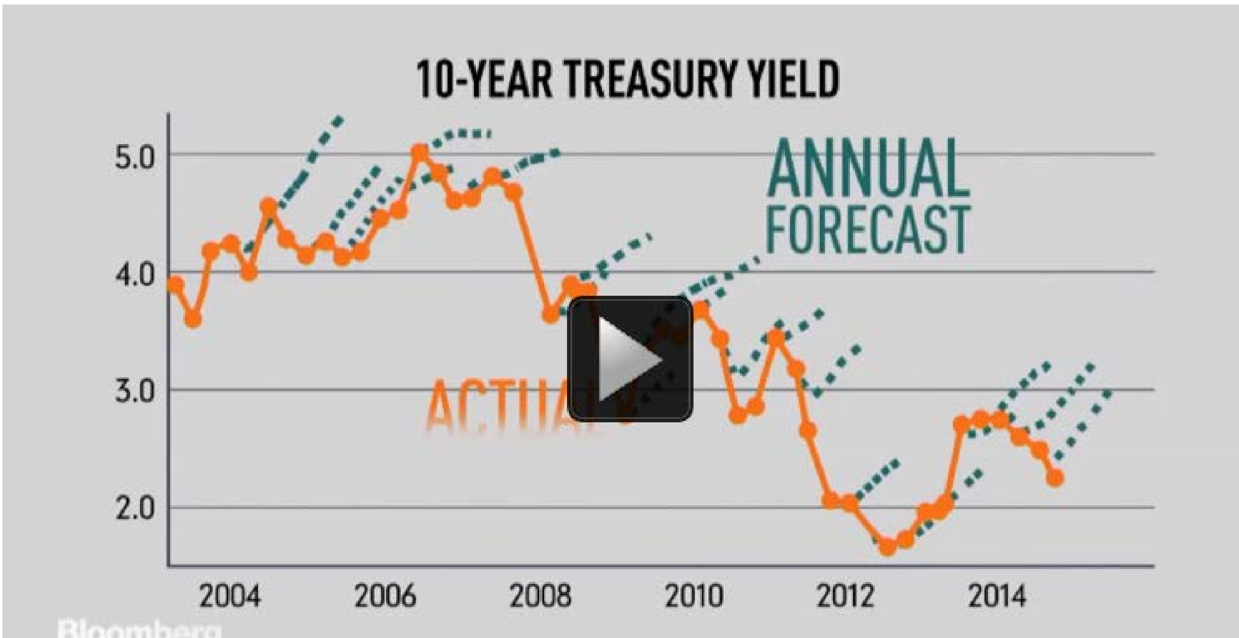
http://www.bloomberg.com/news/articles/2015-03-16/how-interest-rates-keep-making-people-on-wall-street-look-like-fools

How Interest Rates Keep Making People on Wall Street Look Like Fools

Will this be the year they get it right?



If there's one call that investors and economists almost always seem to get wrong, it's the direction of long-term interest rates. For years economists have been predicting that rates would rise, yet rates have been on a downtrend for ages.

Over the years, a variety of reasons have been given for the forecasted rise. Inflation and the amount of government spending have often been cited. You also frequently hear that "rates have nowhere to go but up," yet it turns out that yes, they can keep getting lower.

The ongoing decline in interest rates isn't just a U.S. phenomenon, either. In Europe, many government bonds now carry negative interest rates—a decline some wouldn't have thought possible. In Japan, the term "the widowmaker" has been used to describe the perpetually losing trade of betting on higher government rates.

So why have rates declined so intensely over the years? Inflation has been on a steady downtrend in most places. And as societies get older, the demand for ultra-safe assets, such as government bonds, gets bigger.

And yes, in 2015, analysts are once again predicting higher rates.

Supreme Court of the United States
BLUEFIELD WATERWORKS & IMPROVEMENT CO.
v.
PUBLIC SERVICE COMMISSION OF WEST VIRGINIA et al.
No. 256.

Argued January 22, 1923.
Decided June 11, 1923.

In Error to the Supreme Court of Appeals of West Virginia.

Proceedings by the Bluefield Waterworks & Improvement Company against the Public Service Commission of the State of West Virginia and others to suspend and set aside an order of the Commission fixing rates. From a judgment of the Supreme Court of West Virginia, dismissing the petition, and denying the relief (89 W. Va. 736, 110 S. E. 205), the Waterworks Company bring error. Reversed.

West Headnotes

Constitutional Law 92 298(1.5)

92 Constitutional Law
92XII Due Process of Law
92k298 Regulation of Charges and Prices
92k298(1.5) k. Public Utilities in General. Most Cited Cases
Rates which are not sufficient to yield a reasonable return on the value of the property used in public service at the time it is being so used to render the service are unjust, unreasonable, and confiscatory, and their enforcement deprives the public utility company of its property, in violation of the Fourteenth Amendment of the Constitution.

Constitutional Law 92 298(3)

92 Constitutional Law
92XII Due Process of Law
92k298 Regulation of Charges and Prices
92k298(3) k. Water and Irrigation Companies. Most Cited Cases
Under the due process clause of the Fourteenth Amendment of the Constitution, U.S.C.A., a waterworks company is entitled to the independent judgment of the court as to both law and facts, where the question is whether the rates fixed by a public service commission are confiscatory.

Waters and Water Courses 405 203(10)

405 Waters and Water Courses
405IX Public Water Supply
405IX(A) Domestic and Municipal Purposes
405k203 Water Rents and Other Charges
405k203(10) k. Reasonableness of Charges. Most Cited Cases
It was error for a state public service commission, in arriving at the value of the property used in public service, for the purpose of fixing the rates, to fail to give proper weight to the greatly increased cost of construction since the war.

Waters and Water Courses 405 203(10)

405 Waters and Water Courses
405IX Public Water Supply
405IX(A) Domestic and Municipal Purposes
405k203 Water Rents and Other Charges
405k203(10) k. Reasonableness of Charges. Most Cited Cases
A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties, but it has no constitutional right to such profits as are realized or anticipated in highly profitable enterprises or speculative ventures.

Waters and Water Courses 405 203(10)

405 Waters and Water Courses
405IX Public Water Supply
405IX(A) Domestic and Municipal Purposes
405k203 Water Rents and Other Charges
405k203(10) k. Reasonableness

of Charges. Most Cited Cases
Since the investors take into account the result of past operations as well as present rates in determining whether they will invest, a waterworks company which had been earning a low rate of returns through a long period up to the time of the inquiry is entitled to return of more than 6 per cent. on the value of its property used in the public service, in order to justly compensate it for the use of its property.

Federal Courts 170B 504.1

170B Federal Courts
170BVII Supreme Court
170BVII(E) Review of Decisions of State Courts
170Bk504 Nature of Decisions or Questions Involved
170Bk504.1 k. In General. Most Cited Cases
(Formerly 106k394(6))
A proceeding in a state court attacking an order of a public service commission fixing rates, on the ground that the rates were confiscatory and the order void under the federal Constitution, is one where there is drawn in question the validity of authority exercised under the state, on the ground of repugnancy to the federal Constitution, and therefore is reviewable by writ of error.

****675 *680** Messrs. Alfred G. Fox and Jos. M. Sanders, both of Bluefield, W. Va., for plaintiff in error.
Mr. Russell S. Ritz, of Bluefield, W. Va., for defendants in error.

***683** Mr. Justice BUTLER delivered the opinion of the Court.
Plaintiff in error is a corporation furnishing water to the city of Bluefield, W. Va., ****676** and its inhabitants. September 27, 1920, the Public Service Commission of the state, being authorized by statute to fix just and reasonable rates, made its order prescribing rates. In accordance with the laws of the state (section 16, c. 15-O, Code of West Virginia [sec. 651]), the company instituted proceedings in the Supreme Court of Appeals to suspend and set aside the order. The petition alleges that the order is repugnant to the Fourteenth Amendment, and deprives the company of its property without just compensation and without due process of law, and denies it equal protection of the laws. A final judgment was entered, denying the company relief and dismissing its petition. The case is here on writ of error.

[1] 1. The city moves to dismiss the writ of error for the reason, as it asserts, that there was not drawn in question the validity of a statute or an authority exercised under the state, on the ground of repugnancy to the federal Constitution.

The validity of the order prescribing the rates was directly challenged on constitutional grounds, and it was held valid by the highest court of the state. The prescribing of rates is a legislative act. The commission is an instrumentality of the state, exercising delegated powers. Its order is of the same force as would be a like enactment by the Legislature. If, as alleged, the prescribed rates are confiscatory, the order is void. Plaintiff in error is entitled to bring the case here on writ of error and to have that question decided by this court. The motion to dismiss will be denied. See ***684**Oklahoma Natural Gas Co. v. Russell, 261 U. S. 290, 43 Sup. Ct. 353, 67 L. Ed. 659, decided March 5, 1923, and cases cited; also Ohio Valley Co. v. Ben Avon Borough, 253 U. S. 287, 40 Sup. Ct. 527, 64 L. Ed. 908.

2. The commission fixed $460,000 as the amount on which the company is entitled to a return. It found that under existing rates, assuming some increase of business, gross earnings for 1921 would be $80,000 and operating expenses $53,000 leaving $27,000, the equivalent of 5.87 per cent., or 3.87 per cent. after deducting 2 per cent. allowed for depreciation. It held existing rates insufficient to the extent of 10,000. Its order allowed the company to add 16 per cent. to all bills, excepting those for public and private fire protection. The total of the bills so to be increased amounted to $64,000; that is, 80 per cent. of the revenue was authorized to be increased 16 per cent., equal to an increase of 12.8 per cent. on the total, amounting to $10,240.

As to value: The company claims that the value of the property is greatly in excess of $460,000. Reference to the evidence is necessary. There was submitted to the commission evidence of value which it summarized substantially as follows:

a. Estimate by company's engineer

	on. basis of reproduction new, less. depreciation, at prewar prices.	$ 624,548 00
b.	Estimate by company's engineer on. basis of reproduction new, less. depreciation, at 1920 prices.	1,194,663 00
c.	Testimony of company's engineer. fixing present fair value for rate. making purposes.	900,000 00
d.	Estimate by commissioner's engineer on. basis of reproduction new, less. depreciation at 1915 prices, plus. additions since December 31, 1915, at. actual cost, excluding Bluefield. Valley waterworks, water rights,. and going value.	397,964 38
e.	Report of commission's statistician. showing investment cost less. depreciation.	365,445 13
f.	Commission's valuation, as fixed in. case No. 368 ($360,000), plus gross. additions to capital since made. ($92,520.53).	452,520 53

***685** It was shown that the prices prevailing in 1920 were nearly double those in 1915 and pre-war time. The company did not claim value as high as its estimate of cost of construction in 1920. Its valuation engineer testified that in his opinion the value of the property was $900,000-a figure between the cost of construction in 1920, less depreciation, and the cost of construction in 1915 and before the war, less depreciation.

The commission's application of the evidence may be stated briefly as follows:

As to ‘a,’ supra: The commission deducted $204,000 from the estimate (details printed in the margin), FN1 leaving approximately $421,000, which it contrasted with the estimate of its own engineer, $397,964.38 (see ‘d,’ supra). It found that there should be included $25,000 for the Bluefield Valley waterworks plant in Virginia, 10 per cent. for going value, and $10,000 for working capital. If these be added to $421,000, there results $500,600. This may be compared with the commission's final figure, $460,000.

FN1

Difference in depreciation allowed.	$ 49,000
Preliminary organization and development. cost.	14,500
Bluefield Valley waterworks plant.	25,000
Water rights.	50,000
Excess overhead costs.	39,000
Paving over mains.	28,500
	$204,000

***686** As to 'b' and 'c,' supra: These were given no weight by the commission in arriving at its final figure, $460,000. It said:

'Applicant's plant was originally constructed more than twenty years ago, and has been added to from time to time as the progress and development of the community required. For this reason, it would be unfair to its consumers to use as a basis for present fair value the abnormal prices prevailing during the recent war period; but, when, as in this case, a part of the plant has been constructed or added to during that period, in fairness to the applicant, consideration must be given to the cost of such expenditures made to meet the demands of the public.'

****677** As to 'd,' supra: The commission, taking $400,000 (round figures), added $25,000 for Bluefield Valley waterworks plant in Virginia, 10 per cent. for going value, and $10,000 for working capital, making $477,500. This may be compared with its final figure, $460,000.

As to 'e,' supra: The commission, on the report of its statistician, found gross investment to be $500,402.53. Its engineer, applying the straight line method, found 19 per cent. depreciation. It applied 81 per cent. to gross investment and added 10 per cent. for going value and $10,000 for working capital, producing $455,500. FN2 This may be compared with its final figure, $460,000.

FN2 As to 'e': $365,445.13 represents investment cost less depreciation. The gross investment was found to be $500,402.53, indicating a deduction on account of depreciation of $134,957.40, about 27 per cent., as against 19 per cent. found by the commission's engineer.

As to 'f,' supra: It is necessary briefly to explain how this figure, $452,520.53, was arrived at. Case No. 368 was a proceeding initiated by the application of the company for higher rates, April 24, 1915. The commission made a valuation as of January 1, 1915. There were presented two estimates of reproduction cost less depreciation, one by a valuation engineer engaged by the company, ***687** and the other by a valuation engineer engaged by the city, both 'using the same method.' An inventory made by the company's engineer was accepted as correct by the city and by the commission. The method 'was that generally employed by courts and commissions in arriving at the value of public utility properties under this method.' and in both estimates 'five year average unit prices' were applied. The estimate of the company's engineer was $540,000 and of the city's engineer, $392,000. The principal differences as given by the commission are shown in the margin. FN3 The commission disregarded both estimates and arrived at $360,000. It held that the best basis of valuation was the net investment, i. e., the total cost of the property less depreciation. It said:

FN3

		Company Engineer.	City Engineer.
1.	Preliminary costs.	$14,455	$1,000
2.	Water rights.	50,000	Nothing
3.	Cutting pavements over. mains.	27,744	233
4.	Pipe lines from gravity. springs.	22,072	15,442
5.	Laying cast iron street. mains.	19,252	15,212
6.	Reproducing Ada springs.	18,558	13,027
7.	Superintendence and. engineering.	20,515	13,621
8.	General contingent cost.	16,415	5,448
		$189,011	$63,983

'The books of the company show a total gross investment, since its organization, of $407,882, and that there has been charged off for depreciation from year to year the total sum of $83,445, leaving a net investment of

$324,427. * * * From an examination of the books * * * it appears that the records of the company have been remarkably well kept and preserved. It therefore seems that, when a plant is developed under these conditions, the net investment, which, of course, means the total gross investment less depreciation, is the very best basis of valuation for rate making purposes and that the other methods above referred to should ***688** be used only when it is impossible to arrive at the true investment. Therefore, after making due allowance for capital necessary for the conduct of the business and considering the plant as a going concern, it is the opinion of the commission that the fair value for the purpose of determining reasonable and just rates in this case of the property of the applicant company, used by it in the public service of supplying water to the city of Bluefield and its citizens, is the sum of $360,000, which sum is hereby fixed and determined by the commission to be the fair present value for the said purpose of determining the reasonable and just rates in this case.'

In its report in No. 368, the commission did not indicate the amounts respectively allowed for going value or working capital. If 10 per cent. be added for the former, and $10,000 for the latter (as fixed by the commission in the present case), there is produced $366,870, to be compared with $360,000, found by the commission in its valuation as of January 1, 1915. To this it added $92,520.53, expended since, producing $452,520.53. This may be compared with its final figure, $460,000.

The state Supreme Court of Appeals holds that the valuing of the property of a public utility corporation and prescribing rates are purely legislative acts, not subject to judicial review, except in so far as may be necessary to determine whether such rates are void on constitutional or other grounds, and that findings of fact by the commission based on evidence to support them will not be reviewed by the court. City of Bluefield v. Waterworks, 81 W. Va. 201, 204, 94 S. E. 121; Coal & Coke Co. v. Public Service Commission, 84 W. Va. 662, 678, 100 S. E. 557, 7 A. L. R. 108; Charleston v. Public Service Commission, 86 W. Va. 536, 103 S. E. 673.

In this case (89 W. Va. 736, 738, 110 S. E. 205, 206) it said:
'From the written opinion of the commission we find that it ascertained the value of the petitioner's property for rate making [then quoting the commission] 'after ***689** maturely and carefully considering the various methods presented for the ascertainment of fair value and giving such weight as seems proper to every element involved and all the facts and circumstances disclosed by the record.''

[2] [3] The record clearly shows that the commission, in arriving at its final figure, did not accord proper, if any, weight to the greatly enhanced costs of construction in 1920 over those prevailing about 1915 and before the war, as established by uncontradicted ****678** evidence; and the company's detailed estimated cost of reproduction new, less depreciation, at 1920 prices, appears to have been wholly disregarded. This was erroneous. Missouri ex rel. Southwestern Bell Telephone Co. v. Public Service Commission of Missouri, 262 U. S. 276, 43 Sup. Ct. 544, 67 L. Ed. 981, decided May 21, 1923. Plaintiff in error is entitled under the due process clause of the Fourteenth Amendment to the independent judgment of the court as to both law and facts. Ohio Valley Co. v. Ben Avon Borough, 253 U. S. 287, 289, 40 Sup. Ct. 527, 64 L. Ed. 908, and cases cited.

We quote further from the court's opinion (89 W. Va. 739, 740, 110 S. E. 206):
'In our opinion the commission was justified by the law and by the facts in finding as a basis for rate making the sum of $460,000.00. * * * In our case of Coal & Coke Ry. Co. v. Conley, 67 W. Va. 129, it is said: 'It seems to be generally held that, in the absence of peculiar and extraordinary conditions, such as a more costly plant than the public service of the community requires, or the erection of a plant at an actual, though extravagant, cost, or the purchase of one at an exorbitant or inflated price, the actual amount of money invested is to be taken as the basis, and upon this a return must be allowed equivalent to that which is ordinarily received in the locality in which the business is done, upon capital invested in similar enterprises. In addition to this, consideration must be given to the nature of the investment, a higher rate ***690** being regarded as justified by the risk incident to a hazardous investment.'
'That the original cost considered in connection with the history and growth of the utility and the value of the services rendered constitute the principal elements to be considered in connection with rate making, seems to be supported by nearly all the authorities.'

[4] The question in the case is whether the rates prescribed in the commission's order are confiscatory and therefore beyond legislative power. Rates which are not sufficient to yield a reasonable return on the value of the property used at the time it is being used to render the service are unjust, unreasonable and confiscatory, and their enforcement deprives the public utility company of its property in violation of the Fourteenth Amendment. This is so well settled by numerous decisions of this court that citation of the cases is scarcely necessary:

'What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience.' Smyth v. Ames (1898) 169 U. S. 467, 547, 18 Sup. Ct. 418, 434 (42 L. Ed. 819).
'There must be a fair return upon the reasonable value of the property at the time it is being used for the public. * * * And we concur with the court below in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property, which legally enters into the consideration of the question of rates, has increased in value since it was acquired, the company is entitled to the benefit of such increase.' Willcox v. Consolidated Gas Co. (1909) 212 U. S. 19, 41, 52, 29 Sup. Ct. 192, 200 (53 L. Ed. 382, 15 Ann. Cas. 1034, 48 L. R. A. [N. S.] 1134).
'The ascertainment of that value is not controlled by artificial rules. It is not a matter of formulas, but there must be a reasonable judgment having its basis in a proper consideration of all relevant facts.' Minnesota Rate Cases (1913) 230 U. S. 352, 434, 33 Sup. Ct. 729, 754 (57 L. Ed. 1511, 48 L. R. A. [N. S.] 1151, Ann. Cas. 1916A, 18).
***691** 'And in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property.' Smyth v. Ames, 169 U. S., 546, 547, 18 Sup. Ct. 434, 42 L. Ed. 819.
'* * * The making of a just return for the use of the property involves the recognition of its fair value if it be more than its cost. The property is held in private ownership and it is that property, and not the original cost of it, of which the owner may not be deprived without due process of law.'

Minnesota Rate Cases, 230 U. S. 454, 33 Sup. Ct. 762, 57 L. Ed. 1511, 48 L. R. A. (N. S.) 1151, Ann. Cas. 1916A, 18.

In Missouri ex rel. Southwestern Bell Telephone Co., v. Public Service Commission of Missouri, supra, applying the principles of the cases above cited and others, this court said:
'Obviously, the commission undertook to value the property without according any weight to the greatly enhanced costs of material, labor, supplies, etc., over those prevailing in 1913, 1914, and 1916. As matter of common knowledge, these increases were large. Competent witnesses estimated them as 45 to 50 per centum. * * * It is impossible to ascertain what will amount to a fair return upon properties devoted to public service, without giving consideration to the cost of labor, supplies, etc., at the time the investigation is made. An honest and intelligent forecast of probable future values, made upon a view of all the relevant circumstances, is essential. If the highly important element of present costs is wholly disregarded, such a forecast becomes impossible. Estimates for to-morrow cannot ignore prices of to-day.'

[5] ***692** It is clear that the court also failed to give proper consideration to the higher cost of construction in 1920 over that in 1915 and before the war, and failed to give weight to cost of reproduction less depreciation on the basis of 1920 prices, or to the testimony of the company's valuation engineer, based on present and past costs of construction, that the property in his opinion, was worth $900,000. The final figure, $460,000, was arrived ****679** at substantially on the basis of actual cost, less depreciation, plus 10 per cent. for going value and $10,000 for working capital. This resulted in a valuation considerably and materially less than would have been reached by a fair and just consideration of all the facts. The valuation cannot be sustained. Other objections to the valuation need not be considered.

3. Rate of return: The state commission found that the company's net annual income should be approximately $37,000, in order to enable it to earn 8 per cent. for return and depreciation upon the value of its property as fixed by it. Deducting 2 per cent. for depreciation, there remains 6 per cent. on $460,000, amounting to $27,600 for return. This was approved by the state court.

[6] The company contends that the rate of return is too low and confiscatory. What annual rate will constitute just compensation depeds upon many circumstances, and must be determined by the exercise of a fair and enlightened judgment, having regard to all relevant facts. A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding, risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in ***693** highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. A

rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions generally.

In 1909, this court, in Willcox v. Consolidated Gas Co., 212 U. S. 19, 48-50, 29 Sup. Ct. 192, 53 L. Ed. 382, 15 Ann. Cas. 1034, 48 L. R. A. (N. S.) 1134, held that the question whether a rate yields such a return as not to be confiscatory depends upon circumstances, locality and risk, and that no proper rate can be established for all cases; and that, under the circumstances of that case, 6 per cent. was a fair return on the value of the property employed in supplying gas to the city of New York, and that a rate yielding that return was not confiscatory. In that case the investment was held to be safe, returns certain and risk reduced almost to a minimum-as nearly a safe and secure investment as could be imagined in regard to any private manufacturing enterprise.

In 1912, in Cedar Rapids Gas Co. v. Cedar Rapids, 223 U. S. 655, 670, 32 Sup. Ct. 389, 56 L. Ed. 594, this court declined to reverse the state court where the value of the plant considerably exceeded its cost, and the estimated return was over 6 per cent.

In 1915, in Des Moines Gas Co. v. Des Moines, 238 U. S. 153, 172, 35 Sup. Ct. 811, 59 L. Ed. 1244, this court declined to reverse the United States District Court in refusing an injunction upon the conclusion reached that a return of 6 per cent. per annum upon the value would not be confiscatory.

In 1919, this court in Lincoln Gas Co. v. Lincoln, 250 U. S. 256, 268, 39 Sup. Ct. 454, 458 (63 L. Ed. 968), declined on the facts of that case to approve a finding that no rate yielding as much as 6 per cent. ***694** on the invested capital could be regarded as confiscatory. Speaking for the court, Mr. Justice Pitney said:
'It is a matter of common knowledge that, owing principally to the World War, the costs of labor and supplies of every kind have greatly advanced since the ordinance was adopted, and largely since this cause was last heard in the court below. And it is equally well known that annual returns upon capital and enterprise the world over have materially increased, so that what would have been a proper rate of return for capital invested in gas plants and similar public utilities a few years ago furnishes no safe criterion for the present or for the future.'

In 1921, in Brush Electric Co. v. Galveston, the United States District Court held 8 per cent. a fair rate of return. [FN4]

FN4 This case was affirmed by this court June 4, 1923, 262 U. S. 443, 43 Sup. Ct. 606, 67 L. Ed. 1076.

In January, 1923, in City of Minneapolis v. Rand, the Circuit Court of Appeals of the Eighth Circuit (285 Fed. 818, 830) sustained, as against the attack of the city on the ground that it was excessive, 7 1/2 per cent., found by a special master and approved by the District Court as a fair and reasonable return on the capital investment-the value of the property.

[7] Investors take into account the result of past operations, especially in recent years, when determining the terms upon which they will invest in such an undertaking. Low, uncertain, or irregular income makes for low prices for the securities of the utility and higher rates of interest to be demanded by investors. The fact that the company may not insist as a matter of constitutional right that past losses be made up by rates to be applied in the present and future tends to weaken credit, and the fact that the utility is protected against being compelled to serve for confiscatory rates tends to support it. In ***695** this case the record shows that the rate of return has been low through a long period up to the time of the inquiry by the commission here involved. For example, the average rate of return on the total cost of the property from 1895 to 1915, inclusive, was less than 5 per cent.; from 1911 to 1915, inclusive, about 4.4 per cent., without allowance for depreciation. In 1919 the net operating income was approximately $24,700, leaving $15,500, approximately, or 3.4 per cent. on $460,000 fixed by the commission, after deducting 2 per cent. for depreciation. In 1920, the net operating income was approximately $25,465, leaving $16,265 for return, after allowing for depreciation. Under the facts and circumstances indicated by the record, we think that a rate of return of 6 per cent. upon the value of the property is substantially too low to constitute just compensation for the use of the property employed to render the service.

The judgment of the Supreme Court of Appeals of West Virginia is reversed.

Mr. Justice BRANDEIS concurs in the judgment of reversal, for the reasons stated by him in Missouri ex rel. Southwestern Bell Telephone Co. v. Public Service Commission of Missouri, supra.
U.S. 1923
Bluefield Waterworks & Imp. Co. v. Public Service Commission of W. Va.
P.U.R. 1923D 11, 262 U.S. 679, 43 S.Ct. 675, 67 L.Ed. 1176

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BUSINESS INSIDER

BofA Now Has One Of The Most Bullish Stock Market Forecasts On Wall Street

Matthew Boesler
Jul. 15, 2013, 11:26 AM

Bloomberg TV

Savita Subramanian

In a note to clients today, BofA Merrill Lynch Head of U.S. Equity Strategy Savita Subramanian ups her year-end target for the S&P 500 to 1750 from 1600 – making hers the second-most bullish forecast on the Street, behind Cannacord's Tony Dwyer, who sees the index finishing 2013 at 1760.

Subramanian's 1750 target implies around 4.2% upside from today's levels at 1680 by the end of 2013.

(Before today, only two Wall Street equity strategists had lower S&P 500 price targets than Subramanian: Gina Martin Adams at Wells Fargo, with a target of 1440 by year-end, and Barry Knapp at Barclays, with a target of 1525.)

"Our new 2013 year-end target of 1750 implies modest upside from current levels, attributable to expected earnings growth, contrasting with returns so far this year driven by multiple expansion," says Subramanian. "While the decline in the equity risk premium (ERP) has been more than twice what we expected, we think it is justified by diminished tail risks, positive surprises in the US economy, and, as expected, a continued decline in earnings volatility."

Table 3: 2013 year-end S&P 500 fair value model

BofAML 2014 Pro Forma EPS Forecast	$115
Normalized 2014 EPS	**$107.50**
Normalized % of Proforma EPS	93%
Nominal Long-Term Risk-Free Rate	3.50%
- Assumed Long-Term Inflation	2.00%
= Normalized Real Risk-Free Rate	1.50%
+ Equity Risk Premium	**475bp**
= Fair Real Cost of Equity Capital (Ke)	6.25%
Fair Forward PE (1 ÷ Fair Ke)	**16.0x**
2013 Year-End Target (Fair PE × Normalized 2014 EPS)	**1,720**

BofA Merrill Lynch US Equity and US Quant Strategy

The biggest input into Subramanian's new S&P 500 price target forecast is the BAML Fair Value model, which assumes a forward price-to-earnings ratio unchanged from current levels at 16 and full-year S&P 500 earnings of $107.50 per share in 2014.

The assumption of a 16x price-to-earnings ratio rests heavily on Subramanian's forecast for the equity risk premium.

Below, Subramanian gives her thoughts on the ERP:

The equity rally over the last eight months has been primarily driven by multiple expansion, with the forward PE multiple on the S&P 500 expanding from 12x to 14x (18%). In our fair value model, we focus on the normalized forward PE multiple, which has also risen from 13.5x to 16.0x (18%). This multiple expansion has predominantly been a function of the significant decline in the equity risk premium (ERP), partially offset by a modest rise in real normalized interest rates.

While current real normalized rates are only modestly higher than our previous year-end assumption of 1.0% (now forecasting 1.5%), the 135bp drop in the ERP is more than double the 50bp that we had originally assumed going into the year. This rapid ERP compression reflects the reality that many of the major uncertainties overhanging the market have been removed or significantly diminished (US election, fiscal cliff, sequestration, Eurozone collapse, China hard landing).

But at 500bp, the ERP is currently still well above the sub-400bp levels preceding the financial crisis, and we think it should continue to decline over the next several years as the memory of the Financial Crisis fades, corporate profits continue to make new highs and some of the macro risks abate. We expect the "wall of worry" to persist as new concerns emerge, but visibility is clearly improving and we still expect global growth to pick up as the year progresses.

As such, we have lowered our normalized risk premium assumption in our fair value model for the end of 2013 from 600bp to 475bp, which assumes roughly another 25bp of ERP contraction by year-end. We have also raised our normalized real risk-free rate assumption for year-end from 1.0% to 1.5%. Not only have current and future inflation expectations declined since last fall, but long-term interest rates have also begun to rise recently. Meanwhile, our Rates Strategist Priya Misra also recently raised her interest rate forecasts.

The chart below shows BAML's ERP forecast.

Chart 2: Normalized equity risk premium

BofAML US Equity & Quant Strategy, Federal Reserve Board, Standard & Poor's, BLS

The Equity Premium

Paul Bostock. **Journal of Portfolio Management**. New York: Winter 2004. Vol. 30, Iss. 2; pg. 104, 8 pgs

Abstract (Summary)
Investors require additional expected returns for bearing costs and risks. The equity premium is the compensation investors require for bearing the additional costs and risks of equity investment compared with government bonds (or cash). In this framework, the equity premium is constructed by assembling the premiums paid for each source of cost and risk. The results appeal to intuition and are closer to theoretical expectations than historical equity and bond return comparisons. [PUBLICATION ABSTRACT]

Full Text (2957 words)

[Headnote]
What level should investors require?

The equity premium relates required returns for equities to returns for cash and bonds. The equity premium is the compensation investors require for bearing the additional costs and risks of equity investment.

Understanding the equity premium is largely a matter of using clear terms. Arnott in "Proceedings" [2002] suggests equity risk premium for the forward-looking expected or required returns and equity excess return for historical performance numbers. It is also useful to refer to the total equity premium, which is the compensation investors require for risk and for non-risk items such as term structure expectations, trading costs, and taxes.

There is a substantial literature on the equity premium. Kocherlakota [1996], Cornell [1999], "Proceedings of Equity Risk Premium Forum" [2002], and Ilmanen [2003] provide excellent reviews with comprehensive references.

Mehra and Prescott [1985] demonstrate theoretically that under standard finance models the equity risk premium should be very low: "The largest premium obtainable with the Model is 0.35%, which is not close to the observed value" (p. 156). Observing that equities had outperformed cash by some 6 percentage points per year over a period of almost 90 years, Mehra and Prescott realized there is a puzzle.

The risk premium is all about expectations and requirements. If assets return their expected rates, there is little dispersion among them. Actual historical returns vary enormously because historical returns also predominantly reflect surprises (departures from, or changes in, expectations.) It is therefore extremely difficult to infer a risk premium from historical returns.

The great 20th century surprise was inflation. In the 19th century, there was no inflation, while the 20th century saw an inflation explosion. Much of the 20th century equity-bond return difference is the effect of unanticipated inflation on cash and bond performance. Wilkie [1995], Arnott and Bernstein [2002], and Hunt and Hoisington [2003] discuss inflation further.

COMPARING REQUIRED RETURNS ACROSS ASSET CLASSES

We develop an intuitive framework for construction of the total equity premium, piece by piece. We do not use historical returns or valuation indicators to assess the equity risk premium, but rather assess how high it j/zowM be, using information from other asset classes whose premiums are arguably more transparent. The approach is neither rigorous nor unique.

As a starting point, equities, bonds, and cash have one important general characteristic in common: Each provides a stream of income over time. For any income-producing asset, we can calculate a fair value by discounting the future expected cash flows at an appropriate rate-one that takes into account all relevant information: credit rating of the issuer, interest rate risk (or duration), discretionary variability of dividend income, trading, and tax costs.

Taking into account the full set of characteristics that investors would use to compare assets leads to a straightforward framework of analysis, illustrated in Exhibit 1. Note that discount rates and required rates of return are the same thing; the price now is the future value discounted back, while the future value is the price now plus its appreciation at the required rate. Required return is a natural characterization of how investors compare assets.

Cash is considered the risk-free asset, and its required return R^sub 0^ is known. The required return on fowg government bonds, over the shorter time horizon, is denoted R^sub L^. This is not the same as the long yield Y^sub L^ because the yield curve reflects expectations about interest rates in later periods as well as an interest rate risk premium.

For the long rate:

R^sub L^ = R^sub 0^, + fn[Duration(Bonds)l (1)

For long corporate bonds, the required return RH differs from the government bond rate solely because of issuer risk (normally expressed as a function of credit rating) . Smithers and Wright [2000] note that issuer differences can be used to refine risk premium measurements (although they do not pursue this). Corporate bonds are included to provide a yardstick for the issuer risk premium:

R^sub B^ = R^sub 0^ + fn[Duration(Bonds)] + fn[Issuer(Bonds)] (2)

The required return for equities, R^sub E^, differs from the long corporate rate because of additional uncertainty in the payout, additional duration, and additional costs. There is no term for price volatility. In the discounted income valuation, a change in the value of equities is either a change in the expected income stream or a change in the discount rate, and the framework includes both these terms:

R^sub E^ = R^sub 0^ + fn[Duration(Equity)] + fn[Issuer(Equity)] + fn(Income Risk) + fn(Tax)+ fn(Trading Costs) (3)

Putting these pieces together, we can construct the equity premium by measuring and extrapolating the duration premium from the yield curve, providing the details for Equation (1); inferring an appropriate issuer premium from corporate bond data [Equation (2)]; calculating tax and trading costs from known rates; and measuring the effect of income volatility in cross-sectional studies of equities, for Equation (3).

ASSIGNING REQUIRED RETURNS TO ASSET CHARACTERISTICS

We use the framework in Exhibit 1 to assign required returns to the various asset characteristics.

Term Structure and Interest Rate Risk

Required returns cannot be taken directly from the yield curve, which shows return expectations over lengthening time horizons. Here we need to compare required returns for different assets over the same time horizon.

Over the longer term, the average yield curve shape should reflect expected interest rate changes split evenly between rises and falls. The yield curve shape is then a measure of the interest rate risk premium. For equities, we must include interest rate risk over and above long bonds.

The going concern equity duration is the reciprocal of the dividend yield, a result implied by the Gordon [1962] model. At a typical U.S. equity market yield of 4%, duration is 25 years. We use this figure to capture the essential property that growth of equity income over time makes equities more interest rate-sensitive than bonds. The duration figure may be model-dependent and may shorten because of buy-backs.

The data in Exhibit 2 show that ten-year bonds have had an average premium of 1.6 percentage points per year over cash. The equity interest rate risk premium is estimated by fitting the yield curve (an exponential shape fits well) and extrapolating it to the equity time horizon (Exhibit 3). The best estimate for the additional annual equity premium is about 3 to 4 percentage points, the error attributable to analysis of the time series volatility of the yield curve slope.

The high differential between long-term and short rates as of December 2002 surely reflects expectations, since the cash rate of 1.2 percentage point is very low relative to its history. To isolate expectations, it is reasonable to assume there is no further interest rate forecasting beyond five years (the yield curve may continue to slope upward as it is the mean value or integral of the forward short rate curve). The choice of five years for the limit of interest rate forecasting is not precise, so we include an error term for this.

According to the best fit, the ten-year yield is explained by term structure alone. This attribution has an indicative error of 0.3%, the interest rate risk premium on the next-higher maturity. Extrapolating to the long duration limit for the currently low equity yield (the analysis is not sensitive to the long duration number) gives an additional interest rate risk premium for equities of 0.8%. The additional equity premium has an error of 1.0%, reflecting the difficulty (and the model-dependence) of separating term structure and interest rate risk in this case.

Issuer Risk

Equities are issued by corporations, and corporations have a risk of default. The total equity premium and the equity risk premium must therefore include some compensation for issuer risk. Issuer risk is readily measurable in the bond markets. We use gross redemption yields on Lehman Corporate Aggregate bond indexes for four credit rating classes of U.S. corporate bonds (AAA, AA, A, BAA) as well as a government bond series (Exhibit 4).

Issuer risk must be aggregated over all companies in the equity market. While not all listed equities have credit-rated debt, it is possible to make reasonable estimates. Equities rank below debt, and companies can cut dividends more readily than they can suspend bond repayments. The larger companies that dominate the equity indexes in capitalization terms are typically rated A or AA. These considerations suggest an average rating of between A and BAA and, for an indicative range for errors, AA to BAA.

Transaction costs are higher for corporate bonds than governments, and an estimated liquidity premium for corporate bonds of 0.5% has been subtracted from yield spreads. Using a series from January 1973, the issuer risk premium is estimated at around 0.9% ± 0.4%. As of the end of 2002, similar analysis produces an estimated issuer premium of 1.4% ± 0.8%.

For an alternative approach that estimates premiums directly using option-based models, see Cooper and Davydenko [2003].

Income Risk

Equities have income risk that government bonds and T-bills do not have, in the sense that dividend payments are not fixed or contractual. This element of unpredictability should require an additional premium in required return. If this income volatility requires additional return, then the more volatile the income, the greater the required return.

The cross-sectional relationship between income volatility and required return may be isolated by grouping equities according to income volatility. From all S&P 500 constituents, over the period January 1960-January 2003, we select companies with a known market value and a dividend record. The five-year dividend volatility is evaluated from quarterly data for each company each year, and companies are assigned to slots of zero to 4% annual dividend volatility, over 4% to under 8%, and so on.

Average dividend yields for these volatility groups are calculated over the entire period. Here, incremental dividend yield is used as a proxy for an incremental discount rate; the steady-state discount rate is dividend yield plus long-term growth, and it is reasonable to assume over so many company-years that average expected growth would not be a function of historical dividend volatility.

Dividend yields are flat to slightly negative across these groups, implying that there is no additional premium for additional volatility (see Exhibits 5 and 6). Running the analysis as of the end of 2002 yields similar results.

This result suggests that investors in equities are not sensitive to dividend variability, and that there should be no additional premium required for the equity market over cash. Variations of the methodology indicate that the result is not explained by the variation of average market yield over the period, or by historical earnings growth, or by recent buybacks. Price volatility gives an even more negative slope. These results are supported by a similar study in the U.K.

Note that we have treated dividend variability and issuer risk separately for convenience. Part of income uncertainty is priced in issuer risk, but since equity income is discretionary and equity ranks below debt, a firm's shares carry more income risk than its corporate bonds.

Transaction Costs

Equities cost significantly more to trade than government bonds. One would expect the rational investor to price securities on the basis of after-cost returns. It is more realistic, however, to look at actual investor holding periods to calculate an appropriate liquidity premium.

Jones [2002] gives a highly informative account of U.S. equity trading volumes and costs over the 20th century. Jones's detailed analysis produces an estimated premium effect of 50 basis points per year, which we use for the long-term adjustment.

For end-2002 costs, we take a simpler approach. Consider a trading time horizon, which is the time it takes for the dollar value of trading in the market to equal the total market capitalization. The liquidity premium is the average round-trip cost taken over the trading time horizon. Using recent trading times (under a year) with current commissions and spreads produces a current U.S. equity liquidity premium of 20 ± 20 basis points.

Tax Costs

Investors should demand a higher return rate from securities that are more highly taxed, because realized net-of-tax returns are what investors actually receive. Government issues are not treated specially in the U.S. In the U.K., for example, government bonds are offered with tax advantages over equities, so in the general case a tax cost term is required.

Assembling the Risk Premium

Estimates of the total equity premium and the equity risk premium are summarized in detail in Exhibit 7. On average, equities should have offered a total premium over government bonds of 1.7% ± 0.6% and a risk premium of 1.2% ± 0.6%.

These results appeal to intuition and are consistent with an increasingly accepted view that the true risk premium is considerably lower than the historical return differential (see, for example, a thorough review in Ilmanen [2003]). We have already shown why historical returns give unreliable results.

The December 2002 total premium is 2.6% ± 1.3% over bonds, reflecting mainly additional issuer risk. The result is very interesting. It means a higher return is required if equities are to be fairly valued against bonds. This premium taken over current long government bond rates of 4.8% gives a total required return over the ten years of 7.4%.

The required long-term growth (with a yield of 1.8% and using the Gordon model again) is 5.6%. In current conditions (a bear market, an economy facing difficulties, and very low inflation), this outcome seems implausible. The analysis quite strongly suggests that the U.S. equity market remained overvalued at the end of 2002.

ESTIMATING THE MEHRA AND PRESCOTT THEORETICAL PREMIUM

Mehra and Prescott's [1985] theory shows how a premium is required for assets that offer uncertain delivery of marginal utility. In terms of securities, this relates both to the volatility of returns and to the timing (in simple terms, the same payment is more valuable in bad times than in good). Measurements or estimates of this premium require us to identify and price only the corresponding characteristics.

An important question arises as to whether issuer risk is part of the theoretical risk premium. Over the very short term (the time horizon for the theoretical risk premium), we would not expect default to be a significant risk other than for already distressed, very low-grade issuers. Equity default is certainly rare (or, at least, it has been). If the Mehra and Prescott theoretical result is strictly a short-term only result, issuer risk should not be included in the premium estimate, which would then be low.

FURTHER WORK

It would be most interesting to explore a framework with a long time horizon and to include the impact of inflation. High and unexpected 20th century inflation explains much of the low real return to cash and bonds. In a real and long-term framework, cash and bonds would be seen as more risky and equities less so, so a smaller risk premium would very probably result.

The analysis here also raises interesting questions of how each premium component should be priced, in theory. In other words, is there a theoretically correct interest rate risk premium, a correct issuer premium, and so on? Mehra [2003] looks at pricing influences including costs and taxes, making modifications to the theory rather than to the measurements.

Refining both the theory and the measurement for each risk premium component will be an interesting task. In other words, our work raises as many new issues as it solves, and it will continue to be interesting to see the subject evolve.

SUMMARY

We have described a procedure for constructing the equity premium by assembling premiums paid for each source of cost and risk. According to historical average data, equities should offer a total premium over government bonds of 1.7% ± 0.6% and a risk premium of 1.2% ± 0.6%.

Investors do not all have the same time horizon and the same inflation risks. For long-term real investors, equities are the natural home, and it does seem that equity buyers accept short-term volatility as part of the package. These results appeal to intuition and are closer to theoretical expectations than historical equity and bond return comparisons.

ENDNOTE

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[Reference]

REFERENCES
Arnott, R.D., and P.L. Bernstein. "What Risk Premium is 'Normal'?" Financial Analysts Journal, March/April 2002.
Cooper, I.A., and S.A. Davydenko. "Using Yield Spreads to Estimate Expected Returns on Debt and Equity." Working paper, London Business School, presented to Joint Inquire UK/ Inquire Europe Conference, March 2003.
Cornell, B. The Equity Risk Premium. New York: Wiley, 1999.
Gordon, MJ. The Investment, Financing and Valuation of the Corporation. Homcwood, IL: Irwin, 1962.
Hunt, L., and D. Hoisington. "Estimating the Stock/Bond Risk Premium." The Journal of Portfolio Management, Winter 2003, pp. 28-34.
Ilmanen, A. "Expected Returns on Stocks and Bonds." The Journal of Portfolio Management, Winter 2003, pp. 7-27.
Jones, C.M. "A Century of Stock Market Liquidity and Trading Costs." Working paper, Columbia University, 2002.
Kocherlakota, N.R. "The Equity Premium: It's Still a Puzzle." Journal of Economic Literature, March 1996, pp. 42-71.
Mehra, R. "The Equity Premium-Why Is It a Puzzle?" Financial Analysts Journal, fenuary/February 2003, pp. 54-69.
Mehra, R., and R.C. Prescott. "The Equity Premium: A Puzzle." Journal of Monetary Economics, 15 (1985), pp. 145-161.
"Proceedings of Equity Risk Premium Forum." AIMR and TIAA-CREF, 2002.
Wilkie, A.D. "The Risk Premium on Ordinary Shares." British Actuarial Journal, Vol. 1 (1995), p. 251.

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A re-examination of analysts' superiority over time-series forecasts

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CARE Conference
April 10, 2010

Summary of slides from the Inaugural CARE Conference

- #1 “Analysts’ forecasts are optimistic”
- #2 “Analysts are better than time-series models”
- #3 We think we know how analysts forecast
- #4 “Analysts’ forecasts are inefficient”
- #5 Limited evidence on what analysts do with forecasts
- #6 Most research ignores analysts’ multi-tasking
- *#7 Analyst data are helpful for capital markets literature*
- #8 “Analysts are dominated by conflicts of interest”
- #9 We may be focusing on their least important activities
- #10 Researchers eschew alternative methodologies

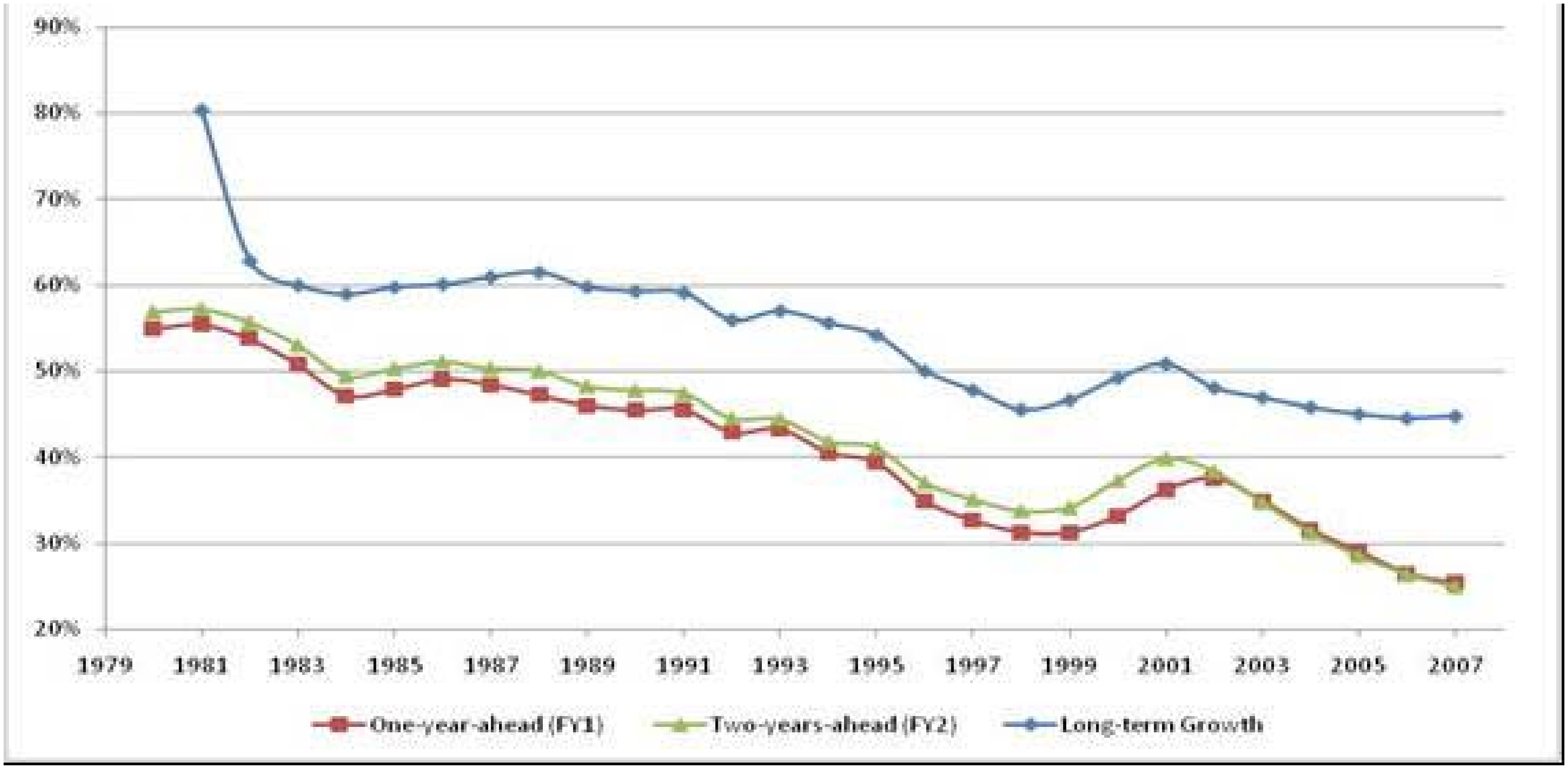
Summary motivation

- Analysts >> Time-series models is widely accepted

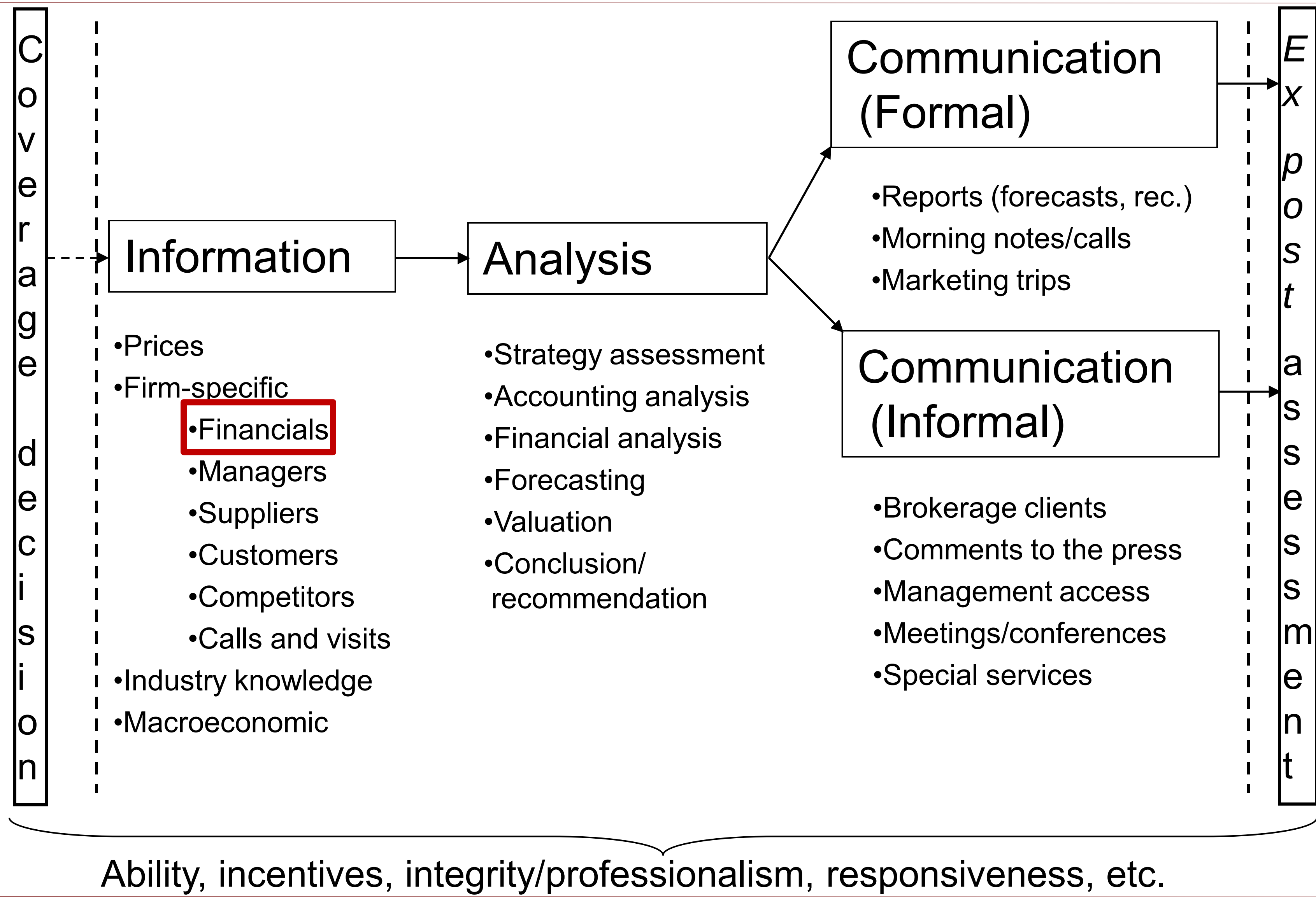
- However, research supporting this view is characterized by:
  - **<u>Tiny samples</u>** relative to current research standards (in capital mkts.)
    - e.g., 50 to a few hundred firms
  - Data demands $\Rightarrow$ **<u>bias towards large, mature firms</u>**
    - e.g., some studies restrict sample to NYSE, or numerous analysts
    - Analyst following correlated with institutional investment
    - e.g., AF and II interact with firms $\Rightarrow$ richer information environment (more severe in earlier years)
  - **<u>Economic significance</u>** of differences seems small
    - Collins & Hopwood (1980): 31.7% vs. 32.9%
    - Fried & Givoly (1982): 16 vs. 19%

- Current-day incorporation of analysts' forecasts into research studies
  - Goes beyond **<u>generalizability</u>** of earlier studies
    - e.g., smaller firms underrepresented in early research,
      longer forecast horizons underrepresented
    - ala Bamber, Christensen & Gaver (AOS2000)

Figure 1: Percentage of firms on Compustat/CRSP ***without*** analyst coverage



Analysts


Coverage decision
Information
Analysis
Communication (Formal)
Communication (Informal)
Ex post assessment
•Prices
•Firm-specific
•Financials
•Managers
•Suppliers
•Customers
•Competitors
•Calls and visits
•Industry knowledge
•Macroeconomic
•Strategy assessment
•Accounting analysis
•Financial analysis
•Forecasting
•Valuation
•Conclusion/ recommendation
•Reports (forecasts, rec.)
•Morning notes/calls
•Marketing trips
•Brokerage clients
•Comments to the press
•Management access
•Meetings/conferences
•Special services
Ability, incentives, integrity/professionalism, responsiveness, etc.

Research question

- Do analysts' forecasts *really* dominate time-series forecasts?
  - When and when not?
    - Covariate 1: Forecast horizon (timing advantage)
    - Covariate 2: Firm age (information advantage)
    - Covariate 3: Firm size “ ”
    - Covariate 4: Analyst following “ ”
    - Covariate 5: Magnitude of changes (when analysts stand to add most value)

- Implicit Null: We should see NO significant results

- Conditional on differences in forecast accuracy (in favor of time-series models), do market returns reinforce the primary results?

Observation: Other Evidence re: Experts vs. Time-Series

- Interest rates (Belongia 1987)
- GDP (Loungani 2000)
- Recessions (Fintzen and Stekler 1999)
- Turning points of business cycles (Zarnowitz 1991)
- …

Landscape – 1970s

- Much capital markets research was aimed at understanding the time-series properties of earnings.
    - Ball and Watts 1972, Brooks and Buckmaster 1976, Albrecht et al. 1977, Salamon and Smith 1977, and Watts and Leftwich 1977.

- General Conclusion: <u>Earnings approximate a random walk</u>. Sophisticated time-series models rarely provide an economically significant improvement, and even when they do it comes at high cost.

- *"The ability of random walk models to "outpredict" the identified Box-Jenkins models suggests that the random walk is still a good description of the process generating annual earnings in general, and for individual firms."* Watts and Leftwich (1977, 269)

- Brown (1993, 295) declares the issue of whether annual earnings follow a random walk as "*pretty much resolved by the late 1970s.*"

Landscape – 1980s

- Newly available analyst data becomes available
  (i.e., Value-Line, I/B/E/S).

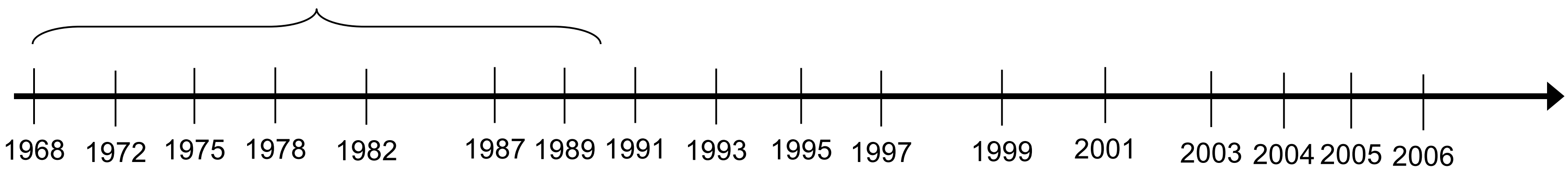
- "Horse-race studies" comparing time-series and analyst forecasts.

- Brown and Rozeff 1978, Fried and Givoly 1982, and Brown et al. 1987a,b

- General Conclusion: Analyst forecasts generally dominate time-series forecasts of earnings. Analyst superiority is attributed to:
  - **Information Advantage**
    - They know all information in TS and more
  - **Timing Advantage**
    - They issue forecasts after the end of the lagged TS

Timeline of Analysts vs. Time-Series Research

Price association



Cragg & Malkiel JF1968
Elton & Gruber MS1972
Barefield & Comiskey JBR1975
Brown & Rozeff JF1978
Fried & Givoly JAE1982

O'Brien JAE1988
O'Brien JAR1990
Stickel JAR1990
Brown IJF1991

Philbrick & Ricks
JAR1991

Brown, Griffin, Hagerman,
& Zmijewski JAE1987

Sinha, Brown & Das CAR1997
Mikhail, Walther, & Willis JAR1997
Clement JAE1999

Analysts vs. time-series models

Refinements/extensions

Landscape – Today

- Researchers generally regard this literature as having conclusively shown that analysts' forecasts are a superior proxy for earnings expectations.

- Kothari (JAE2001) concludes that
  - The time-series properties of earnings literature is fast becoming extinct because of "the easy availability of a better substitute" which is "available at a low cost in machine-readable form for a large fraction of publicly traded firms." (p. 145)
  - "[C]onflicting evidence notwithstanding, in recent years it is common practice to (implicitly) assume that analysts' forecasts are a better surrogate for market's expectations than time-series forecasts." (p. 153)

Landscape – Today (cont.)

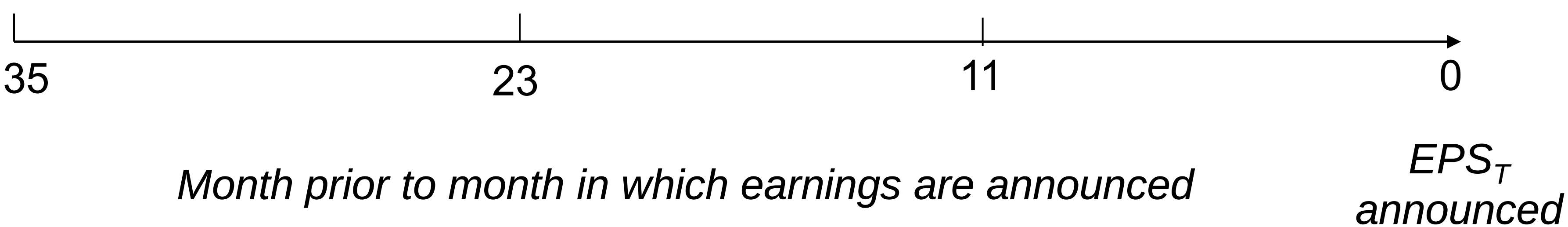
- Random Walk
  - Still descriptive (Lorek, Willinger & Bathke RQFA2008)

- Valuation and cost of capital literature:
  - Researchers use analyst forecasts over some short horizon and then extrapolate to value a perpetuity.
  - Example: Dhaliwal et al. (JAE 2007), Frankel & Lee (JAE1998), etc.
    - One-year-ahead: FY1 (I/B/E/S Consensus forecast)
    - Two-years-ahead: FY2
    - Three-years-ahead: FY3 = FY2 x (1+LTG)
    - Four-years-ahead: FY4 = FY3 x (1+LTG)
    - Five-years-ahead: FY5 = FY4 x (1+LTG)
  - Exceptions: Allee (2009); Hou, Van Dijk and Zhang (2010)

Data

- 1983-2007 (25 years)
- Minimal constraints on data
  - Biggest constraint is presence on *I/B/E/S*
    - EPS forecast, actual EPS, stock price
  - Sales on *Compustat* in year t-1
  - Earnings in year t-1 > 0
    - Hayn (1995): losses less persistent than profits
      $\Rightarrow$ bias results in favor of random walk (but not really)
  - *CRSP* returns for last analysis

- Consensus forecasts in months 0 to -35



Forecast errors

- Random Walk
  - Minimizes data demands
  - Performs as well or better than higher order models (consistent w/ Lorek, WIllinger & Bathke RQFA2008)
  - *We aim to do nothing to "help" RW forecasts**

- Forecast of EPS for year T as of t months prior to the month EPS_T announced
  - Analysts: $|(FEPS_{T,t} – EPS_T)| / Price_t$
  - Time-series: $|(EPS_{T-1} – EPS_T)| / Price_t$

	#Forecasts	#Firm-years	#Firms
FY1:	740,070	69,483	10,140
FY2:	611,132	60,170	9,037
FY3:	468,777	46,226	7,070

- Analyst superiority = RWFE – AFE
  - $>0 \Rightarrow$ analysts more accurate than random walk
  - $<0 \Rightarrow$ random walk more accurate than analysts

Table 2 Descriptive Statistics

	Mean	Q1	Median	Q3
Sales	>374	110	374	1,384
BTM	0.58	0.31	0.50	0.75
Age	8.2	4	7	12
# Analysts	7.6	2	5	10

* A hypothetical data requirement of 10 years (as in Fried and Givoly 1982) would eliminate 70% of the observations in our sample).

Scaling and winsorizing

$$Error = \left| \frac{(\text{Actual} - \text{Predicted})}{|\,\text{Actual}\,|} \right|$$

% > 1.00

Months Prior to RDQE	**Analysts Forecasts Errors**	**Random Walk Errors**
1 Month (Mature Firms)	2.90%	10.50%
1 Month	5.20%	14.20%
11 Months	16.50%	14.60%
23 Months	22.60%	19.70%
35 Months	29.50%	26.20%

**The 1.00 cut-off was reasonable in earlier studies. Fried and Givoly (1982) report that only 0.5% of their observations have scaled forecast errors that are greater than 1.00.

Table 2 Descriptive Statistics (i.e., Forecast– Actual)

Panel C: Signed Forecast Errors

	Mean	**Median**	**Q1**	**Q3**
Signed Random Walk Errors				
11 Months	0.0086	-0.0055	-0.0153	0.0108
23 Months	0.0033	-0.0091	-0.0260	0.0150
35 Months	-0.0038	-0.0124	-0.0363	0.0166
Signed Analysts' Forecasts Errors				
11 Months	0.0194	0.0028	-0.0041	0.0209
23 Months	0.0272	0.0090	-0.0049	0.0391
35 Months	0.0332	0.0162	-0.0047	0.0541

Table 3 – Main Results
Analysts' forecast superiority, Full sample

FY1			FY2			FY3		
Months Prior	Firm-years	Analyst Superiority	Months Prior	Firm-years	Analyst Superiority	Months Prior	Firm-years	Analyst Superiority
0	32,723	0.0245	12	29,072	0.0120	24	21,944	0.0072
1	66,224	0.0236	13	55,447	0.0106	25	41,766	0.0055
2	66,104	0.0227	14	56,659	0.0095	26	42,827	0.0044
3	65,794	0.0212	15	56,575	0.0081	27	42,941	0.0033
4	65,458	0.0182	16	56,023	0.0063	28	42,588	0.0019
5	65,158	0.0155	17	55,360	0.0049	29	42,272	0.0007
6	64,787	0.0131	18	54,458	0.0037	30	41,753	(0.0000) NS
7	64,361	0.0102	19	53,195	0.0022	31	40,952	(0.0012)
8	63,869	0.0081	20	51,832	0.0012	32	40,137	(0.0020)
9	63,200	0.0064	21	49,745	0.0004	33	38,925	(0.0027)
10	62,103	0.0041	22	46,501	(0.0006)	34	36,836	(0.0035)
11	60,289	0.0025	23	42,124	(0.0011)	35	33,789	(0.0040)

Analyst are more accurate than RW by 25 basis-pts

RW is more accurate than Analysts by 40 basis-pts

Table 4 – Analysts' forecast superiority and firm age

Panel A: FY1 – 11 months prior to RDQE

Firm Age	Firm-years	Analysts'Superiority	RW Forecast Error	Analysts' Forecast Error
1	2,534	0.0007	0.0534	0.0527
2	6,321	0.0015	0.0405	0.0391
3	5,867	0.0005	0.0382	0.0378
4	5,109	0.0005	0.0379	0.0374
5+	40,335	0.0033	0.0301	0.0268

Panel B: FY2 – 23 months prior to RDQE

Firm Age	Firm Years	Analysts' Superiority	RW Forecast Error	Analysts' Forecast Error
1	1,413	(0.0102)	0.0628	0.0730
2	3,969	(0.0072)	0.0528	0.0599
3	3,810	(0.0048)	0.0511	0.0559
4	3,404	(0.0028)	0.0472	0.0500
5+	29,447	0.0008	0.0396	0.0388

Panel C: FY3 – 35 months prior to RDQE

Firm Age	Firm Years	Analysts' Superiority	RW Forecast Error	Analysts' Forecast Error
1	1,119	(0.0186)	0.0735	0.0871
2	2,954	(0.0147)	0.0647	0.0785
3	3,011	(0.0084)	0.0604	0.0670
4	2,794	(0.0060)	0.0584	0.0618
5+	23,868	(0.0012)	0.0498	0.0488

Table 5: Partitions for size and analyst following

Panel A: Small Firms

FY1			FY2				FY3		
Months Prior	**Firm-years**	**Analysts' Superiority**	**Months Prior**	**Firm-years**	**Analysts' Superiority**		**Months Prior**	**Firm-years**	**Analysts' Superiority**
0	6,897	0.0256	12	5,786	0.0085		24	3,067	0.0007
1	13,845	0.0252	13	10,871	0.0074		25	6,006	(0.0023)
2	13,737	0.0242	14	11,087	0.0060		26	6,192	(0.0040)
3	13,535	0.0225	15	10,885	0.0045		27	6,114	(0.0054)
4	13,396	0.0191	16	10,574	0.0020		28	5,968	(0.0074)
5	13,175	0.0162	17	10,204	0.0004	NS	29	5,836	(0.0086)
6	13,009	0.0132	18	9,799	(0.0012)		30	5,626	(0.0096)
7	12,815	0.0098	19	9,299	(0.0026)		31	5,366	(0.0106)
8	12,607	0.0071	20	8,759	(0.0040)		32	5,055	(0.0119)
9	12,341	0.0052	21	8,023	(0.0055)		33	4,707	(0.0131)
10	11,906	0.0023	22	6,987	(0.0066)		34	4,152	(0.0151)
11	11,314	(0.0003)	23	5,804	(0.0078)		35	3,521	(0.0167)

Table 5: Partitions for size and analyst following

Panel B: Low Analyst Following

FY1				FY2				FY3			
Months Prior	**Firm-years**	**Analysts' Superiority**		**Months Prior**	**Firm-years**	**Analysts' Superiority**		**Months Prior**	**Firm-years**	**Analysts' Superiority**	
0	9,089	0.0314		12	8,001	0.0110		24	8,634	0.0063	
1	18,744	0.0311		13	14,945	0.0102		25	16,197	0.0036	
2	18,704	0.0289		14	15,648	0.0085		26	16,784	0.0022	
3	18,557	0.0267		15	15,890	0.0066		27	16,848	0.0005	NS
4	18,422	0.0224		16	16,055	0.0043		28	16,672	(0.0014)	
5	18,265	0.0185		17	16,138	0.0027		29	16,489	(0.0030)	
6	18,104	0.0151		18	16,319	0.0008	NS	30	16,180	(0.0035)	
7	18,062	0.0109		19	16,646	(0.0009)		31	15,556	(0.0051)	
8	17,880	0.0080		20	16,901	(0.0022)		32	14,941	(0.0063)	
9	17,636	0.0058		21	17,310	(0.0032)		33	13,992	(0.0074)	
10	17,113	0.0026		22	17,924	(0.0041)		34	12,501	(0.0087)	
11	16,264	0.0000	NS	23	18,185	(0.0045)		35	10,544	(0.0099)	

Table 6: Partitions by magnitude of change in EPS

Panel A: The 33% of Forecasts with the Least Extreme Forecasted Change in EPS

FY1			FY2			FY3		
Months Prior	**Firm-years**	**Analysts' Superiority**	**Months Prior**	**Firm-years**	**Analysts' Superiority**	**Months Prior**	**Firm-years**	**Analysts' Superiority**
0	10,915	0.0025	12	9,679	0.0174	24	7,305	0.0140
1	22,093	0.0026	13	18,472	0.0156	25	13,910	0.0124
2	22,053	0.0025	14	18,881	0.0143	26	14,268	0.0115
3	21,954	0.0023	15	18,845	0.0125	27	14,300	0.0106
4	21,842	0.0020	16	18,654	0.0106	28	14,185	0.0097
5	21,743	0.0018	17	18,439	0.0087	29	14,075	0.0085
6	21,620	0.0016	18	18,139	0.0074	30	13,907	0.0078
7	21,481	0.0014	19	17,721	0.0058	31	13,645	0.0071
8	21,324	0.0013	20	17,260	0.0051	32	13,382	0.0065
9	21,110	0.0012	21	16,561	0.0041	33	12,968	0.0061
10	20,731	0.0012	22	15,488	0.0034	34	12,277	0.0057
11	20,117	0.0012	23	14,023	0.0029	35	11,263	0.0053

Table 6: Partitions by magnitude of change in EPS

Panel B: The 33% of Forecasts with the Most Extreme Forecasted Change in EPS

FY1			FY2			FY3		
Months Prior	**Firm-years**	**Analysts' Superiority**	**Months Prior**	**Firm-years**	**Analysts' Superiority**	**Months Prior**	**Firm-years**	**Analysts' Superiority**
0	20,131	0.0025	12	9,695	0.0090	24	7,319	0.0018
1	10,881	0.0616	13	18,483	0.0077	25	13,924	0.0005 NS
2	22,029	0.0591	14	18,885	0.0067	26	14,272	(0.0007) NS
3	21,988	0.0566	15	18,865	0.0057	27	14,316	(0.0021)
4	21,881	0.0530	16	18,684	0.0042	28	14,196	(0.0037)
5	21,761	0.0453	17	18,463	0.0028	29	14,088	(0.0049)
6	21,657	0.0381	18	18,157	0.0014	30	13,908	(0.0058)
7	21,530	0.0320	19	17,728	0.0000 NS	31	13,639	(0.0076)
8	21,385	0.0244	20	17,276	(0.0012)	32	13,360	(0.0087)
9	21,217	0.0190	21	16,584	(0.0025)	33	12,964	(0.0095)
10	20,993	0.0143	22	15,498	(0.0035)	34	12,267	(0.0109)
11	20,635	0.0083	23	14,042	(0.0040)	35	11,256	(0.0115)

Market expectation tests

- We estimate:

$$\text{Return} = \alpha + \beta\ \text{RWFE} + \epsilon_{\text{it}}$$

$$\text{Return} = \text{a} + \text{b}\ \text{AFE} + \text{e}_{\text{it}}$$

where the return accumulation period is equaled to forecast horizon.

- Market Expectation Proxy Ratio = β / b

Table 7: Associations with market returns

$$Return_{T,M} = \alpha + \beta\,(EPS_{T-1} - EPS_T) + \varepsilon_T$$

$$Return_{T,M} = \alpha + b\,\left(Forecasted\ EPS_{T,M} - EPS_T\right) + e_T$$

FY1			FY2				FY3			
Months Prior	Firm-years	β/b	Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b	
0	30,411	0.345	12	28,003	0.602		24	21,097	0.784	
1	62,355	0.395	13	53,654	0.678		25	40,377	0.831	
2	63,455	0.342	14	54,664	0.707		26	41,336	0.843	
3	63,419	0.396	15	54,473	0.742		27	41,369	0.874	
4	63,101	0.540	16	53,882	0.798		28	40,992	0.908	
5	62,790	0.632	17	53,196	0.833		29	40,674	0.928	
6	62,441	0.685	18	52,319	0.888		30	40,151	0.962	
7	62,016	0.735	19	51,113	0.912		31	39,409	1.001	
8	61,540	0.795	20	49,789	0.953		32	38,624	1.017	NS
9	60,915	0.838	21	47,783	1.007	NS	33	37,455	1.057	NS
10	59,936	0.905	22	44,672	1.008	NS	34	35,435	1.081	
11	58,261	0.939	23	40,500	1.032		35	32,530	1.099	

The association between returns and RW is 94% of the association between returns and analyst forecast errors.

Table 8: Market returns, by size & analyst following

$$Return_{T,M} = \alpha + \beta\,(EPS_{T-1} - EPS_T) + \varepsilon_T$$

$$Return_{T,M} = \alpha + b\left(Forecasted\ EPS_{T,M} - EPS_T\right) + e_T$$

Panel A: Small Firms

FY1				FY2				FY3			
Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b	
0	6,558	0.1813		12	7,275	0.6957		24	3,396	0.9083	
1	13,382	0.3422		13	13,711	0.7238		25	6,575	0.8822	
2	13,474	0.4286		14	14,068	0.7550		26	6,814	0.9084	
3	13,364	0.4433		15	13,887	0.7793		27	6,757	0.9330	
4	13,227	0.5309		16	13,468	0.8111		28	6,552	0.9392	NS
5	13,001	0.6186		17	12,974	0.8496		29	6,422	0.9495	NS
6	12,838	0.6610		18	12,424	0.9076		30	6,173	0.9550	NS
7	12,643	0.7170		19	11,713	0.8973		31	5,844	0.9762	NS
8	12,431	0.8323		20	10,906	0.9676	NS	32	5,491	1.0016	NS
9	12,176	0.8551		21	9,808	1.0151	NS	33	5,028	1.0965	
10	11,750	0.9273	NS	22	8,168	1.0043	NS	34	4,258	1.1229	
11	11,167	0.9431	NS	23	6,392	1.0277	NS	35	3,431	1.1230	

Table 8: Market returns, by size & analyst following

Panel B: Low analyst following

FY1				FY2				FY3			
Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b	
0	8,522	0.4728		12	5,691	0.6681		24	3,010	0.9507	NS
1	17,567	0.5084		13	10,710	0.6871		25	5,901	0.9674	NS
2	17,746	0.4986		14	10,912	0.7337		26	6,077	0.9682	NS
3	17,688	0.5739		15	10,706	0.7421		27	5,993	0.9786	NS
4	17,582	0.6328		16	10,395	0.8069		28	5,842	1.0100	NS
5	17,437	0.7040		17	10,026	0.8506		29	5,706	1.0230	NS
6	17,289	0.7165		18	9,631	0.9414	NS	30	5,502	1.0464	NS
7	17,220	0.7617		19	9,140	0.9273	NS	31	5,247	1.0736	NS
8	17,039	0.8377		20	8,606	0.9721	NS	32	4,941	1.0892	NS
9	16,825	0.9025		21	7,878	1.0209	NS	33	4,596	1.1288	
10	16,383	0.9530	NS	22	6,849	1.0100	NS	34	4,045	1.2025	
11	15,615	0.9823	NS	23	5,687	1.0570	NS	35	3,426	1.1849	

Table 9: Market returns, by magnitude of change in EPS

$$Return_{T,M} = \alpha + \beta\,(EPS_{T-1} - EPS_T) + \varepsilon_T$$

$$Return_{T,M} = \alpha + b\,\left(Forecasted\ EPS_{T,M} - EPS_T\right) + e_T$$

Panel A: The 33% of Forecasts with the Least Extreme Forecasted Change in EPS

FY1				FY2				FY3			
Months Prior	Firm-Years	β/b		Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b	
0	9,023	0.9388	NS	12	7,763	0.6330		24	5,840	0.7597	
1	18,254	0.9280	NS	13	14,935	0.7053		25	11,227	0.7974	
2	18,188	0.9300	NS	14	15,145	0.7316		26	11,462	0.8336	
3	18,083	0.9620	NS	15	15,057	0.7808		27	11,466	0.8514	
4	18,018	0.9882	NS	16	14,865	0.8222		28	11,356	0.8433	
5	17,921	0.9764	NS	17	14,697	0.8603		29	11,264	0.8631	
6	17,807	0.9807	NS	18	14,479	0.8661		30	11,101	0.9067	
7	17,710	0.9866	NS	19	14,147	0.9241		31	10,891	0.9716	NS
8	17,566	0.9767	NS	20	13,783	0.9412		32	10,696	0.9870	NS
9	17,398	0.9794	NS	21	13,218	0.9643	NS	33	10,337	1.0165	NS
10	17,143	0.9772	NS	22	12,365	0.9747	NS	34	9,777	1.0334	NS
11	16,646	0.9791	NS	23	11,269	0.9930	NS	35	9,034	1.0473	NS

Panel B: The 33% of Forecasts with the Most Extreme Forecasted Change in EPS

FY1				FY2				FY3			
Months Prior	Firm-Years	β/b		Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b	
0	8,795	0.2981		12	7,575	0.5937		24	5,566	0.8875	
1	17,647	0.3710		13	14,701	0.6814		25	10,831	0.8781	
2	17,619	0.3270		14	14,892	0.7739		26	10,975	0.8875	
3	17,498	0.3560		15	14,823	0.7831		27	10,950	0.9032	
4	17,319	0.5213		16	14,617	0.7384		28	10,811	0.9513	NS
5	17,210	0.6093		17	14,426	0.8124		29	10,741	0.9741	NS
6	17,103	0.6808		18	14,171	0.9003		30	10,587	0.9953	NS
7	16,903	0.7110		19	13,800	0.9175		31	10,376	1.0477	
8	16,709	0.7550		20	13,433	1.0186		32	10,130	1.0967	
9	16,438	0.7822		21	12,856	1.0476		33	9,823	1.0626	
10	16,084	0.8471		22	11,983	1.0304		34	9,269	1.1096	
11	15,650	0.8717		23	10,852	1.0735		35	8,493	1.1257	

Table 10: Panel multivariate regression

$$Analysts'Superiority_{T,M} = \gamma_0 + \gamma_1\ \#Analysts_T + \gamma_2\ STD_{T,M} + \gamma_3\ BTM_{T-1} + \gamma_4\ Sales_{\ T-1} + \gamma_5\ Forecast\Delta_{T,M} + \varepsilon_T$$

Months Prior RDQE	Intercept	#Analysts	STD	BTM	Sales	Forecasted Δ
0	-0.0083	-0.0021	0.0055	0.0035	0.0015 [NS]	0.0279
1	-0.0072	-0.0022	0.0052	0.0028	0.0017	0.0262
2	-0.0079	-0.0013	0.0043	0.0030	0.0017	0.0253
3	-0.0079	-0.0013	0.0047	0.0029	0.0012	0.0238
4	-0.0071	-0.0005	0.0039	0.0024	0.0005 [NS]	0.0206
5	-0.0055	0.0003 [NS]	0.0027	0.0025	-0.0002 [NS]	0.0175
6	-0.0054	0.0006	0.0025	0.0022	0.0001 [NS]	0.0148
7	-0.0050	0.0011	0.0015	0.0019	0.0004 [NS]	0.0115
8	-0.0047	0.0015	0.0009	0.0017	0.0007 [NS]	0.0092
9	-0.0041	0.0016	0.0004	0.0015	0.0010	0.0069
10	-0.0026	0.0015	-0.0003	0.0010	0.0012	0.0043
11	-0.0017	0.0018	-0.0011	0.0008	0.0012	0.0025
12	0.0076	-0.0002 [NS]	0.0050	0.0045	0.0058	-0.0064
13	0.0070	0.0003 [NS]	0.0031	0.0041	0.0055	-0.0057
14	0.0056	0.0008	0.0031	0.0042	0.0053	-0.0057
15	0.0046	0.0011	0.0020	0.0042	0.0049	-0.0050
16	0.0028	0.0017	0.0010	0.0037	0.0052	-0.0048
17	0.0012	0.0022	0.0000 [NS]	0.0036	0.0054	-0.0043
18	0.0005 [NS]	0.0028	-0.0007	0.0036	0.0048	-0.0043
19	-0.0015	0.0031	-0.0014	0.0033	0.0049	-0.0037
20	-0.0023	0.0037	-0.0019	0.0030	0.0048	-0.0035
21	-0.0029	0.0038	-0.0023	0.0026	0.0054	-0.0036
22	-0.0036	0.0038	-0.0028	0.0024	0.0057	-0.0035
23	-0.0079	0.0057	-0.0027	0.0019	0.0062	-0.0035
24	0.0048	0.0009	-0.0005 [NS]	0.0051	0.0094	-0.0074
25	0.0026	0.0023	-0.0016	0.0059	0.0090	-0.0074
26	0.0026	0.0025	-0.0023	0.0056	0.0093	-0.0078
27	0.0019	0.0029	-0.0026	0.0053	0.0094	-0.0083
28	0.0007 [NS]	0.0035	-0.0028	0.0052	0.0096	-0.0089
29	-0.0007 [NS]	0.0039	-0.0028	0.0047	0.0096	-0.0090
30	-0.0020	0.0042	-0.0033	0.0046	0.0106	-0.0093
31	-0.0027	0.0046	-0.0035	0.0042	0.0104	-0.0097
32	-0.0036	0.0049	-0.0038	0.0038	0.0108	-0.0099
33	-0.0040	0.0051	-0.0040	0.0035	0.0111	-0.0103
34	-0.0060	0.0054	-0.0044	0.0030	0.0133	-0.0108
35	-0.0062	0.0058	-0.0048	0.0019	0.0127	-0.0108

Conclusion

- DISCLAIMER: Prior research was appropriately deliberate in its sample selection and other research design choices, and the conclusions drawn are warranted.
    - However, as is common in our field, it is the subsequent researcher who over-generalizes findings from prior studies.

- **Analysts** only appear persistently superior to a simple earnings extrapolation for **short horizons for large firms**.
- Equivalently, **time-series** forecasts perform as well or better than analysts over **moderate-to-long forecast horizons, and especially for smaller, younger firms**.

TYPICAL STUDY:
1. Data from 1960 and 1970.
2. Sample size ranges from fifty to a few hundred.
3. Models require a minimum of 10 years of data, and some require as many as 20 years of data.
4. Forecast horizons range from 1 quarter-ahead to 18 months-ahead.
5. Reported differences are typically statistically significant in favor of analysts, only modest magnitudes .

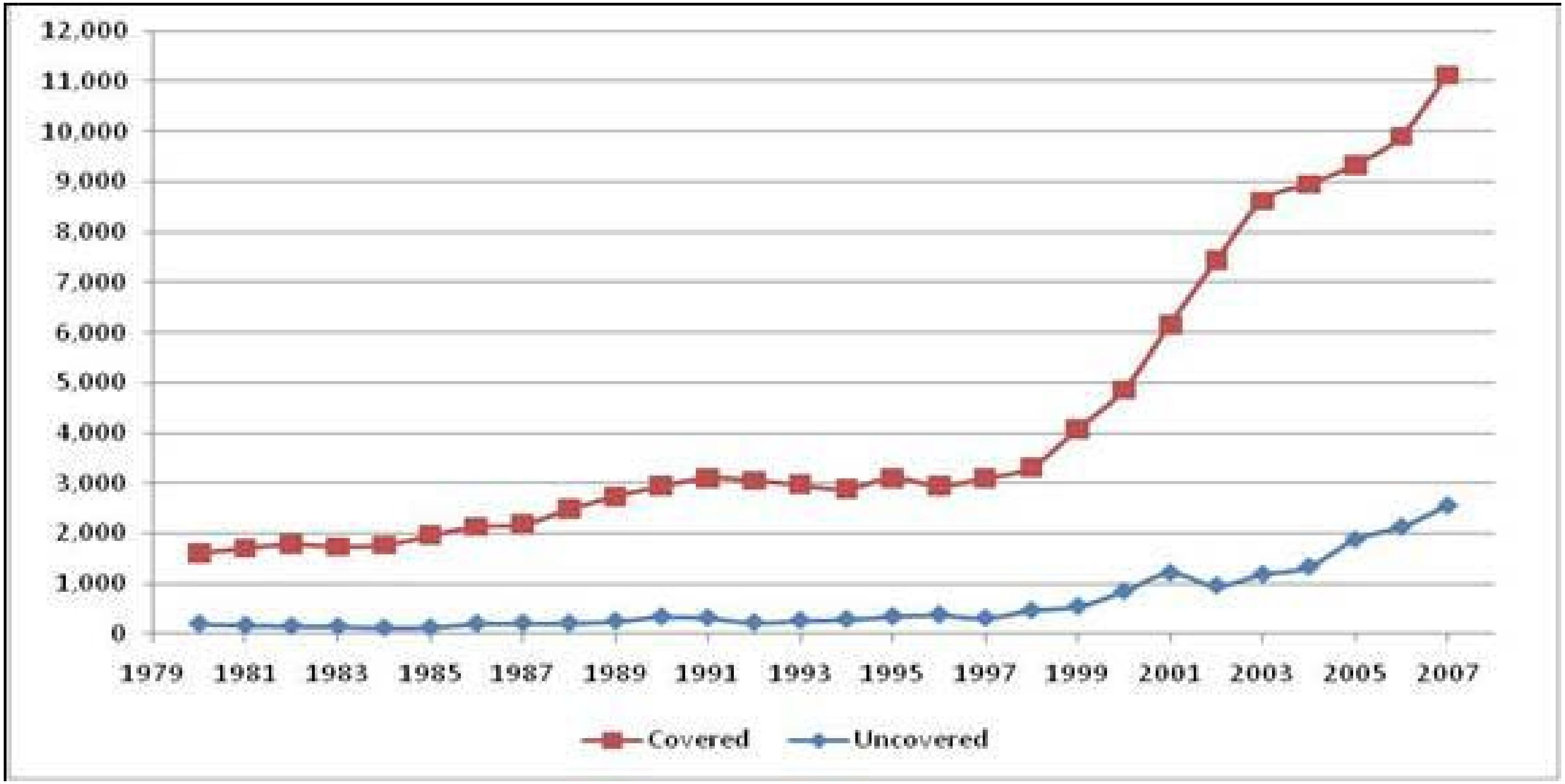
Table 1

Paper	Sample and Time Period	Time-Series (TS) Models and Data Requirements	Outliers	Forecast Horizon	Difference in Forecast Accuracy	Analysts' Superiority Determinants
Brown and Rozeff (1978)	50 firms from 1972 through 1975.	Three TS models using quarterly data, requiring complete data for 20 years.	Winsorized forecast errors at 1.0	One to five quarters ahead.	Median difference in forecast errors between all univariate forecasts and the analysts' forecast is significantly greater than zero.	
Collins and Hopwood (1980)	50 firms from 1951 through 1974.	Four TS models, requiring a minimum of 76 quarters of data.	Winsorized forecast errors at 3.0	One to four quarters ahead.	Four quarters out, analysts' forecast errors are 31.7% compared to the best TS error of 32.9%. One quarter out, mean analysts' forecast error are 9.7% compared to the best TS error of 10.9%.	
Fried and Givoly (1982)	424 firms from 1969 through 1979.	Modified submartingale models, requiring a minimum of 10 years of past data.	Winsorized forecast errors at 1.0	8 months prior to the fiscal end.	Analysts' forecast errors are 16.4% of realized EPS compared to 19.3% for the best TS model.	
Hopwood and McKeown (1982)	258 firms from 1974 through 1978.	Random walk and 7 other TS models, requiring at least 12 years (48 quarters) of data.		One to four quarters ahead.	Four quarters out (annual), absolute analysts' forecasts errors are 22.5% compared to absolute forecast errors of 26.1% for random walk.	Number of days separating TS and analysts' forecast – positive
Brown, Hagerman, Griffin, and Zmijewski (1987)	233 firms from the 1975 through 1980.	3 TS models, requiring a minimum of 60 quarters of data.	Winsorized forecast errors at 1.0	One, two, and three quarters ahead.	Three-quarters-ahead, analysts' forecast errors are 28.7% and TS forecast errors are 33%.	Forecast horizon – negative
Brown, Richardson, and Schwager (1987)	Sample 1: 168 firms from Q1-1977 through Q4-1979.	Quarterly random-walk model.		One, two, and three quarters ahead.	For the one month horizon, the log of the squared ratio of TS to analysts' forecast errors is 0.56.	Firm size – positive; Prior analysts' forecast dispersion – negative

Table 1 (cont.)

Brown, Richardson, and Schwager (1987)	Sample 2: 168 firms from 1977 through 1979.	Annual random-walk model.		Horizons of 1, 6, and 18 months prior to the fiscal year-end date.	For the one month horizon, the log of the squared ratio of TS to analysts' forecast errors is 1.08.	Firm size – positive; Prior analysts' forecast dispersion – negative
Brown, Richardson, and Schwager (1987)	Sample 3: 702 firms from 1977 through 1982.	Annual random-walk model.		Horizons of 1, 6, and 18 months prior to the fiscal year-end date.	Log of the squared ratio of TS to analysts' forecast errors is 1.01 for the one month horizon.	Firm size – positive; Prior analysts' forecast dispersion – negative
O'Brien (1988)	184 firms from 1975 through 1982.	Two TS models, requiring 30 consecutive quarters of data.	Deleted absolute forecast errors larger than $10	Horizons of 5, 60, 120, 180, and 240 trading days prior to the earnings announcement date.	At 240 trading days (one year), analysts' forecast errors are $0.74 compared to TS forecast errors of $0.96.	Forecast horizon – positive
Kross, Ro, and Schroeder (1990)	279 firms from 1980 through 1981.	Box-Jenkins model, requiring 28 quarters of data.		Last available one-quarter-ahead forecast.	Natural log of 1 + absolute TS error - absolute analysts' error is positive across all industries (ranging from (0.043 to 0.385)).	Earnings variability – positive; *Wall Street Journal* coverage – positive; # of days separating TS and analysts' forecasts – positive
Lys and Soo (1995)	62 firms from 1980 through 1986.	Box-Jenkins model, requiring 20 years of data.	Removed one firm	Up to 8 quarters ahead.	Across all horizons, the mean (median) absolute analysts' forecast error is 4.4% (2.8%) and the mean (median) absolute TS error is 26.8% (1.4%).	Forecast horizon – negative
Branson, Lorek, and Pagach (1995)	223 firms from 1988 through 1989.	ARIMA model, requiring 11 years of complete data.		One quarter ahead.	The median absolute percentage forecast error (Actual - predicted)/actual)) from TS minus analysts' forecasts is 7.22%.	Conditional on the firm being small: earnings variability – positive; firm size – negative

Figure 3: Mean assets for firms with (in maroon) and without (in blue) earnings forecasts on I/B/E/S



I have no idea what you're talking about...

...so here's a bunny with a pancake on its head.

A re-examination of analysts' superiority over time-series forecasts of annual earnings

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A re-examination of analysts' superiority over time-series forecasts of annual earnings

Abstract: In this paper, we re-examine the widely-held belief that analysts' earnings per share (EPS) forecasts are superior to forecasts from a time-series model. Using a naive random walk time-series model for annual earnings, we investigate whether and when analysts' annual EPS forecasts are superior. We also examine whether analysts' forecasts approximate market expectations better than expectations from a simple random walk model. Our results indicate that simple random walk EPS forecasts are more accurate than analysts' forecasts over longer forecast horizons and for firms that are smaller, younger, or have limited analyst following. Moreover, analysts' superiority is less prevalent when analysts forecast large changes in EPS. These findings recharacterize generalizations about the superiority of analysts' forecasts over even simple time-series-based earnings forecasts and suggest that they are incomplete and/or misleading. Our findings suggest that in certain settings, researchers can reliably use time-series-based forecasts in studies requiring earnings expectations.

A re-examination of analysts' superiority over time-series forecasts of annual earnings

1 Introduction

Research on analysts' forecasts originated from a need within capital markets research to find a reliable proxy for investor expectations of earnings per share (EPS). The need for a proxy was necessitated by a growing interest in the relation between accounting earnings and stock returns that began with Ball and Brown (1968). Prior to the widespread availability of analysts' forecasts, much capital markets research was aimed at better understanding the time-series properties of earnings in an effort to gauge the association between earnings expectations and stock prices (e.g., Ball and Watts 1972; Brooks and Buckmaster 1976; Albrecht et al. 1977; Salomon and Smith 1977; Watts and Leftwich 1977). Numerous time-series specifications are examined in these studies, but the overall evidence points towards *sophisticated* time-series models of annual earnings rarely providing an economically significant improvement over a *simple* random walk model in terms of reduced forecast errors.[1] This led Brown (1993, 295) to observe that the general consensus among researchers is that earnings follow a random walk, which he states was "pretty much resolved by the late 1970s."

In a parallel stream of studies between 1968 and 1987, many researchers examined whether *analysts*' forecasts are superior to *time-series* forecasts. The culmination of that research is Brown et al. (1987a), who conclude that analysts' forecasts are superior to time-series forecasts because of both an information advantage and a timing advantage. This conclusion was followed by a sharp decline in research on the properties of time-series forecasts. Indeed, in a review of the capital markets literature, Kothari (2001, 145) observes that the time-series

[1] We note that prior research finds consistent evidence that sophisticated time-series models of *quarterly* earnings outperform a simple random walk model (see, for example, Lorek (1979) and Hopwood et al. (1982)). However, we focus our examination on forecasts of annual earnings as we explain later in the introduction.

properties of earnings literature is fast becoming extinct because of "the easy availability of a better substitute" which is "available at a low cost in machine-readable form for a large fraction of publicly traded firms."[2] Thus, it appears that academics have generally concluded that analysts' forecasts of annual earnings are superior to those from time-series models.

In this paper, we re-examine the widely-held belief that analysts' annual EPS forecasts are superior to those from time-series models. We do this by comparing the performance of simple random walk annual earnings forecasts to that of analysts' annual earnings forecasts, and by correlating the associated forecast errors with long-window market returns. Given information and timing advantages (Brown et al. 1987a), it seems improbable that analysts would *not* provide more accurate forecasts than a simple random walk model. However, the prior research upon which the conclusion that analysts are superior is based is subject to numerous caveats (e.g., small samples, bias towards large firms, questionable economic significance, etc.), as we further discuss below. Moreover, analysts are subject to a number of conflicting incentives that can result in biased or inaccurate forecasts (Francis and Philbrick 1993; Dugar and Nathan 1995; McNichols and O'Brien 1997; Lin and McNichols 1998).

As noted in Bradshaw (2009), the accounting literature is unique in its conclusion that expert forecasts are superior to forecasts from time-series models. For example, findings from research in economics, genetics, and physics are largely consistent with time-series models outperforming experts.[3] Obviously, forecasts of macroeconomic variables like interest rates, unemployment, and GDP are different from forecasts of accounting earnings because firm

[2] Kothari (2001, 153) further states that "conflicting evidence notwithstanding, in recent years it is common practice to (implicitly) assume that analysts' forecasts are a better surrogate for market's expectations than time-series forecasts."

[3] For example, in the economics literature, Belongia (1987) examines expert and time-series forecasts of interest rates and finds that time-series forecasts are more accurate. Similarly, Fintzen and Stekler (1999) and Loungani (2000) find that time-series forecasts of recessions and of gross domestic product (GDP) are more accurate than expert forecasts. In addition, in the genetics literature, Orr (1998) finds that random walk describes the time-series properties of genetic drift, and in physics, Mazo (2002) finds that random walk describes Brownian motions.

managers can affect both analysts' forecasts (through guidance) and accounting earnings (through financial reporting discretion) (Watts and Zimmerman 1990; Matsumoto 2002). This interaction clearly gives financial analysts' forecasts of EPS an advantage vis-à-vis expert forecasts of 'less controllable' economic outcomes like interest rates or GDP.

Furthermore, relative to the extensive amount of analyst forecast data currently available, the empirical results of the early studies examining analysts versus time-series models are based on very small samples. For example, Brown and Rozeff (1978) use forecasts for only 50 firms from 1972 through 1975, and Fried and Givoly (1982) – arguably the most extensive sample in this early literature – use forecasts for only 424 firms from 1969 through 1979. In addition to the limited availability of machine readable data when these studies were performed, another explanation for the small sample sizes is the data demands of ARIMA models, which require a long time series of earnings (e.g., 10 to 20 years) to estimate time-series parameters. Other common research design choices, such as the selection of only December fiscal year-end firms or only firms trading on the New York Stock Exchange (which bias samples towards large, mature, and stable firms), may also affect early results. Finally, as is well-known, the firms followed by analysts are biased towards larger firms with institutional following (Bhushan 1989) and with more extensive disclosures (Lang and Lundholm 1996), which censors the availability of analysts' forecasts for other firms. The generalizability of the early evidence on analysts' forecast superiority is accordingly limited, as is made clear by descriptions in these studies about their sample characteristics and by other important caveats.

Researchers now utilize analysts' earnings forecasts as a proxy for expected earnings for samples of firms that are not well-represented in these early studies. For example, Lee (1992), Clement et al. (2003), and Jegadeesh and Livnat (2006) use analysts' forecasts to proxy for earnings expectations for small firms (which are underrepresented in the early studies on the accuracy of analysts' versus time-series forecasts). Similarly, researchers sometimes use analysts' forecasts of earnings over horizons that are not represented in these early studies (which rarely examine forecast horizons beyond one year). For example, in the valuation and cost of capital literature (e.g., Frankel and Lee 1998; Claus and Thomas 2001; Gebhardt et al. 2001; Easton et al. 2002; and Hribar and Jenkins 2004), analysts' earnings forecasts are often used as a proxy for longer-horizon earnings expectations, such as two- to five-year-ahead earnings. One notable exception is Allee (2010) who utilizes exponential smoothing time-series forecasts for two-year horizons to estimate the firm-specific cost of equity capital. He finds that cost of equity capital estimates using time-series forecasts are reliably associated with risk proxies (e.g., market volatility, beta, leverage, size, book-to-price, etc.) and concludes that researchers and investors may use time-series forecasts of earnings to estimate the implied cost of equity capital for firms not covered by analysts.

Our empirical tests are based on annual earnings with forecast horizons ranging from 1 month through 36 months. We focus solely on annual earnings because we are interested in evaluating analysts' superiority over both short and long forecast horizons and the availability of quarterly analysts' earnings forecasts is generally limited to several quarters ahead. Furthermore, it is unlikely that random walk forecasts are superior to analysts' forecasts in the quarterly setting, where both the information and timing advantage of analysts are greatest.[4] Our focus on annual earnings forecasts is also consistent with the extensive use of these forecasts in research on the cost of equity capital and valuation, where longer horizon forecasts are the most cogent in terms of their influence on valuation-related estimates.

[4] We do not directly examine this conjecture, but our near-term forecasts of annual earnings are analogous to quarterly forecasts for the fourth quarter and for these very short forecast horizons, the results are consistent with analysts dominating time-series models.

We document several surprising findings. First, for longer forecast horizons, analysts' forecasts do *not* consistently provide more accurate estimates of future earnings than time-series models, even when analysts have timing and information advantages. Second, for forecast horizons where analysts *are* more accurate than random walk forecasts (i.e., shorter forecast horizons of several months), the differences in forecast accuracy are economically small. Third, random walk forecasts are more accurate than analysts' forecasts for estimating two-year-ahead earnings in approximately half of the forecast horizons analyzed, and random walk forecasts strongly dominate analysts' forecasts of three-year-ahead earnings. Fourth, over longer forecast horizons, analysts' forecast superiority is prevalent only in limited settings, such as when analysts forecast negative changes or small absolute changes in EPS. Finally, the associations between random walk versus analysts' forecast errors and stock returns track the results of our forecast accuracy tests. Over the shortest forecast horizon, when analysts' forecasts and earnings announcements occur almost simultaneously, the association between analysts' forecast errors and returns is three times larger than that between random walk forecast errors and returns. However, over longer forecast horizons, returns are more strongly associated with random walk forecast errors than with analysts' forecast errors, suggesting that random walk forecasts are a better proxy for market expectations of earnings than consensus analysts' forecasts over all but very limited forecast horizons.

These results conflict with common (often implicit) assertions that analysts' forecasts are uniformly a better proxy for investor expectations than are forecasts from time-series models. For example, Frankel and Lee (1998, 289) state that *I/B/E/S* earnings forecasts "should result in a more precise proxy for market expectations of earnings." They use these forecasts as a proxy for expected earnings for horizons of up to three years. Similarly, Easton et al. (2002) proxy for expected earnings using analysts' forecasts for horizons of up to four years, and Claus and Thomas (2001) use analysts' forecasts for horizons of up to five years. The evidence that time-series forecasts perform as well or better than analysts' forecasts suggests that the generalizability of research typically confined to firms for which analysts forecast long-term earnings (i.e., large, mature firms) might be reliably enhanced by substituting time-series forecasts for those of analysts and by expanding the samples of firms examined.

Although the tenor of our conclusions appears to contradict conclusions in early analysts' forecast research and questions the use of analysts' forecasts in more recent studies, we emphasize that early research was deliberate in its sample selection and other research design choices, and the conclusions were drawn appropriately. As in many literatures, it is the subsequent researcher who over-generalizes findings in the prior literature (Bamber et al. 2000). The early research examines the relative accuracy of time-series versus analysts' forecasts using samples of firms that are large, mature, and stable, and studies fairly limited forecast horizons. For these types of firms, over relatively short horizons, we also find that analysts' forecasts consistently outperform forecasts from a random walk model (and from all of the other time-series models that we evaluate).[5] However, we do emphasize that for all but the very shortest of forecast horizons, analysts' forecast superiority is economically small for the average firm. Moreover, for smaller firms and for firms with low analyst following, we find that analysts' superiority is quite small, and over longer horizons, analysts' forecasts are not superior to random walk forecasts.

[5] In untabulated analyses, we also find that random walk forecasts are superior to forecasts from more complicated time-series models such as random walk with a drift. This superiority exists for two reasons. First, analysts are better at estimating earnings for firms with sufficient data to calculate the time-series parameters in some complicated time-series models because longer time-series availability is associated with more mature firms. Second, adding time-series parameters to a random walk forecast does not help much because the negative serial correlation in EPS changes is very small.

Our study is also subject to an unavoidable sample bias because to assess analysts' forecasts relative to time-series forecasts, we are necessarily constrained to use data for firms with available analyst forecasts. Thus, we cannot avoid biasing our sample towards covered firms. However, as we document, the percentage of firms without analyst coverage has fallen from more than 50% in the 1990s to approximately 25% and firms without analyst coverage have median total assets of less than $100 million. A second design choice is that, because analysts forecast earnings purged of transitory or special items, we use actual earnings per *I/B/E/S* (rather than earnings from Compustat) to calculate forecast errors based on analysts' forecasts and random walk. This is necessary in order to make the analyst and random walk forecast errors comparable.

The remainder of this paper proceeds as follows. In section 2, we review the prior literature. We describe our data and develop hypotheses in section 3. We present the results of our tests in section 4, and section 5 concludes.

2 Prior research and motivation

2.1 Prior Research

Numerous studies examine the time-series properties of annual earnings, motivated by a need for a well-specified expectations model to be used in asset pricing tests. The early studies (e.g., Little 1962; Ball and Watts 1972) provide evidence that annual earnings approximate a simple random walk process. Subsequent studies (e.g., Albrecht et al. 1977; Watts and Leftwich 1977) find that this simple time-series characterization performs at least as well as more complex models of annual earnings, such as random walk with drift or Box Jenkins.[6] Based on this

[6] Albrecht et al. (1977) also show that the choice of scalar is important to the relative accuracy of predictions from random walk versus random walk with drift models. Specifically, a random walk model outperforms a random walk

evidence, Brown (1993, 295) concludes that earnings follow a random walk and that this was "pretty much resolved by the late 1970s." In addition to the empirical evidence, the random walk model is advantageous because it does not require a long time series of data, which restricts the sample size and induces survivor bias.

A stream of literature based on these prior studies compares the accuracy of earnings forecasts from time-series models to that of analysts' forecasts. These studies can be broadly classified into one of two lines of research. The first line asks whether analysts' forecasts *are superior to* forecasts derived from time-series models. These studies are motivated by the intuition that analysts' forecasts should be more accurate than time-series forecasts for a number of reasons (e.g., analysts have access to more information and have a timing advantage), and these studies provide evidence that analysts' forecasts are more accurate than time-series forecasts. For example, Fried and Givoly (1982) argue that analysts' superiority is related to an *information advantage* because analysts have access to a broader information set, which includes non-accounting information as well as information released after the prior fiscal year. They compare prediction errors (defined as (forecasted EPS – realized EPS) / |realized EPS|) based on analysts' forecasts made approximately eight months prior to the fiscal-end date to those based on forecasts from two time-series models. The eight-month forecast horizon roughly corresponds to the annual forecast horizon of time-series models based on earnings releases, which typically occur by four months after fiscal year-end. Fried and Givoly (1982) report prediction errors of 16.4 percent using analysts' forecasts versus 19.3 percent using a modified sub-martingale random walk model and 20.3 percent using a random walk model.[7] The

with drift model when earnings are deflated by stockholders' equity but underperforms when earnings are not deflated.

[7] Fried and Givoly (1982) analyze a modified submartingale model that uses the firm's past earnings growth as the drift term as well as an index model that uses past earnings growth of the Standard & Poor's 500 as the drift term.

differences among these prediction errors seem small but are statistically significant. Fried and Givoly (1982) also find that analysts' forecast errors are more closely associated with security price movements than are forecast errors from time-series models. Collins and Hopwood (1980) document similar evidence using a slightly longer forecast horizon. Using forecasts made four quarters prior to year-end, they find mean analysts' forecast errors of 31.7 percent compared to 32.9 percent for their most accurate time-series forecast, again, an economically small but statistically significant difference.

A related line of research investigates the source of this apparent superiority. For example, Brown et al. (1987b) find that analysts' forecast superiority is positively (negatively) related to firm size (forecast dispersion). Similarly, Brown et al. (1987a) provide evidence consistent with analysts possessing an information advantage in that they better utilize information available on the date on which the time-series forecast is made, which Brown et al. (1987a) label a "contemporaneous advantage," and with analysts better utilizing information acquired between the date on which the time-series forecast is made and the date on which the analysts' forecast is made, which they label a "timing advantage." Subsequent research supports their conclusion that analysts' superiority is negatively associated with the forecast horizon (Kross et al. 1990; Lys and Soo 1995). Finally, O'Brien (1988) argues that analysts' superiority stems from their use of time-series models along with a broader information set that includes information about industry and firm sales and production, general macroeconomic information, and other analysts' forecasts. Consistent with this, Kross et al. (1990) find that the analysts' advantage is positively associated with firm coverage in the *Wall Street Journal*.

Our focus is limited to the random walk model out of simplicity; refinement to incorporate past earnings growth would likely improve the performance of time-series forecasts relative to analysts' forecasts, but would require longer time series, thus biasing the sample.

Collectively, these studies use samples comprised mainly of large firms. One exception is Branson et al. (1995) who re-examine the question of whether analysts' forecasts are superior to forecasts from time-series models using a sample of small market capitalization firms (where the median market value of equity is $215 million). Using one-quarter-ahead forecasts, they find that analysts' forecasts are also more accurate than time-series forecasts for their sample, but conclude that time-series models might be useful for small firms without analyst following. More recently, Allee (2010) examines cost of equity capital estimates based on time-series forecasts, so is able to extend his analyses to firms without analyst following. He uses two-year-ahead annual forecasts combined with the Easton (2004) implementation of the Ohlson and Jeuttner-Nauroth (2005) earnings growth valuation model to back-out the implied cost of equity capital. His results are also encouraging with respect to the usefulness of time-series forecasts in a valuation setting.

To succinctly summarize and place some structure on the prior research on analysts' versus time-series forecasts, table 1 summarizes twelve important studies on the relative performance of time-series and analysts' forecasts. We compile summary data on the sample size and time-period, the time-series models investigated, data requirements, treatment of outliers, forecast horizon, and summary results. Several observations are noteworthy. First, these studies typically use time-series data from the 1960s and 1970s. Second, the sample sizes are small by current capital markets research standards, ranging anywhere from only 50 to only a few hundred firms. Third, the time-series models used require a minimum of 10 years of data, and some require as many as 20 years of data. Fourth, the forecast horizons studied range from one quarter ahead in the quarterly setting to 18 months ahead in the annual setting, with the majority focused on the quarterly forecast horizon. Fifth, forecast accuracy is generally evaluated using the absolute value of forecast errors scaled by either actual EPS or stock prices. Sixth, the reported differences in forecast accuracy between analysts and time-series models are typically statistically significant and analysts typically ‘win,’ but the economic magnitudes of the differences appear modest at best. Finally, the analysts’ forecast advantage is positively associated with firm size and is negatively associated with prior dispersion in analysts’ forecasts and forecast horizon.

2.2 Why re-examine the relative forecast accuracy of analysts versus time-series models?

Two factors, combined with the availability of analysts’ forecasts for a large number of public firms, motivate our re-examination of the superiority of analysts’ forecasts over time-series forecasts. First, our review of the accounting and finance literature above suggests that it took approximately two decades (i.e., the 1970s and 1980s) for the literature to conclude that analysts are better at predicting future earnings than are time-series models. As Kothari (2001) notes, due to this conclusion and the increased availability of analysts’ forecast data in machine-readable form, the literature on time-series models quickly died.[8] However, as noted above and as evident in table 1, this generalized conclusion is primarily based on studies investigating small samples of firms that are large, mature, and stable, and the margin of analysts’ superiority over time-series forecasts is not overwhelming. However, analysts’ forecasts are used pervasively in the literature as proxies for market expectations for all firms, both large and small. This general reliance on analysts’ forecasts contrasts with Walther (1997), who concludes that the market does not consistently use analysts’ forecasts or forecasts from time-series models to form expectations of future earnings; her evidence indicates that market participants place more

[8] Since the 1980s, the forecasting literature has focused on refinements to better understand various features of analysts’ forecasts, such as the determinants of analysts’ forecast accuracy (Clement 1999), bias in analysts’ forecasts (Lim 2001), and the efficiency of analysts’ forecasts with respect to public information (Abarbanell 1991).

weight on time-series forecasts relative to analysts' forecasts as analyst following decreases. Additionally, it is not obvious that analysts are equally skilled at predicting earnings for large and small firms (or for firms that differ on other dimensions).

The second motivation for our re-examination is that a significant number of firms were not covered by analysts during the sample periods studied in early research and, therefore, are excluded from research that requires longer-term earnings forecasts. If analysts' forecasts over long horizons are not superior to time-series forecasts, then requiring firms to have available analysts' forecasts unnecessarily limits the data upon which this research is based and hence, is a costly restriction. To get a sense of the cost (in terms of sample exclusion) of requiring analysts' forecasts, we identify the number of firms with available financial and market data not included in *I/B/E/S*. Figure 1 plots of the percentage of public firms with available data in *Compustat* and in the Center for Research in Securities Prices (*CRSP*) that *do not* have analysts' one- and two-year-ahead earnings forecasts and long-term growth forecasts available in *I/B/E/S*.[9] As illustrated in figure 1, the percentage of firms with available *Compustat* and *CRSP* data that do not have one-year-ahead analyst forecast data in *I/B/E/S* was approximately 50% through the early 1990s but in recent years, the percentage of firms without one-year-ahead analyst forecasts has declined to approximately 25%. Figure 2 plots the median assets of firms with available *Compustat* and *CRSP* data, sorted by whether they are covered by analysts on *I/B/E/S*. As noted in prior research, the uncovered firms are considerably smaller (Bhushan 1989). Whereas the difference in median total assets between covered and not covered firms was relatively small through the early 1990s, it is now quite large; the median total assets of firms without analysts' forecasts is generally below $100 million. Thus, broadly speaking, the evidence in figures 1 and

[9] We identify this sample by starting with all firms in *Compustat* with positive total assets. We retain all firms with monthly stock price data as of the fiscal-end month available from *CRSP*. Finally, we use *I/B/E/S* data to identify whether consensus forecast data as of the fiscal-end month are available for the remaining firms.

2 highlights the sample effects of requiring analysts' forecasts in terms of excluding otherwise useable data. As noted in the introduction, we cannot avoid this sample selection issue, but because analyst coverage is much greater in recent years, we are able to include the majority of public firms in our analyses.

2.3 Empirical Methodology

In the first set of tests, we compare the accuracy of analysts' forecasts of annual earnings to that of time-series forecasts over various horizons ranging from 1 through 36 months prior to the earnings announcement date. The time-series forecasts that we examine are based on both annual realizations and annual realizations updated with subsequent quarterly realizations. We employ a random walk time-series forecast for three reasons. First, as noted above, there is very little evidence suggesting that more sophisticated time-series models are more accurate than simple time-series models of annual earnings (Albrecht et al. 1977; Watts and Leftwich 1977; Brown et al. 1987a). Second, random walk requires no parameter estimates and so, does not have the data demands of more complicated ARIMA models. That is, using the random walk forecast rather than more complex time-series models frees us from further data requirements that would skew our analyses to large, mature firms, as in prior research.[10] Third, Klein and Marquardt (2006) find that losses occur with increasing frequency over time, suggesting that the earnings process is becoming more volatile. Thus, random walk may be more descriptive than more complicated ARIMA models.

Consistent with prior studies, we expect analysts' superiority to decrease as the forecast horizon increases (Brown et al. 1987a). Next, we investigate settings where we would expect analysts to have less of an information advantage. That is, we compare the forecast accuracy of

[10] In addition, the use of random walk is consistent with Occam's razor, which advocates simplicity.

analysts' forecasts to that of a time-series model for young firms, small firms, and firms with low analyst following. We also examine how much information analysts add when they forecast positive versus negative changes in EPS and when they forecast large versus small changes in EPS.[11]

In the second set of tests, we examine the association between random walk forecast errors and stock returns, and the association between analysts' forecast errors and stock returns.[12] Here, we also expect the relative strength of the correlation between analysts' forecast errors and returns over the correlation between random walk forecast errors and returns to decrease as the forecast horizon increases and expect the relative strength of the correlation between analysts' forecast errors and returns to be lower in settings where analysts should have less of an advantage or when analysts forecast greater changes in future earnings.

As a final test, we investigate analysts' superiority in a multivariate setting. For each forecast horizon, we estimate regressions with our measure of analysts' superiority as the dependent variable and proxies for the quality of the information environment, firm risk, and the analysts' forecasted changes in earnings as covariates. The objective of this test is to investigate the incremental impact of these factors on analysts' superiority and to assess whether the impact changes across the various forecast horizons.

3 Data

We first collect data from the *I/B/E/S* consensus file and from the *Compustat* annual file. Our sample spans a 25 year period, from 1983 through 2008. We attempt to impose minimal

[11] When analysts forecast no change in EPS, the random walk forecast and the analysts' forecasts are equal; thus, analysts' forecasts differ most from random walk forecasts when analysts forecast large changes in EPS.
[12] Thus, we our tests following Foster (1977) who first put forth the dual evaluative criteria of predictive ability and capital market association.

constraints on data availability. For a firm-year observation to be included in our sample, the prior year's EPS, at least one earnings forecast, the associated stock price, and the EPS realization for the target year must be available from *I/B/E/S*. For supplementary tests using quarterly data to form annual earnings forecasts, we further require that quarterly EPS realizations be available from *I/B/E/S*. We require that sales (our proxy for size) be available from *Compustat* for the year immediately preceding the forecast.[13] Because losses are less persistent than positive earnings (Hayn 1995), we further limit our analyses to firm-years with positive earnings in the base year.[14] In sensitivity analyses, we find that including loss firms does not change our overall conclusions.[15] Finally, for the market-based tests, we require sufficient monthly data from *CRSP* to calculate returns over the specified holding periods, which slightly reduces the sample for these tests.

For each target firm-years' earnings (EPS_T), we collect the *I/B/E/S* consensus analysts' forecast made in each of the previous 36 months. For the first 12 previous months (i.e., 0 through 11 months prior), we use FY1 (the one-year-ahead earnings forecast) as the measure of the analysts' forecast of earnings, and the EPS one year prior (EPS_{T-1}) as the random walk forecast of earnings. Thus, for the first year prior to the target year's earnings announcement, we

[13] For the analyses that can be done without *Compustat* data (i.e., the main results, analyses related to firm age, and analyses related to the number of analysts following), the *Compustat* restriction makes no substantive difference in the results. However, we impose this restriction across all analyses to facilitate sample consistency between the tables.

[14] The base year is defined as the year immediately preceding the forecast. For example, letting the target year be year T, when forecasting one-year-ahead earnings, the base year is year T-1; when forecasting two-year-ahead earnings, the base year is T-2; etcetera.

[15] In unreported analyses, we find that random walk forecasts perform poorly for fiscal periods following a loss; however, analysts' forecasts also perform poorly for these firms. While including loss firms does not change the results over horizons of one year or less, the random walk results improve somewhat relative to analysts' forecasts for forecast horizons of two and three years when loss firms are included. Although the lack of persistence of losses makes random walk a poor predictor of future earnings when the base year's earnings are negative, analysts are aware of the base year's earnings before they make their forecasts, so this data restriction does not provide time-series models with a natural advantage.

have 12 pairs of forecast errors.[16] For each pair, the analysts' forecast error is the difference between the analysts' forecast and realized earnings (EPS_T) and the random walk forecast error is the difference between EPS_{T-1} and EPS_T. We then take the absolute value of the forecast errors and scale by price as of the analysts' forecast date. We obtain 844,643 consensus forecasts, representing 77,013 firm-years and 10, 919 firms, with sufficient data to be included in the one-year-ahead (FY1) analyses.

For the 12 through 23 months prior to the target year's earnings announcement date, we use the *I/B/E/S* forecasts of FY2 (the two-year-ahead earnings forecast). As with the forecasts of FY1, there are 12 monthly forecasts of FY2. For these months, the random walk forecast of earnings is equal to EPS_{T-2}. We obtain 715,730 consensus forecasts, representing 68,870 firm-years and 9, 870 firms, with sufficient data to be included in the two-year-ahead (FY2) analyses.

Finally, for the 24 through 35 months prior to the target year's earnings announcement date, we construct estimates of FY3 (the three-year-ahead earnings forecast) because few analysts forecast three-year-ahead earnings directly. We construct these estimates using the method outlined in studies like Frankel and Lee (1998), Lee et al. (1999), Gebhardt et al. (2001), and Ali et al. (2003). This method generates the FY3 forecast from the FY2 forecast adjusted by the mean analysts' long-term growth forecast as follows:

$$\mathrm{FY3} = \mathrm{FY2} \times (1 + \mathrm{LTG\%}) \qquad (1)$$

where FY2 is defined above and LTG is the long-term growth forecast from *I/B/E/S*. Thus, to be included in the FY3 sample, a firm must report positive base year earnings (EPS_{T-3}) and have a

[16] Note that when the earnings announcement is made early in the calendar month, there will not be an earnings forecast in that calendar month. For these observations, there are only 11 forecasts of FY1. Thus, there are approximately half as many month 0 observations as there are month 1 observations.

FY2 forecast and a long-term growth forecast available in *I/B/E/S*.[17] We next calculate the pairs of forecast errors, analogous to the FY1 and FY2 analyses. We obtain 545,354 *I/B/E/S* consensus forecasts, representing 53,561 firm-years and 7, 636 firms, with sufficient data to be included in the three-year-ahead (FY3) analyses.

Our primary random walk-based forecasts of future earnings are simply the lagged annual realized earnings:

$$\mathrm{E}_{\mathrm{T}-\tau}(\mathrm{EPS}_{\mathrm{T}}) = \mathrm{EPS}_{\mathrm{T}-\tau} \quad \in \tau = \{1, 2, 3\} \tag{2}$$

For FY1 forecasts, the random walk forecast is the realized EPS from the previous fiscal year, and for FY2 (FY3), the random walk forecast is the realized EPS two (three) years prior to the forecast year. We also examine the sensitivity of the results to the alternative random walk forecast formed using the sum of the prior four quarters of EPS ($\mathrm{QEPS}_{\mathrm{T-1}}$). Note that 11 months prior to the earnings announcement, the random walk forecast based on annual realizations ($\mathrm{EPS}_{\mathrm{T-1}}$) and the random walk forecast based on quarterly realizations ($\mathrm{QEPS}_{\mathrm{T-1}}$) will be equal because they are based on the same four quarters. However, 9 months prior to the earnings announcement, $\mathrm{EPS}_{\mathrm{T-1}}$ will not change but $\mathrm{QEPS}_{\mathrm{T-1}}$ will be equal to the sum of quarterly EPS from the prior four quarters (in this case, Q2 through Q4 of the prior year (T-1) and Q1 of the current year (T)).

4 Results

4.1 Descriptive Statistics

Panel A of table 2 presents descriptive statistics for the 68,870 firm-years with sufficient data to estimate random walk forecast errors and analysts' forecast errors 11 months prior to the

[17] We also test the robustness of our results to using explicit FY3 forecasts when available in *I/B/E/S*. We find that our general conclusions are unchanged.

target earnings announcement. Untabulated statistics reveal that a hypothetical data requirement of 10 years of prior earnings data (e.g., Fried and Givoly 1982) would eliminate more than 60 percent of the observations, so estimating more complex time-series forecasts would result in a considerable loss of sample observations. We also find that the mean (median) observation has only 7.6 (5) analysts following, consistent with a large number of the firms in our sample having relatively sparse analyst coverage (i.e., only 1 or 2 analysts following).

As noted in table 1, prior literature frequently scales forecast errors by reported earnings and many important studies in this literature (e.g., Brown and Rozeff 1978; Fried and Givoly 1982; Brown et al. 1987a) winsorize forecast errors at 100 percent. For a sample comprised of large, mature firms and for forecasts with short horizons, this winsorization rule is reasonable because it results in very few of the analysts' forecast errors being winsorized. For example, Fried and Givoly (1982) find that approximately 0.5 percent of their sample observations have scaled forecast errors that are greater than 100 percent. Moreover, for the subsample of firms in our study that are at least 10 years old, we find that one month prior to the earnings announcement date, only 4.3 percent of scaled absolute analysts' forecast errors are greater than 100 percent. However, we find that for younger firms and over longer forecast horizons, many more extreme forecast errors exist. When we include younger firms in the analyses, the proportion of analysts' forecast errors (at the same one month forecast horizon) that are greater than 100 percent of reported earnings increases to 6.0 percent. Moreover, this proportion rises dramatically as the forecast horizon lengthens.

In panel B of table 2, we present the proportion of the absolute forecast errors (scaled by reported earnings) that are greater than 100 percent to illustrate the consequences of scaling forecast errors by reported earnings. Thirty-five months prior to the earnings announcement, almost 32 percent of analysts' forecast errors and 26 percent of random walk forecast errors are greater than 100 percent. Because winsorizing 32 percent of the sample could severely affect the reported results, in the analyses that follow, we scale forecast errors by price, as reported in *I/B/E/S*.[18] Scaling by price limits the number of extreme observations so that less than one percent of observations for both random walk forecast errors and analysts' forecast errors are greater than 100 percent at every forecast horizon. Thus, scaling by price provides a more accurate picture of the relative forecast accuracy of analysts versus random walk.

In panel C of table 2, we examine the bias in both types of forecasts. We report descriptive statistics for signed analysts' forecast errors and signed random walk forecast errors scaled by price at 11, 23, and 35 months prior to the earnings announcement date. We find that both forecast errors are biased, and that the absolute magnitudes of the bias for the median forecast errors are similar, but the biases are in the opposite direction. Specifically, the median random walk forecasts are negatively biased, while the median analysts' forecast errors are positively biased. The negative bias in random walk forecast errors occurs because EPS tends to grow by approximately 50 basis points per year and the random walk model does not allow for this growth. Analysts' forecast errors are biased such that the median analysts' forecast error is consistently positive and is much larger at longer horizons. This pattern of bias in analysts' forecast errors is consistent with findings in Richardson et al. (2004).

4.2 Tests of Analysts' Superiority Using Absolute Forecast Errors

We present the main results of our tests in table 3. In panel A of table 3, we compare the forecast accuracy of random walk forecasts based on annual EPS to that of the analysts'

[18] The price reported in *I/B/E/S* is usually the price at the end of the day prior to the day on which the forecast is released. However, our results are insensitive to the measurement date for price. Specifically, our results are essentially unchanged when we scale by the first price for the fiscal year.

consensus forecasts for the full sample. We calculate the analysts' superiority over the random walk model as follows (firm subscripts omitted):

$$Analysts' \, Superiority = \frac{|EPS_{T-1} - EPS_T| - |Forecasted\ EPS_{T,M} - EPS_T|}{Price_{T,M}} \qquad (3)$$

where *Forecasted EPS* is the consensus analysts' forecast (i.e., FY1, FY2, or FY3) issued M months prior to the earnings announcement for year T earnings. At each forecast horizon, we calculate mean *Analysts' Superiority*. A positive mean indicates that analysts are superior to a random walk model at that particular forecast horizon, on average, and a negative mean indicates that a random walk model is superior to analysts at that particular forecast horizon, on average.[19]

The first set of columns in panel A, labeled FY1, presents the mean analysts' superiority during months 0 through 11 prior to the earnings announcement. For the full sample, our results confirm those in the prior literature – analysts' forecasts *are* more accurate than forecasts from time-series models (specifically, forecasts from a random walk model) and their superiority is more evident as the earnings announcement approaches. For forecasts made in the same month as the earnings announcement (i.e., 0 months prior), analysts' forecasts are more accurate than random walk forecasts by 282 basis points. This result is not surprising given that this is the forecast horizon where analysts have the greatest timing and information advantages. In other words, for most firms, the random walk forecast is approximately one year old at this time and analysts have the advantage of having access to all of the news that has occurred over the year and to the earnings announcements made in the first three quarters of the year (i.e., to three of the four quarterly earnings numbers used to calculate EPS_T). In contrast, 11 months prior to the

[19] Note that the measurement of analysts' forecast superiority requires matched pairs of random walk forecasts and analysts' forecasts. That is, for a given firm-year observation, we require both a random walk forecast (so a prior earnings realization) and a consensus analysts' forecast, as well as the reported earnings.

earnings announcement date, analysts' superiority is only 35 basis points, which is approximately 88 percent smaller than analysts' superiority in month 0.

The second set of columns, labeled FY2, presents the mean analysts' superiority from 12 through 23 months prior to the earnings announcement. Here, we use the consensus analysts' forecasts of two-year-ahead earnings and the random walk forecast is earnings reported two years prior to the target date. Again, analysts' forecasts are significantly more accurate than random walk forecasts from 12 through 21 months prior to the earnings announcement, but as with FY1, their relative superiority falls monotonically as the forecast horizon lengthens. Moreover, at month 21, analysts' superiority is only 3 basis points, and by months 22 and 23, the random walk forecast is significantly more accurate than analysts' forecasts on average, so time-series forecasts are superior. However, the difference in accuracy is economically trivial, at 7 and 14 basis points respectively.

The third set of columns, labeled FY3, presents the mean analysts' superiority from 24 through 35 months prior to the earnings announcement. Again, analysts' superiority falls monotonically, from 66 basis points at 24 months prior to -41 basis points at 35 months prior, as their timing and information advantages increase.

In panel B of table 3, we compare the forecast accuracy of random walk forecasts based on quarterly EPS (i.e., the sum of EPS for the prior four quarters) to that of the analysts' consensus forecasts for the full sample. We find that the magnitude of analysts' superiority is smaller with quarterly updating than with the annual random walk forecast (reported in panel A) at every horizon. To illustrate, in panel B, analysts' superiority ranges from 62 basis points to -26 basis points, compared to a range of 282 basis points to -41 basis points in panel A. This decrease in magnitude is to be expected since quarterly updating reduces analysts' information and timing advantages. We also find that the sign and significance of analysts' superiority for the FY1 and FY2 horizons are very similar to those in panel A. Specifically, in FY1, we find that analysts are more accurate at every horizon. In FY2, we find that analysts and random walk forecasts are no different at 21 and 22 months prior, and that random walk forecasts are more accurate at 23 months prior. However, in FY3, we find a marked difference from the pattern in panel A. Here, random walk forecasts are more accurate than analysts' forecasts (or, at least, as accurate as analysts' forecasts) for almost all horizons.

Finally, in panel C of table 3, we compare the forecast accuracy of random walk forecasts using explicit FY3 forecasts to that of the analysts' consensus forecasts for the full sample. By construction, the results for FY1 and FY2 are identical to those in panel A. For FY3, we find that analysts' superiority falls monotonically from 54 basis points at 24 months prior to 20 basis points at 35 months prior. This pattern is similar to that in panel A, but the magnitudes are smaller at every horizon in FY3.

Overall, the results presented in table 3 reveal that, consistent with prior literature, analysts are better than time-series models at predicting earnings over relatively short windows. However, as the forecast horizon grows, analysts' superiority decreases and becomes negative, so that random walk forecasts are superior to analysts' forecasts when the forecast horizon is sufficiently long. Moreover, the results across the various panels reveal that quarterly updating to the random walk forecasts reduces the magnitude of analyst superiority and that random walk forecasts for FY3 based on long-term growth forecasts and explicit FY3 forecasts are very similar. For the remainder of our analyses, we focus on random walk forecasts based on annual EPS because these forecasts give the analysts the greatest information and timing advantages, thus biasing our results against random walk.

4.2.1 Partitioning on firm age

Table 4 partitions observations based on firm age, measured as the number of years that the firm's earnings have been reported in *I/B/E/S*. Because samples in prior literature are comprised of mature firms, we separate observations into young firms versus mature firms to compare the relative forecast accuracy between the two groups. Panel A reveals that even one-year-ahead earnings are much more difficult to forecast for young firms than for mature firms. Specifically, for firms in their first year on *I/B/E/S*, the mean analysts' forecast error 11 months prior is 409 basis points while the matching random walk forecast error is 426 basis points. For firms that have been on *I/B/E/S* for at least five years, the mean analysts' forecast error is approximately 25 percent smaller, at 305 basis points, while the random walk forecast error is 347 basis points. Thus, it appears that mature firms are inherently more predictable, and although the random walk forecast error is smaller for mature firms than for young firms, the superiority of analysts' forecasts is greater for mature firms. For firms in their first year on *I/B/E/S*, analysts' superiority is only 18 basis points, but for the firms that are at least five years old, analysts' superiority is 41 basis points.

The difference in second year forecast accuracy is even more striking. At month 23, analyst superiority is negative for firms that are four years old or less, indicating random walk forecast superiority. Moreover, for firms in their first year on *I/B/E/S*, the differences are quite large, with random walk forecast superiority of 56 basis points. Thus, for firms in their first year on *I/B/E/S*, analysts' forecasts are less accurate than random walk forecasts by more than one-half percent of price at the 23 month forecast horizon. In contrast, for firms that have been on *I/B/E/S* for at least five years, analysts' forecasts are only slightly more accurate than random walk forecasts (by 3 basis points).

The results for FY3 presented in panel C are even more striking. At month 35, time-series forecast superiority is evident regardless of firm age. For firms in their first year on *I/B/E/S*, random walk forecasts are superior to analysts' forecasts by 116 basis points. However, for firms that have been on *I/B/E/S* for at least five years, the superiority of random walk forecasts is only 12 basis points at month -35.

4.2.2 Partitioning on firm size

Table 5 partitions observations based on firm size or on analyst following. To partition on firm size, each year, we partition all firms on *Compustat* with positive sales into two groups, large firms and small firms, using the median sales in the year as the threshold. Because *I/B/E/S* firms are generally larger than *Compustat* firms, fewer than half of the firms are classified as small using this threshold. As reported in panel A, analysts' superiority for small firms is much smaller than for large firms. In fact, for small firms, random walk is superior in 5 and 10 of the 12 monthly forecast horizons during FY2 and FY3, respectively. Moreover, some of these differences are economically significant. For example, at the 23 month forecast horizon, the difference is almost one and a half percent of price, and at the 35 month forecast horizon, the difference is more than one percent of price.

4.2.3 Partitioning on analyst following

In panel B, we report similar results for lightly followed firms (i.e., those followed by one or two analysts). While analysts' forecasts are superior in most months, for early fiscal-year forecasts, the difference in the accuracy of random walk forecasts and analysts' forecasts is economically trivial (e.g., it is only 12 basis points 11 months prior). Consistent with the results in table 4, results for FY2 and FY3 are similar, with random walk forecasts dominating analysts' forecasts at numerous forecast horizons.

4.3 The Relation between Analysts' Superiority and the Sign of the Forecasted Change in EPS

Table 6 partitions observations based on the sign of the analysts' forecasted change in EPS. Comparing the results in panels A (positive forecasted changes) with those in panel B (negative forecasted changes) across all horizons, we find that analysts forecast negative earnings changes less often than positive earnings changes, but when they do forecast negative changes, analysts' superiority is much stronger. Most strikingly, at 11 months prior to the earnings announcements, analysts' superiority is less than 1 basis point for the 59,086 positive forecasted changes in EPS, and is 209 basis points for the 11,789 negative forecasted changes in EPS.

We find similar evidence over FY2 forecast horizons. At 23 months prior to the earnings announcement, random walk forecasts are superior to analysts' forecasts by 29 basis points (see panel A) when analysts forecast positive changes in EPS. However, over this same horizon, analysts' superiority is 168 basis points when analysts forecast negative changes in EPS (see panel B). Here, we also find that analysts rarely forecast negative changes in two-year-ahead EPS. For example, at month -23, there are 47,260 positive forecasted changes and only 3,903 negative forecasted changes.

Finally, for FY3, when analysts forecast positive changes in EPS, random walk forecasts are superior to analysts' forecasts starting 30 months prior to the earnings announcement. The difference between analysts' forecast error and random walk forecast error is almost one half percent of price in month -35. However, when analysts forecast negative changes in earnings, analysts' superiority is very large, ranging from 8.52 percent of price at month -24 to 10.6 percent of price at month -35. That said, the small number of negative forecasted changes in

FY3 across these horizons indicates that analysts very rarely forecast negative changes in three-year-ahead earnings (i.e., approximately 1 in 1,000 forecasted changes are negative over this horizon).

4.4 The Relation between Analysts' Superiority and Absolute Forecasted Change in EPS

Table 7 partitions observations based on the absolute magnitude of the analysts' forecasted change in EPS. As discussed above, when analysts forecast no change in EPS, the random walk forecasts and the analysts' forecasts are equal. Thus, to further examine whether analysts' superiority varies with the forecasted change in EPS, we partition the observations into small, moderate, and large forecasted changes in EPS. For this analysis, we calculate the absolute value of the analysts' forecasted change in EPS and let the lowest and highest 33 percent represent small and large forecasted changes respectively. The difference in analysts' superiority between the extreme forecasts and the moderate forecasts is always large, but the direction of the effect differs for short and long forecast horizons.

Comparing the results in panel A (for the partition with the least extreme forecasted changes) with those in panel B (for the partition with the most extreme forecasted changes), we find that for short horizons (i.e., FY1 forecasts), analysts' superiority is strongest when the absolute forecasted change in EPS is extreme. At the one month forecast horizon, for the group of firms with the smallest forecasted change, analysts' superiority is only 44 basis points, but for the group of firms with the largest forecasted change, analysts' superiority is 570 basis points. However, this relative superiority deteriorates as the horizon lengthens. For example, for the group of firms with small forecasted changes, analysts' superiority is only 17 basis points 10 months prior to the earnings announcement, while at the same horizon, analysts' superiority is

117 basis points for the group of firms with large forecasted changes. Although analysts' superiority diminishes as the horizon lengthens, in the first year, analysts' superiority is always significantly greater for the group of firms with large forecasted changes in EPS than for the group of firms with small forecasted changes in EPS.

The results differ, however, over longer horizons. For the group of firms with small forecasted changes, analysts' forecasts are more accurate than random walk forecasts over each of the 36 monthly horizons in FY2. However, for the group of firms with large forecasted changes, random walk dominates in a large number of forecast horizons. At 23 months prior to the earnings announcement, when analysts have no timing advantage and a slight information advantage, random walk forecasts are 61 basis points more accurate than analysts' forecasts for the group of firms with large forecasted changes and are 27 basis points more accurate for the group of firms with small forecasted changes. In addition, analysts are not superior to random walk for the group of firms with large forecasted changes in FY2 until month 18, when analysts have a 4 month timing advantage. This compares to month 21 for the full sample.

The difference in accuracy between the groups with large versus small forecasted changes is even greater for forecasts made for FY3. As with two-year-ahead forecasts, analysts' forecasts of three-year-ahead earnings are always superior to random walk forecasts for the group of firms with the least extreme forecasted changes in EPS. However, for the groups of firms with the most extreme forecasted changes, analysts' superiority is significantly positive in only 3 of the 12 forecast horizons; this occurs 26 months prior to the earnings announcement, when analysts have an 9 month timing advantage. From 28 through 35 months prior to the earnings announcement, random walk forecasts are superior to analysts' forecasts, and the difference is 69 basis points at the 35 month horizon. In other words, when analysts forecast large changes in three-year-ahead earnings, a simple random walk estimate of those earnings is more accurate by approximately 70 percent of price on average. Over the same horizon, when analysts forecast a small change in earnings, their forecasts are more accurate than a simple random walk estimate by approximately 20 percent of price.

4.5 Tests of Analysts' Superiority Using Market Expectations

Next, we examine the associations between time-series forecast errors and stock returns and between analysts' forecast errors and stock returns over various forecast horizons. To the extent that stock prices react to earnings surprises, higher associations between forecast errors and stock returns indicate a greater correspondence between the forecasts and ex ante market expectations. We regress stock returns measured from the month of the forecast through the month of the earnings announcement on forecast errors from random walk and analysts' forecasts using a seemingly unrelated regression system:

$$Return_{T,M} = \alpha + \beta\,(EPS_{T-1} - EPS_T) + \varepsilon_T \qquad (4)$$

$$Return_{T,M} = a + b\,(Forecasted\ EPS_{T,M} - EPS_T) + e_T \qquad (5)$$

The coefficient β measures the relation between returns and random walk forecast errors, and the coefficient b measures the relation between returns and analysts' forecast errors. We report tests on the ratio of the regression coefficients β to b. We estimate this system for each of the 36 forecast horizons from 0 months prior (i.e., when analysts' forecasts and earnings are announced in the same month) to 35 months prior to the earnings announcement. Thus, we measure stock returns and forecast errors contemporaneously such that the returns accumulation period and the forecast horizon are equal. For example, when the forecast horizon is 12 months in length, the returns accumulation period is also 12 months in length and the forecast horizon and returns accumulation period represent the same 12 months.

In panel A of table 8, we present the estimation results for models (4) and (5) across all forecast horizons using annual EPS. As the forecast horizon lengthens, the association between stock returns and forecast errors increases for both random walk and analysts' forecasts. The random walk coefficient ranges from 0.069 in the 1 month forecast horizon regression to 3.454 in the 24 month forecast horizon regression. Similarly, the analysts' forecast coefficient ranges from 0.148 in the 1 month forecast horizon regression to 3.354 in the 24 month forecast horizon regression. While the coefficients on both errors increase with the length of the forecast horizon, they grow at different rates.

We find that the relative weights that the market seems to assign to random walk forecast errors and analysts' forecast errors tend to track fairly closely to the accuracy tests in table 3. Over the shortest forecast horizon, when analysts' forecasts and earnings announcements coincide in the same calendar month, the association between stock returns and random walk forecast errors is 47 percent of the association between stock returns and analysts' forecast errors. However, the relative magnitudes of the stock return associations grow nearly monotonically, so that at the 11 month forecast horizon, the random walk coefficient is 72 percent of the analysts' forecast error coefficient. To summarize, at the one year horizon, analysts' forecasts dominate random walk-based forecasts as a proxy for market expectations, which mirrors the accuracy results from table 3. However, the relative ability of analysts' forecasts to proxy for market expectations is much stronger at the one month forecast horizon than over longer forecast horizons.

The pattern for FY2 forecasts is similar, but analysts' forecasts are a significantly better proxy for market expectations than random walk forecasts only for horizons shorter than 21 months. For the 23 month forecast horizon, the random walk forecast is a significantly better proxy for market expectations, on average. Finally, for forecasts of FY3, analysts' forecasts are a better proxy in only 6 of the 12 months. For forecast horizons of 32 through 35 months, random walk is again a significantly better proxy for market expectations. Overall, it appears that market expectations track fairly closely to the forecast accuracy results. Over horizons where analysts' forecasts are more accurate than random walk forecasts, analysts' forecasts seem to provide a better proxy for market expectations. However, over horizons where random walk forecasts are more accurate than analysts' forecasts, random walk forecasts seem to provide a better proxy for market expectations.

In panel B of table 8 we present the results using random walk forecasts based on quarterly EPS (i.e., the sum of EPS for the prior four quarters). For FY1, we find that random walk forecasts are as good a proxy for market expectations as analysts' forecasts in the month of the earnings announcement. Thereafter (i.e., in months 1 through 11), we find that analysts' forecasts are a better proxy for market expectations. In addition, in FY2, we find that analysts' forecasts are the better proxy for market expectations in only 5 of the 12 months, and in FY3, random walk forecasts are a better proxy in all of the months.

4.5.1 Partitioning on firm size and on analyst following

Panels A and B of table 9 present the estimation results for models (4) and (5) for small firms and for lightly followed firms, respectively. In panel A, for FY1, we find that β/b ranges from 44 percent for the shortest forecast horizon to 84 percent for the 11 month forecast horizon. Moreover, analysts' forecasts are no better than random walk forecasts as a proxy for market expectations 10 and 11 months prior to the earnings announcement. For FY2 and FY3, we find that analysts' forecasts are no better than random walk forecasts over horizons of 19 through 23 months and 26 through 31 months prior to the earnings announcement, respectively, and that random walk forecasts dominate analysts' forecasts over horizons of 32 through 35 months prior.

The results for lightly followed firms are reported in panel B, and are very similar to those reported in panel A (for small firms) for FY1 and FY2. That is, analysts' forecasts dominate random walk forecasts as a proxy for market expectations only over shorter forecast horizons. For three-year-ahead forecasts, analysts' forecasts are not a better proxy than random walk forecasts starting in month 30. Overall, the results reported in table 9 for small and lightly followed firms are consistent with the analysts' forecast accuracy results reported in table 5.

4.5.2 Partitioning on the sign of the forecasted change in EPS

Panels A and B of Table 10 present the estimation results for models (4) and (5) for firms with positive and negative forecasted changes in EPS, respectively. In panel A, when analysts forecast increasing EPS, we find that analysts' forecasts are no better than random walk forecasts as a proxy for market expectations across all horizons. Moreover, beginning 7 months prior to the earnings announcement, random walk forecasts dominate analyst forecasts. In stark contrast, in panel B, when analysts forecast decreasing EPS, we find that analysts' forecasts dominate random walk forecasts as a proxy for market expectations across all horizons. This evidence is consistent with that presented in table 6 and suggests that analysts do much better than random walk forecasts when they forecast negative changes in earnings.

4.5.3 Partitioning on the absolute forecasted change in EPS

Panels A and B of table 11 present the estimation results for models (4) and (5) for firms with small and large analysts' forecasts of the change in EPS, respectively. In panel A, for FY1, FY2, and FY3, we find no statistical differences between the coefficients on the random walk forecast errors and on the analysts' forecast errors when analysts forecast the least extreme changes in EPS. Thus, analysts' forecasts are no better than random walk forecasts as a proxy for market expectations when analysts forecast small changes in EPS.

In panel B, we present the results when analysts forecast the most extreme changes in EPS. For FY1, we find that analysts' forecasts dominate random walk forecasts as a proxy for market expectations in all months. However, in FY2, we find that random walk forecasts are as good a proxy for market expectations as analysts' forecasts over horizons greater than 22 months, and in FY3, we find that random walk forecasts dominate for horizons of 34 and 35 months. Overall, the market expectation results in Table 11 track fairly closely to the forecast accuracy results presented previously.

4.6 Multivariate Tests

As a final test, we investigate analysts' superiority in a multivariate setting which controls for the information environment of the firm as well as for risk factors. Specifically, we estimate the following regression separately for each of the 36 forecast horizons:

$$\begin{aligned} Analysts'\,Superiority_{T,M} = {} & \gamma_0 + \gamma_1\,\#Analysts_T + \gamma_2\,STD_{T,M} + \gamma_3\,BTM_{T-1} \\ & + \gamma_4\,Sales_{\,T-1} + \gamma_5\,Forecast\ Increase_{T,M} + \gamma_6\,|Forecast\ \Delta|_{T,M} + \\ & + \gamma_7 Post\ FD_{T,M} + \varepsilon_T \end{aligned} \tag{6}$$

where: *#Analysts* is the number of analysts in the consensus forecast of EPS in year T made in month M; *STD* is the standard deviation of analysts' forecasts for year T earnings as measured in month M; *BTM* is the book-to-market ratio (from *Compustat*) measured at the end of year T-1; *Sales* (from *Compustat*) is measured at the end of year T-1; *Forecast Increase* is an indicator variable set equal to one if analysts forecast a positive change in EPS and to zero otherwise; |*ForecastΔ*| is the absolute value of the forecasted change in EPS (i.e., |*Forecasted* EPS_T – EPS_{T-1}|) implied by the analysts' forecast of year T earnings as measured in month M; and *Post FD* is an indicator variable set equal to one if the forecast is issued after passage of Regulation Fair Disclosure in October 2000, and zero otherwise. We include this control for the pre- versus post-Regulation Fair Disclosure (Reg FD) environment based on evidence in prior research that after passage of Reg FD, analysts invest more time gathering information about the firms they cover and that their forecasts are less biased (see, e.g., Mohanram and Sunder (2006) and Drake and Myers (2009)).

In table 12, we present the estimation results for equation (6) for each of the 36 forecast horizons. We find that the book-to-market ratio, sales revenue (size), the forecasted increase in EPS indicator variable, the absolute value of the analysts' forecasted change in EPS, and the *Post FD* indicator variable are all significantly related to the level of analysts' superiority over almost every forecast horizon. In addition, the number of analysts' estimates and the standard deviation of the estimates are significantly related to the level of analysts' superiority in the majority of the forecast horizons. Although several factors (such as the number of analysts and sales) are correlated with one another, each is significantly related to analysts' superiority over the vast majority of horizons. In addition, the most consistent and strongest relation is that the forecasted increase in EPS indicator variable is highly significant at every horizon. For forecasts that are in the same fiscal year as the earnings being forecasted (i.e., FY1 forecasts), the coefficient on the forecasted increase indicator variable is consistently negative, revealing that analysts' forecasts of decreasing EPS are more accurate than random walk forecasts across all forecast horizons. This is true even after controlling for the number of forecasts, variance in those forecasts, size, book-to-market, the absolute forecasted change in EPS, and whether the forecast is made post Reg FD. We also find that the coefficient on the post Reg FD indicator variable is positive and significant in all but 4 of the 36 horizons, suggesting that the regulation has lead to an increase in the accuracy of analysts' forecasts.

5 Conclusion

In this paper, we show that the widely held belief that analysts' forecasts of annual earnings are superior to time-series forecasts is not fully descriptive. Although analysts' earnings forecasts consistently beat random walk earnings forecasts over short windows, for longer forecast horizons, analysts' superiority declines, and at certain horizons, analysts' forecasts are dominated by random walk forecasts. This is especially true for small firms, young firms, thinly followed firms, and when analysts forecast positive or more extreme changes in earnings. We link this finding to stock returns, and show that the market seems to rely on random walk forecasts (or similar simple models of earnings) at longer horizons, but tends towards analysts' forecasts as the forecast horizon becomes shorter.

While our results are not inconsistent with prior literature that concludes that analysts' forecasts are superior to forecasts from time-series models in a general sense, we find that over longer horizons, analysts' forecasts lose their relative superiority to time-series forecasts. In fact, we show that even a simple random walk forecast performs as well, in both an economic and statistical sense, relative to analysts' forecasts. This is important because analysts' forecasts are not available for a large number of firms. Our findings suggest that investors can reasonably rely on random walk forecasts when implementing long-term buy-and-hold valuation strategies, and similarly, researchers interested in phenomena that require longer-term earnings expectations can work with larger samples than those comprised of firms with long-term analysts' forecasts. In addition, because our results suggest that the use of a simple random walk model to form forecasts in securities analysis is feasible, we suggest that declining analyst coverage alleged to have resulted from increased regulation in the securities industry (Mohanram and Sunder 2006) may be less detrimental than some assume.

It is important to note that our results do not refute the results of studies that use analysts' forecasts to proxy for market expectations. Moreover, our finding that random walk forecasts are more accurate than analysts' forecasts over long horizons does not imply that random walk forecasts would improve prediction models of firm value, the cost of capital, or stock returns. We leave these issues for future research.

References

Abarbanell, J. S. 1991. Do analysts' earnings forecast incorporate information in prior stock price changes? *Journal of Accounting and Economics* 14 (2): 147-165.

Albrecht, W. S., L. L. Lookabill, & J. C. McKeown. 1977. The time-series properties of annual earnings. *Journal of Accounting Research* 15 (2): 226-244.

Ali, A., L-S. Hwang, & M. A. Trombley. 2003. Residual-income-based valuation predicts future stock returns: Evidence on mispricing vs. risk explanations. *The Accounting Review* 78 (2): 377-396.

Allee, K. D. 2010. Examining the cost of equity capital benefits of analyst following using time-series forecasts of earnings. Working paper, Michigan State University.

Ball, R., & P. Brown. 1968. An empirical investigation of accounting income numbers. *Journal of Accounting Research* (Autumn): 159-178.

Ball, R., & R. Watts. 1972. Some time series properties of accounting income. *Journal of Finance* 27(3): 663-681.

Bamber, L. S., T. E. Christensen, & K. M. Gaver. 2000. Do we really 'know' what we think we know? A case study of seminal research and its subsequent overgeneralization. *Accounting, Organizations and Society* 25 (2): 103-129.

Belongia, M. 1987. Predicting interest rates: A comparison of professional and market-based forecasts. *Federal Reserve Bank of St. Louis Review,* March.

Bhushan, R. 1989. Firm characteristics and analyst following. *Journal of Accounting and Economics* 11 (2-3): 255-274.

Branson, B. C., K. S. Lorek, & D. P. Pagach. 1995. Evidence on the superiority of analysts' quarterly earnings forecasts for small capitalization firms. *Decision Sciences* 26 (2): 243-263.

Bradshaw, M. T. 2009. Analysts' forecasts: What do we know after decades of research? Working paper, University of Chicago.

Brooks, L., & D. Buckmaster. 1976. Further evidence on the time series properties of accounting income. *Journal of Finance* 31 (5): 1359-1373.

Brown, L. D. 1993. Earnings forecasting research: Its implications for capital markets research. *International Journal of Forecasting* 9: 295-320.

Brown, L. D., R. L. Hagerman, P. A. Griffin, & M. E. Zmijewski. 1987a. An evaluation of alternative proxies for the market's assessment of unexpected earnings. *Journal of Accounting and Economics* 9 (2): 159-193.

Brown, L. D., G. D. Richardson, & S. J. Schwager. 1987b. An information interpretation of financial analyst superiority in forecasting earnings. *Journal of Accounting Research* 25 (1): 49-67.

Brown, L. D., & M. S. Rozeff. 1978. The superiority of analyst forecasts as measures of earnings expectations: Evidence from earnings. *Journal of Finance* 33 (1): 1-16.

Claus, J., & J. Thomas. 2001. Equity premia as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stock markets. *Journal of Finance* 56 (5): 1629-1666.

Clement, M. B. 1999. Analyst forecast accuracy: Do ability, resources, and portfolio complexity matter? *Journal of Accounting and Economics* 27 (3): 285-303.

Clement, M. B., R. Frankel, & J. Miller. 2003. Confirming management earnings forecasts, earnings uncertainty, and stock returns. *Journal of Accounting Research* 41 (4): 653-679.

Collins, W. A., & W. S. Hopwood. 1980. A multivariate analysis of annual earnings forecasts generated from quarterly forecasts of financial analysts and time-series models. *Journal of Accounting Research* 18 (2): 390-406.

Drake, M, & L. A. Myers. 2009. Analysts' accrual-related over-optimism: Do analyst characteristics play a role? Forthcoming, *Review of Accounting Studies.*

Dugar, A., & S. Nathan. 1995. The effects of investment banking relationships on financial analysts' earnings forecasts and investment recommendations. *Contemporary Accounting Research* (12): 131-160.

Easton, P. 2004. P E ratios, PEG ratios, and estimating the implied expected rate of return on equity capital. *The Accounting Review* 79: 73-95.

Easton, P., G. Taylor, P. Shroff, & T. Sougiannis. 2002. Using forecasts of earnings to simultaneously estimate growth and the rate of return on equity investment. *Journal of Accounting Research* 40 (3): 657-676.

Fintzen, D., & H. O. Stekler. 1999. Why did forecasters fail to predict the 1990 recession? *International Journal of Forecasting* 15: 309-323.

Foster, G. 1977. Quarterly accounting data: Time-series properties and predictive ability results. *The Accounting Review* 52: 1-21.

Francis, J., & D. Philbrick. 1993. Analysts' decisions as products of a multi-task environment. *Journal of Accounting Research* 31 (2): 216-230.

Frankel, R., & C. M. C. Lee. 1998. Accounting valuation, market expectation, and cross-sectional stock returns. *Journal of Accounting and Economics* 25 (3): 283-319.

Fried, D., & D. Givoly. 1982. Financial analysts' forecasts of earnings: A better surrogate for market expectations. *Journal of Accounting and Economics* 4 (2): 85-107.

Gebhardt, W. R., C. M. C. Lee, & B. Swaminathan. 2001. Towards an implied cost of capital. *Journal of Accounting Research* 39 (1): 135-176.

Hayn, C. 1995. The information content of losses. *Journal of Accounting and Economics* 20 (2): 125-153.

Hopwood, W. S., & J. C. McKeown. 1982. Evidence on surrogates for earnings expectations within a capital market context. *Journal on Accounting, Auditing and Finance* 5: 339-368.

Hopwood, W. S., J. C. McKeown, & P. Newbold. 1982. The additional information content of quarterly earnings reports: Intertemporal disaggregation. *Journal of Accounting Research* 20: 343-349.

Hribar, P., & N. T. Jenkins. 2004. The effect of accounting restatements on earnings revisions and the estimated cost of capital. *Review of Accounting Studies* 9: 337-356.

Jegadeesh, N., & J. Livnat. 2006. Revenue surprises and stock returns. *Journal of Accounting and Economics* 41: 147-171.

Klein, A., & C. Marquardt. 2006. Fundamentals of accounting losses. *The Accounting Review* 81: 179-206.

Kothari, S. P. 2001. Capital markets research in accounting. *Journal of Accounting and Economics* 31 (1-3): 105-231.

Kross, W., B. Ro, & D. Schroeder. 1990. Earnings expectations: The analysts' information advantage. *The Accounting Review* 65 (2): 461-476.

Lang, M. H., & R. J. Lundholm. 1996. Corporate disclosure policy and analyst behavior. *The Accounting Review* 71 (4): 467-492.

Lee, C. M. C. 1992. Earnings news and small traders: An intraday analysis. *Journal of Accounting and Economics* 15 (2-3): 265-302.

Lee, C. M. C., J. Myers, & B. Swaminathan. 1999. What is the intrinsic value of the Dow? *Journal of Finance* 54 (5): 1693-1741.

Lim, T. 2001. Rationality and analysts' forecast bias. *Journal of Finance* 56 (1): 369-385

Lin, H., & M. McNichols. 1998. Underwriting relationships, analysts' earnings forecasts and investment recommendations. *Journal of Accounting and Economics* 25: 101-127.

Little, I. 1962, *Higgledy Piggledy Growth.* Institute of Statistics, Oxford University Press.

Lorek, K. S. 1979. Predicting annual net earnings with quarterly earnings time-series models. *Journal of Accounting Research* 17: 190-204.

Loungani, P. 2000. How accurate are private sector forecasts? Cross-country evidence from consensus forecasts of output growth. IMF Working Paper No. 00/77, April.

Lys, T., & L. G. Soo. 1995. Analysts' forecast precision as a response to competition. *Journal of Accounting, Auditing, & Finance* 10 (4): 751-765.

Matsumoto, D. 2002. Management's incentives to avoid negative earnings surprises. *The Accounting Review* 77 (3): 483-514.

Mazo, R. 2002. *Brownian Motion: Fluctuations Dynamics and Applications.* Oxford University Press.

McNichols, M., & P. O'Brien. 1997. Self-selection and analyst coverage. *Journal of Accounting Research* 35 (Supplement): 167-199.

Mohanram, P. S., & S. V. Sunder. 2006. How has Regulation FD affected the operations of financial analysts? *Contemporary Accounting Research* 23 (2): 491-525.

O'Brien, P. C. 1988. Analysts' forecasts as earnings expectations. *Journal of Accounting and Economics* 10 (1): 53-83.

Ohlson, J. A., & B. E. Jeuttner-Nauroth. 2005. Expected EPS and EPS growth as determinants of value. *Review of Accounting Studies* 10: 349-365.

Orr, H. 1998. Testing natural selection vs. genetic drift in phenotypic evolution using quantitative trait locus data. *Genetics* 149: 2099-2104.

Richardson, S., Teoh, S. H., & P. D. Wysocki. 2004. The walk-down to beatable analyst forecasts: The role of equity issuance and insider trading incentives. *Contemporary Accounting Research* 21: 885-924.

Salamon, G. L., & E. D. Smith. 1977. Additional evidence on the time series properties of reported earnings per share: Comment. *Journal of Finance* 32 (5): 1795-1801.

Walther, B. R. 1997. Investor sophistication and market earnings expectations. *Journal of Accounting Research* 35 (2): 157-179.

Watts, R. L., & R. W. Leftwich. 1977. The time series of annual accounting earnings. *Journal of Accounting Research* 15 (2): 253-271.

Watts, R. L., & J. L. Zimmerman. 1990. Positive accounting theory: A ten year perspective. *The Accounting Review* 65 (1): 131-156.

Table 1 Prior Literature

Paper	Sample and Time Period	Time-Series (TS) Models and Data Requirements	Outliers	Forecast Horizon	Difference in Forecast Accuracy	Analysts' Superiority Determinants
Brown and Rozeff (1978)	50 firms from 1972 through 1975.	Three TS models using quarterly data, requiring complete data for 20 years.	Winsorized forecast errors at 1.0	One to five quarters ahead.	Median difference in forecast errors between all univariate forecasts and the analysts' forecast is significantly greater than zero.	
Collins and Hopwood (1980)	50 firms from 1951 through 1974.	Four TS models, requiring a minimum of 76 quarters of data.	Winsorized forecast errors at 3.0	One to four quarters ahead.	Four quarters out, analysts' forecast errors are 31.7% compared to the best TS error of 32.9%. One quarter out, mean analysts' forecast error are 9.7% compared to the best TS error of 10.9%.	
Fried and Givoly (1982)	424 firms from 1969 through 1979.	Modified submartingale models, requiring a minimum of 10 years of past data.	Winsorized forecast errors at 1.0	8 months prior to the fiscal end.	Analysts' forecast errors are 16.4% of realized EPS compared to 19.3% for the best TS model.	
Hopwood and McKeown (1982)	258 firms from 1974 through 1978.	Random walk and 7 other TS models, requiring at least 12 years (48 quarters) of data.		One to four quarters ahead.	Four quarters out (annual), absolute analysts' forecasts errors are 22.5% compared to absolute forecast errors of 26.1% for random walk.	Number of days separating TS and analysts' forecast – positive
Brown, Hagerman, Griffin, and Zmijewski (1987)	233 firms from the 1975 through 1980.	3 TS models, requiring a minimum of 60 quarters of data.	Winsorized forecast errors at 1.0	One, two, and three quarters ahead.	Three-quarters-ahead, analysts' forecast errors are 28.7% and TS forecast errors are 33%.	Forecast horizon – negative
Brown, Richardson, and Schwager (1987)	Sample 1: 168 firms from Q1-1977 through Q4-1979.	Quarterly random-walk model.		One, two, and three quarters ahead.	For the one month horizon, the log of the squared ratio of TS to analysts' forecast errors is 0.56.	Firm size – positive; Prior analysts' forecast dispersion – negative

Brown, Richardson, and Schwager (1987)	Sample 2: 168 firms from 1977 through 1979.	Annual random-walk model.		Horizons of 1, 6, and 18 months prior to the fiscal year-end date.	For the one month horizon, the log of the squared ratio of TS to analysts' forecast errors is 1.08.	Firm size – positive; Prior analysts' forecast dispersion – negative
Brown, Richardson, and Schwager (1987)	Sample 3: 702 firms from 1977 through 1982.	Annual random-walk model.		Horizons of 1, 6, and 18 months prior to the fiscal year-end date.	Log of the squared ratio of TS to analysts' forecast errors is 1.01 for the one month horizon.	Firm size – positive; Prior analysts' forecast dispersion – negative
O'Brien (1988)	184 firms from 1975 through 1982.	Two TS models, requiring 30 consecutive quarters of data.	Deleted absolute forecast errors larger than $10	Horizons of 5, 60, 120, 180, and 240 trading days prior to the earnings announcement date.	At 240 trading days (one year), analysts' forecast errors are $0.74 compared to TS forecast errors of $0.96.	Forecast horizon – positive
Kross, Ro, and Schroeder (1990)	279 firms from 1980 through 1981.	Box-Jenkins model, requiring 28 quarters of data.		Last available one-quarter-ahead forecast.	Natural log of 1 + absolute TS error - absolute analysts' error is positive across all industries (ranging from (0.043 to 0.385)).	Earnings variability – positive; *Wall Street Journal* coverage – positive; # of days separating TS and analysts' forecasts – positive
Lys and Soo (1995)	62 firms from 1980 through 1986.	Box-Jenkins model, requiring 20 years of data.	Removed one firm	Up to 8 quarters ahead.	Across all horizons, the mean (median) absolute analysts' forecast error is 4.4% (2.8%) and the mean (median) absolute TS error is 26.8% (1.4%).	Forecast horizon – negative
Branson, Lorek, and Pagach (1995)	223 firms from 1988 through 1989.	ARIMA model, requiring 11 years of complete data.		One quarter ahead.	The median absolute percentage forecast error (Actual - predicted)/actual)) from TS minus analysts' forecasts is 7.22%.	Conditional on the firm being small: earnings variability – positive; firm size – negative

Table 2 Descriptive Statistics

Panel A: Firm Characteristics

	Mean	Median	Q1	Q3
Sales	2,921	410	125	1,504
BTM	0.5823	0.4985	0.3124	0.7391
Age	8.9340	7	3	13
# Analysts	7.5832	5	2	10

The sample consists of all firms with data available 11 months prior to the earnings announcement date. Sales are in $ millions. Book-to-Market (BTM) and Sales are measured as of the end of the base year. Age is measured as the number of prior years for which *I/B/E/S* has recorded annual EPS for the firm. # Analysts is the number of analysts following measured as NUMEST for the statistical period 11 months prior to the report date of annual earnings.

Panel B: Percent of Forecast Errors Greater than the Absolute Value of Reported Earnings

Months Prior to the Earnings Announcement Date	Analysts' Forecasts Errors	Random Walk Errors
Mature firms:		
1 Month	4.9%	16.4%
All firms:		
1 Month	6.4%	16.4%
11 Months	16.5%	19.5%
23 Months	28.8%	23.9%
35 Months	31.9%	25.6%

Panel percentages represent the proportion of forecast errors that exceed 100 percent of realized earnings. In the first row, the sample is restricted to mature firms with at least 10 prior years of annual EPS reported on *I/B/E/S*.

Panel C: Signed Forecast Errors

	Mean	Median	Q1	Q3
Signed Random Walk Errors				
11 Months	0.0020	-0.0052	-0.0156	0.0131
23 Months	-0.0050	-0.0082	-0.0260	0.0180
35 Months	-0.0013	-0.0108	-0.0357	0.0204
Signed Analysts' Forecasts Errors				
11 Months	0.0214	0.0030	-0.0043	0.0224
23 Months	0.0308	0.0104	-0.0044	0.0422
35 Months	0.0359	0.0173	-0.0041	0.0553

Forecast errors are measured as the difference between forecasted and actual earnings scaled by price 11, 23 or 35 months prior to the earnings announcement.

Table 3 Main Results Analysts' Forecast Superiority, Full Sample

Panel A: Based on Annual Updates of Random Walk

FY1			FY2			FY3		
Months Prior	Firm-years	Analyst Superiority	Months Prior	Firm-years	Analyst Superiority	Months Prior	Firm-years	Analyst Superiority
0	36,688	0.0282	12	33,822	0.0134	24	25,418	0.0066
1	73,618	0.0267	13	63,869	0.0118	25	48,196	0.0050
2	73,791	0.0255	14	65,413	0.0105	26	49,347	0.0040
3	73,853	0.0237	15	65,660	0.0089	27	49,452	0.0031
4	73,953	0.0201	16	65,415	0.0066	28	49,293	0.0018
5	74,006	0.0172	17	65,059	0.0050	29	49,167	0.0007
6	74,030	0.0147	18	64,362	0.0038	30	48,769	(0.0000) NS
7	73,935	0.0117	19	63,185	0.0023	31	48,083	(0.0012)
8	73,759	0.0095	20	61,837	0.0013	32	47,301	(0.0019)
9	73,505	0.0076	21	59,738	0.0003	33	46,096	(0.0026)
10	72,630	0.0051	22	56,207	(0.0007)	34	43,869	(0.0035)
11	70,875	0.0035	23	51,163	(0.0014)	35	40,363	(0.0041)

The table reports the mean difference between absolute random walk errors and absolute analysts' forecast errors in the 36 months prior to an earnings announcement. Negative numbers indicate random walk superiority. All errors are scaled by price at the time the analysts' forecast is made and are winsorized at 1. NS Indicates not significant at the 5 percent level, two-tailed. All other values are significant (almost all at $p < 0.0001$).

Panel B: Based on Quarterly Updates of Random Walk

FY1			FY2			FY3		
Months Prior	Firm-years	Analyst Superiority	Months Prior	Firm-years	Analyst Superiority	Months Prior	Firm-years	Analyst Superiority
0	28,332	0.0062	12	25,715	0.0060	24	19,763	0.0012
1	58,314	0.0061	13	51,185	0.0048	25	39,156	(0.0001)
2	58,425	0.0054	14	52,235	0.0035	26	40,141	(0.0013)
3	55,886	0.0058	15	49,960	0.0028	27	38,484	(0.0021)
4	56,006	0.0073	16	49,820	0.0022	28	38,666	(0.0018)^{NS}
5	57,093	0.0066	17	50,588	0.0014	29	39,459	(0.0019)^{NS}
6	54,560	0.0062	18	47,991	0.0009	30	37,520	(0.0022)^{NS}
7	54,628	0.0068	19	47,387	0.0008	31	37,237	(0.0018)
8	55,815	0.0059	20	47,732	0.0003	32	37,852	(0.0016)
9	53,366	0.0053	21	44,733	(0.0001)^{NS}	33	35,630	(0.0004)
10	52,741	0.0054	22	42,586	0.0001^{NS}	34	34,384	(0.0008)
11	52,754	0.0046	23	40,529	(0.0003)	35	33,059	(0.0026)

The table reports the mean difference between absolute random walk errors and absolute analysts' forecast errors in the 36 months prior to an earnings announcement. Negative numbers indicate random walk superiority. All errors are scaled by price at the time the analysts' forecast is made and are winsorized at 1. ^{NS} Indicates not significant at the 5 percent level, two-tailed. All other values are significant (almost all at $p < 0.0001$).

Panel C: Based on Explicit FY3 Forecasts

FY1			FY2			FY3		
Months Prior	Firm-years	Analyst Superiority	Months Prior	Firm-years	Analyst Superiority	Months Prior	Firm-years	Analyst Superiority
0	36,688	0.0282	12	33,822	0.0134	24	17,038	0.0054
1	73,618	0.0267	13	63,869	0.0118	25	28,659	0.0038
2	73,791	0.0255	14	65,413	0.0105	26	25,958	0.0026
3	73,853	0.0237	15	65,660	0.0089	27	22,901	0.0016
4	73,953	0.0201	16	65,415	0.0066	28	19,800	0.0005 [NS]
5	74,006	0.0172	17	65,059	0.0050	29	17,938	(0.0000) [NS]
6	74,030	0.0147	18	64,362	0.0038	30	16,441	(0.0003) [NS]
7	73,935	0.0117	19	63,185	0.0023	31	14,842	(0.0008)
8	73,759	0.0095	20	61,837	0.0013	32	13,831	(0.0008)
9	73,505	0.0076	21	59,738	0.0003	33	12,917	(0.0011)
10	72,630	0.0051	22	56,207	(0.0007)	34	11,496	(0.0016)
11	70,875	0.0035	23	51,163	(0.0014)	35	10,295	(0.0020)

The table reports the mean difference between absolute random walk errors and absolute analysts' forecast errors in the 36 months prior to an earnings announcement. Negative numbers indicate random walk superiority. All errors are scaled by price at the time the analysts' forecast is made and are winsorized at 1. [NS] Indicates not significant at the 5 percent level, two-tailed. All other values are significant (almost all at $p < 0.0001$).

Table 4 Analysts' Forecast Superiority and Firm Age

Panel A: FY1 – 11 Months Prior to RDQE

Firm Age	Firm-years	Analysts' Superiority	RW Forecast Error	Analysts' Forecast Error
1	6,175	0.0018	0.0426	0.0409
2	5,862	0.0015	0.0453	0.0438
3	4,983	0.0014	0.0491	0.0477
4	4,263	0.0031	0.0488	0.0458
5+	49,592	0.0041	0.0347	0.0305

Panel B: FY2 – 23 Months Prior to RDQE

Firm Age	Firm Years	Analysts' Superiority	RW Forecast Error	Analysts' Forecast Error
1	3,914	(0.0056)	0.0539	0.0596
2	3,756	(0.0065)	0.0590	0.0656
3	3,214	(0.0068)	0.0577	0.0645
4	2,802	(0.0049)	0.0541	0.0590
5+	37,477	0.0003	0.0427	0.0424

Panel C: FY3 – 35 Months Prior to RDQE

Firm Age	Firm Years	Analysts' Superiority	RW Forecast Error	Analysts' Forecast Error
1	2,338	(0.0116)	0.0671	0.0756
2	2,387	(0.0126)	0.0652	0.0746
3	2,081	(0.0094)	0.0619	0.0694
4	1,891	(0.0084)	0.0642	0.0697
5+	28,330	(0.0012)	0.0498	0.0491

The table reports the mean difference between absolute random walk errors and absolute analysts' forecast errors in the 36 months prior to an earnings announcement. Negative numbers indicate random walk superiority. All errors are scaled by price at the time the analysts' forecast is made and are winsorized at 1. [NS] Indicates not significant at the 5 percent level, two-tailed. All other values are significant (almost all at $p < 0.0001$).

Table 5 Analysts' Forecast Superiority for Small Firms

Panel A: Small Firms

FY1			FY2			FY3		
Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority
0	7,352	0.0301	12	6,283	0.0104	24	3,527	0.0026
1	14,882	0.0290	13	12,176	0.0091	25	7,158	(0.0002) NS
2	14,909	0.0276	14	12,490	0.0079	26	7,378	(0.0015)
3	14,914	0.0251	15	12,444	0.0061	27	7,383	(0.0024) NS
4	14,974	0.0213	16	12,305	0.0037	28	7,321	(0.0038)
5	14,997	0.0182	17	12,127	0.0019	29	7,273	(0.0048)
6	15,003	0.0153	18	11,852	0.0005 NS	30	7,121	(0.0059)
7	15,010	0.0120	19	11,473	(0.0009)	31	6,928	(0.0071)
8	14,991	0.0094	20	11,022	(0.0019)	32	6,683	(0.0077)
9	14,971	0.0070	21	10,462	(0.0030)	33	6,383	(0.0085)
10	14,758	0.0043	22	9,398	(0.0039)	34	5,818	(0.0096)
11	14,376	0.0022	23	8,161	(0.0047)	35	5,150	(0.0105)

Panel B: Low Analyst Following

FY1			FY2			FY3		
Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority
0	9,949	0.0377	12	8,908	0.0130	24	9,743	0.0059
1	19,810	0.0365	13	16,062	0.0118	25	18,072	0.0037
2	19,863	0.0343	14	16,883	0.0099	26	18,780	0.0025
3	19,896	0.0309	15	17,358	0.0083	27	18,915	0.0012
4	19,966	0.0257	16	17,749	0.0056	28	18,849	(0.0004) NS
5	20,016	0.0212	17	18,153	0.0038	29	18,795	(0.0019)
6	20,099	0.0172	18	18,546	0.0020	30	18,549	(0.0025)
7	20,215	0.0130	19	19,060	0.0000 NS	31	17,996	(0.0041)
8	20,168	0.0097	20	19,515	(0.0012)	32	17,413	(0.0051)
9	20,144	0.0071	21	20,173	(0.0025)	33	16,399	(0.0060)
10	19,755	0.0037	22	21,079	(0.0036)	34	14,886	(0.0073)
11	19,030	0.0012	23	21,483	(0.0042)	35	12,764	(0.0082)

The table reports the mean difference between absolute random walk errors and absolute analysts' forecast errors in the 36 months prior to an earnings announcement. Negative numbers indicate random walk superiority. All errors are scaled by price at the time the analysts' forecast is made and are winsorized at 1. [NS] Indicates not significant at the 5 percent level, two-tailed. All other values are significant (almost all at $p < 0.0001$).

Table 6 Analysts' Forecast Superiority Observations Partitioned by Positive and Negative Forecasted Change in EPS

Panel A: Positive Forecasted Changes in EPS

FY1			FY2			FY3		
Months Prior	Firm-years	Analysta' Superiority	Months Prior	Firm-Years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority
0	22,706	0.0115	12	26,015	0.0059	24	25,314	0.0062
1	46,516	0.0113	13	50,326	0.0049	25	48,012	0.0046
2	47,310	0.0107	14	52,229	0.0039	26	49,171	0.0036
3	48,343	0.0098	15	53,645	0.0029	27	49,310	0.0028
4	49,986	0.0083	16	54,891	0.0016	28	49,181	0.0016
5	51,569	0.0070	17	55,685	0.0008	29	49,066	0.0005 NS
6	53,028	0.0058	18	55,951	0.0002 NS	30	48,689	(0.0002)
7	54,927	0.0044	19	56,044	(0.0007)	31	48,007	(0.0013)
8	56,506	0.0035	20	55,513	(0.0012)	32	47,234	(0.0020)
9	57,816	0.0024	21	54,164	(0.0017)	33	46,042	(0.0026)
10	59,104	0.0010	22	51,572	(0.0025)	34	43,813	(0.0036)
11	59,086	(0.0000) NS	23	47,260	(0.0029)	35	40,322	(0.0042)

Panel B: Negative Forecasted Changes in EPS

FY1			FY2			FY3		
Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority
0	13,982	0.0553	12	7,807	0.0382	24	104	0.0852
1	27,102	0.0531	13	13,543	0.0373	25	184	0.1048
2	26,481	0.0521	14	13,184	0.0364	26	176	0.1083
3	25,510	0.0500	15	12,015	0.0361	27	142	0.1002
4	23,967	0.0449	16	10,524	0.0328	28	112	0.0915
5	22,437	0.0405	17	9,374	0.0298	29	101	0.0849
6	21,002	0.0370	18	8,411	0.0278	30	80	0.0603
7	19,008	0.0330	19	7,141	0.0251	31	76	0.0600
8	17,253	0.0293	20	6,324	0.0227	32	67	0.0514
9	15,689	0.0267	21	5,574	0.0203	33	54	0.0492
10	13,526	0.0234	22	4,635	0.0196	34	56	0.0688
11	11,789	0.0209	23	3,903	0.0168	35	41	0.1060

The table reports the mean difference between absolute random walk errors and absolute analysts' forecast errors in the 36 months prior to an earnings announcement. Negative numbers indicate random walk superiority. All errors are scaled by price at the time the analysts' forecast is made and are winsorized at 1. [NS] Indicates not significant at the 5 percent level, two-tailed. All other values are significant (almost all at $p < 0.0001$).

Table 7 Analysts' Forecast Superiority Observations Partitioned by the Magnitude of the Forecasted Change in EPS

Panel A: The 33% of Forecasts with the Least Extreme Forecasted Change in EPS

FY1			FY2			FY3		
Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority
0	11,355	0.0044	12	12,195	0.0039	24	9,674	0.0025
1	23,178	0.0044	13	22,983	0.0038	25	17,997	0.0023
2	23,433	0.0043	14	23,360	0.0036	26	18,096	0.0017
3	23,851	0.0040	15	23,220	0.0032	27	17,798	0.0013
4	24,359	0.0035	16	22,701	0.0030	28	17,103	0.0009
5	24,512	0.0031	17	22,080	0.0028	29	16,628	0.0011
6	24,915	0.0028	18	21,526	0.0028	30	16,114	0.0015
7	25,348	0.0024	19	20,586	0.0027	31	15,386	0.0018
8	25,358	0.0021	20	19,591	0.0027	32	14,704	0.0016
9	25,588	0.0019	21	18,521	0.0027	33	13,975	0.0023
10	25,396	0.0017	22	16,872	0.0027	34	12,854	0.0024
11	24,480	0.0015	23	14,874	0.0027	35	11,443	0.0021

Panel B: The 33% of Forecasts with the Most Extreme Forecasted Change in EPS

FY1			FY2			FY3		
Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority	Months Prior	Firm-years	Analysts' Superiority
0	14,178	0.0593	12	11,127	0.0275	24	7,794	0.0066
1	27,629	0.0570	13	20,632	0.0237	25	14,711	0.0041
2	27,293	0.0549	14	21,304	0.0207	26	15,300	0.0022
3	26,628	0.0519	15	21,289	0.0172	27	15,513	0.0006 NS
4	25,784	0.0450	16	21,303	0.0119	28	15,792	(0.0016)
5	25,356	0.0385	17	21,499	0.0082	29	16,128	(0.0022)
6	24,567	0.0334	18	21,328	0.0055	30	16,243	(0.0033)
7	23,438	0.0273	19	21,122	0.0020	31	16,430	(0.0043)
8	22,900	0.0221	20	20,974	(0.0002) NS	32	16,507	(0.0042)
9	22,104	0.0177	21	20,413	(0.0024)	33	16,390	(0.0048)
10	21,216	0.0117	22	19,453	(0.0046)	34	15,886	(0.0066)
11	20,745	0.0074	23	18,141	(0.0061)	35	15,094	(0.0069)

Observations are partitioned into thirds based on the analysts' forecasted change in EPS as a percentage of price. The table reports the mean difference between absolute random walk errors and absolute analysts' forecast errors in the 36 months prior to an earnings announcement. Negative numbers indicate random walk superiority. All errors are scaled by price at the time the analysts' forecast is made and are winsorized at 1. [NS] Indicates not significant at the 5 percent level, two-tailed. All other values are significant (almost all at $p < 0.0001$).

Table 8 Market Expectations Random Walk Forecast Error versus Analysts' Forecast Error and Market Returns

Panel A: Based on Annual Updates of Random Walk

$$Return_{T,M} = \alpha + \beta\,(EPS_{T-1} - EPS_T) + \varepsilon_T$$

$$Return_{T,M} = a + b\,(Forecasted\ EPS_{T,M} - EPS_T) + e_T$$

FY1			FY2				FY3			
Months Prior	Firm-years	β/b	Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b	
0	34,601	0.471	12	32,710	0.437		24	24,848	0.841	
1	69,470	0.426	13	62,350	0.587		25	47,490	0.867	
2	70,881	0.414	14	63,729	0.651		26	48,554	0.885	
3	71,313	0.454	15	63,867	0.734		27	48,585	0.916	
4	71,428	0.580	16	63,566	0.829		28	48,413	0.932	
5	71,515	0.640	17	63,203	0.874		29	48,302	0.956	
6	71,596	0.644	18	62,531	0.909		30	47,915	0.987	NS
7	71,574	0.651	19	61,460	0.935		31	47,262	1.031	NS
8	71,485	0.702	20	60,223	0.959		32	46,534	1.049	
9	71,347	0.738	21	58,282	0.995	NS	33	45,401	1.068	
10	70,721	0.730	22	54,919	1.014	NS	34	43,240	1.085	
11	69,243	0.717	23	50,114	1.030		35	39,842	1.102	

In this table, we regress returns on random walk forecast errors and analysts' forecast errors separately. Returns are compounded raw monthly returns from *CRSP*, calculated beginning in the month that the forecast is issued and ending as of the end of the month of the earnings announcement. The first column is the number of months prior to the earnings announcements date that the analysts' forecast is made. The second column is the number of firm-years with sufficient data to calculate forecast errors for both random walk and analysts, and with stock market returns over the horizon. The third column is the ratio of the coefficient on the random walk error to the coefficient on the analysts' forecast error. [NS] indicates that the difference between the estimates of the β and b coefficients is not significantly different at the 5 percent level, two-sided. All other differences are statistically significant.

Panel B: Based on Quarterly Updates of Random Walk

$$Return_{T,M} = \alpha + \beta\,(EPS_{T-1} - EPS_T) + \varepsilon_T$$

$$Return_{T,M} = a + b\,(Forecasted\ EPS_{T,M} - EPS_T) + e_T$$

FY1				FY2				FY3			
Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b		Months Prior	Firm-years	β/b	
0	27,344	0.948	NS	12	25,052	0.995	NS	24	19,667	0.961	NS
1	56,436	0.815		13	50,170	0.987	NS	25	39,011	0.984	NS
2	57,647	0.796		14	51,194	0.956	NS	26	39,983	0.987	NS
3	55,432	0.792		15	48,927	0.949		27	38,307	0.997	NS
4	55,544	0.735		16	48,817	0.911		28	38,446	0.998	NS
5	56,645	0.732		17	49,591	0.919		29	39,277	0.995	NS
6	54,086	0.680		18	47,022	0.932		30	37,318	1.004	NS
7	54,153	0.656		19	46,432	0.953		31	36,996	1.034	
8	55,321	0.710		20	46,839	0.976	NS	32	37,605	1.040	
9	52,924	0.727		21	43,910	0.993	NS	33	35,437	1.050	
10	52,370	0.626		22	41,911	1.002	NS	34	34,230	1.058	
11	52,361	0.589		23	39,915	1.007	NS	35	32,889	1.067	

In this table, we regress returns on random walk forecast errors and analysts' forecast errors separately. Returns are compounded raw monthly returns from *CRSP*, calculated beginning in the month that the forecast is issued and ending as of the end of the month of the earnings announcement. The first column is the number of months prior to the earnings announcements date that the analysts' forecast is made. The second column is the number of firm-years with sufficient data to calculate forecast errors for both random walk and analysts, and with stock market returns over the horizon. The third column is the ratio of the coefficient on the random walk error to the coefficient on the analysts' forecast error. NS indicates that the difference between the estimates of the β and b coefficients is not significantly different at the 5 percent level, two-sided. All other differences are statistically significant.

Table 9 Market Expectations Subsamples Random Walk Forecast Error versus Analysts' Forecast Error and Market Returns

$$Return_{T,M} = \alpha + \beta\,(EPS_{T-1} - EPS_T) + \varepsilon_T$$

$$Return_{T,M} = a + b\,(Forecasted\ EPS_{T,M} - EPS_T) + e_T$$

Panel A: Small Firms

FY1				FY2				FY3			
Months Prior	Firm-years	*β/b*		Months Prior	Firm-years	*β/b*		Months Prior	Firm-years	*β/b*	
0	7,099	0.440		12	6,263	0.629		24	3,522	0.894	
1	14,435	0.360		13	12,141	0.698		25	7,152	0.919	
2	14,695	0.508		14	12,452	0.745		26	7,372	0.953	NS
3	14,847	0.591		15	12,405	0.793		27	7,376	0.967	NS
4	14,906	0.587		16	12,266	0.841		28	7,314	0.979	NS
5	14,927	0.631		17	12,090	0.889		29	7,266	0.988	NS
6	14,934	0.628		18	11,815	0.941		30	7,114	1.009	NS
7	14,944	0.659		19	11,439	0.963	NS	31	6,921	1.071	NS
8	14,923	0.743		20	10,993	0.974	NS	32	6,675	1.086	
9	14,904	0.785		21	10,435	1.023	NS	33	6,376	1.096	
10	14,695	0.815	NS	22	9,373	1.015	NS	34	5,812	1.126	
11	14,323	0.826	NS	23	8,139	1.049	NS	35	5,144	1.137	

Panel B: Low Analyst Following

FY1				FY2				FY3			
Months Prior	Firm-years	*β/b*		Months Prior	Firm-years	*β/b*		Months Prior	Firm-years	*β/b*	
0	8,969	0.562		12	8,190	0.696		24	9,239	0.871	
1	17,936	0.557		13	15,134	0.721		25	17,456	0.888	
2	18,217	0.545		14	15,859	0.760		26	18,086	0.919	
3	18,369	0.631		15	16,277	0.796		27	18,156	0.946	
4	18,462	0.729		16	16,621	0.879		28	18,067	0.959	
5	18,532	0.767		17	16,991	0.897		29	18,034	0.978	
6	18,650	0.720		18	17,396	0.931	NS	30	17,791	1.001	NS
7	18,788	0.757		19	17,966	0.935	NS	31	17,268	1.042	NS
8	18,809	0.822		20	18,478	0.961	NS	32	16,738	1.062	NS
9	18,873	0.851		21	19,209	0.999	NS	33	15,794	1.076	
10	18,653	0.901	NS	22	20,214	1.013	NS	34	14,349	1.091	
11	18,123	0.908	NS	23	20,774	1.033	NS	35	12,323	1.113	

In this table, we regress returns on random walk forecast errors and analysts' forecast errors separately. Returns are compounded raw monthly returns from *CRSP*, calculated beginning in the month that the forecast is issued and ending as of the end of the month of the earnings announcement. The first column is the number of months prior to the earnings announcements date that the analysts' forecast is made. The second column is the number of firm-years with sufficient data to calculate forecast errors for both random walk and analysts, and with stock market returns over the horizon. The third column is the ratio of the coefficient on the random walk error to the coefficient on the analysts' forecast error. ^{NS} indicates that the difference between the estimates of the β and b coefficients is not significantly different at the 5 percent level, two-sided. All other differences are statistically significant.

Table 10 Market Expectations Subsamples Observations Partitioned by Positive and Negative Forecasted Change in EPS

$$Return_{T,M} = \alpha + \beta\,(EPS_{T-1} - EPS_T) + \varepsilon_T$$

$$Return_{T,M} = a + b\,(Forecasted\ EPS_{T,M} - EPS_T) + e_T$$

Panel A: Analysts' Forecasts of Increasing EPS

FY1				FY2			FY3		
Months Prior	Firm-Years	β/b		Months Prior	Firm-Years	β/b	Months Prior	Firm-years	β/b
0	21,676	0.959	NS	12	25,186	1.232	24	21,607	1.129
1	44,354	0.906	NS	13	49,177	1.178	25	41,861	1.117
2	45,611	1.034	NS	14	50,958	1.151	26	43,129	1.114
3	46,747	0.964	NS	15	52,275	1.158	27	43,671	1.114
4	48,353	0.961	NS	16	53,470	1.146	28	44,215	1.107
5	49,930	1.024	NS	17	54,238	1.133	29	44,576	1.106
6	51,402	1.064	NS	18	54,516	1.133	30	44,663	1.112
7	53,308	1.075		19	54,667	1.117	31	44,566	1.127
8	54,921	1.088		20	54,212	1.112	32	44,141	1.128
9	56,301	1.113		21	52,964	1.121	33	43,277	1.135
10	57,728	1.154		22	50,510	1.136	34	41,448	1.152
11	57,891	1.170		23	46,378	1.143	35	38,310	1.160

Panel B: Analysts' Forecasts of Decreasing EPS

FY1			FY2			FY3		
Months Prior	Firm-Years	β/b	Months Prior	Firm-Years	β/b	Months Prior	Firm-years	β/b
0	12,923	0.477	12	7,522	0.177	24	3,239	0.636
1	25,114	0.395	13	13,171	0.368	25	5,627	0.686
2	25,268	0.373	14	12,769	0.448	26	5,423	0.713
3	24,564	0.417	15	11,590	0.540	27	4,912	0.756
4	23,073	0.529	16	10,094	0.677	28	4,196	0.748
5	21,583	0.584	17	8,963	0.726	29	3,724	0.753
6	20,192	0.552	18	8,013	0.755	30	3,250	0.810
7	18,264	0.523	19	6,791	0.785	31	2,694	0.853
8	16,562	0.541	20	6,009	0.813	32	2,391	0.866
9	15,044	0.546	21	5,316	0.840	33	2,122	0.885
10	12,991	0.450	22	4,407	0.831	34	1,790	0.857
11	11,350	0.337	23	3,734	0.840	35	1,530	0.872

In this table, we regress returns on random walk forecast errors and analysts' forecast errors separately. Returns are compounded raw monthly returns from *CRSP*, calculated beginning in the month that the forecast is issued and ending as of the end of the month of the earnings announcement. The first column is the number of months prior to the earnings announcements date that the analysts' forecast is made. The second column is the number of firm-years with sufficient data to calculate forecast errors for both random walk and analysts, and with stock market returns over the horizon. The third column is the ratio of the coefficient on the random walk error to the coefficient on the analysts' forecast error. ^{NS} indicates that the difference between the estimates of the β and b coefficients is not significantly different at the 5 percent level, two-sided. All other differences are statistically significant.

Table 11 Market Expectations Subsamples Observations Partitioned by the Magnitude of the Forecasted Change in EPS

$$Return_{T,M} = \alpha + \beta\,(EPS_{T-1} - EPS_T) + \varepsilon_T$$

$$Return_{T,M} = a + b\,(Forecasted\ EPS_{T,M} - EPS_T) + e_T$$

Panel A: The 33% of Forecasts with the Least Extreme Forecasted Change in EPS

FY1				FY2				FY3			
Months Prior	Firm-Years	*β/b*		Months Prior	Firm-Years	*β/b*		Months Prior	Firm-years	*β/b*	
0	11,398	0.945	NS	12	12,553	0.967	NS	24	10,350	0.961	NS
1	22,489	0.952	NS	13	23,006	0.971	NS	25	18,658	0.969	NS
2	22,944	0.960	NS	14	22,810	0.971	NS	26	18,285	0.967	NS
3	23,211	0.967	NS	15	22,218	0.975	NS	27	17,500	0.970	NS
4	23,571	0.995	NS	16	21,522	0.977	NS	28	16,659	0.973	NS
5	23,804	0.989	NS	17	21,082	0.981	NS	29	16,189	0.975	NS
6	24,157	0.987	NS	18	20,548	0.986	NS	30	15,533	0.978	NS
7	24,524	0.989	NS	19	19,623	0.984	NS	31	14,672	0.978	NS
8	24,334	0.986	NS	20	18,719	0.984	NS	32	13,858	0.982	NS
9	24,264	0.985	NS	21	17,712	0.984	NS	33	13,023	0.984	NS
10	23,747	0.979	NS	22	16,178	0.985	NS	34	11,982	0.991	NS
11	22,880	0.981	NS	23	14,539	0.986	NS	35	10,689	0.990	NS

Panel B: The 33% of Forecasts with the Most Extreme Forecasted Change in EPS

FY1				FY2				FY3			
Months Prior	Firm-Years	*β/b*		Months Prior	Firm-years	*β/b*		Months Prior	Firm-years	*β/b*	
0	12,988	0.475		12	10,651	0.296		24	6,983	0.729	
1	26,091	0.428		13	20,446	0.470		25	13,955	0.764	
2	26,280	0.414		14	21,302	0.546		26	14,806	0.791	
3	26,011	0.454		15	21,406	0.642		27	15,283	0.837	
4	25,071	0.573		16	21,287	0.758		28	15,696	0.854	
5	24,272	0.628		17	21,009	0.804		29	15,950	0.884	
6	23,395	0.615		18	20,751	0.842		30	16,160	0.929	
7	22,294	0.595		19	20,323	0.871		31	16,364	0.989	NS
8	21,723	0.640		20	20,011	0.898		32	16,389	1.010	NS
9	21,079	0.668		21	19,399	0.943		33	16,316	1.029	NS
10	20,607	0.626		22	18,472	0.962	NS	34	16,066	1.044	
11	20,210	0.580		23	16,945	0.980	NS	35	15,035	1.063	

In this table, we regress returns on random walk forecast errors and analysts' forecast errors separately. Returns are compounded raw monthly returns from *CRSP*, calculated beginning in the month that the forecast is issued and ending as of the end of the month of the earnings announcement. The first column is the number of months prior to the earnings announcements date that the analysts' forecast is made. The second column is the number of firm-years with sufficient data to calculate forecast errors for both random walk and analysts, and with stock market returns over the horizon. The third column is the ratio of the coefficient on the random walk error to the coefficient on the analysts' forecast error. ^{NS} indicates that the difference between the estimates of the β and b coefficients is not significantly different at the 5 percent level, two-sided. All other differences are statistically significant.

Table 12 Multivariate Regression of Analysts' Superiority by Months Prior to Earnings Announcement Date

$$Analysts'Superiority_{T,M} = \gamma_0 + \gamma_1\ \#Analysts_T + \gamma_2\ STD_{T,M} + \gamma_3\ BTM_{T-1} + \gamma_4\ Sales_{\ T-1} + \gamma_5\ Forecast\ Increase_{T,M} + \gamma_6\ |Forecast\ \Delta|_{T,M} + \gamma_7 Post\ FD_{T,M} + \varepsilon_T$$

	γ_0	*#Analysts*	*STD*	*BTM*	*Sales*	*Forecast Increase*	*|Forecast Δ|*	*Post FD*
0	0.025	-0.004	0.004	0.009	-0.007	-0.031	0.023	0.003
1	0.024	-0.004	0.002	0.008	-0.006	-0.029	0.022	0.003
2	0.024	-0.003	0.001	0.008	-0.005	-0.029	0.021	0.003
3	0.023	-0.003	0.000 NS	0.007	-0.005	-0.029	0.021	0.004
4	0.023	-0.002	-0.001	0.006	-0.004	-0.028	0.019	0.003
5	0.022	-0.002	-0.001	0.005	-0.004	-0.026	0.017	0.002
6	0.021	-0.001	-0.002	0.005	-0.004	-0.025	0.015	0.002
7	0.019	0.000 NS	-0.003	0.004	-0.003	-0.024	0.013	0.003
8	0.018	0.000 NS	-0.003	0.004	-0.003	-0.022	0.011	0.003
9	0.017	0.001	-0.003	0.003	-0.002	-0.021	0.009	0.003
10	0.016	0.001	-0.003	0.002	-0.001	-0.02	0.007	0.003
11	0.015	0.001	-0.003	0.001	0.000 NS	-0.018	0.005	0.003
12	0.027	0.000 NS	-0.004	0.003	0.000 NS	-0.032	0.013	0.001 NS
13	0.026	0.000 NS	-0.004	0.003	0.001 NS	-0.032	0.012	0.001
14	0.026	0.000 NS	-0.005	0.004	0.001	-0.032	0.011	0.001
15	0.028	0.000 NS	-0.005	0.003	0.002	-0.033	0.01	0.002
16	0.026	0.001	-0.005	0.002	0.002	-0.031	0.007	0.001
17	0.022	0.001	-0.005	0.002	0.003	-0.028	0.005	0.001
18	0.02	0.002	-0.005	0.002	0.003	-0.025	0.004	0.002
19	0.017	0.002	-0.004	0.002	0.004	-0.023	0.002	0.002
20	0.016	0.002	-0.004	0.001	0.003	-0.021	0.001	0.002

21	0.014	0.002	-0.004	0.001	0.004	-0.018	0.000 [NS]	0.002
22	0.014	0.002	-0.004	0.000 [NS]	0.005	-0.018	-0.001	0.002
23	0.012	0.002	-0.004	-0.001 [NS]	0.005	-0.015	-0.001	0.001
24	0.029	0.000 [NS]	0.000 [NS]	0.001	0.002	-0.03	0.006	-0.001
25	0.028	0.000 [NS]	0.000 [NS]	0.002	0.002	-0.029	0.005	-0.001
26	0.029	0.000 [NS]	0.000 [NS]	0.002	0.002	-0.03	0.005	0.000 [NS]
27	0.028	0.001	0.000 [NS]	0.002	0.002	-0.03	0.004	0.001
28	0.029	0.002	0.000 [NS]	0.001	0.002	-0.031	0.002	0.001
29	0.026	0.002	0.000 [NS]	0.001	0.002	-0.029	0.001	0.002
30	0.024	0.002	0.000 [NS]	0.001 [NS]	0.003	-0.027	0.000 [NS]	0.002
31	0.022	0.002	-0.001	0.000 [NS]	0.002	-0.024	-0.001	0.002
32	0.019	0.003	-0.001	0.000 [NS]	0.002	-0.021	-0.002	0.002
33	0.018	0.003	-0.001	-0.001 [NS]	0.002	-0.019	-0.003	0.003
34	0.017	0.003	-0.001	-0.001	0.003	-0.019	-0.004	0.003
35	0.013	0.003	-0.001	-0.002	0.003	-0.014	-0.004	0.003

In this table, we regress analysts' superiority on a number of factors separately for each of the 36 forecast horizons. # Analysts is the number of analysts following measured as NUMEST for the statistical period 11 months prior to the report date of annual earnings. *STD* is the standard deviation of analysts' forecasts for year T earnings as measured in month M. Book-to-Market (BTM) and Sales are measured as of the end of the base year. |*Forecast*Δ| is the absolute value of forecasted change in EPS (i.e., $|Forecasted\ EPS_T - EPS_{T-1}|$) implied by the analysts' forecast of year T earnings as measured in month M. *Post FD* is an indicator variable set equal to one if the forecast is issued after passage of Regulation Fair Disclosure in October 2000, and zero otherwise. [NS] indicates that the coefficient is not significantly different from zero at the 5 percent level, two-sided.

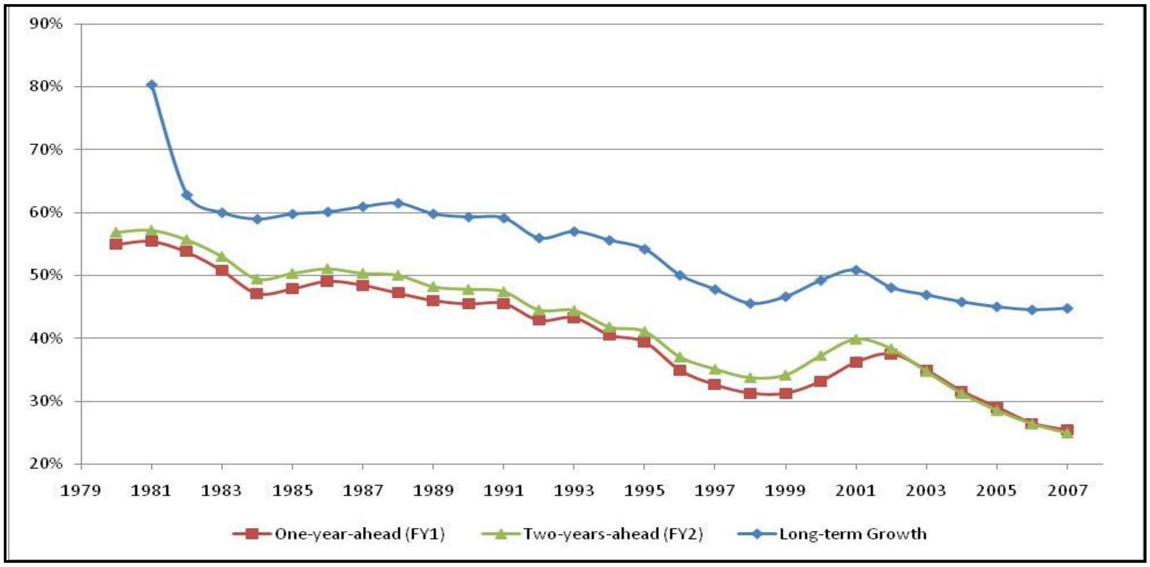

Fig. 1 Percentage of Firms with Available Data in *Compustat* and *CRSP* that are Uncovered in *I/B/E/S*

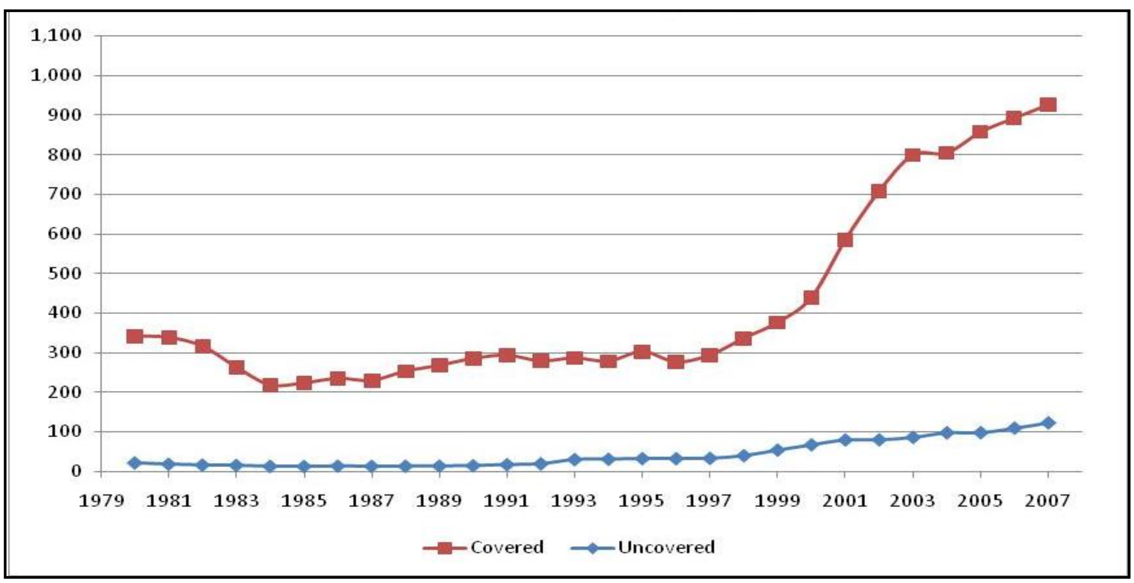

Fig. 2 Median Assets for Firms with and without One-year-ahead Earnings Forecasts in *I/B/E/S*

Analysts' Forecasts:
What Do We Know After Decades of Work?

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SYNOPSIS: Sell-side analysts have been the subject of hundreds of academic studies. In this paper, I offer perspectives on the state of our understanding of analysts based on prior academic research. Additionally, several observations are offered, which question how descriptive certain widely held beliefs are in light of the evidence. These observations on the literature serve as both criticisms and suggestions for future research.

Data Availability: Data used in this paper came from publicly available sources.

* This paper is based on a presentation ("How do analysts forecast earnings, and what do they do with these forecasts?") delivered at a conference sponsored by the Center for Accounting Research and Education at the University of Notre Dame, organized by Peter Easton. I wish to thank Peter for the invitation to address this topic, and also Jim Wahlen and Robert Lipe for encouraging me to transcribe the presentation in this document. Very helpful comments were received from David Weber. All omissions or inaccuracies are my own.

Analysts' Forecasts:
What Do We Know After Decades of Work?

INTRODUCTION

Accountants are interested in the production and use of financial information. Consequently, a large number of academic accounting studies are concerned with whether sophisticated users of financial data understand such information and how they process it. Sophisticated users include sell-side analysts, short sellers, institutional investors, regulators, the financial press, and other market participants. However, a seemingly disproportionate amount of research has focused on sell-side analysts. For example, Brown (2000) highlights over 575 studies on expectations research, most of which are devoted to sell-side analysts' earnings forecasts and stock recommendations. Additionally, as of early 2006 there are over 500 papers listed on ssrn.com that have some emphasis placed on analysts, with most of these being posted after 1995.

Clearly, interest in sell-side analysts is great. As a result of this interest, our understanding of their role in the capital markets has grown over the past several decades during which academics have extensively studied sell-side analysts. Our understanding of sell-side analysts' behavior is not only beneficial to academics interested in a working framework that describes capital markets, but is also of interest to practitioners who operate in these markets. Managers of public companies must be able to communicate with analysts, and in particular, need to understand what information they want and how they process and communicate it. Investors with limited abilities or time to analyze individual securities often rely on the work of sell-side analysts, typically through the analysts' reports. Finally, regulators are keenly interested in the flow of information that facilitates functional and liquid markets, and analysts are one contributor to the critical flow of information.

The purpose of this commentary is to survey what we have learned about analysts' role in the capital markets and to comment on the state of our understanding of their analysts' activities. A primary conclusion is that our focus almost exclusively on earnings forecasts now obstructs the growth in our understanding of analysts' role in the capital markets. Whereas the initial reason researchers began examining analysts' earnings forecasts was to gauge their usefulness as a surrogate for time-series forecasts in studies of the efficiency of the capital markets, interest in analysts has grown such that analysts are perceived as an interesting economic agent in their own right, much like the literature that studies CEO's or CFO's. Thus, it is necessary for the literature to expand its focus on other activities performed by analysts and attempt to better model their incentives than has typically been done.

The literature on analysts is vast, and I make no representation to provide a comprehensive review of the literature. To the extent that I do mention specific studies, the citations are necessarily incomplete, so apologies are requested in advance. Second, to the extent that I mention work that I have done, it is done because it is convenient. Finally, many of the critical comments I have to make about the analyst literature are probably applicable to other streams of literature that purport to describe decision processes of capital market participants.

For those seeking comprehensive reviews of the literature, Givoly and Lakonishok (1984) provide a review of the very early literature, and Brown (1993) reviews literature up through the early 1990s. Discussions by P. Brown (1993), O'Hanlon (1993), Thomas (1993), and Zmijewski (1993) of L. Brown's (1993) literature review are each excellent and almost orthogonal to one another in the points they raise. Zmijewski's (1993) discussion is particularly recommended as relevant to the current state of the literature, which will be revisited later in the paper. Kothari (2001) provides a comprehensive review of the broader capital markets literature, which encompasses studies on analysts. Finally, Ramnath, Rock, and Shane (2008) review the literature since 1993 and provide taxonomy of that research.

Finally, Schipper's (1991) commentary that appeared in this journal did not have as its purpose a comprehensive review of the literature, but it is part of the 'required background reading' on sell-side analysts. The tenor of many of my views on the literature are present in her commentary, and many of the observations made by Schipper (1991) are perhaps even more applicable in assessing the current state of our knowledge of analysts' activities than they were in 1991. Indeed, the title of my paper is derived from an observation that surprisingly little research has been produced since her review that capitalizes on several observations made in that commentary.

The rest of the paper proceeds as follows. The next section discusses how research on analysts fits in with other capital markets research. I then briefly summarize the evolution of the current state of knowledge on analysts. Following this summary, ten observations on regularities and widely held beliefs from this literature are discussed. Many of these beliefs are critiqued and challenged, the result being suggestions for further work. The final section concludes.

WHAT IS IT WE SEEK TO UNDERSTAND?

As mentioned above, there are hundreds of studies performed by academics, aimed at understanding various aspects of analysts' activities. After decades of research, and the associated attention on this research by both academics and practitioners, it seems reasonable to articulate what it is we have been attempting to gain from this collective effort. To provide a context for the discussion that follows, it is worthwhile describing the analyst's role within the capital markets. Figure 1a provides a schematic that describes analysts' activities.

The first aspect of figure 1a that is important is that analysts reach some coverage decision. Analysts generally specialize by industry (Dunn and Nathan 2005), but within an industry analysts (or their employers) must decide what particular stocks to cover. For practical purposes, analysts tend to cover firms within an industry that is biased towards larger firms. Next, for any given stock that is covered, the analyst has access to a wide array of information, including security prices, firm-specific financial and operating information, industry data, and macroeconomic factors. Presumably, the value-added activity of the analyst is, not surprisingly, 'analysis.' Analysis encompasses the process through which the analyst considers a company's strategy, accounting policies, historical financial performance, future prospects for sales and earnings growth, and ultimately a valuation and purchase or sell recommendation. Based on the analysis, the analyst presumably draws a conclusion, most succinctly conveyed by a purchase or sell recommendation, but conclusions are likely more complex than a discrete stock recommendation and are conveyed through various communication channels.

The analysts' conclusions are conveyed to clients, investors, company management, and other market participants via *formal* or *informal* channels. Formal channels are the source of most of the data examined by academics, primarily drawn from analysts' formal reports and morning broker notes – archived by data providers such as Value Line and I/B/E/S. Analysts also give formal presentations to major clients and other investor groups. Similarly, they communicate results of their analyses informally through brokerage client communication, press interviews, industry meetings and conferences, and also by coordinating meetings between institutional investors and the firm managers. The end result is that part of the information communicated to the markets can be assessed *ex post* in terms of earnings forecast accuracy, recommendation profitability, and so on. Underlying this entire process are qualitative factors that affect the information gathering, analysis, and communication processes such as the analyst's ability, incentives, integrity, responsiveness to clients, and other such behavioral effects.

A potential problem for academics attempting to use the body of knowledge generated from research on analysts is demonstrated in figure 1b. For the most part, research methods do not really measure the most interesting part of the schematic, which is the analysts' analysis. This is literally a 'black box' in the figure. However, this is only a potential problem. What academics generally do instead of directly observing the analysts' decision process of analysis is to examine correlations between inputs, outputs, and conditioning variables to understand the analysis process.

A general characterization of the literature is as follows. Outputs extensively studied primarily include earnings forecasts and recommendations. A long line of research simply examines distributional properties of these outputs. As for inputs, researchers have primarily focused on prices and financial statement information. Additionally, recent research has begun to examine whether analyst ability and incentives affect the processing of inputs into forecasts and recommendations. The direction of a typical research study is typically two-way, meaning that the researcher measures a correlation between outputs (i.e., earnings forecasts, recommendations) and some other variable such as stock prices. For example, a typical approach is to examine whether forecasts or recommendations affect stock prices, as well as whether information in prices affects forecasts and recommendations. Other relations typically examined by researchers are unidirectional, examining whether inputs such as the information in financial statements is captured in earnings forecasts or recommendations. Similarly, researchers examine whether proxies for analysts' abilities and incentives affect the accuracy of forecasts and profitability of recommendations.

It should not matter that researchers do not directly observe the activities represented by the black box in figure 1b. In this literature, like many others that are archival in method, outputs from some economic setting are observed to infer how agents have behaved. For example, if forecasts made by analysts are observed and errors are measured, this can be informative about how well the analyst forecasted, which may give insight into the process by which the analyst derived the forecast. Indeed, most current studies designed to examine correlations between analysts' inputs and outputs draw conclusions in terms of what information analysts used, how they used this information, and whether the analysts 'fully used' such information. Unfortunately, the literature has evolved to the point where some penetration of the black box is now necessary to push the literature foreword. The latter part of the paper discusses areas where this might be possible. In summary, however, an important observation on the current state of the analyst literature is that it is almost exclusively based on indirect evidence.

The earliest research on financial analysts developed as a by-product of capital markets research focused on correlations between accounting earnings and stock prices. In that line of research, it was necessary to quantify the amount of 'news' in earnings announcements. Thus, a measure of 'expected' earnings was required, which was compared to earnings actually reported, allowing a quantification of the 'unexpected' component of earnings. In an informationally efficient market, this unexpected news should lead to immediate short-window stock price reactions.

The interest in tests of market efficiency and value relevance of accounting earnings prompted a significant amount of research on time-series modeling of earnings. This literature is extensive and generated much discussion about then new topics in the accounting literature such as earnings response coefficients (ERCs), ARIMA parameters, impulse response functions, and so on. This literature seems to have reached its peak during the late 1970s and early 1980s, at which time researchers gravitated towards using analysts' forecasts of earnings as a substitute for the complex time-series models. This launched a number of studies that ran horse races between analysts' forecasts and time-series models to see which was a better measure of the 'expected' component of earnings. Fried and Givoly (1982) are often given credit as the paper that supported the definitive conclusion that analysts are a better proxy for expected earnings than estimates from time-series models.

Although there remains scattered interest in the time-series properties of earnings, Kothari (2001) recently commented that the literature on time-series modeling of earnings is “fast becoming extinct … [due to] the easy availability of a better substitute: analysts’ forecasts are available at a low cost in machine-readable form for a large fraction of publicly traded firms.” As it became generally accepted that analysts’ forecasts were superior to time-series forecasts, academics became interested in a deeper understanding of analysts’ forecasts and analysts’ themselves. Among academic accountants, analysts were elevated to the status of an economic agent in the capital markets worthy of extensive study. As a result, more recent work attempts to understand analysts’ incentives, conflicts of interest, loss functions, and so on. Prior to briefly reviewing what we know about analysts, it is important to articulate why we *still* study analysts.

The cynical response to why academics still study analysts is that the data are easy and cheap to access. Several companies like First Call, I/B/E/S, Value Line, and Zacks maintain databases on the forecasts and recommendations of thousands of analysts covering thousands of companies, allowing easy use of these data by academic researchers. Perhaps an even more cynical response is that academics very much enjoy analyzing distributions (i.e., means, medians, standard deviations, etc.) and correlations. Analyst data are easily converted into variables that provide interesting distributions and correlations (e.g., signed forecast error, forecast accuracy, ERCs, etc.).

However, the real reason I believe research on analysts continues is that we are interested in how the capital markets function, and examining analysts furthers such knowledge. On one hand, analysts are one of the preeminent market information intermediaries, distributing forecasts and results of their analysis to institutional and individual investors. Thus, examining properties of the analysts’ forecasts and analysis helps us understand the nature of the information that seems to be impounded in stock prices. Another perspective is that analysts are a good proxy for beliefs held by investors in general, so examining properties of analyst data provides insight into how investors in general utilize and process accounting information like financial statements, footnotes, and other financial disclosures. Finally, having elevated analysts to the status of an interesting set of economics agents for detailed study, it is intrinsically interesting to study what analysts do and how they utilize financial accounting information. This final reason explains most of the current work on analysts.

OVERVIEW OF WHAT WE KNOW (OR THINK WE KNOW)

Early survey research and anecdotal evidence suggest that analysts are voracious for all kinds of information (e.g., Tevelow 1971, Chandra 1974, Frishkoff, Frishkoff, and Bouwman 1984, Epstein and Palepu 1999). It is not surprising, however, that in responding to surveys, analysts would tend indicate they always prefer more information to less. It is one thing to simply express a desire for information and another to incur costs to acquire or process it, particularly given a drastic increase in the length of annual reports in recent years (Li 2006). Research on analysts' information needs and preferences is generally regarded as 'descriptive' and is frequently overlooked in empirical research. This is unfortunate, because investigations on what information analysts might use and how they use it should incorporate these findings, if for no other reason than to see if what analysts say is consistent with what it appears they actually do.

Prior to discussing specific observations on generally accepted findings in the literature, a very brief discussion of the evolution of the literature is in order. Figure 2 provides a timeline that highlights general trends in the literature between the 1960s and early 2000s. Let me again emphasize that this is not meant to be a literature review or a comprehensive summary of all primary questions examined. Additionally, figure 2 is employed as a heuristic to place the subsequent discussion of specific observations in context. The reader is directed to the literature reviews identified in the introduction for a full list of questions and a more comprehensive coverage of relevant studies. Also, I will provide very brief highlights of each paper, and the brevity of these oversimplified highlights will necessarily oversimplify and undersell the full contribution of the paper.

As previously discussed, the initial impetus for examining analysts forecasts was the need for a better proxy for earnings expectations to be used in capital markets research. This literature spanned approximately two decades (1968-1987) and appears in the lower left quadrant of figure 2. Brief highlights of notable conclusion from these studies are as follows:

- Cragg and Malkiel (1968): Five-year growth rates forecasted by analysts were no different than simple algebraic extrapolations.
- Elton and Gruber (1972): Annual forecasts by various groups (pension fund, investment advisors, investment bank analysts) were no different between naïve time-series model and each group of analysts.
- Barefield and Comiskey (1975): Analysts' forecasts outperformed a simple no-change earnings forecast model.
- Brown and Rozeff (1978): Analysts' forecasts outperformed 'less naïve' time-series models, especially at longer forecast horizons.
- Fried and Givoly (1982): Using a (then) large sample of panel data (100 forecasts per year for 1969-1979), analysts' forecasts were more accurate than those from various time-series models.
- Brown, Griffin, Hagerman, and Zmijewski (1987): Analysts' forecast superiority over time-series models is due to (i) a timing advantage and (ii) an information advantage.

These studies primarily appeared in finance journals, employed small samples relative to those typical in current analyst research (e.g., hundreds of observations vs. hundreds of thousands), and used research designs that ran horse races between different forecasts. Fried and Givoly (1982) is generally recognized as having provided the most compelling evidence that analysts are superior to time-series models and several years later, Brown et al. (1987) clarified the source of analysts' superiority. Thus, it took almost two decades for researchers to settle comfortably on the conclusion that analysts were better than time-series models at forecasting earnings. However, as discussed below, the economic magnitude of analysts' superiority appears to be small, suggesting that analysts' value to the capital markets likely rests on other roles than simply forecasting earnings.

Building on the research that compared analysts relative to time-series models, research considered refinements and extensions to research designs, with the goal of identifying factors that are correlated with incremental earnings forecast accuracy. These studies also appear in the lower left quadrant of figure 2, and are briefly highlighted below:

- O'Brien (1988): The most recent forecast more accurate than consensus.
- O'Brien (1990): There is no evidence of an analyst-level effect on forecast accuracy, thus no analysts are persistently better than others.
- Stickel (1990): Analysts ranked as an Institutional Investor All-Star are superior forecasters than a matched sample based on forecast recency.
- Brown (1991): The accuracy of the consensus forecast gets more accurate if older forecasts are dropped.
- Sinha, Brown, and Das (1997): Careful controls for forecast recency yield evidence that some analysts are more accurate than others
- Mikhail, Walther, and Willis (1997): Individual analyst experience increases forecast accuracy
- Clement (1999): Analysts' forecast accuracy is increasing in resources and decreasing in complexity.

Thus, the literature moved beyond concern over analysts being superior to time-series models, and began investigating whether some analysts were better than others. As with the previous efforts on analysts versus time-series models, this series of research initially showed no differences, but subsequently found the existence of differences.

Simultaneous to these two sets of studies, research was also considering the association of analysts' forecasting activities with stock prices. Some of the papers highlighted above also examined market reactions to forecasts and earnings surprises. For example,

- Fried and Givoly (1982) and others: Earnings forecast accuracy generally corresponds to a greater association between unexpected earnings based on such forecasts and announcement period stock returns.
- O'Brien (1988): Even though Standard & Poors and I/B/E/S analysts exhibit higher forecast accuracy, they have no stronger association with stock returns than time series models.
- Philbrick and Ricks (1991): The actual definition of what income statement level earnings being forecasted varies across forecast data providers. Value Line forecast errors are the smallest, but various combinations of forecasts and actual earnings across the databases yields the strongest association with announcement period stock returns (e.g., unexpected earnings based on Value Line earnings forecasts and I/B/E/S actual earnings)

This focus on the correlation between analysts-based earnings surprises and stock prices prompted researchers to examine whether analysts' themselves appeared to be efficient with respect to information cues. Such studies tend to examine whether analyst forecast errors are correlated with publicly available information. If a correlation exists, research concludes that analysts are inefficient with respect to such information. This area of research arose around 1990 and continues to the present. Studies shown in the top right quadrant of figure 2 are highlighted below:

- De Bondt and Thaler (1990): Analysts overreact to past earnings changes, resulting in forecasts that are overoptimistic.
- Lys and Sohn (1990) and Abarbanell (1991): Analysts' forecasts underreact to information in prior stock price changes.
- Mendenhall (1991) and Abarbanell and Bernard (1992): Analysts underestimate the serial correlation in quarterly earnings (i.e., post-earnings announcement drift), but to a lesser extent than investors do through stock prices.
- Elliott, Philbrick, and Wiedman (1995): Analysts systematically underreact to their own sequential prior forecast revisions.
- Easterwood and Nutt (1999): Analysts underreact to negative information and overreact to positive information, both reactions leading to analysts being persistently overoptimistic.
- Bradshaw, Richardson, and Sloan (2001): Analysts underreact to predictable earnings patterns following extreme accruals.

As can be seen from the highlights, there does not appear to be a general consensus on whether analysts over- or underreact to information. Either way, the conclusions that are inevitably that analysts are 'inefficient' with respect to numerous pieces of information. This literature is vast, with almost any information cue one can consider having been subjected to an analyst forecast analysis. In the next section, I argue that drawing conclusions about the efficiency of analysts' forecasts based on correlations may not be a strong test of analysts' processing of information.

A second wave of research on the efficiency of analysts attempts to understand whether analysts are internally efficient with respect to their own information outputs. For example, given the correspondence between earnings expectations and value, do analysts efficiently use their own earnings forecasts in valuing companies and generating stock recommendations? Select papers include:

- Bradshaw (2004): Analysts' recommendations are consistent with the use of heuristic valuations incorporating their own earnings forecasts.

- Asquith, Mikhail, and Au (2005): Qualitative information in analysts' reports explains a significant amount of their recommendations, target prices, and the price reaction to these forecasts.
- Loh and Mian (2006): More accurate forecasts lead to more profitable stock recommendations.

This research is noteworthy in that it necessarily considers simultaneously more outputs from the analyst than just the earnings forecasts. As argued in the next section, the literature on analysts suffers from an overemphasis on earnings forecasts relative to other important tasks performed by analysts. In this spirit, many of what some consider to be the most interesting papers on analysts focus on their activities within the context of what their individual and employer-level incentives are. A sampling of these types of papers is as follows:

- Francis and Philbrick (1993): Analysts trade off earnings forecast accuracy for intentional optimism to curry favor with managers.
- McNichols and O'Brien (1997): Analysts' exhibit a self-selection bias such that negative views are censored, and hence unobservable to investors or researchers.
- Lin and McNichols (1998): Analysts exhibit overoptimism when their employers perform investment banking services for covered firms.
- Michaely and Womack (1999): After the quiet period following an initial public offering, affiliated analysts are more likely to issue buy recommendations than are unaffiliated analysts.
- Mikhail, Walther, and Willis (1999): Forecast accuracy is negatively related to analyst job turnover.
- Hong and Kubik (2003): Promotions and demotions at investment banks depend more on optimism than accuracy.
- Gu and Wu (2003) and Basu and Markov (2004): These papers question analysts' loss functions implied by prior work that uses ordinary least squares models to link forecast errors and various measures (implying a quadratic loss function) by proposing that analysts' might prefer to minimize the absolute error instead.
- Raedy, Shane, and Yang (2006): Evidence of analyst underreaction might not be due to them ignoring publicly available information, but due to their asymmetric loss function whereby they incur greater reputation cost

> of forecast errors when the error has the opposite sign as the analysts' prior earnings forecast revision. (i.e., bad to 'overshoot').

Left out of the terse listing of papers in figure 2 are many important studies on (i) the analyst coverage decision, (ii) dispersion and its association with prices and accuracy, (iii) recent changes in the regulatory environment (FD), and (iv) experimental research that has a bearing on decision processes (but I'll defer discussion of these until later). I have also focused the studies listed here on those involving earnings forecasts, which is consistent with the representativeness of earnings forecasts as the focus of most studies in this literature. It is only recently that researchers have begun investigating recommendations (Womack 1996), growth projections (LaPorta 1996), and target prices (Brav and Lehavy 2003).

The overall takeaways from the above discussion is that approximately four decades of research on analysts focuses heavily on the earnings forecasting task, with only recently increasing interest in other activities performed by analysts. Second, the literature moves relatively carefully, with the conclusion that analysts dominate time-series models taking two decades. Third, beginning in the 1990s, much work has been positioned as attempts to understand what information analysts use and how they use it (i.e., the black box). Finally, as research studies have begun to consider activities beyond basic earnings forecasting, it has become necessary (and interesting) to examine analysts' incentives and investigate what role they might play in the empirical regularities developed over the past several decades of research (e.g., optimism). The next section provides ten specific observations that may guide future thought on how to interpret and advance the evidence on analysts' and their roles in the capital markets.

SPECIFIC OBSERVATIONS ON WHAT WE KNOW (OR THINK WE KNOW)

1. Analysts' Forecasts are Optimistic

Of all the regularities regarding sell-side analysts, the understanding that analysts' forecasts are routinely optimistic is the most pervasive. Numerous studies document that analysts' forecasts of earnings end up, on average, being too high. The problem is that this is a sweeping generalization that is not *on average* descriptive. There are at least three qualifications to the generalization that analysts are routinely optimistic. First, what specific forecasts are believed to be optimistic – quarterly earnings per share forecasts, annual earnings per share forecasts, growth forecasts, target prices, sales forecasts, cash forecasts, etc.? The typical explanation for why analysts would be persistently optimistic is that they wish to maintain cordial relationships with management, and optimistic forecasts further this goal. However, with regards to the most prevalent forecast made by analysts, earnings per share, it is difficult to understand why the managers analysts are presumably trying to please would prefer optimistic earnings forecasts. Research makes it clear that forecast errors (measured as actual earnings minus the forecast) are positively correlated with stock price reactions. Thus, forecasts that are too high (i.e., optimistic) create negative forecast errors and negative stock price reactions. On average, managers would seem to desire avoiding such reactions. Indeed, recent evidence in the accounting literature examines the 'meet or beat' phenomenon, which describes the preference by managers and tendency for quarterly earnings announcements to equal or slightly exceed analysts' forecasts. Overall, it appears that at least for short-term forecasts, it is not descriptive to generalize that analysts' forecasts are optimistic.

Second, we seem to be well aware of selection biases in analyst forecast data which form the basis of most of our research. Several studies indicate that analysts seem to follow the old adage, 'if you don't have anything good to say, don't say anything at all.' For example, analysts are reluctant to issue negative recommendations (i.e., 'sell'), and more important, having issued favorable recommendations, they exhibit a reluctance or sluggishness in downgrading recommendations. Even though this is a well-known phenomenon, we apparently disregard knowledge of this selection bias in drawing generalities about the overall level of analyst optimism. In other words, what is interpreted as persistent optimistic bias by analysts could simply reflect the fact that we do not get to observe analysts' pessimistic views. With the recent implementation of NASD 2711 and NYSE 472 rules that, among other things, require analyst research reports to provide benchmark distributions of the brokerage's recommendations and target prices, we may witness an increasing tendency for analysts to convey previously non-communicated pessimistic views.

Finally, a recent body of research on 'street' or 'pro forma' earnings has revealed issues with analyst forecast data that systematically result in optimistically biased forecasts. Firm managers have always highlighted earnings in earnings releases that exclude the effect of various one-time charges. However, this practice escalated beginning in the 1990s, and firms began reporting earnings excluding an even greater number of income statement line items, including, for example, research and development expense, advertising expense, customer acquisition costs, and so on. As these examples suggest, the types of income statement amounts excluded were disproportionately expenses (rather than gains or revenues). Both Bradshaw and Sloan (2002) and Abarbanell and Lehavy (2007) note that forecast data providers such as First Call and I/B/E/S claim to archive actual earnings figures that match the earnings definition being forecasted by the majority of analysts. This is important because the standard practice to calculate analyst forecast error (and hence bias) is to subtract the actual earnings figure from the forecast database from the forecast. Thus, if analysts forecast earnings before the effects of one-time items and research and development expense, then the forecast data providers include the actual earnings before one-time items and research and development expense in the historical database used by academics. Evidence presented in both papers referenced above indicate that the forecast data providers seem to have only gradually adjusted the actual earnings figures on the database to correspond to figures being forecasted by analysts. Both papers identify 1992 as representing a marked shift in the correspondence of actual and forecasted earnings. As much of the research supporting the inference that analysts are persistently optimistic was published using pre-1992 data, the non-correspondence between the actual earnings used in those studies (i.e., bottom-line ‘net income’ from Compustat or one of the forecast data providers) would have systematically resulted in mechanically upwardly biased forecast errors.

2. Analysts’ Forecasts Are Superior to Time-Series Model Forecasts

The second presumably well-known feature of analysts’ forecasts is that they are superior to forecasts from time-series models. Accounting research aimed at modeling earnings using ARIMA models was at its peak during the 1970's and seems to have effectively ended in the mid-1980's. Brown (1993) provides a comprehensive review of much of this literature, which is also briefly summarized by Kothari (2001), who states at the outset (p. 145), "I deliberately keep my remarks on the earnings' time-series properties short because I believe this literature is fast becoming extinct. … [due to] easy availability of a better substitute: analysts' forecasts…."

On one hand, if analysts are efficient in any sense, as has been noted before by Brown et al. (1987), it has to be the case that analysts' forecasts outperform time-series model forecasts, because analysts have both a timing and information advantage. Analysts can easily calculate any anointed time-series model and incorporate that information into their overall information set. Moreover, because time-series models are parsimonious, the information available to analysts is greater than that which can be quantified by any time-series model. Thus, for most forecast dates, an analyst will have an information advantage over a time-series model, which necessarily relies on historical inputs. Nevertheless, it took scores of papers spanning two decades (i.e., approximately 1968-1987) for academic research to conclude that analysts' are superior to time-series models.

Many of the papers that concluded examined the relative forecasting ability of analysts versus time-series models were based on limited samples. For example, Barefield and Comiskey (1975) examine forecasts for 100 firms (and conclude that analysts outperformed a simple random walk forecast) and Brown and Rozeff (1978) examine forecasts for 50 firms (and conclude that most time-series models are outperformed by analysts, particularly at longer horizons). Fried and Givoly (1982) is generally credited as one of the decisive studies in this area, primarily due to the significantly expanded sample size. They examine 100 forecasts per year for the period 1969-1979 and conclude that analysts were superior to time-series models. However, what seems to have been overshadowed in subsequent research that wholly abandoned time-series models is the slim margin by which analysts won this contest. For example, Fried and Givoly calculate absolute forecast errors scaled by actual earnings per share. Their primary results indicate an average absolute forecast error for analysts of 16% relative to a comparable forecast error for two time-series models of 19% and 20%, respectively. Furthermore, results for individual years are often closer than this 3-4% spread. This seems to be a slim margin of victory for analysts given the information and timing advantages they have over the time-series models. The increasing tendency for managers to provide earnings guidance (Matsumoto 2002) and earnings preannouncements (Soffer, Thiagarajan, and Walther 2000) should have increased analysts' superiority over time-series models, but no research of which I am aware has examined this.

If one restricts their consumption of research to accounting journals, then it would appear that research using time-series models is indeed extinct.[1] However, outside of the accounting literature, continued use of time-series forecasts as an alternative and as a benchmark for expert forecasts is prevalent. Indeed, the economics literature largely concludes that time-series forecasts are superior to those of various experts. For example, this is argued to be the case for forecasts of interest rates (Belongia 1987), gross domestic product (Loungani 2000), recessions (Fintzen and Stekler 1999), and business

[1] This is not meant to dispute the conclusion in Kothari (2001) referenced above, which is indeed accurate.

cycles (Zarnowitz 1991). This discrepancy in conclusions across research paradigms is surely related to the unit of analysis. Forecasts of earnings is done frequently with the input of the preparers of the earnings being forecasted, accounting procedures for those earnings are well-understood, and such accounting standards often have the objective of smoothing reported earnings (e.g., pension assumptions). In contrast, items like interest rates, GDP, recessions, and business cycles are not generally subject to the control of an individual manager or follow a prescribed set of rule governing their reporting.

3. Analysts' Forecasts are Inefficient

A large number of research papers spanning the late 1980s through the present examine whether analysts' forecasts are 'efficient.' Similar to how efficient market prices are defined, forecasts are said to be efficient if they incorporate all information available to the analyst. Thus, studies have examined whether analysts incorporate information in past earnings, past market prices, and past forecast revisions; similarly, more recent studies examine whether analysts' forecasts are efficient with respect to information in financial statement information like accruals, management forecasts, and various other financial disclosures.

These studies inevitably draw conclusions about the efficiency of analysts' forecasts. If forecast errors are correlated with some information available *ex ante* to the analyst, the forecast is said to be inefficient with respect to that information. In these cases, the analyst is said to have either 'underreacted' or 'overreacted' to the information. As it turns out, it is rare to witness empirical results which support an efficient use of information. The likely reason is that the data we rely upon is noisy, which inevitably leads to coefficients in empirical tests that are consistent with inefficient use of information.

To clarify this, consider a simple correlation between some analyst variable AV (e.g., annual forecast revision) and some variable of interest X (e.g., information in a quarterly earnings announcement). What the researcher wants to measure is corr(AV, X). However, X is likely measured with error, so the researcher ends up measuring X+error, rather than X. In the typical regression framework, the researcher would estimate the following regression:

$$AV = \alpha + \beta(X+\text{error})+e,$$

leading to the well-known downward bias in the estimate of β (absent other covariates). This downward bias inevitably leads researchers to conclude that, with respect to the information in the phenomenon measured by X, analysts appear to be inefficient. The often overlooked or unstated alternative is that the tyranny of measurement error contaminates our ability to draw strong conclusions regarding analysts' efficiency in processing particular pieces of information.[2]

4. Most Academic Research Ignores Analysts' Multi-Tasking

Of the hundreds of papers published on sell-side analysts, casual empiricism supports the conclusion that most focus exclusively on the earnings forecasting process. Thus, if someone unfamiliar with sell-side analysts went to the accounting and finance

[2] Of course, if the left hand side were some analyst variable, like forecast error, measurement error would tend to bias this simple univariate specification towards a conclusion of efficiency rather than inefficiency. The variety of empirical specifications in the literature and the multivariate (rather than simple univariate) nature of such specifications leads to ambiguous directional predictions regarding measurement error induced bias, but it is reasonable to presume that conclusions that generally fall between full efficient use of information by analysts and complete inefficiency are most likely.

literature to understand what it is they do, they would likely come away with the impression that analysts' primary goal is to issue accurate earnings per share forecasts.

In contrast, consideration of all the roles performed by an analyst suggests that earnings per share forecasts are either tangential or at best just one of many inputs into the analysts' other (primary) activities. Thus, a focus on earnings forecasts by academics is useful to understanding what analysts do, but it is a means not an end. Schipper (1991) noted early on in this literature that, "The general focus of accounting research on accuracy and bias of analysts' earnings forecasts has yet to capitalize on whatever opportunities for insights might arise from considering these forecasts in the context of *what the analyst does* … [emphasis added] (p. 112). Similarly, Zmijewski (1993) argued shortly thereafter that one of the primary areas of research that could further our knowledge are studies that lead to "expansion of our analysis of financial analysts' earnings forecasts to encompass more of what they actually do [emphasis added] (p. 338).

The easiest means of understanding what analysts do is to examine other outputs provided by them. In recent years, research into these other outputs has been growing, with studies on stock recommendations (e.g., Womack 1996), growth projections (e.g., Dechow and Sloan 1997), target prices (e.g., Brav and Lehavy 2003), and risk ratings (Lui, Markov, and Tamayo 2007). A second step is to simultaneously examine these outputs. In other words, if one of analysts' primary objectives is to issue an investment recommendation for a security, then one might examine how earnings forecasts and growth projections are associated with the actual recommendation (e.g., Bradshaw 2004). To gather a quick feel for how active research is along these suggestions, I performed a global search of scholarly articles on ABI/INFORM using various keywords, and found the following:

analyst+earnings	867 articles
analyst+recommendation	149 articles
analyst+long+term+growth	54 articles
analyst+target+price	14 articles
analyst+earnings+recommendation	27 articles
analyst+earnings+long+term+growth	22 articles
analyst+earnings+target+price	3 articles
analyst+earnings+recommendation+long+term+growth	1 article

This is not to suggest that research studies that incorporate more than one analyst variable are superior, but rather, that furthering our understanding of what analysts do and why they do it requires consideration of their portfolio of activities. For example, Loh and Mian (2006) examine whether analysts who provide superior earnings forecasts also provide more profitable stock recommendations, which is a useful question to answer as it pertains directly to the use of earnings forecasts as an input into the arguably more important role of providing investment advice.

Clearly, as discussed above, the overwhelming bulk of research effort appears to focus on earnings forecasts, with some distant level of interest on analysts' stock recommendations. However, beyond that the interest level suggested by the above ABI/INFORM search seems to drop substantially. The simple explanation may simply be that data on these other metrics have not been widely available until recently. For example, whereas large samples of machine-readable earnings forecast data have been available since the early 1970s, data for long-term growth forecasts became available in 1981, for recommendations in 1992, and for target prices in 1996. I return to this theme later when I comment on research that is aimed at understanding what analysts' do with their own earnings forecasts.

5. Analysts are Dominated by Conflicts of Interest

Besides the first point raised regarding the belief that analysts' forecasts are persistently overoptimistic, perhaps the second most prevalent belief is that analysts' behavior is dominated by conflicts of interest. There are at least six sources of conflicts that have been discussed either in the literature or the financial press and that are purported to lead to analysts being overoptimistic. The following briefly lists, in my assessment, the sources of conflict in descending order of the relative emphasis given to them in the literature.

1. Investment banking fees. Managers periodically require access to the capital markets and require the assistance of investment banking professionals, who are frequently employed by firms that also run sell-side research shops. It has long been argued, and recent anecdotal evidence is consistent with the charge, that sell-side research departments are rewarded by the investment banking side of operations for providing favorable coverage of deals that the firm underwrites. Such fees are the fuel of such firms, and typical large placements bring in millions of dollars in fees. Accordingly, sell-side research, which is generally a cost rather than a profit center, is argued to be predisposed towards overoptimism due to the lure of lucrative investment banking fees. This explanation is the most prevalent.

2. Currying favor with management. Distinct from the incentive to appease managers to obtain investment banking business, sell-side analysts have also been accused of being optimistic so that they maintain access to firm managers who are a primary source of information flow (Francis and Philbrick 1993). The recently implemented Regulation FD is meant to curb this practice, and requires that managers refrain from selectively releasing private information. Several studies have attempted to examine whether the implementation of this regulation led to less optimistic forecasts and recommendations by analysts. However, around the same time that Regulation FD was implemented, there were other regulations and market sentiment changes that make it difficult to attribute any observed change in overall analyst optimism to this single piece of regulation (e.g., NYSE 472, Nasdaq 2711, Sarbanes-Oxley, large interest rate changes, severe currency

exchange changes, etc.). Even in the presence of regulation disallowing selective disclosure, there remain reasons for analysts to maintain cordial relations with managers (e.g., simply getting managers to return phone calls, receiving favorable queuing during conference calls, etc.).

3. Trade generation incentives. Another reason analysts are allegedly predisposed towards optimism is that their firms also receive compensation through handling investor trades. As the argument goes, it is easier to convince an investor to buy a stock that they do not own rather than convincing them to sell a stock they must already own. Consequently, to generate investor purchases, analysts will optimistically bias their reports. Recent evidence by Cowen et al. (2006) and Jacob et al. (2008) suggests that incentives for optimistic bias are stronger for trading than for investment banking. They partition investment banks into those that provide investment banking and those that do not, where trading fees are the primary source of revenues, and find that *ex post* optimistic bias is stronger for analysts working at the non-investment bank firms. Also, Jacob et al. (2008) provide some evidence that affiliated analysts are actually more accurate than unaffiliated analysts, and moreover, the differential forecast accuracy appears due to the employment of better analysts and the presence of greater resources.

4. Institutional investor relationships. The close ties between institutional investors and investment banks also provide sources of conflicts for sell-side analysts. As recipients of sell-side research, institutions may take positions in securities based on the information and recommendations conveyed in analysts' formal reports. If an analyst then downgraded a security that an institution had taken a position in, this would clearly be viewed unfavorably by the institution.

5. Research for hire. Given that approximately one-third of public companies have no analyst coverage and over half have at most two analysts, a recent phenomenon in equity research is for companies to pay for research to be conducted on their company. Several consortiums have been established, such as the National Research Exchange and the Independent Research Network. The conflicts of interest in these arrangements are obvious, and it remains to be seen how these will be managed.

6. Themselves. Finally, an often overlooked source of conflicts for analysts is the behavioral bias inherent in the analysis of securities. Similar to the well-documented home bias in the finance literature, the familiarity analysts develop with firms and their managers can lead analysts to develop close affinity to a firm.

> This affinity may then result in analysts seeing the firm 'through rose-colored glasses,' and being incapable of downgrading or forecasting negative outcomes.

Of these six sources of analyst conflicts, the allegation that lucrative investment banking fees is the most cogent. Clearly, regardless of the reputation of a particular investment bank, any right-minded manager would steer clear of their services if sell-side analysts employed by that investment bank held negative views on the firm. Researchers have investigated such effects extensively, and it would appear that most researchers subscribe to the belief that these conflicts have strong effects on observed optimism in analysts' reports. Numerous studies document significantly more optimistic forecasts and recommendations for affiliated analysts (e.g., Lin and McNichols 1998, Michaely and Womack 1999, Dechow, Hutton, and Sloan 2000, Lin, McNichols, and O'Brien (2005).

One explanation other than analysts' deliberate optimism inspired by investment banking business is that among the distribution of investment banks, some will be the employers of analysts that are more optimistic about a particular firm, and it is the selection of those investment banks by the managers that explains the documented optimism by affiliated analysts. Research is unable to distinguish between these two explanations, but Ljungqvist, Marston and Wilhelm (2006) offer some evidence consistent with management choice. They examine investment banking deal flows and find no evidence that overoptimistic recommendations by analysts explain investment banking selection, the main determinant being the strength of prior investment banking relationships. Another explanation is that there is a collective level of heightened positive sentiment about firms that are in the growth stage and hence need external financing. Consistent with this, Bradshaw, Richardson, and Sloan (2006) document that both affiliated and unaffiliated analysts display increasing optimism around periods of external financing and both groups show declines in the levels of optimism subsequent to external financing. This is not inconsistent with investment banking conflicts leading to optimism in research, but it does attenuate the degree of sinister interpretation given to the reports of analysts that are viewed as 'affiliated.' If analysts (as well as other market participants) tend to be optimistic about subsets of firms, it is not surprising that it would be the subset that is growing and seeking external financing.

However, it is instructive to review the economic significance of investment banking conflicts as documented in the literature. Lin and McNichols (1998) provide one of the most compelling studies to review because of the relatively large sample and well-executed matched sample design. They examine approximately 2,400 seasoned equity offerings (SEO) spanning 1989-1994. Primary results examine for significant differences in one-year ahead and two-year ahead earnings per share forecasts, growth projections, and stock recommendations. A summary of their results is as follows:

	One-year ahead EPS	Two-year ahead EPS	Earnings growth	Stock Recommendation
Unaffiliated	0.071	0.098	0.207	3.901
Affiliated	0.070	0.099	0.213	4.259
Difference	-0.001	0.001	0.006	0.358
Significant difference?	No	No	Yes	Yes

Note: EPS forecasts are scaled by price. Earnings growth projections reflect forecasts of annual percentage growth. Stock recommendations are coded on a 1 to 5 scale, with 1 being 'strong sell' and 5 being 'strong buy'.

They find no differences in optimism in earnings forecasts, but they find analysts affiliated with SEOs provide higher growth projections and more positive recommendations. However, the economic significance of the differences do not seem large. For annual earnings growth projections, the difference is less than one percent, and the difference in stock recommendations is approximately one-third of a change in ranking. Adherents to the paradigm arguing that investment banking biases analysts to be optimistic would highlight that the analysts that are unaffiliated are almost as optimistic as the affiliated analysts because they too were using research to court the managers for the investment banking business, which is in conflict to the evidence discussed earlier in papers like Jacob et al. (2006).

6. Limited Evidence Exists Regarding What Analysts Do with Their Own Forecasts

It is presumed that analysts are sophisticated and their analyses are internally consistent. However, very little research has examined their outputs in a multivariate setting. For example, research has examined analysts' forecasting abilities extensively, and there have been moderate efforts to understand their recommendation abilities. Clearly, recommendations should be linked in some manner to analysts' valuations, and we believe from many capital markets studies (i.e., Ball and Brown 1968, etc.) that earnings expectations are positively correlated with prices. Thus, rational behavior by analysts would mean that their own earnings forecasts are correlated with their valuations that provide the basis for their stock recommendations.

Francis and Philbrick (1993) provided the earliest systematic study of the interplay between analysts' various forecasts. Although their sample prevents an examination of how individual analysts use their own forecasts. Nevertheless, their study is one of the first to attempt to understand how analysts incorporate specific information into their forecasts. They examined Value Line analysts, who issue earnings forecasts but include in their reports a ‘timeliness ranking’ of a stock, akin to an individual analyst’s stock recommendation but prepared by other analysts at Value Line. They hypothesized that analysts would attempt to curry favor with managers by diffusing unfavorable timeliness rankings by optimistic forecasts, and they conclude that Value Line analysts appear to behave in this manner.

Another early study that attempted to directly examine the within-analyst correlation of various outputs is Bandyopadhyay, Brown, and Richardson (1995), who examine analysts’ target prices and earnings forecasts. Based on the presumption that analysts use their own forecasts in deriving stock valuations, they hypothesize that both one-year ahead and two-year ahead earnings forecasts will be correlated with analysts target prices (i.e., valuations), and that the correlations will be stronger for longer horizon forecasts. Indeed, they document R^2s of approximately 30% (60%) when correlating changes in target prices with changes in one-year ahead (two-year ahead) earnings forecasts. Similarly, Loh and Mian (2006) find that analysts with more accurate earnings forecasts provide more profitable stock recommendations, consistent with analysts using their own forecasts as inputs into their valuations and recommendations.

Recently, there seems to be a growing understanding of the benefits of understanding analysts’ use of information, and attempts to measure within-analyst correlations of data are becoming more common. For example, Bradshaw (2002) performed a content analysis and found that analysts’ valuations are almost always based on various earnings-multiple heuristics, and Bradshaw (2004) documented that researcher-generated recommendations based on simple residual income valuations using analysts' earnings forecasts as inputs outperform the analysts' recommendations that are based on heuristics. Similarly, Barker (1999) and Asquith, Mikhail, and Au (2005) document a high degree of reliance by analysts on qualitative factors in communicating their analyses, supplementing their heuristic use of earnings forecasts to assess valuations of firms. Given increasing availability of line item forecasts other than earnings, there is also an increasing interest in the internal consistency of those measures as well. For example, Ertimur, Mayew, and Stubben (2008) examine the multiple-level forecast accuracy of analysts that provide disaggregated forecasts (i.e., sales and earnings).

The trend towards research that simultaneously considers multiple analyst outputs is a step in the right direction if our goal is to increase our knowledge of analysts using large sample databases. One of the common objectives of research on analysts is to provide evidence that allows us to peer inside the decision-making processes they follow. However, though there are benefits from the typical archival empirical approach, the methodology is necessarily limited in its ability to garner insights into how analysts make decisions. Alternatively, research methodologies that work with data other than the databases provided by I/B/E/S and other providers are likely to provide complementary approaches. The next two sections expand on these

7. We Think We Know *How* Analysts Forecast

As the literature on analysts has grown, researchers have moved beyond straightforward investigations of distributional properties of forecast errors and profitability of analysts' recommendations. The tenor of most studies is that the researchers are interested in *how* analysts perform their tasks. However, with few exceptions, none provide direct evidence on *how* analysts go about generating forecasts or making stock recommendations. The problem appears to be a preference for archival research, which is subject to data and methodological constraints. Thus, researchers tend towards similar approaches and typically regress forecast errors on different independent variables to explain forecast errors. Some papers attempt to provide indirect evidence, but the nature of these analyses limits the strength of conclusions we can draw about analysts' actual decision processes.

The typical research design adopted when a researcher holds some hypothesis about how analysts use some information signal is to estimate a regression of analyst forecast error on the information variable,

$$\text{Forecast Error} = \alpha+\beta X + e,$$

where X is the variable of interest. As summarized in figure XX, right-hand side variables have included past earnings changes, past price changes, analysts' forecast errors, income statement line items, balance sheet line items, financial statement footnote information, management forecasts, macroeconomic variables, and so on. From these econometric analyses, conclusions are drawn as to whether the analyst incorporated the information captured by the variable X in their earnings forecast process.

Such a research design is a study of associations, not behavior. However, it has become prevalent to draw conclusions regarding analysts' behavior from these tests. Notwithstanding the fact that the combination of the research designs and the conclusions do not actually speak to analysts' behavior, these results do not map into the way that forecasting is covered in most financial statement analysis courses and textbooks. This suggests that either the research designs that are utilized in an attempt to see into the forecasting process or the pedagogical approach to prospective analysis needs revision. At a minimum, it is important for researchers to be careful about drawing strong conclusions about analysts' behavior based only on data that can be quantified and used as inputs in a specification like that above.

One alternative is to continue the trend in simultaneously examining multiple analyst forecasts and other information, as discussed earlier. Though limited by the research design that relies on archival data, this approach allows extended insights into statistical associations. Combined with prior findings of associations between forecast errors and various information signals, multivariate analyses of analysts' outputs can address numerous interesting questions (e.g., does forecasting cash flows lead to more accurate forecasts, more profitable recommendations, and so on). The second alternative is to embrace alternative research methodologies, discussed next.

8. Empiricists Have Traditionally Not Embraced Alternative Methodologies (but This is Changing)

As noted above, the primary methodology employed in the analyst literature is the empirical analysis of archival data. With a few exceptions, only recently have other methodologies received more attention in the literature. A likely explanation for the disproportionate focus on analysis of archival data is that it is much less costly to download a panel of I/B/E/S data than it is to conduct an experiment or perform a content analysis of a distribution of analyst reports. This explanation mirrors the likely explanation for the disproportionate analysis of earnings forecast data relative to other analyst outputs for which data availability is lower, such as risk ratings and target prices.

An early paper by Larcker and Lessig (1983) is a good example of the limitation of statistical analysis of archival data. In this study, Larcker and Lessig perform an experiment with 31 subjects who were asked to make buy or no-buy decisions for 45 stocks. They were interested in the competing ability of linear modeling (i.e., regression analysis) and retroactive process tracing (i.e., ex post interviews of subjects) to accomplish two objectives: (i) predicting subjects buy and no-buy decision and (ii) identifying the relative importance of various information cues used by the subjects. These objectives continue to map very well into those of many analyst studies that employ archival data.

They found that both linear models and process tracing performed reasonably well at predicting the buy and no-buy decisions of the subjects. However, there were frequent differences between the two approaches in identifying relative cue importance to the subject's buy and no-buy decisions. These findings lead the authors to conclude that if the goal of a research study is the *prediction of a judgment decision*, then both approaches appear valid, and lower cost and complexity would favor linear modeling. However, if the goal of a research study is *to understand what information is used and how it is used*, a technique like retroactive process tracing seems necessary. This point cannot be emphasized enough, as it bears directly on the 'black box' in figure 1b.

The current shortcoming of the literature on sell-side analysts is our lack of understanding of what goes on inside the black box of what an analyst actually does. Fortunately, there is a growing use of alternative methodologies that complement research that uses linear models. Alternative approaches to understanding analysts' activities include surveys and interviews, experiments, rigorous content analysis approaches, and focused analysis of representative firms). Clearly, alternatives to linear modeling also have weaknesses (i.e., surveys risk biased responses, experiments have difficulty replicating complex unstructured tasks, content analysis only has access to the final communication medium rather than the process itself, analyzing a single brokerage firm may have no external validity, etc.). For such reasons, these approaches are to be viewed as complementary. Together, consistent evidence across alternative methodologies increases validity of research conclusions and is necessary for this literature to progress.

The popularity of the recent survey of managers by Graham, Harvey, and Rajgopal (2005) is testament to the level of potential interest in the results of a survey of financial executives. Although there are a number of various surveys of financial analysts, most are relatively limited in scope or geography.[3] A notable exception is a survey by Block (1999), who surveyed members of the Association for Investment Management and Research (AIMR). His survey was broadly focused and queried analysts on their uses of valuation models, importance of financial inputs, bases for recommendations, various opinions regarding market efficiency and dynamics. The most remarkable finding in his survey is that analysts overwhelmingly do not emphasize present value models to value firms. Additionally, he found that analysts do not pay much attention to dividend policy, they focus more on the long-term prospects than near-term quarterly results, and analysts believe that skilled portfolio managers can beat the market.

[3] For example, surveys have focused on analysts' opinions of cash flow accounting (McEnroe 1996) and forecast revisions (Moyes, Saadouni, Simon, and Williams 2001), and have been conducted in various international markets including Saudi Arabia (Alrazeen 1999), Japan (Mande and Ortman 2002), Belgium (Orens and Lybaert 2007), and China (Hu, Lin, and Li 2008).

As noted above, surveys provide useful insights, but a weakness is the possibility that respondents do not truthfully report. However, as also noted above, if this survey evidence is combined with alternative research methodologies and the results consistently point towards the same conclusion, concerns over threats to validity can be minimized. As an example of how a conclusion can be compelling based on the collective results from studies using alternative methodologies, consider the conclusion in Block (1999) that analysts do not rely very much on present value models. This could be due to some form of non-response bias, a miscommunication of what was meant by present value techniques, or analysts' concerns that their approaches are proprietary and they bias their responses. However, subsequent studies that adopted content analysis (Bradshaw 2002) and linear modeling (Bradshaw 2004) provide uniformly consistent results that analysts indeed do not appear to make stock recommendations consistent with present value-based models.

Published surveys on analysts are relatively rare, as are content analyses and focused studies of individual brokerage firms. Moreover, those that are published appear to be concentrated outside of what are typically considered 'top-tier' journals. This is unfortunate, because other than my own personal interactions with analysts and users of analysts' information, where most of my knowledge of analysts has been obtained, I have learned a great deal from reading these studies. On an optimistic note, research utilizing experimental research methods is much more common and seems to be increasingly acceptable to top-tier journals. Many of these types of studies employ undergraduate or graduate students as subjects, but it is becoming increasingly common to see actual analysts serving as subjects. For example, Libby et al. (2008) employ a sample of 81 experience analysts and examine the tension between maintenance of relationships with firm managers and optimism and pessimism in earnings forecasts. Perhaps more interesting than the actual experimental results, the post-experiment subject interviews provide insights into how analysts are aware of the optimism-to-pessimism pattern in earnings across fiscal periods, but believe this pattern helps them receive preferential treatment in conference calls. Again, echoing the theme that multiple research designs can be combined to increase the validity of a research conclusion, the evidence in Libby et al. (2008) regarding analysts' desire to receive preferential or favorable treatment in conference calls (even in a post-Regulation FD environment) is also shown by Mayew (2008), who extracted data from conference call transcripts. His archival empirical study also confirms that analysts' with optimistic research on a company get more attention during conference calls. Together the Mayew and Libby et al. studies give increased comfort that analysts are indeed still concerned about currying favor with managers.

A final trend that is serving to make research on analysts more cohesive across methodologies is a growing prevalence of accounting academics properly trained in experimental research techniques. Moreover, this is accompanied by the gaining acceptance of 'behavioral finance' research, which is incorporating psychology research on decision making. The majority of experimental accounting research relies on similar theories (Koonce and Mercer 2005). Further, researchers appear to be realizing that certain methodologies are suited for specific research questions. For questions which arise around situations of decision-making and information processing, experiments seem useful because of their ability to minimize confounding 'real-world' variables and manipulate the variables of interest (Bloomfield, Libby, and Nelson 2002).

9. Academics May Be Focusing Too Much on the Least Important Activities

As has been noted, the vast majority of research on analysts is focused on their ability to forecast earnings. The early literature pitted analysts against time-series forecasts, then gravitated towards identifying superior analysts with more accurate earnings forecasts. Recently, researchers have been simultaneously considering the interplay among various analyst outputs (e.g., earnings and recommendations), but the anchor of the analysis remains earnings forecast accuracy. If an individual with no understanding of sell-side analysts were to attempt to understand what they do based on a reading of our academic literature, that person would surely conclude that one of the things most important to analysts is their earnings forecasts. I contend that this would be a gross mischaracterization of the analyst's job function, and hence his/her incentives. I believe such a view characterizes that of many academics, and as a result impedes our ability to further our understanding of sell-side analysts.

To provide some perspective on the importance of earnings forecasts, table 1 provides a panel of data reflecting traits of analysts ranked in order of importance by respondents to the annual Institutional Investor Ranking of analysts. This ranking is the first-order determinant of an analyst's compensation (Groysberg, Healy, and Maber 2008). Thus, if we assume that analysts wish to maximize their compensation, then providing institutional investors with what they need, as reflected in the rankings, will be descriptive of aspects of their job towards which they devote significant effort.

The data in table 1 span 1998-2005, and show that the number of criteria reported in the rankings each year range from a low of eight items in 1998 to fifteen during 2002-

2004. The rankings indicate that the most important trait valued by institutional investors is industry knowledge, which has been the number one trait for all years of the survey. Clearly, analysts' are valued for their ability to see individual companies within the context of the industry as a whole. Other traits appear relatively stable in their importance across recent years, with two exceptions – earnings forecast and stock selection. Whereas earnings forecasts were ranked fifth in importance in 1998, they are ranked last in the most recent year in table 1. Similarly, stock selection was ranked as high as second in 1998, but has fallen to second-to-last in the last year of table 1. As a statistical measure of whether these changes are meaningful, table 2 provides a simple test of whether the changes in the ranking are significant. The mean change in rank is calculated for the annual changes in ranking, where rankings are converted to a [0,1] interval.[4] For both earnings forecast and stock selection traits, the average change in ranking across 1998-2005 is significantly negative, indicating that both measures have become less important to institutional investors, and presumably less important to analysts, relative to other characteristics. Of course, one explanation is that earnings forecasts and stock selection are viewed as necessary by institutional investors, and presumably by analysts as well, but that other aspects of their jobs are relatively more important. This is consistent with earnings forecasts and stock selection being important; however, as suggested above, it also is consistent with these aspects of an analyst's job being relatively unimportant when their roles are viewed in context.

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[4] Each ranking is converted to RANK' to span the interval [0,1] as

$$RANK' = ((NRANK+1)-RANK)/NRANK,$$

where NRANK is the number of characteristics listed in the annual ranking and RANK is the numerical rank of the characteristic. Characteristics ranked in other years but not on the ranking in any individual year are assigned RANK'=0.

I believe that part of our focus on earnings forecast accuracy is driven simply by the wide availability of data on analysts' earnings forecasts and actual earnings and a predilection of accounting academics towards the investigation of phenomena that can be quantified. Measuring the accuracy of an earnings per share forecast suits our comfort zone. Similarly, measuring recommendation profitability is also appealing, despite numerous alternative measurement criteria decisions (i.e., return accumulation period, raw or adjusted returns, etc.). What is a lot more difficult to measure is the measurement of important aspects of the analysts' job function such as industry knowledge, assessment of firm strategy or quality of management, accessibility, the tone of their contextual reports, and so on. Nevertheless, researchers in this area must be open to alternative methodologies and data if the literature on analysts is to proceed in a meaningful way.

10. Analyst Data are Indirectly Helpful to Other Work Examining the Functioning of Capital Markets

In contrast to other critical points raised above, the following point is a commendation of research on analysts. As noted above, research on analysts has become pervasive with the elevation of analysts to a status of interesting economic agent worthy of individual examination. Comments numbered one through nine focus on this aspect of analysts. There is another very useful role of research using analyst data, which is that these data can provide insights into questions that arise in other capital market studies. Specifically, the identification and examination of asset pricing anomalies is an active area of research in the finance and accounting literatures. In the typical study, researchers demonstrate that future stock returns are systematically associated with information available *ex ante* (e.g., past earnings changes, past price changes, accounting accruals, insider trading, etc.). Such studies are always subject to the 'bad model' criticism, which argues that the correlation reflects an incomplete control for priced risk rather than a true asset pricing anomaly that can be costlessly arbitraged away.

Because of the difficulty of convincingly capturing priced risk (or priced risk factors), an alternative to addressing the bad model criticism is to use a research design that skirts the risk issue. Whereas capital market anomalies all pertain to how investors incorporate information into prices, and analysts' roles include the incorporation of information into their research, it is frequently useful to examine documented anomalies in the context of analysts' research. For example, as an extension of the seminal studies by Bernard and Thomas (1989, 1990) on the post-earnings announcement drift anomaly, Abarbanell and Bernard (1992) examine whether analysts incorporate the autocorrelation structure documented in the Bernard and Thomas papers into their forecasts. They find that similar to market prices, analysts underreact to prior earnings changes. Accordingly, critics that dismissed the post-earnings announcement drift anomaly as a mis-measurement of risk must also explain why the phenomenon shows up in a non-asset pricing setting. Similar analyses have been conducted with respect to the glamour anomaly (Frankel and Lee 1998), the January effect (Ackert and Athanassakos 2000), and the accruals anomaly (Bradshaw, Richardson, and Sloan 2001; Barth and Hutton 2004),

CONCLUSION

In summary, we have learned a lot about analysts and their role in capital markets. However, research has focused on a narrow set of analyst outputs to draw conclusions regarding what analysts do and how they do it. Further, this research is largely limited to variables that can be quantified, there is limited but growing investigation of the co-determination of analysts' outputs, and there is a disproportionately large emphasis on what is likely a relatively unimportant activity – forecasting earnings. For this literature to progress, research that provides any kind of penetration of the 'black box' of how analysts actually process information should be encouraged, even if methods or approaches are imperfect.

This literature finds itself at an interesting juncture of time, with numerous recent shocks to the capital markets (e.g., Regulation FD, $1.4 billion SEC/state regulator settlement against ten large investment banks, a new independent brokerage research requirement, disclosure requirements of NASD Rule 2711 and NYSE Rule 472, and a trend towards paying for analyst coverage). Thus, there are numerous opportunities for the literature to progress if researchers move beyond the current prevailing paradigm of performing univariate analyses of earnings forecasts. Zmijewski (1993) discussed a literature review by Brown (1993), and echoed similar sentiments to those offered here. In commenting on the state of the literature at that time, he stated, "That is not to say, however, that researching the 'same old' issues using the 'same old' methodologies will be informative.… It will, naturally, become more and more challenging to identify interesting questions and to design interesting and meaningful empirical tests."

REFERENCES

Abarbanell, J. 1991. Do analysts' earnings forecasts incorporate information in prior stock price changes? *Journal of Accounting and Economics* 14 (2): 147-165.

Abarbanell, J., and B. Bernard. 1992. Tests of analysts' overreaction/underreaction to earnings information as an explanation for anomalous stock price behavior. *The Journal of Finance* 47 (3): 1181-1207.

Abarbanell, J., and R. Lehavy. 2007. Letting the 'Tail Wag the Dog'': The debate over GAAP versus street earnings revisited. *Contemporary Accounting Research* 24 (3): 675-723.

Abdolmohammadi, M., R. Simnett, J. Thibodeau, and A. Wright. 2006. Sell-Side analysts' reports and the current external reporting model. *Accounting Horizons* 20 (4): 375-389.

Ackert, L., and G. Athanassakos. 2000. Institutional investors, analyst following and the January anomaly. *Journal of Business Finance and Accounting* 27 (3-4): 469-485.

Alrazeen, M.H., 1999. “The Quality of Annual Financial Reports of Saudi Corporations: Users' Perceptions and Companies' Practices.” Ph.D. Thesis, Cardiff University.

Asquith, P., M. Mikhail, and A.Au. 2005. Information content of equity analyst reports. *Journal of Financial Economics* 75 (2): 245-282.

Ball, R., and P. Brown. 1968. An empirical evaluation of accounting income numbers. *Journal of Accounting Research* 6 (2): 159-178.

Bandyopadhyay, S., L. Brown, and G. Richardson. 1995. Analysts' use of earnings forecasts in predicting stock returns: Forecast horizon effects. *International Journal of Forecasting* 11 (3): 429-445.

Barefield, R., and E. Comiskey. 1975. The accuracy of analysts’ forecasts of earnings per share. *Journal of Business Research* 3: 241-251.

Barker, R.. 1999. Survey and market-based evidence of industry-dependence in analysts’ preferences between the dividend yield and price-earnings ratio valuation models.” *Journal of Business Finance and Accounting* 26 (3-4): 393-418.

Barth, M., and A. Hutton. 2004. Analyst earnings forecast revisions and the pricing of accruals. *Review of Accounting Studies* 9: 59-96.

Basu, S., and S. Markov. 2004. Loss function assumptions in rational expectations tests on financial analysts' earnings forecasts. *Journal of Accounting and Economics* 38: 171-203.

Belongia, M. 1987. Predicting interest rates: A comparison of professional and market-based forecasts. *Federal Reserve Bank of St. Louis Review* March: 9-15.

Bernard, V., and J. Thomas. 1989. Post-earnings-announcement drift: delayed price response or risk premium? *Journal of Accounting Research* 27 (3): l-36.

Bernard, V., and J. Thomas. 1990. Evidence that stock prices do not fully reflect the implications of current earnings for future earnings. *Journal of Accounting and Economics* 13: 305-340.

Block, S. B. 1999. A study of financial analysts: Practice and theory. *Financial Analysts Journal* 55 (4): 86–95.

Bloomfield, R., R. Libby, and M. Nelson. 2002. Experimental research in financial accounting. *Accounting, Organizations and Society* 27 (8): 775-810.

Bradshaw, M., S. Richardson, and R. Sloan. 2001. Do analysts and auditors use information in accruals? *Journal of Accounting Research* 39 (1): 45-74.

Bradshaw, M. 2002. The use of target prices to justify sell-side analysts' stock recommendations. *Accounting Horizons* 16 (1): 27-41.

Bradshaw, M., and R. Sloan. 2002. GAAP versus the street: An empirical assessment of two alternative definitions of earnings." *Journal of Accounting Research* 40 (1): 41-66.

Bradshaw, M. 2004. How do analysts use their earnings forecasts in generating stock recommendations?" *The Accounting Review* 79 (1): 25-50.

Bradshaw, M., S. Richardson, and R. Sloan. 2006. The relation between corporate financing activities, analysts' forecasts and stock returns. *Journal of Accounting & Economics* 42 (1-2): 53-85.

Brav, A., and R. Lehavy. 2003. An empirical analysis of analysts' target prices: Short-term informativeness and long-term dynamics. *The Journal of Finance* 58 (5): 1933-1968.

Brown, L., and M. Rozeff. 1978. The superiority of analyst forecasts as measures of expectations: Evidence from earnings. *The Journal of Finance* 33 (1): 1-16.

Brown, L., P. Griffin, R. Hagerman, and M. Zmijewski. 1987. Security analyst superiority relative to univariate time-series models in forecasting quarterly earnings. *Journal of Accounting and Economics* 9: 61-87.

Brown, L. 1991. Forecast selection when all forecasts are not equally recent. *International Journal of Forecasting* 7 (3): 349-356.

Brown, L. 1993. Earnings forecasting research: Its implications for capital markets research." *International Journal of Forecasting* 9: 295-320.

Brown, L., ed. 2000. *I/B/E/S Research Bibliography: Sixth Edition*. I/B/E/S International Inc., New York, NY.

Brown, P. 1993. Comments on 'Earnings forecasting research: Its implications for capital markets research'. *International Journal of Forecasting* 9: 331-335.

Chandra, G. 1974. A study of the consensus on disclosure among public accountants and securities analysts. *The Accounting Review* 49 (4): 733-742.

Clement, M. 1999. Analyst forecast accuracy: Do ability, resources and portfolio complexity matter? *Journal of Accounting and Economics* 27 (3): 285-303.

Cowen, A., B. Groysberg, and P. Healy. 2006. Which types of analyst firms are more optimistic? *Journal of Accounting and Economics* 41 (1-2): 119-146.

Cragg, J., and B. Malkiel. 1968. The consensus and accuracy of some predictions of the growth of corporate earnings. The *Journal of Finance* 23 (1): 67-84.

De Bondt, W., and R. Thaler. 1990. Do security analysts overreact? *The American Economic Review* 80 (2): 52-57.

Dechow, P., and R. Sloan. 1997. Returns to contrarian investment strategies: Tests of naïve expectations hypotheses. *Journal of Financial Economics* 43 (1): 3-27.

DeChow, P., A. Hutton, and R. Sloan. 2000. The relation between analysts'forecasts of long-term earnings growth and stock price performance following equity offerings. *Contemporary Accounting Research* 17 (1): 1-32.

Dunn, K., and S. Nathan, 2005. "Analyst Industry Diversification and Earnings Forecast Accuracy." *Journal of Investing* 14, 7-14.

Easterwood, J., and S. Nutt. 1999. Inefficiency in analysts' earnings forecasts: Systematic misreaction or systematic optimism? *The Journal of Finance* 54 (5): 1777-1797.

Elliot, J., D. Philbrick, and C. Wiedman. 1995. Evidence from archival data on the relation between security analysts' forecast errors and prior forecast revisions. *Contemporary Accounting Research* 11 (2): 919-938.

Elton, E., and M. Gruber. 1972. Earnings estimates and the accuracy of expectational data. *Management Science* 18 (8): 409-424.

Epstein, M., and K. Palepu. 1999. What financial analysts want. *Strategic Finance* 80 (10): 48-52.

Ertimur, Y., W.J. Mayew, and S.R. Stubben. 2008. Analyst reputation and the issuance of disaggregated earnings forecasts to I/B/E/S. Working paper, Duke University and University of North Carolina.

Fintzen, D., and H.O. Stekler. 1999. Why did forecasters fail to predict the 1990 recession? *International Journal of Forecasting* 15: 309-323.

Francis, J., and D. Philbrick. 1993. Analysts' decisions as products of a multi-task environment. *Journal of Accounting Research* 31 (2): 216-230.

Frankel, R., and C. Lee. 1998. Accounting valuation, market expectation, and cross-sectional stock returns. *Journal of Accounting and Economics* 25 (3): 283-319.

Fried, D., and D. Givoly. 1982. Financial analysts' forecasts of earnings: a better surrogate for market expectations. *Journal of Accounting and Economics* 4 (2): 85-107.

Frishkoff, P., P. Frishkoff, and M. Bouwman. 1984. Use of accounting data in screening by financial analysts. *Journal of Accounting, Auditing, and Finance* 8 (1): 44-53.

Givoly, D., and J. Lakonishok. 1984. Properties of analysts' forecasts of earnings: A review and analysis of the research. *Journal of Accounting Literature* 3: 117-152.

Graham, J., C. Harvey, and S. Rajgopal. 2005. The economic implications of corporate financial reporting. *Journal of Accounting and Economics* 40 (1-3): 3-73.

Groysberg, B., P.Healy, and D. Maber. 2008. What drives financial analyst compensation? Working Paper, Harvard Business School.

Gu, Z., and J. Wu. 2003. Earnings skewness and analyst forecast bias. *Journal of Accounting and Economics* 35 (1): 5-29.

Hirst, D., and P. Hopkins. 1998. Comprehensive income reporting and analysts' valuation judgments. *Journal of Accounting Research* 36: 47-75.

Hong, H., and J. Kubik. 2003. Analyzing the analysts: Career concerns and biased earnings forecasts. *The Journal of Finance* 58 (1): 313-351.

Hu, Y., T.W. Lin, and S. Li. 2008. An examination of factors affecting Chinese financial analysts' information comprehension, analyzing ability, and job quality. *Review of Quantitative Finance and Accounting* 30 (4): 397-417.

Jacob, J., S. Rock, and D.P. Weber, 2008. Do non-investment bank analysts make better earnings forecasts? *Journal of Accounting, Auditing and Finance*, Winter, Vol. 23 Iss. 1, 23-61.

Koonce, L., and M. Mercer. 2005. Using psychology theories in archival financial accounting research. *Journal of Accounting Literature* 24: 175-214.

Kothari, S.P. 2001. Capital markets research in accounting. *Journal of Accounting and Economics* 31: 105-231.

La Porta, R. 1996. Expectations and the cross-section of stock returns. *The Journal of Finance* 51 (5): 1715-1742.

Larcker, D.F., and V.P. Lessig. 1983. An examination of the linear and retrospective process tracing approaches to judgment modeling. *The Accounting Review* 58 (1): 58-77.

Li, F. 2006. Annual report readability, current earnings, and earnings persistence. Working paper, University of Michigan.

Libby, R., J. Hunton, H. Tan, and N. Seybert. 2008. Relationship incentives and the optimistic/pessimistic pattern in analysts' forecasts." *Journal of Accounting Research* 46 (1): 173-198.

Lin, H., and M. McNichols. 1998. Underwriting relationships, analysts' earnings forecasts and investment recommendations. *Journal of Accounting and Economics* 25: 101-127.

Lin, H., M. McNichols, and P. O'Brien. 2005. Analyst impartiality and investment banking relationships. *Journal of Accounting Research* 43 (4): 623-650.

Ljungqvist, A., F. Marston, and W.J. Wilhelm Jr. 2006. Competing for securities underwriting mandates: Banking relationships and analyst recommendations. *Journal of Finance*, Vol. 61, Iss. 1, 301-340.

Loh, R., and G. Mian. 2006. Do accurate earnings forecasts facilitate superior investment recommendations? *Journal of Financial Economics* 80 (2): 455-483.

Loungani, P. 2000. How accurate are private sector forecasts? Cross-country evidence from consensus forecasts of output growth. IMF Working Paper No. 00/77, April.

Lui, D., S. Markov, and A. Tamayo. 2007. What makes a stock risky? Evidence from sell-side analysts' risk ratings. *Journal of Accounting Research* 45 (3):629-665.

Lys, T., and S. Sohn. 1990. The association between revisions of financial analysts' earnings forecasts and security-price changes. *Journal of Accounting and Economics* 13 (4): 341-363.

Mande, V., and R. Ortman. 2002. Are recent segment disclosures of Japanese firms useful? Views of Japanese financial analysts. *The International Journal of Accounting* 37 (1): 27-46.

Matsumoto, D. 2002. Management's incentives to avoid negative earnings surprises. *The Accounting Review* 77 (3): 483-514.

Mayew, W. 2008. Evidence of management discrimination among analysts during earnings conference calls. *Journal of Accounting Research*, Forthcoming,

McEnroe, J.E. 1996. An examination of attitudes involving cash flow accounting: Implications for the content of cash flow statements. *The International Journal of Accounting* 31 (2): 161-174.

McNichols, M., and P.O'Brien. 1997. Self-selection and analyst coverage. *Journal of Accounting Research* 35 (Supplement): 167-199.

Mendenhall, R. 1991. Evidence on the possible underweighting of earnings-related information. *Journal of Accounting Research* 29 (1): 170-179.

Michaely, R., and K. Womack. 1999. Conflict of interest and the credibility of underwriter analyst recommendations. *The Review of Financial Studies* 12 (4): 653-686.

Mikhail, M., B.Walther, and R. Willis. 1997. Do security analysts improve their performance with experience? *Journal of Accounting Research* 35: 131-157.

Mikhail, M., B. Walther, and R. Willis. 1999. Does forecast accuracy matter to security analysts? *The Accounting Review* 74: 185-200.

Moyes, G., B. Saadouni, J. Simon, and P. Williams. 2001. A comparison of factors affecting UK and US analyst forecast revisions. *The International Journal of Accounting* 36 (1): 47-63.

Nichols, C., and J. Whalen. 2004. How do earnings numbers relate to stock returns? A review of classic accounting research with updated evidence. *Accounting Horizons* 18 (4): 263-286.

O'Brien, P. 1988. Analysts' forecasts as earnings expectations. *Journal of Accounting and Economics* 10: 53-83.

O'Brien, P. 1990. Forecast accuracy of individual analysts in nine industries. *Journal of Accounting Research* 28 (2): 286-304.

O'Hanlon, J. 1993. Commentary on: Lawrence D. Brown 'Earnings forecasting research: Its implications for capital markets research. *International Journal of Forecasting* 9: 321-323.

Orens, R., and N. Lybaert. 2007. Does the financial analysts' usage of non-financial information influence the analysts' forecast accuracy? Some evidence from the Belgian sell-side financial analyst. *The International Journal of Accounting* 42 (3): 237-271.

Philbrick, D., and W. Ricks. 1991. Using Value Line and IBES analyst forecasts in accounting research. *Journal of Accounting Research* 29 (2): 397-417.

Raedy, J., P. Shane, and S. Yang. 2006. Horizon-dependent underreaction in financial analysts' earnings forecasts. *Contemporary Accounting Research* 23 (1): 291-322.

Ramnath, S., S. Rock, and P. Shane. 2008. The Financial analyst forecasting literature: A taxonomy with suggestions for further research. *International Journal of Forecasting*, 24 (1): 34-75.

Schipper, K. 1991. Commentary on analysts' forecasts. *Accounting Horizons* 5 (4): 105-121.

Sinha, P., L. Brown, and S. Das. 1997. A re-examination of financial analysts' differential earnings forecast accuracy. *Contemporary Accounting Research* 14 (1): 1-42.

Soffer, L., S. Thiagarajan, and B. Walther. 2000. Earnings preannouncement strategies. *Review of Accounting Studies* 5 (1): 5-26.

Stickel, S. 1990. Predicting individual analyst earnings forecasts. *Journal of Accounting Research* 28 (2): 409-417.

Tevelow, R. 1971. How a security analyst uses the annual report. *Financial Executive* 39 (11): 18-21.

Thomas, J. 1993. Comments on 'Earnings forecasting research: Its implications for capital markets research' by L. Brown. *International Journal of Forecasting* 9: 325-330.

Womack, K. 1996. Do brokerage analysts' recommendations have investment value?" *The Journal of Finance* 51 (1): 137-167.

Zarnowitz, V. 1991. Has macro-forecasting failed? *The Cato Journal* 12 (1): 129-164.

Zmijewski, M. 1993. Comments on 'Earnings forecasting research: Its implications for capital markets research' by L. Brown." *International Journal of Forecasting* 9: 337-342.

Figure 1a – Analyst Decision Process Schematic

Panel A: Decision process schematic

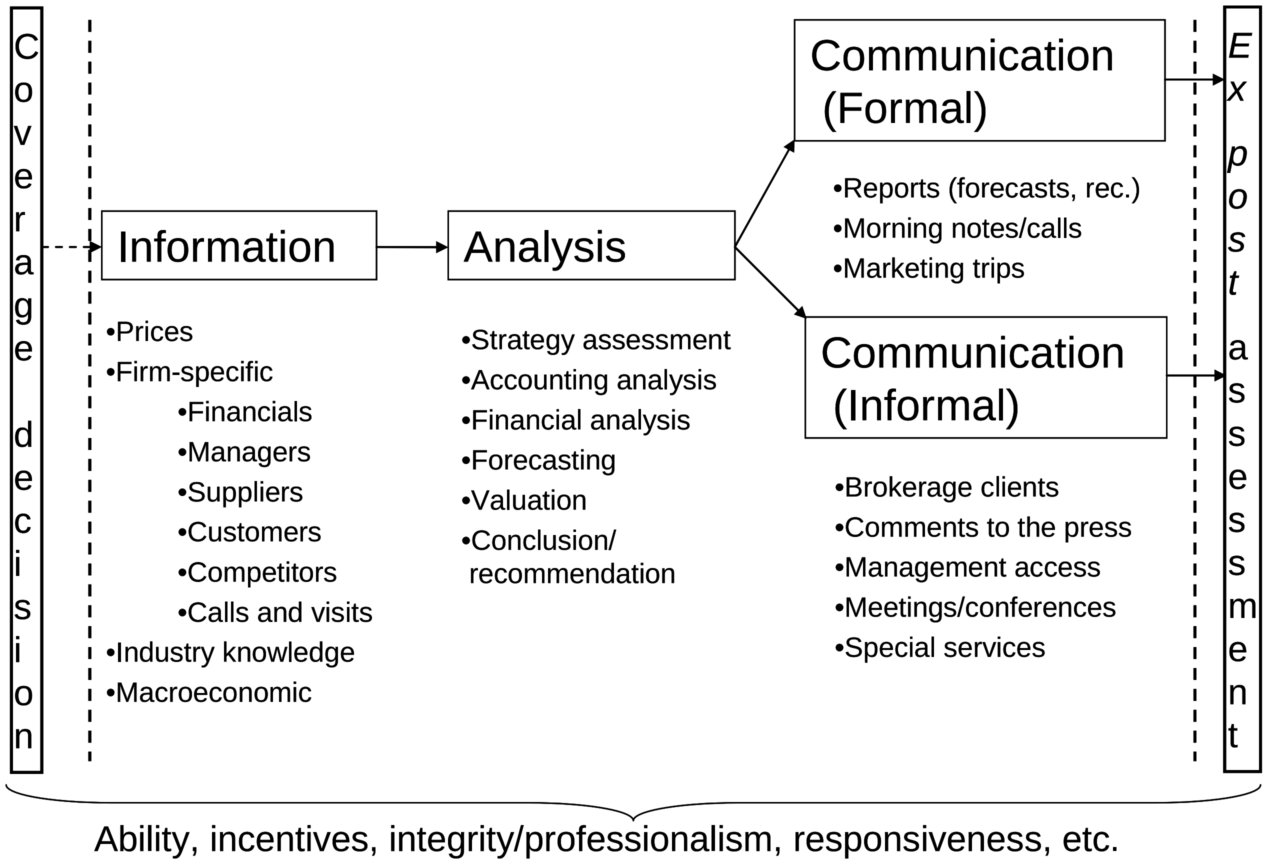

Figure 1b – Analyst Decision Process Schematic (cont.)

Panel A: Decision process schematic with most common research designs indicated

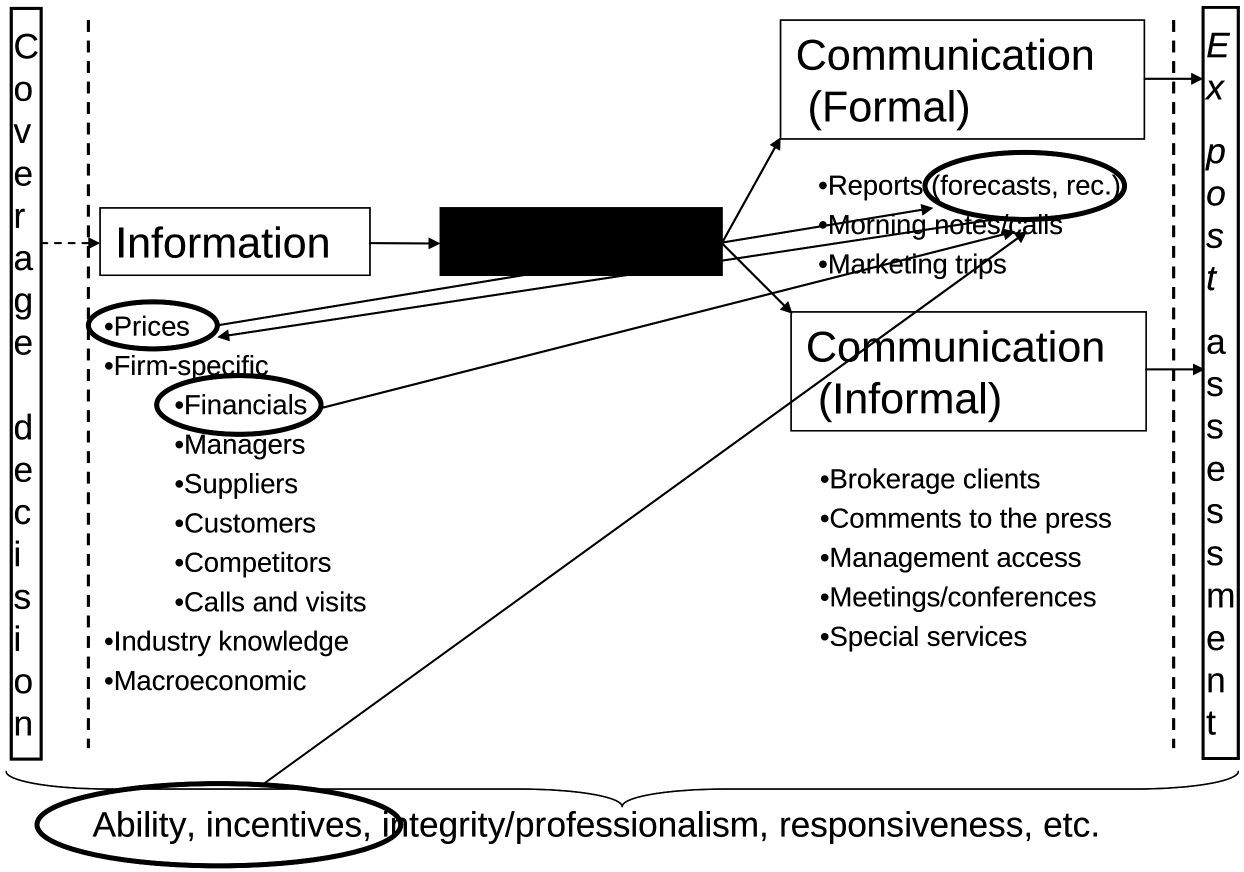

Figure 2 – Timeline of Major Areas of Research 1968-2006

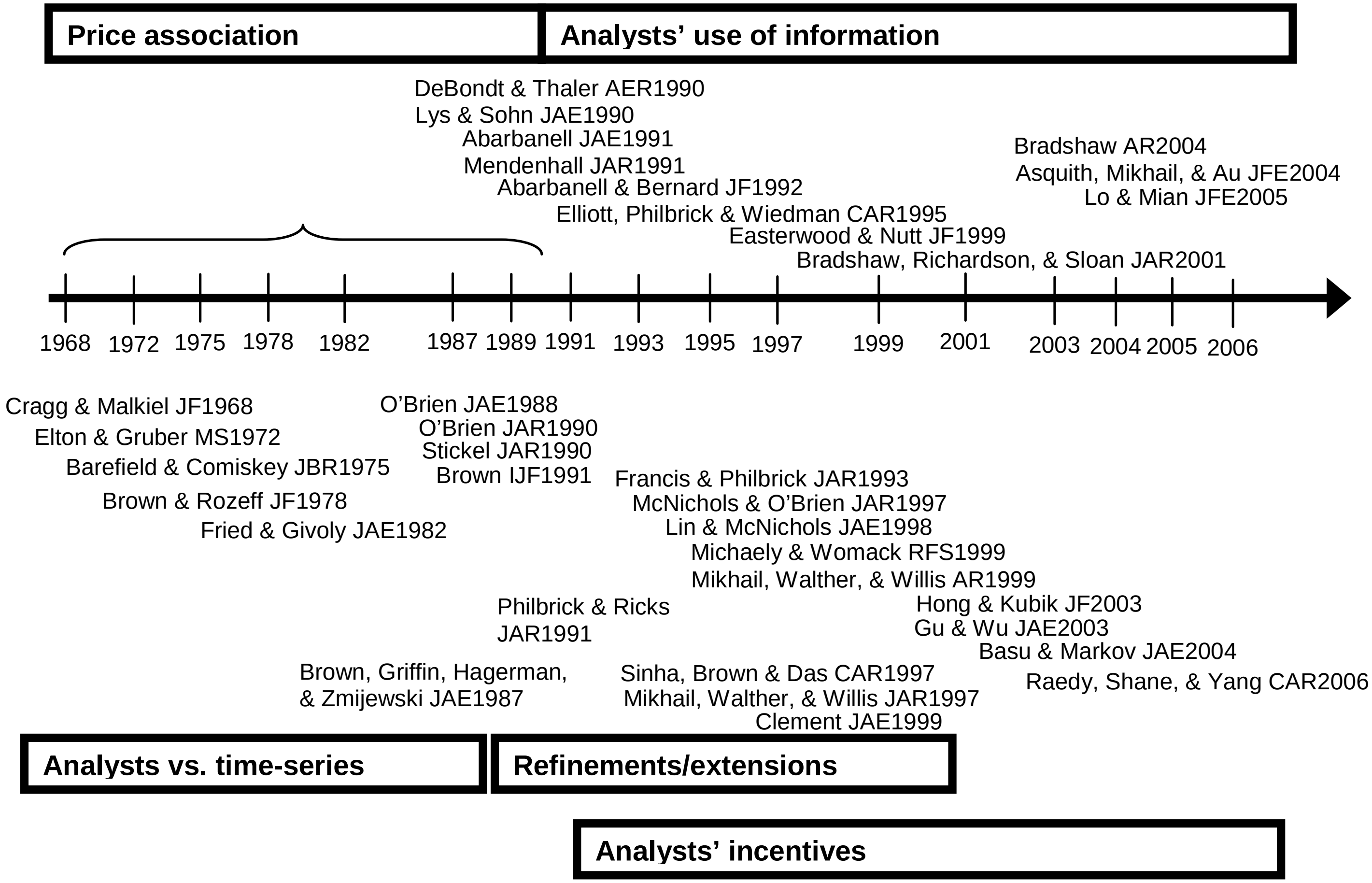

Table 1 – Summary of Institutional Investor Ranking Surveys 1998-2005

	1998	1999	2000	2001	2002	2003	2004	2005
Industry knowledge	1	1	1	1	1	1	1	1
Integrity/professionalism					2	2	2	2
Accessibility/responsiveness				2	3	3	3	3
Management access				7	5	5	4	4
Special services	4	3	2	5	7	6	5	5
Written reports	3	2	4	6	8	7	7	6
Timely calls and visits				4	4	4	6	7
Communication skills					10	9	8	8
Financial models			3	8	9	10	10	9
Management of conflicts of interest				3	6	8	9	10
Stock selection	2	5	7	10	11	11	11	11
Earnings estimates	5	6	5	9	12	12	12	12
Quality of sales force	7	7	8	11	13	13	13	
Market making	8	8	9	12	14	14	14	
Primary market services			10		15	15	15	
Servicing	6	4	6					

Table 2 – Change in Ranked Characteristics, Institutional Investor Ranking Surveys 1998-2005

	Avg. rank change, 98-05
(#2) Integrity/professionalism	0.13
(#3) Accessibility/responsiveness	0.12
Management access	0.11
Timely calls and visits	0.07
Communication skills	0.06
Financial models	0.05
Management of conflicts of interest	0.04
Special services	0.01
(#1) Industry knowledge	0.00
Primary market services	0.00
Market making	-0.02
Written reports	-0.02
Quality of sales force	-0.04*
Servicing	-0.05
Earnings estimates	-0.06*
Stock selection	-0.10***

An Updated Model of Price to Book

Ben Branch, Anurag Sharma, Chetan Chawla, and Feng Tu

The price-to-book (PB) ratio is a measure of the relative value that the market places on a share of stock. We have estimated an empirical equation of two stages that explain about 62% of the variation in annual PB levels for the S&P 500 companies from the year 2000 to 2009. We explored the market's ability to anticipate changes in performance and found that the market price appears to reflect anticipatory information not present in the model value. This paper both advances understanding of PB's determinants and provides a tool for managers who wish to enhance their firm's PB.

■Almost 30 years ago, Branch and Gale (1983) developed a price-to-book (PB) (the ratio of a stock's price to its book value) model that explained over 70% of their sample's variability. Subsequent research on a later sample validated the model, explaining more than 63% of the variance (Branch, Sharma, Gale, Chichirau, and Proy, 2005).

Since the original Branch-Gale (1983) paper, PB has taken on increasing significance. The price-to-book ratio is a basic measure of the relative value that the market places on a share of stock. For all of its shortcomings, a stock's book value per share remains the best easily accessible measure of the asset value (according to generally accepted accounting principles (GAAP) lying behind each share. Accordingly, the ratio of this per share book value to the stock's market price provides a useful index of how the market values the firm as a going concern (market price of stock) as opposed to the bundle of assets (book value per share). The higher the PB, the more favorably the market views the company's prospects. A PB below one implies that the firm's going concern value is actually below the reported value its net assets.

Herein, using a more recent sample (2000-2009), we further explore the factors that influence the PB level. We build and test a multivariate model which relates those factors to PB. Our study and the resulting model are designed both to advance understanding of PB's determinants and to provide a tool for those managers who wish to enhance their own firm's PB.

I. Literature Background

The relation between the firm's market and book value has long been of interest to researchers. Tobin (1969), in his seminal paper theorized that the economy-wide rate of capital goods investment was related to the ratio (q) of those assets' market values to reproduction costs. The changes in rate of return brought about by a changing market value in relation to reproduction cost, he argued, regulated the rate of investment in durable goods. Conversely, increases in the marginal efficiency of capital (rate of return) tended to raise its valuation in relation to its cost.

Quickly coined Tobin's q in honor of its originator, this ratio of market value to reproduction cost was adapted from macroeconomics to the industry and firm level of analysis. Yet, the interpretation tends to differ in economics and finance literatures. In industrial organization and strategy, the ratio is generally taken to indicate the efficiency with which the installed base of assets (on accounting cost basis) is being utilized. The higher the ratio of market to book,

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the greater is the indicated efficiency. In finance, on the other hand, the ratio is more likely to be used as indicative of market risk and increasingly seen as an additional (to beta) proxy for risk; in other words, the lower the price to book, the greater is the risk (of bankruptcy) to investors. We discuss both viewpoints in the sections below.

The earliest adaptations were in industrial organization and in the merger literature in the banking industry. Lindenberg and Ross (1981), for instance, used Tobin's q – ratio of the market value of a firm to the replacement cost of its assets – as a proxy for the presumed monopoly rents earned by firms. Similarly, Smirlock, Gilligan, and Marshall (1984) used price-to-book to examine the structure-conduct-performance hypothesis in the industrial organization literature. In a slightly different vein, the banking literature too was quick to use the price-to-book ratio as a proxy for the premium paid in mergers and acquisitions (Rogowski and Simonson, 1987; Cheng, Gup, and Wall, 1989). Very rapidly after that, the ratio of market to book value found its way into the mainstream literature in other areas such as management.

A few early efforts notwithstanding, not until the 1990s did a series of Fama and French papers (1992, 1993, 1995, and 1998) spur deeper interest in the relationship between market and book value of the firm. Unlike the literature in other disciplines, however, their concern was with the ability of the ratio to explain variations in the cross-section of portfolio returns. They also defined the ratio as book-to-market, the reciprocal of market-to-book convention used in other areas. Below, we discuss the literature on the relationship between market and book values. We begin with the literature in finance and then turn to a brief discussion of the related literature in other areas.

In one of their first papers in the series, Fama and French (1992) highlighted "several empirical contradictions" (pg. 427) to the presumed supremacy of market in explaining cross-sectional returns. Ever since, they have continued to highlight the prevailing anomalies as reflected in the disconnect between average cross-section of returns on equities and the market βs of the Sharpe (1964) and Lintner (1965) asset pricing model. The disconnect appears to hold true when using the consumption βs of the inter-temporal asset pricing model (Breeden, 1979; Reinganum, 1981; Breeden, Gibbons and Litzenberger, 1989). Furthermore, invoking Banz (1981), Bhandari (1988), Basu (1983), Rosenberg, Reid and Lanstein (1985), and Fama and French (1993) claimed that variables which aren't part of the asset pricing theory, such as size, leverage, earnings-to-price, and book-to-market had reliable power to explain the cross section of average returns.

Over the years, two broad explanations have been put forth for the anomaly as observed by Fama and French in their series of empirical papers (Fama and French, 1992, 1993, 1995, and 1998). The traditional explanations adhere to the rational pricing assumption and the efficient market hypothesis; and the relatively newer literature relies more on potential behavioral explanations for the observed anomalies. Each representing a different paradigm, the rational and behavioral explanations have advanced further insights into why capital asset pricing model (CAPM) may not be able to explain the variation in cross-section of returns – why book-to-market may, in fact, offer a better explanation.

Initial reaction to Fama and French (1992) was one of skepticism. Within the rational framework, in particular, researchers argued that the relationship observed between book-to-market and average returns is an artifact of the sample chosen and is unlikely to be observed out of sample (Black, 1993; MacKinlay, 1995). Contrary evidence to this objection is presented, however, by Chan, Hamao, and Lakonishok (1991), Capaul, Rowley, and Sharpe (1993), and Fama and French (1998). Chan et al. (1991), for instance, find strong evidence linking book-to-market and expected returns in their sample of Japanese firms. Similarly, Capaul et al (1993) find clear confirmation for linkages between book-to-price and returns in a diverse sample of firms from France, Germany, Switzerland, United Kingdom, Japan, and the US. Fama and French (1998) provide more evidence for the out of sample robustness of their original results. Working with data from thirteen major markets (including the US), they show return premium for value (high book-to-market) stocks in twelve of those markets. Barber and Lyon (1997) find similar value premium for financial firms (holdout sample in the original Fama and French 1992 study). Davis (1994) presents evidence of the value premium for US stocks extending back to 1941. Davis, Fama and French (2000) extend this result back to 1926 and include the whole population of NYSE industrial firms. Taken altogether, this research presents formidable confirmation of the relationship between book-to-market and equity returns.

In defense of Fama and French, researchers have argued that not only does the relationship between book-to-market and returns hold true out of sample, it is in fact a reflection of a perfectly reasonable trade-off between risk and return. That is, book-to-market is a proxy for risk and the observed relationship with equity returns captures thus – high book-to-market reflects high risk and yields greater rewards, and vice versa. One should not be surprised, therefore, that the high book-to-market equities generate a value premium – as compensation for risk within a broader multifactor model of inter-temporal capital asset pricing (ICAPM) (Merton, 1973) or the arbitrage pricing theory (APT) of Ross (1976). Much of Fama and French's work in the 1990s supports this viewpoint.

In their seminal 1993 paper, Fama and French identify five common risk factors in the returns on stocks and bonds – three stock market factors, an overall market factor and factors linked to firm size and book-to-market equity. They find return covariation related to book-to-market that is beyond that explained by the market return. In a later paper (1995), they refine the multi-factor model and posit that a three factor model (consisting of factors related to size, leverage, and book-to-market) largely captures the variation in average returns. Vassalou and Xing's study (2004) further supports the risk-based interpretation for the size and book-to-market effects.

Nevertheless, contradictory evidence to the "compensation for risk" explanation is provided by Griffin and Lemmon (2002). Using a direct proxy for financial distress proposed by Ohlson (1980), Griffin and Lemmon (2002) examine the linkages between book-to-market, distress risk and stock returns. Although they find a large return differential between firms with high and low book-to-market values, they show that this differential is driven by extremely low returns on firms with low book-to-market equity. Arguing that this differential cannot be explained by the three-factor model, Griffin and Lemmon (2002) posit that the mispricing explanation is better suited to the findings since "firms with the highest distress risk exhibit the largest return reversals around earnings announcements and the book-to-market return premium is largest in small firms with low analyst coverage" (pg. 2335). This explanation based on investor mispricing is in line with the earlier behavioral explanations (e.g., over-reaction) that have been provided by DeBondt and Thaler (1987), Lakonishok, Shleifer, and Vishny (1994), and Haugen (1995).

In effect, the rational pricing response to Fama and French is, first, of disbelief that a book-to-market anomaly exists and then a grudging acceptance with an explanation based in the risk-reward framework of the efficient market hypothesis. That is, the book-to-market anomaly is encapsulated within the prevailing views about the value premium within the rational pricing/efficient market branch of finance.

Yet, as in Griffin and Lemmon (2002), the risk-reward explanation for the book-to-market anomaly appears to be less robust than originally thought and doubts about that open the door to behavioral and other non-rational explanations. Along these lines, Daniel and Titman (1997) posit that the return (value) premium on small capitalization (size) and high book-to-market firms is caused not by co-movements of returns with pervasive factors but by specific characteristics of the equities in question. In explaining why characteristics may be important, they invoke the behavioral arguments of Lakonishok, Shleifer and Vishny (1994) that "investors may incorrectly extrapolate past growth rates" (pg. 29) based on certain particulars of stocks.

Davis et al. (2000) highlight the causal linkage between the two behavioral explanations: while the first behavioral explanation posits the importance of investor over-reaction to firm performance, the second behavioral explanation links the value premium to value characteristic and not to risk. For example, investors may demonstrate a preference for growth stocks at the expense of value stocks – this may result in a value premium for value stocks (lower prices and higher returns) that is unrelated to risk. This implies that the difference between the two behavioral explanations is one of preference, of demarcation of causal boundaries rather than presence of different causal processes. These final two behavioral explanations are attempts to refute the dominant explanation within the rational pricing/efficient market hypothesis paradigm of finance, i.e., the value premium is compensation for higher risk.

In spite of objections, the proponents of the rational pricing/efficient market hypothesis paradigm have continued to defend the risk-reward linkage between the value premium and the three factor risk model (Davis et al., 2000; Malkiel, 2003; Fama and French, 2006).

That argument has been extended in other ways as well. Gutierrez (2001), for instance, reported that book-to-market and size effects also exist in the cross section of bond returns. Another variant in the literature has been the explaining away of size and price-to-book effects by incorporation of macroeconomic variables. Jensen, Johnson, and Mercer (1997) found that size and price-to-book effects depend largely on the monetary policy of the Fed. They claim, for example, that the low price-to-book and small firm premiums are statistically and economically significant only in expansive monetary policy periods. In a more recent work, Hahn and Lee (2009) claim that changes in default spread and term spread capture the systemic differences in average returns – that, in effect, in the presence of default and term spread, the Fama-French factors are superfluous in explaining the variation in the cross-section of returns.

A growing body of work surrounds the relationship between market and book price and the immense relevance and utility of this ratio. Where the literature in finance has been concerned with the risk implications of the ratio, however, a well-established body of work is concerned with factors that may explain the ratio itself (see Sharma, Branch, Chawla, and Qiu, 2013). That is, the concern in economics and especially in the management literature has been with identifying discretionary variables that managers may be able to use to influence their firm's market valuation in relation to its book value.

Thus an extensive amount of literature is concerned with identifying independent variables, especially firm-level characteristics that explain the market-to-book ratio (Rogowski and Simonson, 1987; Varaiya, Kerin, and Weeks, 1987; Amit and Livnat, 1988; Barton, 1988; Montgomery and Wernerfelt, 1988; Wernerfelt and Montgomery, 1988; Murray, 1989; Cheng, Gup, and Wall, 1989; Morck, Shleifer, and Vishny, 1989; Amit and Wernerfelt, 1990; Fombrun and Shanley, 1990; Nayyar, 1992; Nayyar, 1993;

Huselid, 1995; Welbourne and Andrews, 1996; Becker and Gerhart, 1996; Anand and Singh, 1997; Huselid, Jackson, and Schuler, 1997; Dutta, Narasimhan, and Rajiv, 1999; Wiggins and Ruefli, 2002; Chang, 2003; Lu and Beamish, 2004; Kor and Mahoney, 2005; Cho and Pucik, 2005; Dutta, Narasimhan, and Rajiv, 2005; Tanriverdi and Venkatraman, 2005; Dushnitsky and Lenox, 2006; Short, Ketchen, Palmer, and Hult, 2007; McDonald, Khanna, and Westphal, 2008). This literature is briefly reviewed below.

One of the earliest papers utilizing the price to book ratio as a dependent variable was Rogowski and Simonson (1987) study of bank mergers. They analyzed 168 mergers in order to identify the factors related to the merger premium, measured as excess purchase price over book value. Cheng, Gup, and Wall (1989) also looked into the financial determinants of bank takeovers by analyzing 136 bank mergers in the Southeast between 1981 and 1986. Their focus was on acquirer characteristics.

In the management literature, Varaiya, Kerin, and Weeks (1987) have shown that the market to book ratio and Tobin's q are theoretically and empirically equivalent measures. Numerous studies have used the market to book ratio as a measure of firm performance. Barton (1988), for instance, explored the relationship between corporate diversification and systemic/market risk. Fombrun and Shanley (1990) studied reputation building as strategic and competitive signaling utilizing market to book as a measure of economic performance. Also relying on market to book, Nayyar (1992) investigated firm focus in the context of service firms finding that focus on customer segments yielded higher performance while focus on distinctive internal capabilities or geographical regions lowered performance (see also Nayyar, 1993). McDonald, Khanna, and Westphal (2008) incorporate social networking research into their study of Chief Executive Officer's (CEO's) advice seeking behavior and it's linkages to firm performance, also formulated as market.

The management literature on diversification contains a plethora of studies using market-to-book as a measure of firm performance. Amit and Livnat (1988) employed the ratio as a market based measure of return in their study of risk-return characteristics of firms with related and unrelated diversification strategies. Other studies which have used Tobin's q in the context of diversification and firm focus based studies are: Wernerfelt and Montgomery (1988), Montgomery and Wernerfelt (1988), Anand and Singh (1997), Lu and Beamish (2004), and, more recently, Tanriverdi and Venkatraman (2005).

Tobin's q as a measure of firm performance has been extensively used in the literature on top management teams since the 1980s. Murray (1989), for instance, analyzed 84 Fortune 500 food and oil firms to explore the relationships between top management group composition and firm performance measured as a mix of variables that included price to book. Morck, Shleifer, and Vishny (1989) studied the linkages between corporate board performance, substitute control devices (like takeovers) and firm performance operationalized as market price in relation to other factors such as book value. The broader human resources management (HRM) literature has also used this ratio as a measure of performance. Huselid (1995) investigated the links between systems of High Performance Work Practices (such as comprehensive employee selection and recruitment procedures, incentive compensation, etc.) and firm performance as measured by Tobin's q. Welbourne and Andrews (1996) extended the application of population ecology model to study relations between HRM practices and organizational performance. Other studies using Tobin's q to measure of firm performance in the context of HRM are Becker and Gerhart (1996), and Huselid, Jackson, and Schuler (1997).

The literature on organizational slack has also frequently used market to book as a performance measure. Chakravarthy (1986) used market to book ratio as one of the measures of organizational slack in his study of measures of strategic performance. Davis and Stout (1992) concluded that market to book was one of the measures that lowered the risk of a takeover while organizational slack increased the risk of takeover. In a similar vein, Gibbs (1993), who also looked at organizational slack and the market for corporate control, used Tobin's q as an indicator of investment opportunity. Iyer and Miller (2008) also found that slack increased an organization's propensity to indulge in acquisitions, they used the market to book ratio to control for the firm's growth opportunities.

Combs and Ketchen (1999) explored the determinants of inter-firm cooperation in the restaurant industry, the resource variable – slack was determined to be inversely related to inter-firm cooperation. They used market to book as a market measure of firm performance. Pitcher and Smith (2001) used multi-method research to study top management heterogeneity and it's linkages to organizational slack and performance – measured using market to book ratio. O'Brien (2003) posited that competition type would influence the strategic importance of financial slack and this would be critical for firms pursuing a strategy of innovation. Wang, He, and Mahoney (2009) looked into trust-building mechanisms such as employee stock option plans and their impact in mitigating employee underinvestment in building firm specific knowledge. They found financial slack to be positively related to firm-employee relationships and used Tobin's q as measure of financial performance.

Within the corporate social responsibility (CSR) literature, slack has been indicated as a determinant of corporate philanthropy. Wang, Choi, and Li (2008) support this hypothesis and used Tobin's q as a market based performance measure. More recently, contradictory evidence has emerged, Surroca, Tribo, and Waddock (2010) studied the mediation of a firm's intangible resources (such as innovation, reputation, human resources, etc.) on the relationship between corporate social responsibility and financial performance. They hypothesize that the causal relationship between CSR (authors term – CRP: Corporate Responsibility Performance) and financial performance is spurious due to mediation of intangibles in the slack resources literature (as well as the instrumental stakeholder literature).

In sum, then, the relationship between market value and book value of firms has been extensively used in the literature. While the finance literature has been concerned with the ability of the ratio to reflect market risk, the literature in management has been concerned mostly with it as a measure of firm performance.

In spite of the burgeoning literature on the subject surprisingly little research has explored the contemporaneous and lagged determinants of the market to book value ratio itself. While the literature sheds useful light on the importance of the PB ratio, it is less than helpful in identifying discretionary variables that managers may use to influence the market valuation of the firms. What, one may ask, could managers do to ensure that their firm is correctly – and perhaps aggressively – valued in the financial markets? That is the topic we address herein.

II. Data & Methods

We begin our exploration of the behavior of PB by constructing a database (from COMPUSTAT) consisting of the S&P 500 companies as of 2000. Each year thereafter our sample's membership was revised to reflect changes in the index's composition. The S&P index is very well known and carefully designed to be representative of large publicly traded US companies. Periodic updates maintain the index's basic character. By following the S&P's membership over time, we were thereby working with a set of companies which S&P believed to be particularly representative of the types of firms that its index was designed to reflect. We based our sample on S&P in order to limit the risk of selection bias. We believe our data set to be a well-structured, representative sample of large to midsized US companies.

The earliest Branch-Gale (1983) study employed a group of 600 industrial COMPUSTAT companies for the 1968-1981 period. The more recent Branch et al. (2005) study used the S&P 500 companies for the 1980-2000. Thus, the two prior studies used somewhat different databases from that of the current study, which begins at about the point (2000) that the second study ends, and ends in 2009.

A. Pooled Data Problems and Tests

Sampling issues surrounding the combination of cross-sectional and time series data have a long history (Chetty, 1968; Mundlak, 1978). The pooling approaches used run the risk that they may have "completely neglected the consequences of the correlation which may exist between the effects and the explanatory variables. Such a correlation leads to a biased estimator" (Mundlak, 1978, pg. 70). However, testing for such multicollinearity yielded VIF values lower than ten for all independent variables in our model.

Furthermore, use of the existing datasets or indices like the S&P 500 universe as a selection criterion is common practice to identify large corporations with readily available stock performance and firm data (Dlugosz, Fahlenbrach, Gompers, and Metrick, 2006).

III. Time Series and Cross Sectional Distribution of Price to Book

Branch-Gale (1968-1981) shows the average PB value declined from about 2.3 to about 1.0, and Branch et al. (2005) shows the average PB for their S&P 500 sample rose from about 1.0 at the end of 1980 to about 5.0 by 2000 (Figure 1b). In the current study covering 2000 to 2009, however, the average PB does not exhibit a clear trend. The average PB fell from about 5.0 at the end of 2000 to about 2.96 in 2002, then rose to about 3.65 in 2003 and stayed around this level for the following four years. In 2008, the average PB declined substantially to around 2 and then rose to 2.80 in 2009 (Figure 1a).

We primarily focus herein on the cross sectional variation of PB. As such we need to remove most of the time series variability in order to focus on the cross sectional variability. Our univariate analysis utilizes the variable *PBdiff*, the difference between each company's PB and the corresponding average PB value. *PBdiff* values tend to cluster near zero (Figure 2a) but some PBs depart by a substantial amount. We next examined the determinants of PB's cross sectional and time series variability.

IV. Building a PB Model

Working from the well-known Dividend Discount Model, Branch et al. (2005) developed a theoretical framework for a PB model in the steady state (book equity growth rate = dividend growth rate):

$$PB = (ROE - G)/(R-G). \quad (1)$$

Where:

P= market price of stock;

B=per share book value;

Figure 1a. Average PB Value from 2000 to 2009

PB value, the average PB ratio across S&P500 companies for each year, is plotted on the vertical axis.

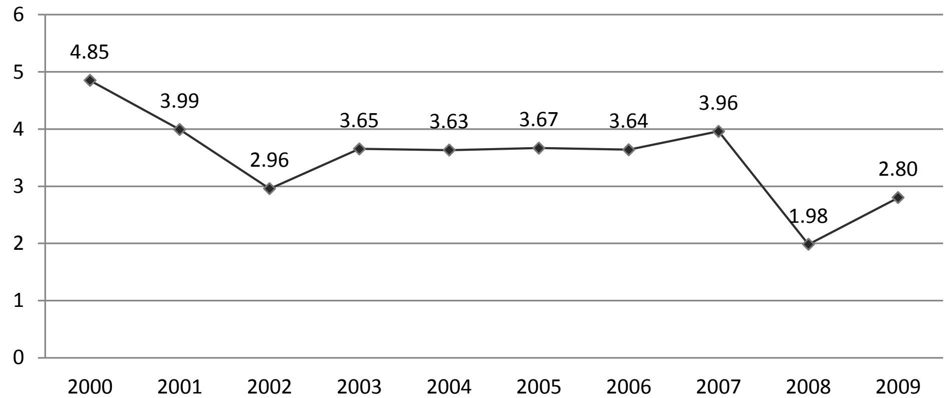
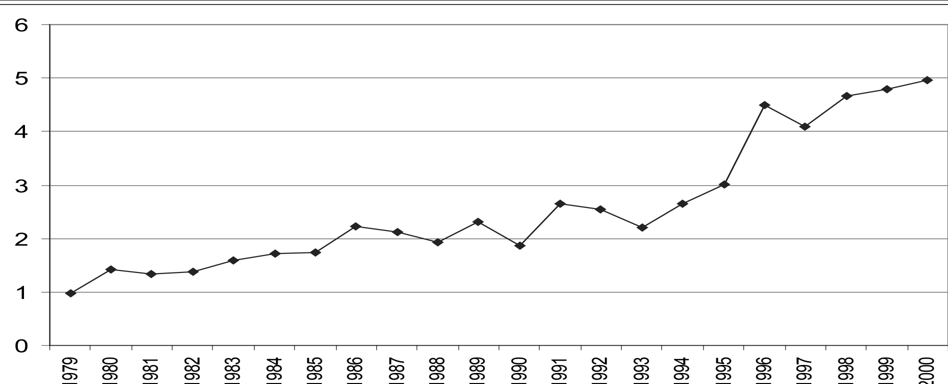


Figure 1b. Average PB Ratio from 1979 to 2000

PB value, the average PB ratio across S&P 500 companies for each year, is plotted on the vertical axis.



ROE=return on book equity (assuming no sale or repurchase of equity);

R= appropriate risk adjusted discount rate;

G= long-term growth rate for per share dividends.

Thus equilibrium PB is a function of ROE, G and R. Or to put it into words: The price to book ratio (PB) is a function of profitability (ROE), growth (G), and the discount rate (R). The nominal risk free rate component of R varies over time but is common to all firms. The non-common component of R varies cross sectionally with the company's risk. Accordingly, the cross sectional variability in PB is a function of profitability (ROE), growth (G), and risk (embedded in R).

Theoretically, R must be greater than G or the price, P, becomes infinite. Similarly, ROE must be greater than or equal to G or P would be negative. And of course we do not observe any infinite or negative market values for P. The limited liability of the corporate form should insure that stock prices are always non negative. Moreover, PB is generally greater than or equal to one indicating that the going concern value of the firm (per share stock price) is greater than its liquidation value (per share book value). This relationship would imply that (ROE-G) is generally greater than or equal to (R-G) which in turn implies that ROE is generally greater than or equal to R. Thus, firms having going concern values greater than their liquidation values (most firms) and firms having finite prices (all firms), should have ROE > R > G. Under these circumstances PB would vary positively with ROE and G and negatively with risk (embedded in R). PB would also vary inversely with the nominal risk free rate (embedded in R).

V. Empirical Analysis

Figure 3a (below) illustrates the relationship between *PB diff* and ROE (bar chart) and ROE and its frequency (line graph). Similar to Branch et al. (2005) study (Figure 3b), most of the ROE values occur within the 0.05-0.30 range with a mean value of about 0.14. For ROE values above the mean level, *PBdiff* rises quite markedly.

For ROEs below the mean and median values, however, *PBdiff* appears to decline with ROE but by no means as dramatically as it rises for above average ROEs. Note that PB itself can only be negative in the unusual circumstance

Figure 2a. Distribution of PBdiff for the Sample Period of 2000 to 2009

The variable, *PBdiff*, is the difference between each company's PB value and the corresponding average PB value.

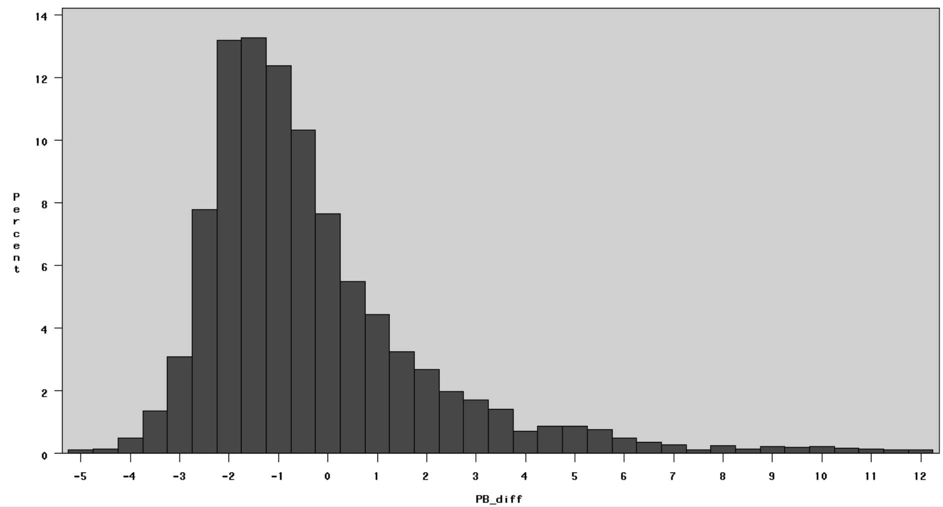
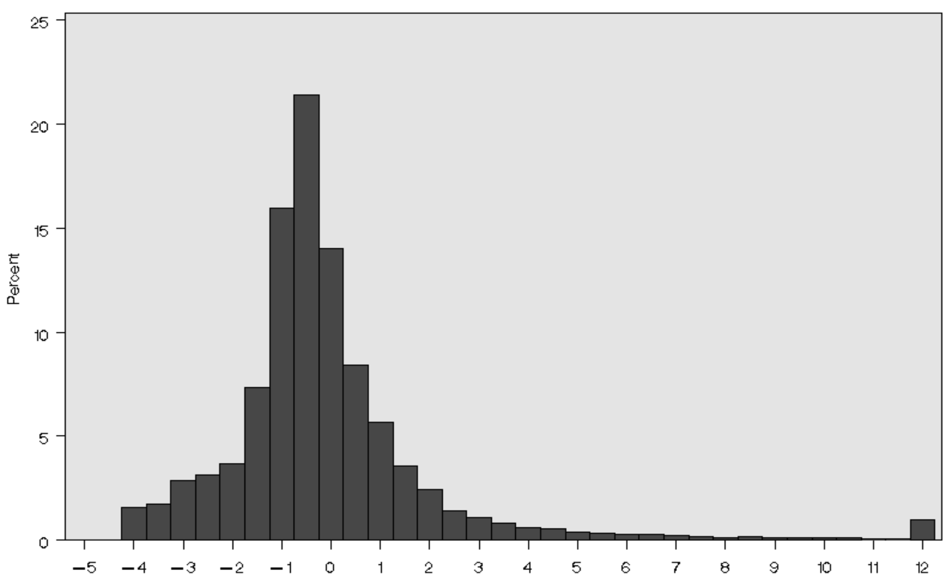


Figure 2b. Distribution of PBdiff for the Sample Period of 1979 to 2000

The variable, *PBdiff*, is the difference between each company's PB value and the corresponding average PB value.



of a negative book value and in general will not be very much below unity (or the firm becomes a candidate for liquidation). The liquidation value of a firm with a very low or negative ROE tends to place a floor on its market value. Thus, we should not be surprised to find that for ROEs above its average value, ROE has a more favorable impact on *PBdiff* than is the negative impact on *PBdiff* of a below average ROEs.

VI. A Multivariate Model

The above reported univariate relationships are consistent with our expectations.

We next develop a more robust set of relationships by building a multivariate regression model in the relationship: PB = (ROE - G)/(R-G). The firm's ROE, R, and G are all long-term forward-looking expectations. Thus proxies for those variables need to capture expectations of their future values. Accordingly we built our model as follows. First we sought to remove the time series variability of PB. To that end we followed Branch et al. (2005) in including in our model the variable average annual PB for our sample of S&P 500 firms. All of the remaining model variables are designed to proxy for the three forward looking expectations

Figure 3a. *PBdiff* rises with ROE in 2000-2009

This exhibit shows the relation between *PBdiff* and ROE in 2000-2009. ROE value is plotted on the horizontal axis. The variable, *PBdiff*, the difference between each company's PB value and the corresponding average PB value, is plotted on the primary vertical axis. The number of observations are plotted on the secondary vertical axis.

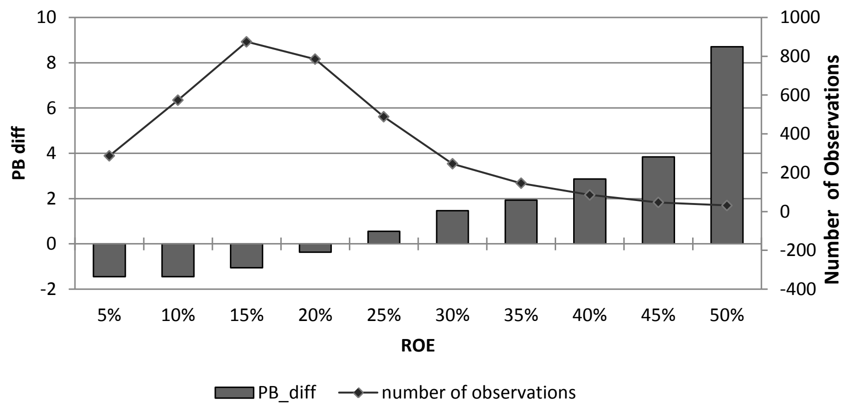
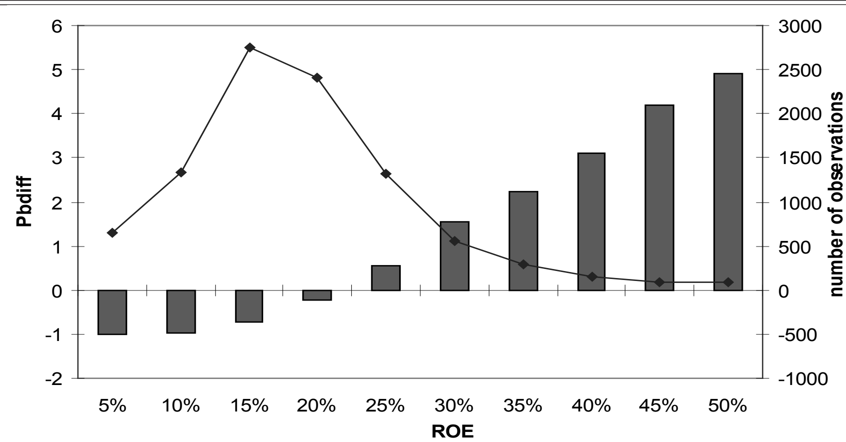


Figure 3b. *PBdiff* rises with ROE in 1979-2000

This exhibit shows the relation between *PBdiff* and ROE in 1979-2000. ROE value is plotted on the horizontal axis. The variable, *PBdiff*, the difference between each company's PB value and the corresponding average PB value, is plotted on the primary vertical axis. The number of observations are plotted on the secondary vertical axis.



of profitability, risk and growth.

A. Profitability Variables: ROE

We expect future profitability to be related to the current levels of return on equity (ROE) and return on capital (ROC) as well as the current dividend as it relates to book value. To the extent that the future will be like the past, current ROE should proxy for the future level. ROC represents a broader measure of profitability which removes the impact of leverage and as such may add to the model's ability to explain the future ROE. Similarly, the dividend as a percentage of book value tends to reflect the firms confidence in its ability to continue to earn profits sufficient to pay out dividends in the future. Some of these relations may be nonlinear and may interact with each other so various forms of the above mentioned variables may enter the regression. We expect profitability to play a major role in explaining PB.

B. Growth Variables: G

We expect future growth to be related to past growth rates in sales and profits as well as the intensity and growth in research and development (R&D) and advertising. Again to the extent that the future will be like the past, we expect that past levels of sales and profits will proxy for future rates. In addition the relative intensity of R&D and advertising spending, which are designed to build future value, are expected to help explain future growth rates. Growth without profits is, however, of little or no value to investors. Accordingly interacting the above mentioned variables with profitability variables is expected to show their power.

Table I. Definitions and Summary Statistics for Exogenous Variables

This table shows the definitions and summary statistics for the exogenous variables. The sample period is 2000-2009. Sample means, medians, and standard deviations are provided for all S&P 500 companies.

Variable	Definition	Sample size	Mean	Median	Standard deviation
Firm price to book ratio					
mnpb	Annual average price to book ratio	4839	3.470	3.639	0.652
Firm profitability					
roe	Return on equity: calculated as the firm's net income divided by equity	4839	0.131	0.140	0.328
db	The firm's dividend as a percentage of book value	4793	0.0488	0.0322	0.0637
roc	Return on capital: calculated as the firm's net income divided by the sum of equity and long term debt	4827	0.0785	0.0816	0.146
shretn	Change in the firm's stock price as a proportion of change in retained earnings	4827	4.046	1.686	46.31
Firm growth					
rdintb	R&D intensity: research and development expenses as a proportion of total revenue	2612	0.0656	0.0284	0.0867
revgrth	Annual revenue growth rate	4839	0.0693	0.0623	0.196
advintb	Advertising intensity: advertising expenses as a proportion of revenue	2062	0.0299	0.0182	0.0309
Firm risk					
cover	Interest coverage ratio: calculated as the firm's EBIT divided by interest expenses	4369	28.82	6.512	98.98
capxintb	Capital intensity: calculated as the firm's capital expenditures divided by total revenue	4678	0.0657	0.0392	0.0766
debtratio	Calculated as the firm's long term debt divided by the sum of equity and long term debt	4827	0.367	0.349	0.242

C. Risk Variables: R

We expect both leverage and capital intensity to impact the market's perception of risk. We use both the long term debt to capital ratio and the coverage ratio to reflect the extent of leverage. As capital intensity is a major source of fixed costs, we expect it to be associated with risk.

The definitions and summary statistics for the exogenous variables are shown in Table I. In this study, we follow Branch et al. (2005) procedures to build our model. We use both the linear and non-linear form of the variables in order to capture the relationship between PB and expected profitability, growth and risk. Then we winsorize our variables using a 1% screen and normalize each of the independent variables except average PB and then create squares of the normalized variables. We also test a number of interaction terms some of which are designed to reflect the joint impact of annual average PB and various independent variables while some others capture the joint impact of profitability and growth. Our final model excludes industry dummies as Branch et al. (2005) finds that differences in PBs across industries are largely due to differences in profitability, growth and risk.

VII. The Regression Model

Using a stepwise regression procedure we obtain a model with 17 statistically significant variables with an $R^2$of 0.5241. The multicollinearity test yields VIFs of less than ten for all independent, which indicates the absence of a multicollinearity problem. We also compute the correlation matrix for the 17 independent variables (shown in Table III below). The absolute value of most correlation coefficients are smaller than 0.1.

The specific PB model (stage I) is reproduced in Table II and Table III.

Table II. PB Model Stage I Regression Results

This table presents regression results for PB Model Stage I. The dependent variable is price to book ratio. All of the level independent variables except *mnpb* are normalized. The non-linear variables and interaction terms are created based on the normalized level variables. The sample period is 2000-2009.

	Coefficient	*t*-statistic
mnpb	0.5896	(8.9755)***
db	1.7070	(28.0271)***
db^2	-0.0532	(-4.1902)***
roe	1.0892	(19.1999)***
mnpb*|roe|	0.7331	(21.3660)***
roe^2	-0.2249	(-12.6582)***
roc	0.6313	(11.5137)***
mnpb*roc^2	-0.0166	(-3.6831)***
mnpb*$shretn^2$	0.0052	(3.1899)***
mnpb*rdintb	0.1666	(9.6990)***
mnpb*revgrth	0.1123	(9.1273)***
mnpb*advintb	0.0393	(2.1574)**
roe*revgrth	0.5628	(10.7010)***
roc*revgrth	-0.1312	(-3.1044)***
cover	0.2889	(6.4386)***
capxintb	-0.1137	(-2.6702)***
debtratio	-0.4276	(-8.5146)***
Constant	0.5928	(2.6281)***
Observations	4839	
R^2	0.524	
Adjusted R^2	0.522	

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

Compared with Branch et al. (2005), *R*-square declined from 0.6324 to 0.5241, as the number of observations in this study is less than half that of the 2005 study. We identify 15 pairs of variables that are highly correlated. As any one of the 15 pairs entering the model will lead to multicollinearity, we select one variable from each pair. Among the original 14 variables, *mnpb, db, db^2, mnpb*|roe|, mnpb*roc^2, mnpb*rdintb, mnpb*revgrth, and mnpb*advintb* are all retained. Although *mnpb*roc, mnpb*capxintb, $shret^2$, mnpb*cover, and mnpb*roe* are not included in the current model, their level variables, roc*, capxintb, mnpb*$shretn^2$, cover, and roe*, which are highly correlated with these five variables respectively, emerge significantly in the model. So only one variable, *mnpb*shretn* , used in 2005 paper lost its explanation. Furthermore, we select four new variables, i.e., *roe^2, roe*revgrth, roc*revgrth, and debtratio,* to be included in the model. Grouping the variables by category we find as follows.

A. Pure Time Series Variables

mnpb = annual average PB
(.0087 vs .120 in 2005 paper). (2)

Thus, *mnpb* by itself explain about 0.87% of the variability in the dependent variable, which is greatly reduced compared to the 2005 study. From Figure 1, *mnpb* doesn't change as much in the 2000-2009 period as in the period of 1979-2000, thereby its power is much smaller than that in 2005 study. The partial contribution to R^2 appears in parentheses.

B. Profitability Variables

db = dividend / book (.3016 vs. .004 in 2005);

db^2 = dividend/book squared (.0015 vs. .238 in 2005);

roe = return on equity(.0651 vs. *mnpb_roen* .004 in 2005);

Table III. Correlation Matrix for the Independent Variables

This table shows the correlation coefficients for the independent variables in the PB Model Stage I. The associated *p*-values are in parentheses. The sample period is 2000-2009.

Variable	mnpb	db	db^2	roe	mnpb*|roe|	roe^2	roc	mnpb*roc^2	mnpb*shretn^2	mnpb*rdintb	mnpb*revgrth	mnpb*advintb	roe*revgrth	roc*revgrth	cover	capxintb
db	0	1														
	(1.00)	(0.00)														
db^2	0	0.68	1													
	(0.97)	(0.00)	(0.00)													
roe	0	0.39	0.33	1												
	(1.00)	(0.00)	(0.00)	(0.00)												
mnpb*|roe|	0.12	0.28	0.42	0.17	1											
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)											
roe^2	0	0.21	0.39	0.25	0.88	1										
	(1.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)										
roc	0	0.21	0.15	0.48	-0.15	-0.09	1									
	(1.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)									
mnpb*roc^2	0.05	0.04	0.10	-0.16	0.56	0.40	-0.37	1								
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.37)								
mnpb*shretn^2	0.03	-0.01	0	-0.04	0.03	0.02	-0.01	-0.01	1							
	(0.07)	(0.67)	(0.97)	(0.00)	(0.04)	(0.29)	(0.41)	(0.37)	(0.00)							
mnpb*rdintb	0	-0.13	-0.04	-0.13	0.05	0.01	-0.16	0.15	0.04	1						
	(1.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.59)	(0.00)	(0.00)	(0.01)	(0.01)						
mnpb*revgrth	0	-0.09	-0.05	0.05	-0.12	-0.08	0.14	-0.10	0.01	0.04	1					
	(1.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.41)	(0.01)	(0.08)					
mnpb*advintb	0	0.15	0.09	0.05	0.04	0.01	0.08	0	0	-0.05	-0.03	1				
	(1.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.34)	(0.00)	(0.74)	(0.93)	(0.00)	(0.08)	(0.00)				
roe*revgrth	-0.03	-0.05	-0.06	-0.38	-0.02	-0.06	-0.21	0.13	-0.06	0.03	-0.21	-0.03	1			
	(0.04)	(0.00)	(0.00)	(0.00)	(0.22)	(0.00)	(0.00)	(0.00)	(0.00)	(0.06)	(0.00)	(0.02)	(0.00)			
roc*revgrth	-0.06	-0.06	-0.03	-0.18	0.11	0.08	-0.28	0.23	-0.04	0.03	-0.26	-0.04	0.63	1		
	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.04)	(0.00)	(0.01)	(0.00)	(0.59)		
cover	0	-0.03	-0.02	0.03	-0.04	-0.03	0.14	0.01	0.01	0.12	0.06	-0.02	0	0.01	1	
	(1.00)	(0.03)	(0.25)	(0.02)	(0.01)	(0.05)	(0.00)	(0.62)	(0.49)	(0.00)	(0.00)	(0.11)	(0.79)	(0.59)	(0.00)	
capxintb	0	-0.04	-0.03	-0.06	-0.02	-0.02	-0.08	-0.02	0.05	0.09	0.08	0.01	0.01	0.02	-0.04	1
	(1.00)	(0.00)	(0.02)	(0.00)	(0.18)	(0.13)	(0.00)	(0.24)	(0.00)	(0.00)	(0.00)	(0.41)	(0.33)	(0.17)	(0.01)	(0.00)
debtratio	0	0.24	0.22	0.07	0.32	0.28	-0.20	0	0	-0.25	-0.07	-0.03	-0.03	-0.02	-0.23	0.09
	(1.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.79)	(0.79)	(0.00)	(0.00)	(0.07)	(0.03)	(0.26)	(0.00)	(0.00)

mnpb*|roe| = roe absolute value interacted with annual average PB (.0375 vs. .005 in 2005);

roe^2 = *roe* squared (.0254);

roc = return on capital (.0309 vs. *mnpb_roc* .0123 in 2005);

mnpb*roc^2 = *roc* squared interacted with annual average PB (.0017 vs. .037 in 2005);

$shret^2$ = the square of (change in stock price / change in retained earnings) (.0009 vs. *mnpb_shretnnsq* .0065 in 2005).

Variables *mnpb_shretn* could not explain PB in period 2000-2009, although they have a significant role in period 1979-2000 in 2005 study. And roe^2 is the newly entering variable.

All of the above variables except *roe^2, db^2 and mnpb*roc^2* have positive signs and are highly significant (at least at the 95% level). Together they imply that PB rises with dividend / book, *roe*, and *roc*, the absolute value of *roe* with a greater positive effect the higher the annual average value for PB, which is indicated by the positive coefficient of *mnpb*|roe|*. These variables explain about 46.5% of the variability in PB, which is higher than that the 41% in 2005 study. So, profitability seems to play a greater role in explaining PB in the recent period.

C. Growth Variables

mnbp*rdintb = R&D intensity interacted with annual average PB (.0096 vs. .020 in 2005);

mnpb*revgrth = revenue growth interacted with annual average PB (.0088 vs. .017 in 2005);

roe*revgrth = revenue growth rate interacted with *roe* (.0083);

roc*revgrth = revenue growth rate interacted with *roc* (0.0010);

mnpb*advintb = advertising intensity interacted with annual average PB (.0005 vs. .017 in 2005).

All of the three growth variables, *mnpb*rdintb, mnpb*revgrth, mnpb*advintb*, used in 2005 study, are still significant and have the same positive sign as in the 2005 study but with less power. Besides, two new growth variables are added to the model: the interaction terms, *roe*revgrth and roc*revgrth*. The five growth variables all together explain about 2.8% of the variability in PB, which is lower than that the 5.4% in the 2005 study.

Expected growth does impact PB but appears to have a much smaller affect than does profitability. Besides, the positive coefficient of interaction term *roe*revgrth* suggests *roe* with a greater positive impact on PB the higher level of revenue growth rate.

D. Risk Variables

cover = interest coverage ratio (.0039 vs. *mnpb_cover* .004 in 2005);

capxintb = capital intensity(0.0007 vs. *mnpb_capxintb*0.029);
debtratio = total long term debt/total capital (0.0181).

All of the level risk variables *cover*, c*apxintb* and *debtratio* emerge significantly in the model. Together the three risk variables explain about 2.3% of the variability in PB, only 1% lower than that 3.3% in the 2005 study. Note, although *db* and *db^2* are classified as profitability variables, such variables have both a profitability and risk component. Companies that pay dividends tend to have more stable earning streams than those that do not. Here, *db* and *db^2* together contribute 30.3%. Thus the impact of risk on PB variability is greater than 2.3%.

In the model building, we also try the change of default spread and the change of the term spread, which are measure of default risk and interest risk, and their interactions with the three risk variables. We expect the change of default spread (*deltaDEF*) may have a significant negative coefficient, the interaction between *deltaDEF* and cover positive, the interaction between *deltaDEF* and *capxintb*(or *debtratio*) negative, and the level and interaction terms of change of term spread (*deltaTERM*) be opposite to those of *deltaDEF*. It turns out that the yearly average *deltaDEF* and *deltaTERM* are highly correlated and they have the right sign but they lose significance as other profitability variables come in the model. Some of the interaction terms get the wrong sign. In the end, they all are out of model as they do not play a role as big as other variables selected.

In the 2005 study, the *mnpb* variable and the nine interaction terms between *mnpb* and various independent variables together explained 37.5% of variability in PB. In contrast, the *mnpb's* contribution is greatly reduced in the recent period 2000-2009. Similarly the nine interaction terms are now much less important. Only five *mnpb* interactions remain in the model, together with *mnpb* explaining only about 6.68% of variability in PB. We do, however, find a significant joint impact of profitability and growth, which was not significant in the 2005 study. However, these newly entered variables could not make up the lost power of *mnpb* and its interaction terms. Therefore, we attribute the smaller *R*-square in our study to the reduced power of annual average PB(*mnpb*).

Having fit our model to contemporaneous data, we next added a data set of lagged variables which enter the model in a second stage. The second stage containing our lagged data set, explains the first stage residual. Working with a set of 12 variables, we were able to explain 19.39% of the variability of the residual. Since our first stage explained 52.41% of the variability and the second stage explained 19.39% of the residual our combined explanatory power was about 61.63%

Table IV. PB model Stage II Regression Results

This table presents regression results for PB Model Stage II. The dependent variable is the residuals from Stage I regressions. All of the level independent variables except *mnpb* are normalized. The non-linear variables and interaction terms are created based on the normalized level variables. The sample period is 2000-2009. *t*-statistics are in parentheses.

	Coefficient	*t*-statistic
pb_lag	1.53	(29.99)***
db_lag	-1.19	(-19.11)***
db^2_lag	0.08	(6.76)***
revgrth_lag	-0.21	(-5.48)***
debtratio_lag	0.19	(4.48)***
roe_lag	-0.28	(-5.88)***
rdintb_lag	-0.18	(-3.29)***
roe^2_lag	-0.05	(-3.46)***
cover_lag	-0.11	(-2.74)***
roc_lag	0.13	(2.86)***
deltadef*debtratio_lag	-0.09	(-2.55)**
mnpb*|roe|_lag	0.05	(2.09)**
Constant	-0.11	(-2.33)**
Observations	4839	
R^2	0.194	
Adjusted R^2	0.192	

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

Figure 4a. Distribution of the Residual Values from Stage II Regression

This figure plots the distribution of stage II regression residual values for the sample period of 2000 to 2009.

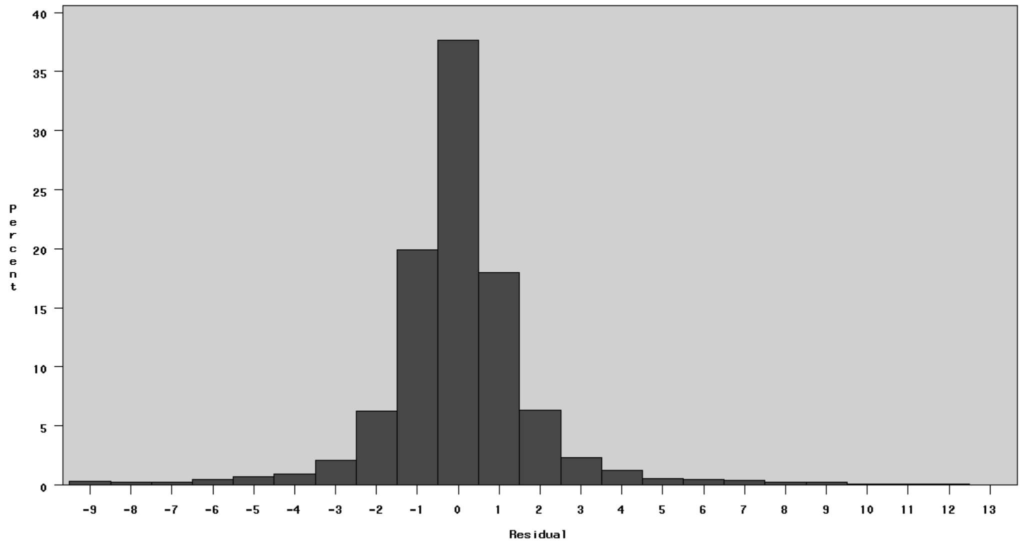


Figure 4b. Distribution of the Residual Values from Stage II Regression

This figure plots the distribution of Stage II regression residual values for the sample period of 1979 to 2000.

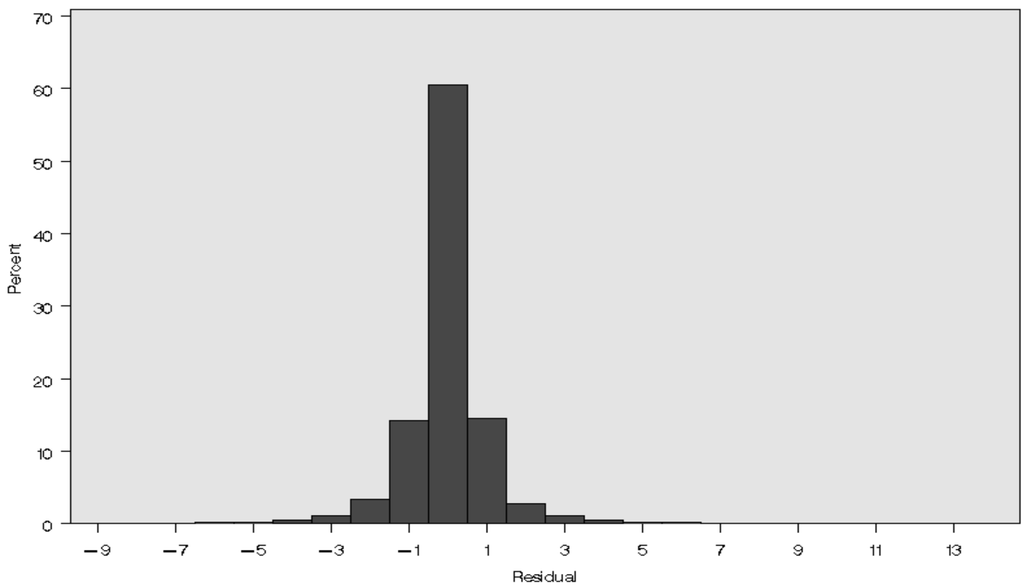
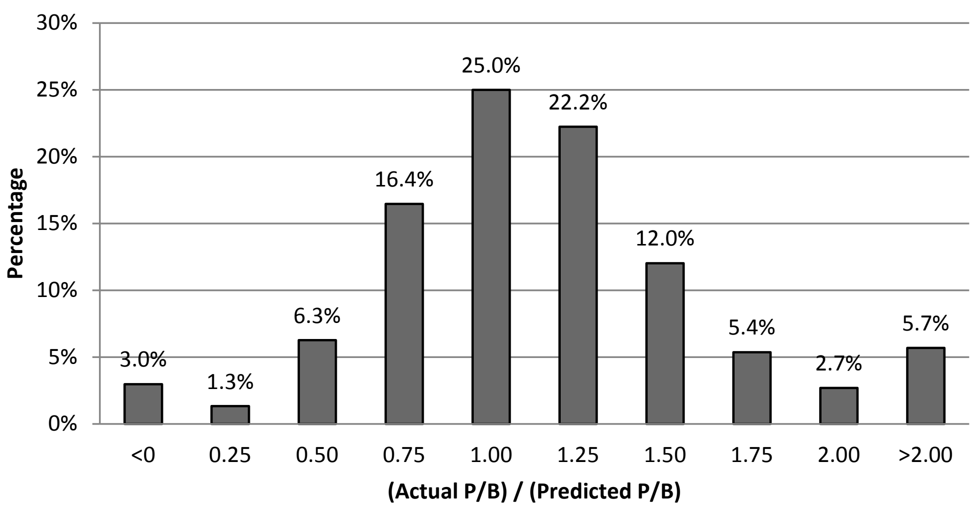


Figure 5a. The Ratio of Actual to Predicted PBs

This figure plots the distribution of actual to predicted PB ratio for the period of 2000 to 2009.



[.5241 + (1-.5241) (.1939) = *.6163*].

VIII. The PB Model Stage II

In Stage II we fit a model to explain the residual for Stage I of our model. The independent variables of Stage II are lagged by one year from the dependent variable. The regression had 15 variables and an R^2 of .1939. The regression result is shown in Table IV.

A. The Variables

PB lagged has a coefficient of 1.53 and a partial R^2 contribution of 0.1058. Thus over one half of the total R^2 of this stage comes from the lagged dependent variable. The next most important variable is (dividend/book) lagged with a partial R^2 contribution of .0599. The remaining variables have contributions in the range of 3% or less.

B. The Fit of the Model

Figure 4a illustrates the distribution of the residual from our model. The residuals cluster near zero with most residuals having values between -2.0 and +2.0. Figure 5a plots the ratio of actual to predicted PBs. About 25% of the ratios are 1.0 or very close to 1.0 (Actual = Predicted). Another 16.4% and 22.2% have actual-to-predicted ratios in

Figure 5b. The Ratio of Actual to Predicted PBs

This figure plots the distribution of actual to predicted PB ratio for the period of 1979 to 2000.

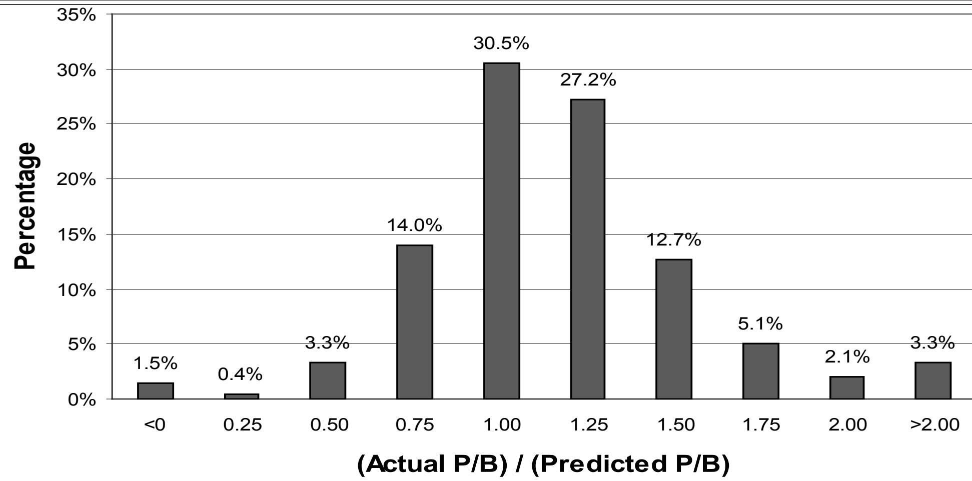
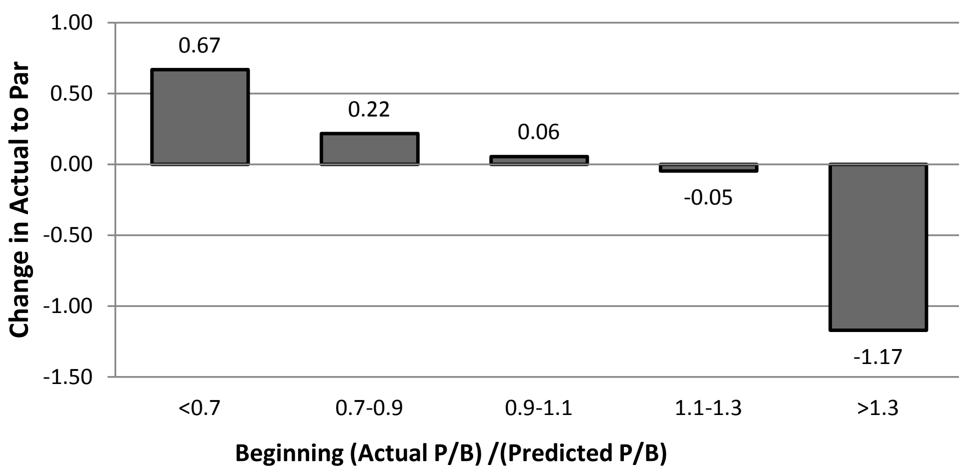


Figure 6a. Actual and Predicted PB Move Together in 2000-2009

This figure shows the actual PB and Predicted PB moves together in the period of 2000 to 2009. The beginning actual PB to Predicted PB ratio is plotted on the horizontal axis. Change in Actual to Par, the difference between the ending Actual PB to Predicted PB ratio and the beginning actual PB to Predicted PB ratio, is plotted on the vertical axis.



the range of .75 and 1.25 respectively. Overall, about 63.6% of the observations (.25 + .164 +.222 = .636) are in the vicinity of .75 to 1.25.

IX. Dynamic Behavior

From the above reported results, we see that our model explains our dataset well.

We explore the model's dynamic properties in this section. We observe a similar tendency for the ratio of actual to predicted PB to move toward one over the period 2000-2009 (Figure 6a) as over the period 1979-2000 (Figure 6b). If the beginning actual is below the predicted, the ratio tends to rise and if the actual begins above the predicted, the ratio tends to fall. Put another way observations with large residuals tend to have smaller residuals in the subsequent period.

X. Actual versus Model Values and Subsequent Firm Performance

We next explore the market's ability to anticipate future company performance, particularly future profitability and growth. When a company's actual PB is above its model value, the market probably expects the company's performance to improve. Similarly, a company with an actual PB below its model value suggests that the market is concerned that the company's performance is likely to deteriorate. The 2005 study documented the market's ability to anticipate future company performance for the period of 1979-2000. We also follow the procedure used in 2005 to test the hypothetical set of relation over the period 2000-2009. Figure 7a illustrates the relationship between the beginning

Figure 6b. Actual and Predicted PB Move Together in 1979-2000

This figure shows the actual PB and Predicted PB moves together in the period of 1979 to 2000. The beginning actual PB to Predicted PB ratio is plotted on the horizontal axis. Change in Actual to Par, the difference between the ending Actual PB to Predicted PB ratio and the beginning actual PB to Predicted PB ratio, is plotted on the vertical axis.

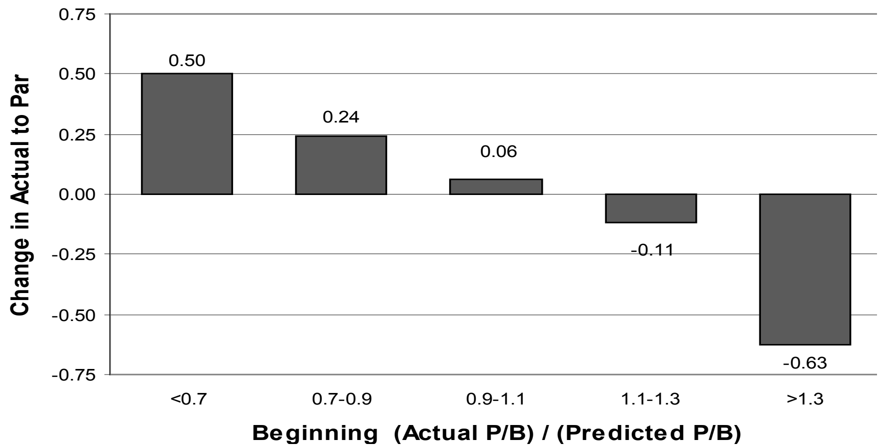
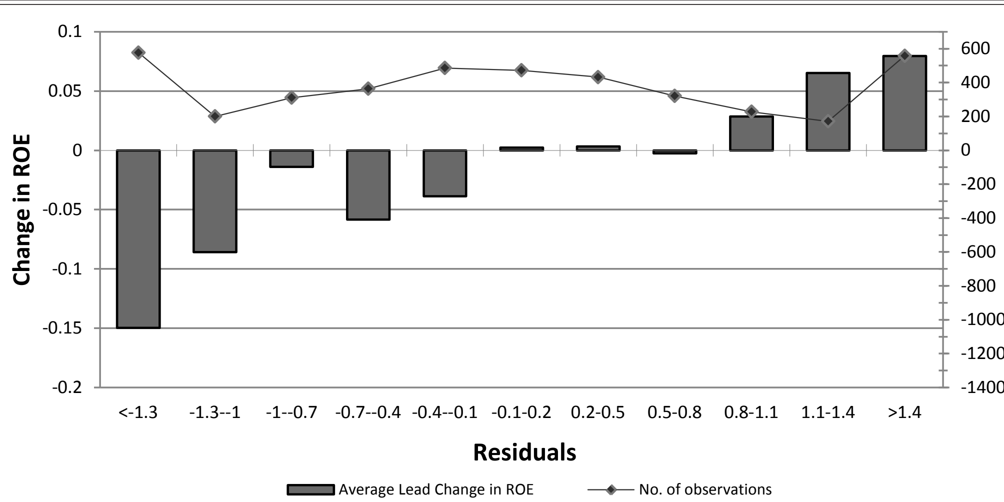


Figure 7a. Lead Changes in ROE and Residuals in 2000-2009

This figure shows the relationship between the beginning period residual and the change in ROE in the following year for the period 2000-2009. The beginning period residual is plotted on the horizontal axis. Lead change in ROE, the difference between the ending period ROE and the beginning period ROE, is plotted on the primary vertical axis. The number of observations are plotted on the secondary vertical axis.



period residual and the change in ROE in the following year for the period 2000-2009. We see that the more positive the residual the more ROE tends to rise, but the pattern is not as persistent as in the 2005 study.

Figure 8a (below) illustrates the relation between the beginning period residual and subsequent change in revenue growth. The more negative is the residual, the more the revenue growth rate tends to fall. Finally Figure 9a illustrates the joint association of profitability and growth with the residual. Firms whose ROEs and revenue growth rates are rising tend to have positive beginning period residuals.

XI. Summary, Conclusion, and Direction for Further Work

We have updated an earlier analysis by rebuilding our PB model and exploring the behavior of PB with a more recent sample. Using the foundation of the dividend discount model we have estimated an empirical equation of two stages which explain about 62 percent of the variation in annual PB levels for the S&P 500 companies from the year 2000 to 2009. Most of the variables used in the earlier Branch et al. (2005) study still explain a significant part of the variation

Figure 7b. Lead Changes in ROE and Residuals in 1979-2000

This figure shows the relationship between the beginning period residual and the change in ROE in the following year for the period 1979-2000. The beginning period residual is plotted on the horizontal axis. Lead change in ROE, the difference between the ending period ROE and the beginning period ROE, is plotted on the primary vertical axis. The number of observations are plotted on the secondary vertical axis.

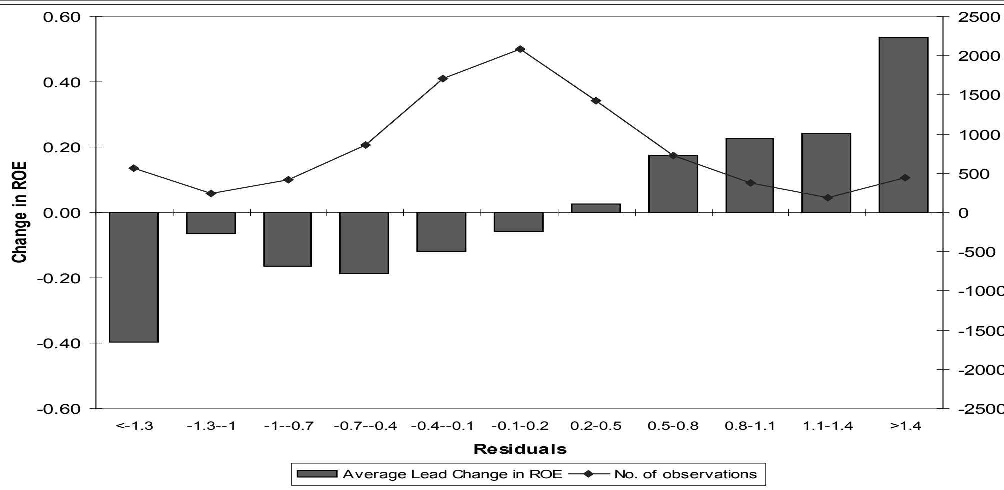


Figure 8. Lead Changes in Revenue Growth and Residuals in 2000-2009

This figure shows the relationship between the beginning period residual and the change in revenue growth in the following year for the period 2000-2009. The beginning period residual is plotted on the horizontal axis. Lead change in revenue growth, the difference between the ending period revenue growth and the beginning period revenue growth, is plotted on the primary vertical axis. The number of observations are plotted on the secondary vertical axis.

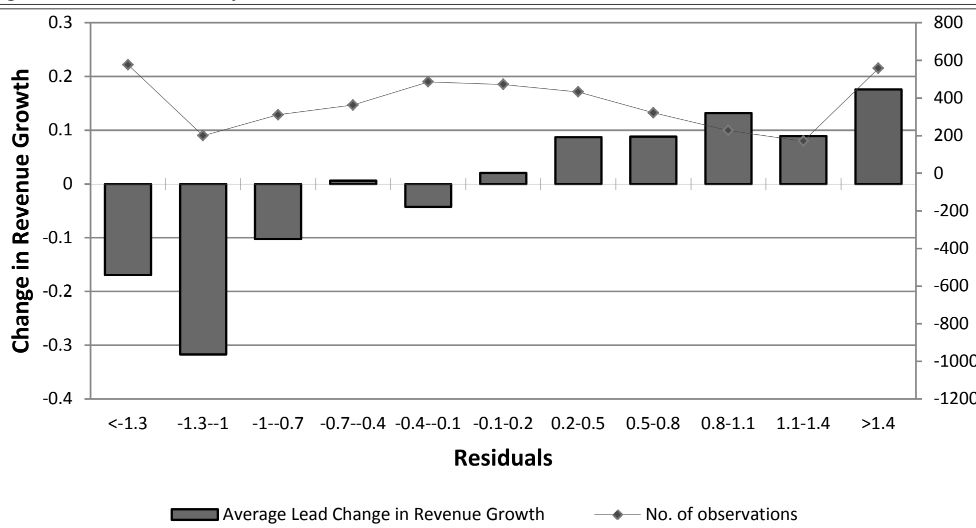


Figure 8b. Lead Changes in Revenue Growth and Residuals in 1979-2000

This figure shows the relationship between the beginning period residual and the change in revenue growth in the following year for the period 1979-2000. The beginning period residual is plotted on the horizontal axis. Lead change in revenue growth, the difference between the ending period revenue growth and the beginning period revenue growth, is plotted on the primary vertical axis. The number of observations are plotted on the secondary vertical axis.

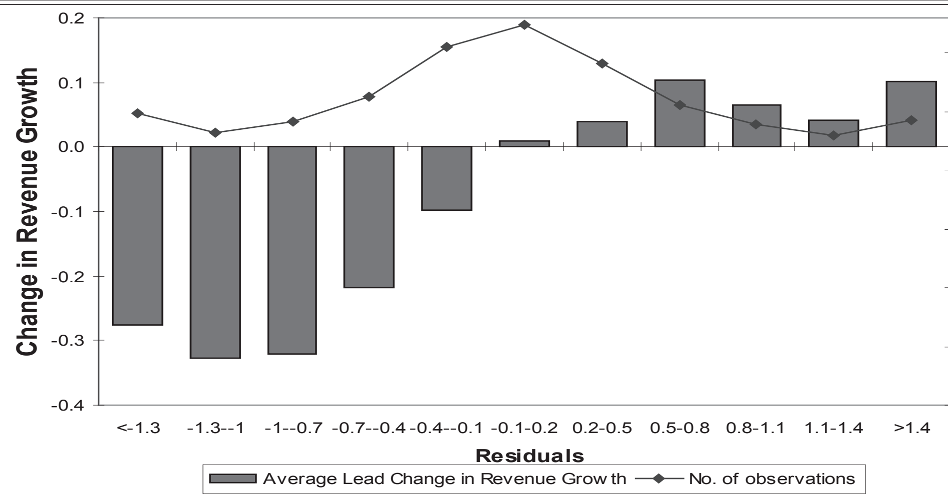
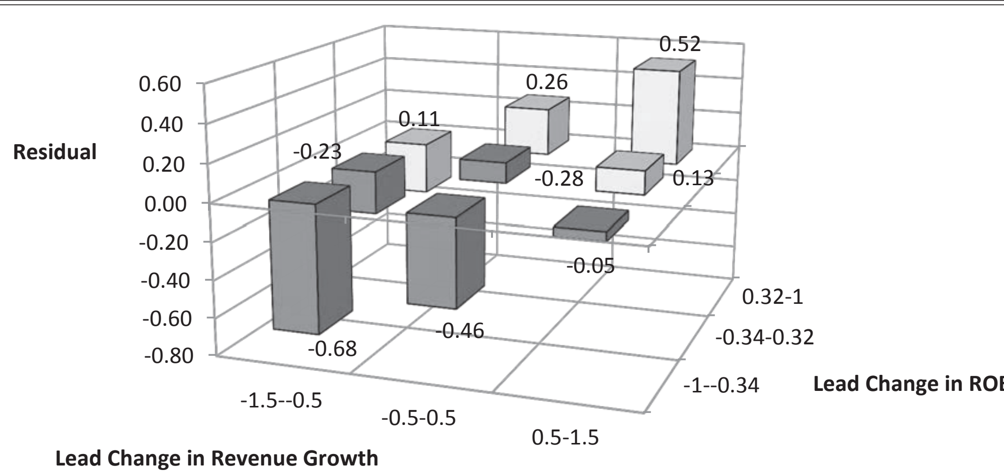


Figure 9a. The Joint Association of Profitability and Growth with the Residual in 2000-2009

This figure shows the joint association of profitability and growth with the residual in 2000-2009. Lead change in ROE, the difference between the ending period ROE and the beginning period ROE, is plotted on the x-axis. Lead change in revenue growth, the difference between the ending period revenue growth and the beginning period revenue growth, is plotted on the y-axis. The beginning period residual is plotted on the z-axis.



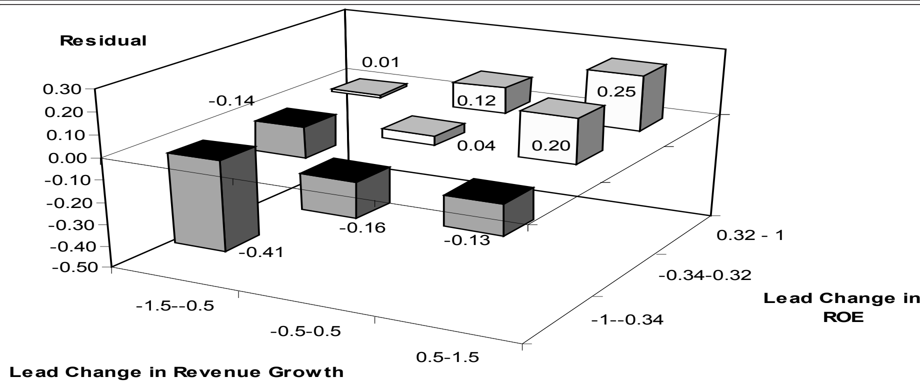
of PB. And we also find a similar time series behavior of the residuals. Observations with large residuals in period t tend to have smaller residuals in period t+1. This movement is a result of both the predicted moving toward the actual and the actual moving toward the predicted.

We also explored the market's ability to anticipate changes in performance. We found that those observations with positive residuals (actual greater than model value PB) tended to experience higher next period profitability (ROE) and more rapid revenue growth. The performance of those with negative residuals tended to deteriorate. Thus the market price appears to reflect anticipatory information not present in the model value.

Our current PB model focuses on four basic forces to explain both cross section and time series variability in PB. First, the time series variability in the yearly average PB picks up most of the market variability. This average PB variable accounts for about 1% of the PB variability in our sample. Second, various profitability related variables explain about 46.5% of PB variability. Profitability

Figure 9b. The Joint Association of Profitability and Growth with the Residual in 1979-2000

This figure shows the joint association of profitability and growth with the residual in 1979-2000. Lead change in ROE, the difference between the ending period ROE and the beginning period ROE, is plotted on the x-axis. Lead change in revenue growth, the difference between the ending period revenue growth and the beginning period revenue growth, is plotted on the y-axis. The beginning period residual is plotted on the z-axis.



levels above its mean value tend to impact PB more than profitability levels below its mean. Third, growth variables explain about 2.8% of PB variability. Finally risk variables explain about 2.3% of PB variability. Profitability still has a very powerful effect on PB in the more recent period. Note that certain of the variables classified as profitability have risk and growth components. Moreover, the market may be reacting to factors not reflected in our model and thereby anticipating growth and risk factors that we have not been able to quantify. Still, we do find that profitability is more powerful in explaining variability in PB in the 2000-2009 period than in the 1979-1999 period.■

References

Amit, R. and J. Livnat, 1988, "Diversification and the Risk-Return Trade-Off," *Academy of Management Journal* 31 (No. 1), 154-166.

Amit, R. and B. Wernerfelt, 1990, "Why do Firms Reduce Business Risk?" *Academy of Management Journal* 33 (No. 3), 520-533.

Anand, J. and H. Singh, 1997, "Asset Redeployment, Acquisitions and Corporate Strategy in Declining Industries," *Strategic Management Journal* 18 (No. S1), 99-118.

Banz, R.W., 1981, "The Relationship Between Return and Market Value of Common Stocks," *Journal of Financial Economics* 9 (No. 1), 3-18.

Barber, B.M. and J.D. Lyon, 1997, "Firm Size, Book-to-Market Ratio, and Security Returns: A Holdout Sample of Financial Firms," *Journal of Finance* 52 (No. 2), 875-883.

Barton, S.L., 1988, "Diversification Strategy and Systematic Risk: Another Look," *Academy of Management Journal* 31 (No. 1), 166-175.

Basu, S., 1983, "The Relationship between Earnings' Yield, Market Value and Return for NYSE Common Stocks: Further Evidence," *Journal of Financial Economics* 12 (No. 1), 129-156.

Becker, B. and B. Gerhart, 1996, "The Impact of Human Resource Management on Organizational Performance: Progress and Prospects," *Academy of Management Journal* 39 (No. 4), 779-801.

Bhandari, L.C., 1988, "Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence," *Journal of Finance* 43 (No. 2), 507-528.

Black, F., 1993, "Return and Beta," *Journal of Portfolio Management* 20 (No. 1), 8-8.

Branch, B.S. and B. Gale, 1983, "Linking Corporate Stock Price Performance to Strategy Formulation," *Journal of Business Strategy* 4 (No. 1), 44-50.

Branch, B.S., A. Sharma, B. Gale, C. Chichirau, and J. Proy, 2005, "Explaining Price to Book," Business Quest, westga.edu/~bquest/2005/Model.pdf.

Breeden, D.T., 1979, "An Intertemporal Asset Pricing Model with Stochastic Consumption and Investment Opportunities," *Journal of Financial Economics* 7 (No. 3), 265-296.

Breeden, D.T., M.R. Gibbons, and R.H. Litzenberger, 1989, "Empirical Test of the Consumption-Oriented CAPM," *Journal of Finance* 44 (No. 2), 231-262.

Capaul, C., I. Rowley, and W.F. Sharpe, 1993, "International Value and Growth Stock Returns," *Financial Analysts Journal* 49 (No. 1), 27-36.

Chakravarthy, B.S., 1986, "Measuring Strategic Performance," *Strategic Management Journal* 7 (No. 5), 437-458.

Chan, L.K.C., Y. Hamao, and J. Lakonishok, 1991, "Fundamentals and Stock Returns in Japan," *Journal of Finance* 46 (No. 5), 1739-1764.

Chang, S.J., 2003, "Ownership Structure, Expropriation, and Performance of Group-Affiliated Companies in Korea," *Academy of Management Journal* 46 (No. 2), 238-253.

Cheng, D.C., B.E. Gup, L.D. Wall, 1989, "Financial Determinants of Bank Takeovers," *Journal of Money, Credit & Banking* 21 (No. 4), 524-536.

Chetty, V.K., 1968, "Pooling of Time Series and Cross Section Data," *Econometrica* 36 (No. 2), 279-290.

Cho, H.J. and V. Pucik, 2005, "Relationship Between Innovativeness, Quality, Growth, Profitability, and Market Value," *Strategic Management Journal* 26 (No. 6), 555-575.

Combs, J.G. and D.J. Ketchen, Jr., 1999, Explaining Interfirm Cooperation and Performance: Toward a Reconciliation of Predictions from the Resource-Based View and Organizational Economics," *Strategic Management Journal* 20 (No. 9), 867-888.

Daniel, K. and S. Titman, 1997, "Evidence on the Characteristics of Cross Sectional Variation in Stock Returns," *Journal of Finance* 52 (No. 1), 1-33.

Davis, G.F. and S.K. Stout, 1992, "Organization Theory and the Market for Corporate Control: A Dynamic Analysis of the Characteristics of Large Takeover Targets, 1980-1990," *Administrative Science Quarterly* 37 (No. 4), 605-633.

Davis, J.L., 1994, "The Cross-Section of Realized Stock Returns: The Pre-COMPUSTAT Evidence," *Journal of Finance* 49 (No. 5), 1579-1593.

Davis, J.L., F.F. Fama, and K.R. French, 2000, "Characteristics, Covariances, and Average Returns: 1929 to 1997," *Journal of Finance* 55 (No. 1), 389-406.

De Bondt, W.F.M. and R.H. Thaler, 1987, "Further Evidence on Investor Overreaction and Stock Market Seasonality," *Journal of Finance* 42 (No. 3), 557-581.

Dlugosz, J., R. Fahlenbrach, P. Gompers, and A. Metrick, 2006, "Large Blocks of Stock: Prevalence, Size, and Measurement," *Journal of Corporate Finance* 12 (No. 3), 594-618.

Dushnitsky, G. and M.J. Lenox, 2006, "When Does Corporate Venture Capital Investment Create Firm Value?" *Journal of Business Venturing* 21 (No. 6), 753-772.

Dutta, S., O. Narasimhan, and S. Rajiv, 1999, "Success in High-Technology Markets: Is Marketing Capability Critical?" *Marketing Science* 18 (No. 4), 547-568.

Dutta, S., O. Narasimhan, and S. Rajiv, 2005, "Conceptualizing and Measuring Capabilities: Methodology and Empirical Application," *Strategic Management Journal* 26 (No. 3), 277-285.

Fama, E.F. and K.R. French, 1992, "The Cross-Section of Expected Stock Returns," *Journal of Finance* 47 (No. 2), 427-465.

Fama, E.F. and K.R. French, 1993, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics* 33 (No. 1), 3-56.

Fama, E.F. and K.R. French, 1995, "Size and Book-to-Market Factors in Earnings and Returns," *Journal of Finance* 50 (No. 1), 131-155.

Fama, E.F. and K.R. French, 1998, "Value Versus Growth: The International Evidence," *Journal of Finance* 53 (No. 6), 1975-1999.

Fama, E.F. and K.R. French, 2006, "The Value Premium and the CAPM," *Journal of Finance* 61 (No. 5), 2163-2185.

Fombrun, C. and M. Shanley, 1990, "What's in a Name? Reputation Building and Corporate Strategy," *Academy of Management Journal* 33 (No. 2), 233-258.

Gibbs, P.A., 1993, "Determinants of Corporate Restructuring: The Relative Importance of Corporate Governance, Takeover Threat, and Free Cash Flow," *Strategic Management Journal* 14 (S1), 51-68.

Griffin, J.M. and M.L. Lemmon, 2002, "Book-to-Market Equity, Distress Risk, and Stock Returns," *Journal of Finance* 57 (No. 5), 2317-2336.

Gutierreez, Jr., RC., 2001, "Book-to-Market Equity, Size, and the Segmentation of the Stock and Bond Markets," Texas A&M University Working Paper.

Hahn, J. and H. Lee, 2009, "Financial Constraints, Debt Capacity, and the Cross-Section of Stock Returns," *Journal of Finance* 64 (No. 2), 891-921.

Haugen, R.A., 1995, *The New Finance: The Case Against Efficient Markets*, Prentice Hall, NJ.

Huselid, M.A., 1995, "The Impact of Human Resource Management Practices on Turnover, Productivity, and Corporate Financial Performance," *Academy of Management Journal* 38 (No. 3), 635-672.

Huselid, M.A., S.E. Jackson, and R.S. Schuler, 1997, "Technical and Strategic Human Resource Management Effectiveness as Determinants of Firm Performance," *Academy of Management Journal* 40 (No. 1), 171-188.

Iyer, D.N. and K.D. Miller, 2008, "Performance Feedback, Slack, and the Timing of Acquisitions," *Academy of Management Journal* 51 (No. 4), 808-822.

Jensen, G.R., R.R. Johnson, and J.M. Mercer, 1997, "New Evidence on Size and Price-to-Book Effects in Stock Returns," *Financial Analysts Journal* 53 (No. 6), 34-42.

Kor, Y.Y. and J.T. Mahoney, 2005, "How Dynamics, Management, and Governance of Resource Deployments Influence Firm-Level Performance," *Strategic Management Journal* 26 (No. 5), 489-496.

Lakonishok, J., A.,Shleifer, and R.W. Vishny, 1994, "Contrarian Investment, Extrapolation, and Risk," *Journal of Finance* 49 (No. 5), 1541-1578.

Lindenberg, E.B. and S.A. Ross, 1981. "Tobin's q Ratio and Industrial Organization," *Journal of Business* 54 (No. 1), 1-32.

Lintner, J., 1965, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," *Review of Economics and Statistics* 47 (No. 1), 13-37.

Lu, J.W. and P.W. Beamish, 2004, "International Diversification and Firm Performance: The S-Curve Hypothesis," *Academy of Management Journal* 47 (No. 4), 598-609.

MacKinlay, A.C., 1995, "Multifactor Models do not Explain Deviations from the CAPM," *Journal of Financial Economics* 38 (No. 1), 3-28.

Malkiel, B.G., 2003, "The Efficient Market Hypothesis and its Critics," *Journal of Economic Perspectives* 17 (No. 1), 59-82.

McDonald, M.L., P. Khanna, and J.D. Westphal, 2008, "Getting them to Think Outside the Circle: Corporate Governance, CEOS' External Advice Networks, and Firm Performance," *Academy of Management Journal* 51 (No. 3), 453-475.

Merton, R.C., 1973, "An Intertemporal Capital Asset Pricing Model," *Econometrica* 41 (No. 5), 867-887.

Montgomery, C.A. and B. Wernerfelt, 1988, "Diversification, Ricardian Rents, and Tobin's q," *Rand Journal of Economics* 19 (No. 4), 623-632.

Morck, R., A. Shleifer, and R.W. Vishny, 1989, "Alternative Mechanisms for Corporate Control," *American Economic Review* 79 (No. 4), 842-852.

Mundlak, Y., 1978, "On the Pooling of Time Series and Cross Section Data," *Econometrica* 46 (No. 1), 69-85.

Murray, A.I., 1989, "Top Management Group Heterogeneity and Firm Performance," *Strategic Management Journal* 10 (No. S1), 125-141.

Nayyar, P.R., 1992, "Performance Effects of Three Foci in Service Firms," *Academy of Management Journal* 35 (No. 5), 985-1009.

Nayyar, P.R., 1993, "Performance Effects of Information Asymmetry and Economies of Scope in Diversified Service Firms," *Academy of Management Journal* 36 (No. 1), 28-57.

O'Brien, J.P., 2003, "The Capital Structure Implications of Pursuing a Strategy of Innovation," *Strategic Management Journal* 24 (No. 5), 415-431.

Ohlson, J.A., 1980, "Financial Ratios and the Probabilistic Prediction of Bankruptcy," *Journal of Accounting Research* 18 (No. 1), 109-131.

Pitcher, P. and A.D. Smith, 2001, "Top Management Team Heterogeneity: Personality, Power, and Proxies," *Organization Science* 12 (No. 1), 1-18.

Reinganum, M.R., 1981, "A New Empirical Perspective on the CAPM," *Journal of Financial and Quantitative Analysis* 16 (No. 4), 439-462.

Rogowski, R.J. and D.G. Simonson, 1987, "Bank Merger Pricing Premiums and Interstate Banking," Paper presented at Financial Management Association Annual Meeting, Las Vegas, NV.

Rosenberg, B., K. Reid, and R. Lanstein, 1985, "Persuasive Evidence of Market Inefficiency," *Journal of Portfolio Management* 11 (No. 3), 9-16.

Ross, S.A., 1976, "The Arbitrage Theory of Capital Asset Pricing," *Journal of Economic Theory* 13 (No. 3), 341-360.

Sharma, A., B.S. Branch, C. Chawla, and L. Qiu., 2013, "Explaining Market to Book: The Relative Impact of Firm Performance, Growth, and Risk," Business Quest: http://www.westga.edu/~bquest/2013/research2013.htm.

Sharpe, W.F., 1964, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," *Journal of Finance* 19 (No. 3), 425-442.

Short, J.C., D.J. Ketchen, Jr., T.B. Palmer, and G.T.M. Hult, 2007, "Firm, Strategic Group, and Industry Influences on Performance," *Strategic Management Journal* 28 (No. 2), 147-167.

Smirlock, M., T. Gilligan, and W. Marshall, 1984, "Tobin's q and the Structure-Performance Relationship," *American Economic Review* 74 (No. 5), 1051-1060.

Surroca, J., J.A. Tribó, and S. Waddock, 2010, "Corporate Responsibility and Financial Performance: The Role of Intangible Resources," *Strategic Management Journal* 31 (No. 5), 463-490.

Tanriverdi, H. and N. Venkatraman, 2005, "Knowledge Relatedness and the Performance of Multibusiness Firms," *Strategic Management Journal* 26 (No. 2), 97-119.

Tobin, J., 1969, "A General Equilibrium Approach to Monetary Theory," *Journal of Money, Credit and Banking* 1 (No. 1), 15-29

Varaiya, N., R.A. Kerin, and D. Weeks, 1987, "The Relationship Between Growth, Profitability, and Firm Value," *Strategic Management Journal* 8 (No. 5), 487-497.

Vassalou, M. and Y. Xing, 2004, "Default Risk in Equity Returns," *Journal of Finance* 59 (No. 2), 831-868.

Wang, H., J. Choi, and J. Li, 2008, "Too Little or too Much? Untangling the Relationship between Corporate Philanthropy and Firm Financial Performance," *Organization Science* 19 (No. 1), 143-159.

Wang, H.C., J. He, and J.T. Mahoney, 2009, "Firm-Specific Knowledge Resources and Competitive Advantage: The Roles of Economic-and Relationship-Based Employee Governance Mechanisms," *Strategic Management Journal* 30 (No. 12), 1265-1285.

Welbourne, T.M. and A.O. Andrews, 1996, "Predicting the Performance of Initial Public Offerings: Should Human Resource Management be in the Equation?" *Academy of Management Journal* 39 (No. 4), 891-919.

Wernerfelt, B. and C.A. Montgomery, 1988, "Tobin's q and the Importance of Focus in Firm Performance," *American Economic Review* 78 (No. 1), 246-250.

Wiggins, R.R. and T.W. Ruefli, 2002, "Sustained Competitive Advantage: Temporal Dynamics and the Incidence and Persistence of Superior Economic Performance," *Organization Science* 13 (No. 1), 82-105.

Analyst Forecasting Errors: Additional Evidence

Lawrence D. Brown

Analyst forecasting errors are approximately as large as Dreman and Berry (1995) documented, and an optimistic bias is evident for all years from 1985 through 1996. In contrast to their findings, I show that analyst forecasting errors and bias have decreased over time. Moreover, the optimistic bias in quarterly forecasts was absent for S&P 500 firms from 1993 through 1996. Analyst forecasting errors are smaller for (1) S&P 500 firms than for other firms; (2) firms with comparatively large amounts of market capitalization, absolute value of earnings forecast, and analyst following; and (3) firms in certain industries.

In recent issues of this journal, David Dreman, Michael Berry, and I have presented alternative views of analysts' earnings forecast errors and their implications for security analysis (Dreman and Berry 1995, Brown 1996, Dreman 1996). The first two papers provided alternative views concerning several issues, including whether (1) analysts' earnings forecast errors are "too large," (2) analysts' earnings forecast errors have increased over time, and (3) analysts' earnings forecasts are optimistically biased.

In the opinion of Dreman and Berry, analysts' earnings forecast errors are too large, and using the deflators the authors suggested (e.g., actual or predicted earnings), analyst forecasting errors do appear large. If analysts' earnings forecast errors are deflated by stock price, however, or compared with forecasts based on extrapolative techniques, they do not appear too large. Dreman–Berry also maintained that analysts' earnings forecasting errors have increased over time. My analysis of their findings, however, suggested that the accuracy of analysts' earnings forecasts has actually improved over time. In addition, Dreman–Berry provided evidence that analysts' earnings forecasts are biased toward optimism. Relying on information provided by I/B/E/S International, I showed that an optimistic bias was absent for S&P 500 firms for the 11 quarters from first-quarter 1993 through third-quarter 1995.

In his letter to the editor, Dreman (1996) responded to the views I expressed in my article, disagreeing with most of them. He correctly observed that much of my analysis was based on the Abel–Noser database, which Dreman–Berry had used but which was inaccessible to me; my analysis relied on summary information provided in the Dreman–Berry article. Moreover, although not stated by Dreman, neither did I examine the I/B/E/S data that I had relied on in my 1996 article. Instead, I relied on summary information provided to me by I/B/E/S.

This article is based on I/B/E/S data for fourth-quarter 1983 through second-quarter 1996. It presents evidence regarding the following issues:

- Is the Dreman–Berry result that analyst forecasting errors are "too large" robust to using a different data source than the Abel–Noser database?
- Is the Dreman–Berry conclusion that analysts' forecasting errors have increased over time robust to using I/B/E/S data? Does it pertain equally to S&P 500 firms and other firms?
- Is the optimistic bias documented by Dreman–Berry robust to using I/B/E/S data? Does this optimism pertain equally to S&P 500 and other firms? Has it been mitigated over time? Is the extent of mitigation similar for both S&P 500 firms and other firms?
- Do analyst forecasting errors and bias differ depending on such firm-specific factors as market capitalization, absolute value of predicted EPS, analyst following, and industry classification?

PRELIMINARY RESULTS

Dreman and Berry relied on the Abel–Noser database, which uses information from Value Line, Zacks Investment Research, I/B/E/S, and First Call. Because different vendors of analyst forecasts define both forecasted and actual earnings numbers differently, mixing data from different vendors introduces error (Philbrick and Ricks 1991), potentially making analysts' earnings forecast errors appear larger than they actually are. For this study, I used the data of a single vendor, I/B/E/S, for the

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time period from fourth-quarter 1983 through second-quarter 1996. The sample consists of all U.S. firms for which analyst earnings forecast errors could be calculated.

Figure 1 provides frequency distributions using the SURPE and SURPF definitions of analyst forecasting errors (earnings surprise), defined as

SURPE = (Actual quarterly earnings – Predicted quarterly earnings)/|Actual quarterly earnings|

SURPF = (Actual quarterly earnings – Predicted quarterly earnings)/|Predicted quarterly earnings|.

Predicted quarterly earnings were obtained from the I/B/E/S summary tape using the last consensus (mean) estimate prior to the firm's quarterly earnings announcement.[1]

SURPE and SURPF are two of the four definitions of earnings surprise Dreman–Berry and I used in our research.[2] My Figure 1 corresponds to their Figure 1 pertaining to SURPE and SURPF, and my results are very similar to theirs. More specifically, the modal and median values of earnings surprise are zero; *small* positive errors are more frequent than negative errors; and *large* negative errors outnumber positive errors. These findings suggest that whereas analysts are more likely to be on target than anywhere else, managers manipulate earnings in a way to generate a considerable number of small positive (relative to small negative) surprises and large negative (relative to large positive) surprises ("big baths").[3]

I/B/E/S VERSUS ABEL–NOSER DATA

Table 1 provides summary statistics on the I/B/E/S and Abel–Noser data. The I/B/E/S results are based on my analysis of these data; the Abel–Noser results are reproduced from Dreman–Berry's Table 1. The average error (mean absolute surprise) using the I/B/E/S data is substantially larger than that using the Abel–Noser data. The I/B/E/S SURPE of 0.590 is approximately one-third greater than the Abel–Noser SURPE of 0.438, and the I/B/E/S SURPF of 0.916 is more than twice as large as the Abel–Noser SURPF of 0.415. Moreover, the mean surprise (bias) using the I/B/E/S data is also substantially larger in absolute value than that documented by Dreman–Berry using the Abel–Noser data. More particularly, the I/B/E/S SURPE and SURPF are –0.316 and –0.414, respectively, compared with the Abel–Noser SURPE and SURPF of –0.250 and –0.111.

My results could differ from Dreman–Berry's because of different sample-selection procedures. Dreman–Berry's sample is confined to firms with fiscal years ending in March, June, September, or December that are followed (after 1981) by at least four analysts. When the I/B/E/S sample is similarly restricted, the results are nearly identical to Dreman–Berry's.[4] More particularly, for the 46,859 I/B/E/S observations that satisfy these criteria, the average absolute surprise of 0.416 (SURPE definition) is similar to Dreman–Berry's 0.438, and the mean SURPE of –0.218 using the I/B/E/S sample closely approximates Dreman–Berry's –0.250.

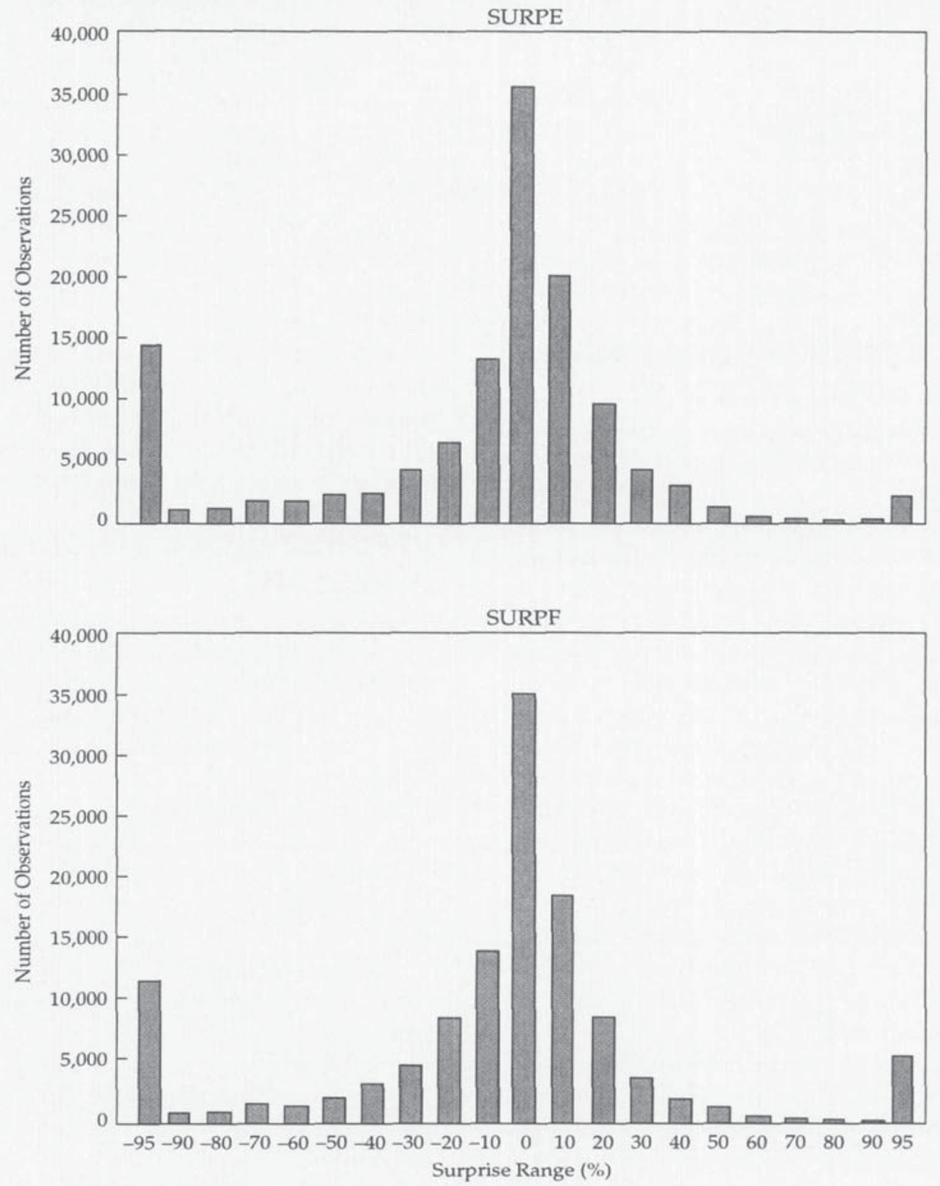
From these results, I conclude that the Dreman–Berry finding of large analyst forecasting errors is robust to using a different data source. Dreman–Berry used Abel–Noser data and examined the first-quarter 1974 through fourth-quarter 1991 time period; I obtained similar results using the I/B/E/S data for fourth-quarter 1983 through second-quarter 1996.

HAVE FORECASTING ERRORS CHANGED?

Evidence regarding five definitions of error—mean absolute surprise, mean surprise (bias), and the proportion of errors outside the +/–10 percent, +10 percent, and –10 percent bandwidths—is presented in Table 2 for all firms, S&P 500 firms, and non-S&P 500 firms.[5] All five error metrics use the SURPF definition of earnings surprise, which has predicted quarterly earnings as its deflator. Dreman–Berry provided evidence pertaining to three +/– bandwidths: 5 percent, 10 percent, and 15 percent. I focused on the second of these bandwidths, +/–10 percent, and considered its plus and minus sides separately.[6]

Dreman–Berry concluded that analyst forecasting errors increase over time. In contrast, Table 2 reveals that both mean absolute surprise and mean surprise (bias) have *decreased* significantly over time. This result is borne out by the rank correlations of analyst forecasting error with year, which are –0.973 and 0.489 for mean absolute surprise and mean surprise, respectively.[7] Nevertheless, the mean surprise is negative and significant in every year from 1985 through 1996, suggesting that, although the optimistic bias has been mitigated, it remains significant. The rank correlations of time with the proportion of errors outside the +/–10 percent, +10 percent, and –10 percent bandwidths are –0.995, –0.038, and –0.945, respectively. The –10 percent bandwidth result is significant, but the +10 percent bandwidth result is not. Thus, the temporal reduction of error results from mitigation of the optimistic bias. Indeed, no temporal reduction in the percentage of large positive errors (i.e., earnings *underestimates*) has occurred.

Figure 1. Histograms of SURPE and SURPF



Comparison of S&P 500 firms with other firms is important because many investors invest exclusively in S&P 500 firms and/or use the S&P 500 Index as a benchmark. Analyst forecasting errors are much smaller for S&P 500 firms than for other firms. More specifically, in *every* year, the mean absolute surprise and the proportion of forecasts outside the +/−10 percent, +10 percent, and −10 percent bandwidths is smaller for the S&P 500 firms than it is for the other firms. Clearly, the earnings of S&P 500 firms are easier to forecast than are those of non-S&P 500 firms.

Although forecasts for S&P 500 firms exhibit a significant optimistic bias for the 1984–96 period as a whole, the optimistic bias in forecasting quarterly earnings of S&P 500 firms disappeared as of 1993. More specifically, for S&P 500 firms, a significant optimistic bias is evident in every year in the 1985–92 period but not in the four most recent years, 1993 through 1996. In contrast, the bottom panel of Table 2 reveals that the optimistic bias in forecasting quarterly earnings of other (non-S&P 500) firms exists in all 12 years, 1985 through 1996. Perhaps the disappearance of the optimistic bias for S&P 500 firms is attributable to mitigation of the big-bath phenomenon or a lessening of the tendency of these firms' managers to manipulate earnings in a way to generate a large number of small positive (relative to small negative) surprises.[8]

Table 1. Descriptive Statistics for Earnings Forecast Errors

	I/B/E/S (4Q 1983–2Q 1996)		Abel–Noser (1Q 1974–4Q 1991)	
Statistic	SURPE	SURPF	SURPE	SURPF
Number of forecasts	129,436		66,100	
Mean absolute surprise	0.590	0.916	0.438	0.415
Mean surprise (bias)	–0.316*	–0.414*	–0.250*	–0.111*
Median	0.000	0.000	0.000	0.000
Maximum	314.000	863.000	49.000	48.000
Minimum	–186.259	–819.000	–216.000	–282.600

Note: SURPE (SURPF) is consensus EPS surprise as a percent of absolute value of actual (forecast) EPS.
*Significant at the 5 percent level, two-tailed test.

DO FORECASTING ERRORS DIFFER BY FIRM-SPECIFIC FACTORS?

Table 3 shows whether errors differ by market capitalization, absolute value of earnings forecast, or analyst following. Such comparisons are relevant because many investors invest primarily in large firms, firms with comparatively large earnings forecasts, or firms with relatively heavy analyst following. For these investors, the average analyst earnings forecast error per se is less relevant than the average forecasting error for these firm-specific subsamples.

The market capitalization results are monotonic for four of the five error measures: mean absolute surprise, mean surprise, and proportion of errors outside the +/–10 percent and –10 percent bandwidths. The highest capitalization group (i.e., firms with market caps in excess of $3 billion) has a smaller proportion of errors outside the +10 percent bandwidth than do any of the other market cap groups. Regarding bias, a significant optimistic bias (negative mean surprise) is evident for all market caps except the largest one.

The absolute value of earnings forecast results is not monotonic for any of the five definitions of error. Nevertheless, the mean absolute surprise and the mean surprise (bias) results are nearly monotonic; the exception occurs when forecasted earnings are at least $1. For this group, the mean absolute surprise and the mean surprise (bias) are approximately halfway between what they are for the [$0.10, $0.25) and [$0.25, $0.50) groups. The bandwidth results are similar to the mean absolute surprise and bias results in that the largest absolute value of earnings forecast group (i.e., $\geq$ $1) does not have the smallest proportion of errors outside the +/–10 percent, +10 percent, or –10 percent bandwidths.[9]

Similar to the absolute value of earnings forecast results, the analyst-following results are not monotonic for any of the five definitions of error. Nevertheless, the results are monotonic for all five error measures as the number of analysts increases from 1 to 5, and the smallest errors are obtained for the largest analyst following (10 or more) for four of the error measures.[10] Moreover, the rank correlations for the five error measures range from an absolute value of 0.782 to 0.988, and they all are statistically significant. Thus, error generally decreases when analyst following increases.

DO FORECASTING ERRORS DIFFER BY SECTOR?

The five error metrics are provided in Table 4 for each of the 14 industries in the I/B/E/S sample with data pertaining to at least 50 firms. The mean absolute surprise ranges from a low of 0.255 to a high of 1.663. Two industries have a mean absolute surprise below 0.400: food and kindred products (0.255) and holding companies and other investment offices (0.392). At the other extreme, two industries have mean absolute surprises in excess of 1.0: oil and gas extraction (1.663) and primary metal industries (1.267).

Eleven of the 14 industries evidence a significant optimistic bias. Optimistic bias for the other three—transportation equipment, communications, and insurance carriers—is not significant. The mean surprises range from a low of –0.068 to a high of –0.721. Three industries have an optimistic bias below 0.080 in absolute value: food and kindred products (–0.068), transportation equipment (–0.070), and communications (–0.076). At the other extreme, two industries have an optimistic bias above 0.500 in absolute value: oil and gas extraction (–0.721) and primary metal industries (–0.532).

The proportion of analyst forecasting errors outside the +/–10 percent bandwidth ranges from a low of 0.361 to a high of 0.780. Two industries have less than 40 percent of their observations outside the +/–10 percent bandwidth: food and kindred products (0.361) and depository institutions (0.369). At the other extreme, two industries have more than two-thirds of their observations outside the +/–10 percent bandwidth: oil and gas extraction (0.780) and primary metal industries (0.683). Twelve of the 14 industries have more errors outside the –10 percent than outside the +10 percent

Table 2. Forecast Errors by Year: All Firms, S&P 500 Firms, and Other Firms

Year/Statistic	Number of Firms	Number of Forecasts	Mean Absolute Surprise	Mean Surprise	+/−10 Percent[a]	+10 Percent[a]	−10 Percent[a]
All firms							
1984	2,109	2,246	2.525	0.795	0.697	0.311	0.386
1985	2,525	8,608	1.593	−0.667*	0.651	0.226	0.426
1986	2,580	8,506	1.773	−1.007*	0.656	0.245	0.412
1987	2,829	8,856	1.362	−0.700*	0.650	0.264	0.386
1988	2,804	9,041	1.067	−0.468*	0.620	0.269	0.351
1989	2,874	9,461	0.959	−0.537*	0.615	0.240	0.374
1990	2,890	9,627	1.034	−0.685*	0.600	0.215	0.384
1991	2,875	9,583	0.802	−0.444*	0.598	0.242	0.356
1992	3,195	10,702	0.688	−0.330*	0.557	0.261	0.296
1993	3,630	12,563	0.583	−0.230*	0.544	0.258	0.286
1994	4,193	14,213	0.494	−0.189*	0.514	0.258	0.256
1995	4,476	15,013	0.541	−0.244*	0.510	0.256	0.255
1996	4,593	11,008	0.527	−0.173*	0.501	0.260	0.241
Mean			0.916	−0.414*	0.577	0.252	0.326
Rank Correlation			−0.973*	0.489*	−0.995*	−0.038	−0.945*
S&P 500 firms							
1984	431	452	0.701	0.237	0.593	0.305	0.288
1985	443	1,743	0.748	−0.474*	0.503	0.186	0.317
1986	453	1,714	0.620	−0.250*	0.496	0.225	0.271
1987	463	1,791	0.487	−0.137*	0.487	0.245	0.243
1988	466	1,852	0.382	−0.143*	0.470	0.259	0.211
1989	473	1,842	0.427	−0.166*	0.447	0.203	0.245
1990	476	1,896	0.331	−0.113*	0.441	0.191	0.249
1991	481	1,892	0.442	−0.267*	0.467	0.189	0.277
1992	485	1,887	0.467	−0.148*	0.420	0.205	0.215
1993	486	1,983	0.345	0.027	0.409	0.220	0.189
1994	492	1,993	0.233	0.027	0.335	0.208	0.126
1995	492	1,936	0.190	−0.008	0.335	0.196	0.139
1996	494	1,314	0.310	0.002	0.318	0.177	0.141
Mean			0.418	−0.129*	0.431	0.211	0.220
Rank Correlation			−0.868*	0.357	−0.978*	−0.462	−0.819*
Other firms							
1984	1,678	1,794	2.985	0.935	0.724	0.312	0.411
1985	2,082	6,865	1.807	−0.716*	0.689	0.236	0.453
1986	2,127	6,792	2.064	−1.198*	0.697	0.250	0.447
1987	2,366	7,074	1.583	−0.843*	0.692	0.269	0.422
1988	2,338	7,189	1.244	−0.552*	0.659	0.272	0.387
1989	2,401	7,619	1.087	−0.626*	0.655	0.250	0.406
1990	2,414	7,731	1.206	−0.825*	0.639	0.221	0.417
1991	2,394	7,691	0.890	−0.488*	0.630	0.255	0.376
1992	2,710	8,815	0.735	−0.369*	0.586	0.274	0.313
1993	3,144	10,580	0.628	−0.278*	0.569	0.265	0.305
1994	3,701	12,220	0.537	−0.225*	0.543	0.266	0.277
1995	3,984	13,077	0.593	−0.279*	0.536	0.264	0.272
1996	4,099	9,694	0.557	−0.197*	0.526	0.272	0.254
Mean			1.019	−0.473*	0.608	0.260	0.348
Rank Correlation			−0.973*	0.489*	−0.984*	0.088	−0.912*

Note: Mean absolute surprise, mean surprise, and the percentage of surprises outside the three bandwidths use absolute value of earnings forecast as the deflator.

[a]Proportion of surprises outside bandwidth.

*Significant at the 5 percent level, two-tailed test.

Table 3. Forecast Errors Classified by Market Capitalization, Absolute Value of Earnings Forecast, and Analyst Following

	Number of Firms	Number of Forecasts	Mean Absolute Surprise	Mean Surprise	+/–10 Percent[d]	+10 Percent[d]	–10 Percent[d]
Market capitalization ($ millions)[a]							
<50	3,137	18,247	2.198	–1.445*	0.774	0.242	0.532
[50–100)	3,316	17,572	1.228	–0.616*	0.679	0.266	0.412
[100–500)	4,529	46,349	0.749	–0.271*	0.585	0.267	0.318
[500–3,000)	2,350	33,777	0.511	–0.096*	0.481	0.246	0.234
≥3,000	652	12,445	0.278	–0.019	0.370	0.203	0.167
Rank correlation			–1.000*	1.000*	–1.000*	–0.300	–1.000*
Absolute value of earnings forecast (cents)[b]							
<5	2,731	8,588	5.407	–2.564*	0.819	0.348	0.471
[5–10)	3,750	13,796	1.528	–0.681*	0.827	0.363	0.464
[10–25)	5,863	40,552	0.644	–0.300*	0.598	0.258	0.340
[25–50)	5,210	37,857	0.380	–0.159*	0.499	0.218	0.282
[50–100)	2,957	22,100	0.297	–0.105*	0.444	0.199	0.245
≥100	1,094	6,544	0.607	–0.250*	0.507	0.277	0.281
Rank correlation			–0.829*	0.829*	–0.771	–0.771	–0.943*
Analyst following (number of analysts)[c]							
1	6,189	35,979	1.421	–0.593*	0.707	0.293	0.414
2	5,011	22,983	1.035	–0.578*	0.629	0.272	0.358
3	3,913	15,728	0.790	–0.364*	0.581	0.251	0.330
4	3,077	11,411	0.674	–0.294*	0.544	0.246	0.298
5	2,384	8,532	0.581	–0.225*	0.519	0.241	0.278
6	1,898	6,775	0.762	–0.460*	0.482	0.217	0.266
7	1,555	5,354	0.553	–0.285*	0.465	0.207	0.258
8	1,296	4,356	0.795	–0.135	0.449	0.191	0.258
9	1,090	3,664	0.486	–0.233*	0.452	0.208	0.244
≥10	1,023	14,654	0.354	–0.126*	0.387	0.192	0.195
Rank correlation			–0.782*	0.842*	–0.988*	–0.939*	–0.988*

Note: Mean absolute surprise, mean surprise, and the percentage of surprises outside the three bandwidths use absolute value of earnings forecast as the deflator.

[a]Stock price multiplied by number of common stocks outstanding.

[b]Earnings forecast is the I/B/E/S mean forecast.

[c]Number of analysts whose forecast is included in the calculation of the I/B/E/S mean forecast.

[d]Proportion of surprises outside bandwidth.

*Significant at the 5 percent level, two-tailed test.

bandwidth, indicating that when large errors occur, analysts are more likely to overestimate earnings (optimistic bias) than to underestimate them (pessimistic bias). The two exceptions are depository institutions and insurance carriers. Perhaps these two industries are less likely than the other 12 to take big baths, which induce large negative errors and give the appearance of analyst optimism.

CONCLUSION

Using the Abel–Noser database for 1974 through 1991, Dreman and Berry argued that analyst forecasting errors are too large. Based on the I/B/E/S database for 1983 through 1996, I show that analysts' earnings forecast errors are approximately as large as Dreman–Berry documented. Thus, their results appear to have external validity.

Dreman–Berry maintained that analyst forecasting errors have increased over time. In a 1996 article, I argued that the Abel–Noser data, as summarized by Dreman–Berry, suggest precisely the opposite. In his critique of my analysis, David Dreman correctly pointed out that I did not access the data Dreman–Berry used to reach their conclusions. In this study, I used I/B/E/S data to examine five error metrics to determine whether analyst forecasting accuracy has deteriorated over time. I found that analyst forecasting errors have *decreased* significantly over time, especially for mean absolute surprise and the proportion of errors outside the +/–10 percent and –10 percent bandwidths.[11] My finding that analysts' earnings forecast errors have decreased over time is robust to firms included in as opposed to those excluded from the S&P 500.

I examined whether analyst forecasting errors differ according to certain firm-specific factors:

Table 4. Forecast Errors by Industry

SIC Code	Industry Name	Number of Firms	Number of Forecasts	Mean Absolute Surprise	Mean Surprise	+/−10 Percent[a]	+10 Percent[a]	−10 Percent[a]
13	Oil and gas extraction	73	1,681	1.663	−0.721*	0.780	0.338	0.442
20	Food and kindred products	55	1,644	0.255	−0.068*	0.361	0.166	0.195
28	Chemicals and allied products	128	3,910	0.454	−0.159*	0.422	0.189	0.233
33	Primary metal industries	63	1,619	1.267	−0.532*	0.683	0.298	0.385
35	Industrial, commercial machinery and computer equipment	128	3,958	0.794	−0.243*	0.596	0.274	0.322
36	Electronics and other equipment companies	104	2,824	0.856	−0.370*	0.556	0.237	0.319
37	Transportation equipment	66	2,096	0.820	−0.070	0.553	0.249	0.305
38	Measurement instruments; photo goods; watches	76	1,991	0.445	−0.186*	0.425	0.186	0.239
48	Communications	56	1,292	0.455	−0.076	0.429	0.202	0.227
49	Electric, gas, and sanitary services	190	6,766	0.436	−0.130*	0.560	0.261	0.299
60	Depository institutions	421	7,298	0.543	−0.336*	0.369	0.197	0.171
63	Insurance carriers	189	4,453	0.512	−0.142	0.517	0.285	0.232
67	Holding; other investment offices	82	777	0.392	−0.151*	0.539	0.175	0.364
73	Business services	78	2,111	0.540	−0.263*	0.448	0.182	0.266

Notes: Mean absolute surprise, mean surprise, and the percentage of surprises outside the three bandwidths use absolute value of earnings forecast as the deflator. To be included in Table 4, an industry must have more than 50 firms in the sample.

[a]Proportion of forecast errors (using absolute value of earnings forecast as a deflator) outside bandwidth.

*Significant at the 5 percent level, two-tailed test.

inclusion in the S&P 500, market capitalization, absolute value of earnings forecast, analyst following, and industry membership. I showed that: (1) analyst forecasting errors for S&P 500 firms are smaller than for other firms; (2) analyst forecasting errors are relatively small for firms with comparatively large market cap, absolute value of earnings forecast, and analyst following; and (3) analyst forecasting errors for firms in certain industries are substantially larger than those in other industries. Thus, depending on the nature of the firms followed by investors, analysts' earnings forecast errors may be considerably larger or smaller than average.

Dreman and Berry showed that analysts' earnings forecasts exhibit an optimistic bias. I had argued in my 1996 paper that the optimistic bias was not evident for S&P 500 firms for the period from first-quarter 1993 through third-quarter 1995. Moreover, according to I/B/E/S, the optimistic bias has not been evident for S&P 500 firms for the subsequent period, fourth-quarter 1995 through second-quarter 1997.[12]

Based on the I/B/E/S data, which include both S&P 500 and other firms, I documented an optimistic bias in analysts' quarterly earnings forecasts for all years, 1985 through 1996, and in 11 of 14 industries. I also showed that the optimistic bias in quarterly forecasts has diminished significantly over time for both S&P 500 and other firms and that it was absent for S&P 500 firms for each year from 1993 through 1996. The optimistic bias in quarterly forecasts for non-S&P 500 firms remains.[13]

NOTES

1. Because earnings forecast errors cannot be calculated when the actual or quarterly earnings forecast equals zero, these observations were omitted from the analysis. To be consistent with Dreman–Berry, I did not adjust outliers in any manner.
2. The other two definitions of earnings surprise are SURP8 and SURPC7, which respectively use the standard deviation of trailing eight-quarter actual earnings per share and the standard deviation of trailing seven-quarter changes in earnings per share.
3. Other studies have documented that managers manipulate earnings in order to report positive earnings, positive earnings growth, and/or earnings that exceed analyst expectations. When managers cannot succeed in these goals, they are likely to take a "big bath." See Lowenstein (1997).
4. For simplicity, I do not provide these results in a table.
5. These results and those that follow are based on the full I/B/E/S sample of 129,436 observations described in Table 1.
6. This suggestion was made when I presented an earlier version of this article at the 1997 Prudential Securities Quantitative Research Seminar for Institutional Investors.
7. The positive rank correlation for mean surprise indicates that the bias has become less negative (i.e., there has been a temporal reduction in the optimistic bias).
8. Such an analysis is beyond the scope of this study but is on the author's research agenda.
9. When I presented results at the 1997 Prudential Securities

Quantitative Research Seminar for Institutional Investors, I used the actual EPS as a deflator. It was suggested to me that the aberrant results for the largest EPS group may be attributable to large random shocks in the actuals. When I substituted forecasted EPS for actual EPS (as in this article), the tenor of my results was unchanged.

10. The exception is the proportion of errors outside the +10 percent bandwidth, for which the proportion of 19.2 percent for the analyst following of ≥10 slightly exceeds the proportion of 19.1 percent for the analyst following of 8.
11. The exception is that the percentage of errors outside the +10 percent bandwidth has not decreased significantly for either the entire I/B/E/S sample or the non-S&P 500 subsample.
12. According to information provided to me by I/B/E/S, the mean surprises for S&P 500 firms for these seven quarters (sample sizes are in parentheses) are 1.7 percent (488), 2.4 percent (492), 2.6 percent (490), 2.4 percent (490), 1.9 percent (481), 3.3 percent (492), and 2.2 percent (491). The optimistic bias is still present for S&P 500 firms for annual forecasts.
13. I am grateful to Deres Tegenaw for providing me with excellent research assistance.

REFERENCES

Brown, L.D. 1996. "Forecasting Errors and Their Implications for Security Analysis: An Alternative Perspective." *Financial Analysts Journal*, vol. 52, no. 1 (January/February):40–47.

Dreman, D.N. 1996. "Analyst Forecasting Errors." *Financial Analysts Journal*, vol. 52, no. 3 (May/June):77–80.

Dreman, D.N., and M.A. Berry. 1995. "Forecasting Errors and Their Implications for Security Analysis." *Financial Analysts Journal*, vol. 51, no. 3 (May/June):30–41.

Lowenstein, R. 1997. "How To Be a Winner in the Profits Game." *Wall Street Journal* (April 3):C1.

Philbrick, D.R., and W.E. Ricks. 1991. "Using Value Line and I/B/E/S Analyst Forecasts in Accounting Research." *Journal of Accounting Research*, vol. 29, no. 2 (Autumn):397–417.

THE WALL STREET JOURNAL.

Analysts: Still Coming Up Rosy --- Over-Optimism on Growth Rates Is Rampant, and the Estimates Help to Buoy Market's Valuation

By Ken Brown. **Wall Street Journal**. (Eastern edition).New York, N.Y.: Jan 27, 2003. pg. C.1

WALL STREET IS pretty downcast these days, what with a $1.5 billion settlement pending with regulators over stock-research conflicts, continuing layoffs at big securities firms and a stock market that is teetering yet again -- not to mention a cold snap that could freeze the thumbs of Blackberry users.

Yet stock analysts are unshaken in their optimistic, if delusional, belief that most of the companies they cover will have above-average, double-digit growth rates during the next several years. That is, of course, highly unlikely. Historically, corporate earnings have grown at about the same rate as the economy over time, and few expect the economy to grow at a double-digit rate any time soon.

But analysts refuse to bend to reality. Of the companies in the Standard & Poor's 500-stock index, analysts expect 345 of them to boost their earnings more than 10% a year during the next three to five years, and 123 companies to grow more than 15%, according to Multex, a stock-market-data firm.

"Hope springs eternal," says Mark Donovan, who manages Boston Partners Large Cap Value Fund. "You would have thought that, given what happened in the last three years, people would have given up the ghost. But in large measure they have not."

These overly optimistic growth estimates also show that, even with all the regulatory focus on too-bullish analysts allegedly influenced by their firms' investment-banking relationships, a lot of things haven't changed: Research remains rosy and many believe it always will.

In some ways, these high estimated growth rates underpin the market's current valuation, which remains pricey by historical standards. Investors expect to pay a higher price for stocks that are growing strongly. So if people realize these long-term growth-rate numbers are largely fictional, then a pillar of support for the market's valuation -- the S&P 500 currently trades at a price-to-earnings ratio of 18.5 based on 2002 earnings -- could go out of the stock market, sending prices lower.

The long-term growth figures come from the earnings estimates Wall Street analysts post for the companies they cover. Besides issuing buy and sell recommendations and predicting earnings during the next few quarters, analysts typically estimate how quickly the companies' earnings will grow during the next few years. Such long-term growth-rate numbers, which are imprecise by nature, give a hint of how analysts feel about companies' future prospects.

A long-term growth-rate number is often used by investors to determine whether a stock is cheap or expensive. Online auctioneer eBay Inc., for example, trades at a price-to-earnings ratio of 88 based on the past year's earnings. Some investors take solace in the fact that the company is expected to expand earnings 40% a year, but even with that growth, it would take until 2006 for the company's price-to-earnings ratio to fall to 22, assuming the stock price remained stalled at today's level.

These rosy figures come on top of three years of little or no growth for many companies. For example, Charles Schwab Corp. hasn't grown at all since 2000 as it has struggled with the stock-market collapse. But analysts, on average, still expect the company will expand its earnings 18% a year during the next several years. While that doesn't justify the company's price-to-earnings ratio of 33, it does give some hope to shareholders that the company one day indeed could resume its old growth rate.

Not surprisingly, the glow is rosiest in the technology sector. Of the 91 tech companies in the S&P 500, analysts expect 82 to grow faster than 10% a year, and 18 to grow better than 20% a year, meaning tech companies account for more than half of the index's 35 top growers.

To be sure, many of these companies could actually meet those growth expectations, if only because earnings have been in such a slump they are bound to rebound at some point. Analysts expect Schwab, for example, to earn 40 cents a share in 2003, up from the 29 cents it earned last year. If the analysts are right, that would be a healthy 38% jump in earnings.

But some also concede that their growth rates are optimistic. Guy Moszkowski, who covers Schwab for Salomon Smith Barney, and whose long-term growth estimate of 18% matches the consensus, concedes that this figure might be optimistic in the years after the expected short-term earnings pop. "If we can get enough of a recovery in the market that they can achieve that 40 cents in earnings, then they'll be on the way to establishing a kind of mid-teens growth track," he says. "But I think it's really hard to make the case they can do much better than that."

Mark Constant, who covers the company for Lehman Brothers and has a 15%-a-year growth estimate, also says the company probably won't reach his target. "I've always characterized it in print as an optimistic growth rate," he says.

If it were true that analysts were expecting a rebound following the current slump and ratcheting up their expectations accordingly, they might now be able to argue that they aren't being overly optimistic. The truth is, however, they have been growing increasingly pessimistic since the tech-stock bubble burst. Back in mid 2000, when earnings had been soaring for years, analysts were predicting that earnings for the S&P 500 would continue growing 15% a year, according to Morgan Stanley. Now, they are predicting 12% annual earnings growth for these same companies.

You can't blame analysts for everything,though. Companies themselves are guilty of being overly optimistic as well. "I think there's an immense amount of inertia in the system. That's the problem," says Steve Galbraith, Morgan Stanley's chief investment strategist. "One of the things people are struggling with are creative ways of reducing your guidance without reducing your guidance."

The problem, he adds, is that many companies set their growth expectations a decade ago, when interest rates and inflation were higher than today. Growth rates are measured in nominal terms, meaning inflation gives them a boost. With virtually no inflation and interest rates near zero, it is harder for companies to post double-digit growth. "I do think this is something that corporate America broadly is wrestling with: How do we ratchet down expectations that we set 10 years ago when things were different?" he says.

The danger comes from companies that can't face the reality that their growth has slowed. "Where I think clients should get concerned is where a company is claiming they're a 15% grower and they're setting their capital expenditures accordingly," Mr. Galbraith says. If the market is pricing in that level of growth, then the company will likely keep investing in itself in an attempt to keep returns high. The danger of that: Companies could be throwing away capital that could be given back to investors in the form of dividends or share buybacks.

Every chief financial officer who took Corporate Finance 101 knows that the bigger the portion of earnings a company reinvests in its business, the faster it conceivably can grow. Sending cash out to investors reduces the amount the company can invest in itself, ultimately lowering its potential growth rate.

But there are signs -- including Microsoft Corp.'s plan to pay a dividend -- that executives are starting to realize that reinvesting all their excess cash in their own business might not produce the highest returns. "It hasn't gotten quite that far, but I think it's going to get there," says Jeff van Harte, who manages Transamerica Premier Equity fund. "It just takes a long time to change attitudes. Some companies are forever lost."

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THE SUPERIORITY OF ANALYST FORECASTS AS MEASURES OF EXPECTATIONS: EVIDENCE FROM EARNINGS

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ACCURATE MEASUREMENT OF EARNINGS expectations is essential for studies of firm valuation, cost of capital and the relationship between unanticipated earnings and stock price changes. Under the rational expectations hypothesis [23], market earnings expectations should be measured by the best available earnings forecasts. Univariate time series forecasts are often used for this purpose ([1], [3], [4], [5], [12], [13], [14], [16], [18], [20]) instead of direct measures of earnings expectations such as security analysts' forecasts. Univariate time series forecasts neglect potentially useful information in other time series and therefore do not generally provide the most accurate possible forecasts [24]. Since security analysts process substantially more data than the time series of past earnings, their earnings forecasts *should* be superior to time series forecasts and provide better measures of market earnings expectations.

However, the mere existence of analysts as an employed factor in long run equilibrium means that analysts *must* make forecasts superior to those of time series models. To reach this conclusion, one need only assume that participants in the market for forecasts act in their own best interests and that both forecast producers and consumers demand forecasts solely on the basis of their predictive ability.[1] Since analysts' forecasts cost more than time series forecasts, the continued employment of analysts by profit-maximizing firms implies that analysts' forecasts must be superior to those of the lower cost factor, time series models.

Past comparisons of analysts' forecasts to sophisticated time series models conclude that analysts' forecasts are not more accurate than time series forecasts (Cragg and Malkiel (CM) [9]; Elton and Gruber (EG) [11]). This evidence plainly conflicts with basic economic theory. Hence, the predictive accuracy of analysts' forecasts is re-examined in this paper. In contrast with other studies, the results overwhelmingly favor the superiority of analysts over time series models.

Part I considers statistical tests and experimental design. Part II contains the empirical results. Summary and implications appear in Part III.

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1. We assume that forecast purchasers do not derive nonmonetary benefits from forecasts.

I. Experimental Design

A. *Statistical Evaluation of Forecast Methods*

Without direct information on the costs of imperfect forecasts to forecast users, comparative forecast accuracy is usually evaluated by comparing the error distributions of different forecast methods statistically. However, statistical comparisons in past studies ([9], [11]) utilize test statistics improperly, particularly Theil's U [25] and Student's t. In this section, after discussing the defects of these statistics for evaluating two or more forecast methods, the alternative statistical methods used in this study are introduced.[2]

Theil's U-statistic (applied to earnings) is the square root of

$$U_{ij}^2 = \frac{\sum_{t=1}^{T} (\dot{P}_{ijt} - \dot{A}_{it})^2}{\sum_{t=1}^{T} \dot{A}_{it}^2},$$

where $\dot{A}_{it}$ = change in actual earnings per share of firm i from $t-1$ to t,
$\dot{P}_{ijt}$ = predicted change in earnings per share of firm i from $t-1$ to t by forecast method j, and
T = total number of time series observations.

For its computation, it requires *time series* data on a firm's earnings *changes*.[3] Given forecast method j and earnings time series data on firm i, Theil's U compares the forecast accuracy of method j to that of a naive, no change, earnings forecast model.[4,5] Since analysts' earnings forecasts are currently available only in short time series, use of Theil's U for comparative forecast evaluation necessarily relies on small samples.[6] Larger sample sizes are possible by testing forecast methods on a cross-section of firms. Finally, no procedure is available with tests of significance which uses Theil's U to compare two forecast methods when neither is a no-change method. Direct hypothesis tests are preferable to inferences drawn from ranking the U statistics of different forecast methods.

For hypothesis tests of two forecast methods, an appropriate design is a one-sample or matched pairs case with self-pairing by firm. The members of each pair

2. Past studies also contain experimental biases: CM compare analysts' five-year forecasts with realizations over three and four-year horizons; EG compare analysts' forecasts with the "best" of nine time series models selected from the same time period in which comparisons with analysts' forecasts are made. This procedure introduces *ex post* selection bias.

3. EG computed "Theil's U" using earnings *levels* rather than *changes*. This statistic has unknown sampling properties.

4. $\dot{P}_{ijt} = \dot{A}_{it}$ and $U_{ij} = 0$ if prediction is perfect in every period. If no change is predicted in each period (i.e., $\dot{P}_{ijt} = 0$), $U_{ij} = 1$; $0 < U_{ij} < 1$ if prediction is less than perfect but better than the no-change prediction and $U_{ij} > 1$ if forecast method j is less accurate than the no-change prediction.

5. CM used *cross-sectional* rather than temporal data. This "Theil's U" statistic has unknown sampling properties because each error is drawn from a different error distribution, one for each firm.

6. EG's sample size in computing Theil's U varied between two and six.

are the errors from the two methods; the matched pair is reduced to a single observation by taking the difference in the errors. The usual parametric test of the mean difference is the paired t-test [17]. An alternative non-parametric test of the median difference is the Wilcoxon Signed Ranks test [8].

The parametric paired t-test is inappropriate for testing mean error differences of forecast methods applied to cross-section earnings data. If applied to error measures stated in level form (e.g., $|P_{ijt} - A_{it}|$, where P_{ijt} = firm i's forecasted earnings per share for period t by method j and A_{it} = firm i's actual earnings per share in period t), the test's assumption that paired differences are drawn from the same population is violated since each error difference depends upon each firm's earnings per share level. If applied to error measures stated in ratio form (e.g., $|P_{ijt} - A_{it}|/|A_{it}|$), the distributional assumptions of the paired t-test are also unlikely to be fulfilled since ratio measures applied to earnings per share data are dominated by outliers because actual earnings per share are often close to zero.[7]

Meaningful pairwise comparisons require test statistics which are insensitive to error definition and outliers. We adopt the Wilcoxon Signed Ranks test which meets these requirements and has power comparable to the parametric paired t-test [8, p. 213].

For tests of several forecast methods, the generalization of the paired t-test, two-way analysis of variance, is inapplicable.[8] The Friedman test [8], which is based on two-way analysis of variance by ranks and is independent of error definition, is used instead.

For an error measure, we choose relative error ignoring sign, $|P_{ijt} - A_{it}|/|A_{it}|$, a metric which is likely to be of interest to forecast purchasers.[9] In any event, the Wilcoxon test statistic is insensitive to error definition (see fn. 16).

B. *Forecast Horizon*

Because economic theory provides no guidance concerning the association of analyst superiority with a particular forecast horizon, several horizons should be investigated.[10] Our choice of horizons reflects the following considerations: (i) micro-level information obtained by analysts often concerns earnings of the following several quarters or fiscal year; (ii) current fiscal and monetary policies affect earnings of the subsequent one to five quarters; (iii) published forecasts are available mainly for short horizons. We thus investigate point estimates of quarterly earnings per share for forecast horizons of one to five quarters. We also examine annual earnings forecasts. The basic time series data are quarterly primary

7. EG's cross-section parametric t-test is inappropriate. Their use of an error measure stated in terms of levels squared (mean square error) appears to compound the inherent difficulty in applying the paired t-test to cross-section earnings data (see fn. 16).

8. Preliminary tests indicated serious violation of the homogeneity of variances and additivity assumptions, basically because of error outliers. Violation of the ANOVA assumptions also prevents application below of a factorial design with sample year and forecast horizon as factors, forecast method as treatment and firm as replication.

9. For a discussion of the deficiencies of using $|P_{ijt}|$ or $|P_{ijt} + A_{it}|/2$ in the denominator see [25].

10. The forecast horizons studied in the past have been five years (CM) and one year (EG).

earnings per share before extraordinary items, adjusted for stock splits, stock dividends and other capitalization changes for the years 1951–1975.

Ex ante conditional predictions of all forecast methods are determined as follows for a sample of 50 firms for each of the four years 1972–1975. Starting with third quarter 1971 earnings (III/1971), conditional earnings per share predictions for the ith firm by the jth method are obtained for the individual quarters of 1972. The forecasts of 1972 quarterly earnings, conditional on III/1971, are denoted $P_{ij}(\mathrm{I}/1972\,|\,\mathrm{III}/1971)$, $P_{ij}(\mathrm{II}/1972\,|\,\mathrm{III}/1971)$, $P_{ij}(\mathrm{III}/1972\,|\,\mathrm{III}/1971)$ and $P_{ij}(\mathrm{IV}/1972\,|\,\mathrm{III}/1971)$. Moving ahead one quarter, predictions are again obtained for each of the four quarters of 1972 made conditional upon IV/1971 earnings data. Again moving ahead one quarter, predictions are obtained for the last three quarters of 1972 conditional upon knowledge of I/1972 earnings, etc. Table 1 shows the set of 1972 predictions so obtained. With these conditional predictions, relative forecast errors ignoring sign are computed for each forecast method j over five distinct quarterly forecast horizons for use in the quarterly error comparisons. Annual earnings forecasts for 1972 are the sum of the forecasts $P_{ij}(\mathrm{I}/1972\,|\,\mathrm{IV}/1971)$, $P_{ij}(\mathrm{II}/1972\,|\,\mathrm{IV}/1971)$, $P_{ij}(\mathrm{III}/1972\,|\,\mathrm{IV}/1971)$, and $P_{ij}(\mathrm{IV}/1972\,|\,\mathrm{IV}/1971)$, that is, the one to four period ahead point forecasts made conditional upon knowledge of the prior year's fiscal earnings.[11] After obtaining analogous forecasts for the years 1973, 1974 and 1975, quarterly and annual comparisons are repeated for these years.

TABLE 1

SUMMARY OF PREDICTIONS BY FORECAST HORIZON FOR 1972[a,b]

1 Quarter Ahead	2 Quarters Ahead	3 Quarters Ahead	4 Quarters Ahead	5 Quarters Ahead[c]
$P_{ij}(\mathrm{I}/1972\|\mathrm{IV}/1971)$	$P_{ij}(\mathrm{I}/1972\|\mathrm{III}/1971)$			
$P_{ij}(\mathrm{II}/1972\|\mathrm{I}/1972)$	$P_{ij}(\mathrm{II}/1972\|\mathrm{IV}/1971)$	$P_{ij}(\mathrm{II}/1972\|\mathrm{III}/1971)$		
$P_{ij}(\mathrm{III}/1972\|\mathrm{II}/1972)$	$P_{ij}(\mathrm{III}/1972\|\mathrm{I}/1972)$	$P_{ij}(\mathrm{III}/1972\|\mathrm{IV}/1971)$	$P_{ij}(\mathrm{III}/1972\|\mathrm{III}/1971)$	
$P_{ij}(\mathrm{IV}/1972\|\mathrm{III}/1972)$	$P_{ij}(\mathrm{IV}/1972\|\mathrm{II}/1972)$	$P_{ij}(\mathrm{IV}/1972\|\mathrm{I}/1972)$	$P_{ij}(\mathrm{IV}/1972\|\mathrm{IV}/1971)$	$P_{ij}(\mathrm{IV}/1972\|\mathrm{III}/1971)$

[a] Predictions missing from the table (e.g., $P_{ij}(\mathrm{I}/1972\,|\,\mathrm{II}/1971)$, $P_{ij}(\mathrm{II}/1972\,|\,\mathrm{II}/1971)$) are absent because our source of analyst data does not contain these forecasts.

[b] i and j refer to firm i and method j, respectively.

[c] Five quarter ahead are available for BJ and V only.

C. *Time Series Models and Analysts' Forecasts*

Within the class of univariate time series models, Box and Jenkins (BJ) [6] models are highly regarded for their ability to make the most efficient use of the time series data. The BJ modelling technique enables one to select the most appropriate time series model consistent with the process generating each firm's time series of quarterly earnings per share data. BJ models, by not making *a priori* assumptions about the processes generating the data, subsume autoregressive,

11. Beaver [1] concludes that a quarterly approach to predicting annual earnings is at least as good as an annual approach to predicting annual earnings. Also see [7], [19] and [22] for other aspects of the usefulness of quarterly earnings per share data.

moving average and mixed models as special cases.[12] Forecasts of individually fitted BJ models should, therefore, perform better than forecasts of a particular class of time series models applied to all firms' time series data. We adopt the BJ modelling technique in this paper. Two other time series models are also included, a "seasonal martingale" (denoted M) and a "seasonal submartingale" (S). These models have been used as standards of comparison in the earnings forecast literature and are available for forecast producers and users at minimal cost.

As a source of analysts' forecasts we choose the Value Line Investment Survey since it contains one to five quarter ahead earnings forecasts which can be accurately dated and measured. Value Line makes earnings forecasts for 1,600 firms in contrast with institutional research firms which provide fewer, more expensive forecasts. Our hypothesis test thus compares a relatively sophisticated time series model with an "average" source of analysts' forecasts.

BJ conditional forecasts are obtained by standard methods after identifying and estimating each firm's appropriate model [6].[13] Value Line's conditional forecasts are taken directly from individual issues of the Value Line Investment Survey. The Survey, published weekly, makes quarterly earnings predictions four times a year for each firm included.

To define conditional forecasts of the naive models for each firm i, let A_{it} denote the tth actual quarterly earnings per share for firm i, where $t=1,\ldots,96$ (I/1951–IV/1974).

Seasonal submartingale (S) conditional one to four quarter ahead forecasts at time t are

one quarter ahead	$A_{it-3}+(A_{it}-A_{it-4})$
two quarters ahead	$A_{it-2}+(A_{it}-A_{it-4})$
three quarters ahead	$A_{it-1}+(A_{it}-A_{it-4})$
four quarters ahead	$A_{it}\quad+(A_{it}-A_{it-4})$.

Seasonal martingale (M) conditional one to four quarter ahead forecasts made in period t are A_{it-3}, A_{it-2}, A_{it-1}, and A_{it}. M's forecasts for a given quarter do not change as actual earnings per share data become available. S modifies M's forecasts with the change of the latest period's quarter over that of the previous year.

Actual quarterly earnings data are announced for most firms approximately five to six weeks into the subsequent quarter. Time series forecasts then become

12. The *ad hoc* time series models used in previous studies at a time when BJ techniques were unavailable are special cases of BJ models.

13. Recent research by Froeschle [15] and diagnostic tests of Dent and Swanson [10] were helpful in identifying the BJ models in addition to the standard diagnostic tests. As an aid to identifying the BJ models, most of which had multiplicative seasonal components, theoretical autocorrelation and partial autocorrelation functions for many quarterly multiplicative seasonal models were obtained. The coefficients of the BJ models, estimated with data through IV/1974, were not re-estimated with less data for earlier periods or more data for later periods. Foster [13] has shown that coefficient re-estimation of BJ quarterly earnings models is unnecessary due to its negligible effect on forecast errors. In any event, our procedure (no re-estimation) favors BJ in nearly all comparisons with Value Line.

possible and Value Line forecasts are published, on average, forty to fifty days later.[14]

The pattern of forecasts for all models is summarized in Table 1. Note that models M and S are not used to generate five quarter ahead forecasts.

II. Empirical Results

A. *Sample Selection*

Fifty firms were randomly selected from Moody's Handbook of Common Stocks. Each firm has complete quarterly earnings data available from 1951, is included in the Value Line Investment Survey since 1971 and has a December fiscal year. The resulting sample (Appendix A) is representative of the New York Stock Exchange firms included in Moody's and Value Line. Utilities were excluded due to insufficient quarterly earnings data. Sample sizes are reduced in those rare instances when the Value Line conditional forecasts are unavailable.

B. *Annual Comparisons*

The error distributions of relative annual forecast errors are shown in Table 2 for each of the years 1972–75 using the four forecast methods, seasonal martingale (M), seasonal submartingale (S), Box-Jenkins (BJ) and Value Line (V). Table 2 also contains Friedman test statistics (Chi-square with 3 degrees of freedom) and Wilcoxon test statistics (Student's t with $N-1$ degrees of freedom where N is sample size). The Friedman test statistic examines the null hypothesis that *all four* error distributions are identically distributed; the Wilcoxon statistic tests the null hypothesis that the median error difference of *two* methods being compared exceeds zero.

Using the Friedman test, the null hypothesis is rejected at the 1% level in 1972, 1973 and 1975. In the 12 pairwise hypothesis tests of V's errors against those of M, S, and BJ, the sign of the Wilcoxon test statistic favors Value Line in every instance. Statistical significance occurs 8 times; 6 times at the 1% level and twice at the 5% level. Thus, V generally produces smaller annual errors than the three time series models suggesting that Value Line annual earnings forecasts are superior to those of time series models.

As argued earlier, BJ forecasts should be superior to forecasts of *ad hoc* time series models. The annual comparisons show that the BJ models generally yield smaller forecast errors than the other time series models studied. In 8 comparisons with M and S, the Wilcoxon test favors BJ 7 times with statistical significance 3 times. These findings suggest that BJ's forecasts are superior to those of *ad hoc* naive time series models.

While the annual results provide strong support for the hypothesis of analyst superiority, they use only a fraction of the data. More powerful tests are achieved using the larger sample sizes of the quarterly data and many more comparative tests can be performed with these data. We turn next to quarterly comparisons.

14. The time interval from announcement to forecast varies from approximately 7 to 70 days for our sample firms. The fact that the Investment Survey, published in 13 installments, makes forecasts for different firms each week accounts for the variation.

TABLE 2

WILCOXON AND FRIEDMAN TEST STATISTICS AND ERROR DISTRIBUTIONS, ANNUAL COMPARISONS OF VALUE LINE AND TIME SERIES MODEL PREDICTION ERRORS, 1972–1975[c]

1972

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	3	7	14	17	4	3	2
S	11	6	12	10	3	1	7
BJ	10	6	12	12	4	1	5
V	13	7	17	12	0	0	1

SAMPLE SIZE = 50

Friedman Statistic = 27.10[a]

Wilcoxon Statistics[e]

	S	BJ	*V*
M	−.55	.24	4.46[a]
S		.46	3.50[a]
BJ			3.45[a]

1973

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	2	6	16	18	6	0	2
S	11	8	14	9	4	1	3
BJ	8	6	15	16	3	0	2
V	10	9	13	16	0	0	2

SAMPLE SIZE = 50

Friedman Statistic = 33.19[a]

Wilcoxon Statistics[e]

	S	BJ	*V*
M	3.15[a]	2.51[a]	4.61[a]
S		−1.89[b]	0.34
BJ			2.17[b]

1974

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	8	6	12	15	4	1	4
S	12	3	11	12	6	2	4
BJ	5	8	16	13	4	0	4
V	6	7	15	13	5	0	4

SAMPLE SIZE = 50

Friedman Statistic = 4.68

Wilcoxon Statistics[e]

	S	BJ	*V*
M	−.21	2.37[a]	2.23[b]
S		1.24	1.44
BJ			0.61

TABLE 2 (*continued*)

1975

Error Distribution[d]

	<.05	.05–.10	.10–.25	.25–.50	.50–.75	.75–1.00	>1.00
M	4	7	13	10	2	3	11
S	3	5	12	7	9	4	10
BJ	7	3	13	12	2	3	10
V	7	5	18	5	3	3	9

SAMPLE SIZE = 50

Friedman Statistics = 12.84[a]

Wilcoxon Statistics[e]

	S	BJ	*V*
M	−1.77[b]	0.86	3.29[a]
S		2.99[a]	3.11[a]
BJ			1.28

[a] Significant at the 1% level, one-tailed test.

[b] Significant at the 5% level, one-tailed test.

[c] V = Value Line, M = Seasonal Martingale, S = Seasonal Submartingale, BJ = Box-Jenkins.

[d] Each entry below designates the number of observations for a given model whose relative error ignoring sign is within the stated fractiles.

[e] Each Wilcoxon test statistic below results from comparing the method at the top with the method on the side. Thus, positive Wilcoxon statistics indicate superiority of model on top.

C. *Quarterly Comparisons*

In each year, 1972 to 1975, quarterly forecasts are obtained for the forecast methods in the manner shown in Table 1. Relative forecast errors of all four methods are compared over 1–4 quarter forecast horizons; BJ and V are also compared over 5 quarter horizons. In each of the four years, sample sizes are approximately 200 for the 1 and 2 quarter ahead comparisons, 150 for the 3 quarter ahead comparisons, and 100 for the 4 quarter ahead comparisons. Test results over all horizons appear in Table 3 and are summarized in Table 4.

With minor exceptions (3 and 4 quarter horizons in 1974), the Friedman statistics are highly significant when the four methods are tested as a group; the null hypothesis of identically distributed distributions is rejected in 14 of the 16 Friedman tests. Using Wilcoxon test statistics, V's errors are tested pairwise against M's and S's errors 16 times each and against BJ's errors 20 times. The resulting 52 hypothesis tests of V against M, S and BJ are summarized in Table 4A. In the 34 instances of significant Wilcoxon test statistics, V is statistically superior 33 times. In the remaining 18 tests, the sign of the t-statistic favors V 12 times. In total, V is favored 45 times out of 52, revealing an overwhelming dominance of V over the time series models.

The data are also summarized in Table 4 by the mean Wilcoxon t-value ($\bar{t}$), the estimated standard deviation of the mean t-value ($s(\bar{t})$) and the ratio $\bar{t}/s(\bar{t})$. The latter ratio is itself a t-statistic only if each t-value being averaged is drawn from the same distribution. Since the distribution of t-values is likely to depend upon the horizon, model and/or year that the experiment is conducted, we refrain from

TABLE 3

WILCOXON AND FRIEDMAN TEST STATISTICS, QUARTERLY COMPARISONS OF VALUE LINE AND TIME SERIES MODEL PREDICTION ERRORS, 1972–1975[c,d]

		Forecast Horizon												
		One Quarter			Two Quarter			Three Quarter			Four Quarter			Five Quarter
		S	BJ	V	S	BJ	V	S	BJ	V	S	BJ	V	V
	M	2.14[b]	6.87[a]	8.15[a]	0.79	5.41[a]	6.87[a]	−1.09	2.50[a]	5.77[a]	−3.09[a]	1.41	5.22[a]	—
1972	S	—	4.62[a]	5.25[a]	—	4.62[a]	5.57[a]	—	3.03[a]	5.42[a]	—	3.38[a]	5.30[a]	—
	BJ	—	—	1.75[b]	—	—	2.51[a]	—	—	4.09[a]	—	—	3.93[a]	3.11[a]
		Sample Size = 200			Sample Size = 200			Sample Size = 150			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 73.45[a]			Friedman Stat. = 60.54[a]			Friedman Stat. = 41.14[a]			Friedman Stat. = 43.43[a]			
		S	BJ	V	S	BJ	V	S	BJ	V	S	BJ	V	V
	M	8.02[a]	8.98[a]	10.66[a]	5.81[a]	6.41[a]	8.70[a]	4.81[a]	3.52[a]	6.31[a]	2.55[a]	1.69[b]	4.63[a]	—
1973	S	—	−0.60	1.62	—	−1.83[b]	1.04	—	−3.57[a]	−0.02	—	−1.59	1.04	—
	BJ	—	—	2.48[a]	—	—	3.47[a]	—	—	3.34[a]	—	—	2.79[a]	1.66
		Sample Size = 199			Sample Size = 200			Sample Size = 150			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 173.51[a]			Friedman Stat. = 119.91[a]			Friedman Stat. = 75.22[a]			Friedman Stat. = 29.12[a]			
		S	BJ	V	S	BJ	V	S	BJ	V	S	BJ	V	V
	M	3.35[a]	6.29[a]	6.19[a]	0.84	4.88[a]	3.78[a]	−0.25	2.59[a]	1.29	−2.69[a]	1.41	0.29	—
1974	S	—	2.34[a]	2.95[a]	—	2.31[b]	1.50	—	1.53	0.97	—	2.67[a]	2.80[a]	—
	BJ	—	—	1.16	—	—	−1.45	—	—	−1.04	—	—	−0.92	−2.20[b]
		Sample Size = 199			Sample Size = 199			Sample Size = 149			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 47.57[a]			Friedman Stat. = 22.63[a]			Friedman Stat. = 5.40			Friedman Stat. = 2.92			
		S	BJ	V	S	BJ	V	S	BJ	V	S	BJ	V	V
	M	2.07[b]	5.76[a]	8.22[a]	−2.64[a]	3.63[a]	5.29[a]	−4.49[a]	2.93[a]	2.95[a]	4.89[a]	−0.78	−0.05	—
1975	S	—	4.70[a]	6.36[a]	—	6.02[a]	6.14[a]	—	6.13[a]	5.14[a]	—	3.62[a]	3.28[a]	—
	BJ	—	—	3.51[a]	—	—	1.62	—	—	−0.22	—	—	0.08	0.45
		Sample Size = 199			Sample Size = 199			Sample Size = 149			Sample Size = 100			Sample Size = 50
		Friedman Stat. = 80.32[a]			Friedman Stat. = 44.49[a]			Friedman Stat. = 33.25[a]			Friedman Stat. = 15.66[b]			

[a] Significant at the 1% level, one-tailed test.

[b] Significant at the 5% level, one-tailed test.

[c] V = Value Line, M = Seasonal Martingale, S = Seasonal Submartingale, BJ = Box-Jenkins.

[d] Each Wilcoxon test statistic entered in the table results from comparing method at the top with method on the side. Thus, positive Wilcoxon statistics indicate superiority of model on top.

TABLE 4

SUMMARY OF WILCOXON TEST COMPARISONS

A: Value Line vs. Time Series Models[a]

		Forecast Horizon					Forecast Model			Year			
	Total	1Q	2Q	3Q	4Q	5Q	M	S	BJ	1972	1973	1974	1975
Number of Comparisons	52	12	12	12	12	4	16	16	20	13	13	13	13
Comparisons Favorable to V[b]	45	12	11	9	10	3	15	15	15	13	12	9	11
Comparisons Statistically Favorable to V[c]	33	10	8	7	7	1	13	10	10	13	8	4	8
Comparisons Statistically Unfavorable to V	1	0	0	0	0	1	0	0	1	0	0	1	0
Mean Wilcoxon Test Statistic ($\bar{t}$)	3.25	4.86	3.75	2.83	2.37	.76	5.27	3.40	1.51	4.84	3.67	1.18	3.29
$\bar{t}/s(\bar{t})$[d]	8.27	5.45	4.51	3.81	3.72	.67	5.65	6.24	3.48	9.98	4.18	1.81	4.24

B: BJ vs. Naive Time Series Models

		Forecast Horizon				Forecast Model		Year			
	Total	1Q	2Q	3Q	4Q	M	S	1972	1973	1974	1975
Number of Comparisons	32	8	8	8	8	16	16	8	8	8	8
Comparisons Favorable to BJ[b]	27	7	7	7	6	15	12	8	4	8	7
Comparisons Statistically Favorable to BJ[c]	24	7	7	6	4	13	11	7	4	6	7
Comparisons Statistically Unfavorable to BJ	2	0	1	1	0	0	2	0	2	0	0
Mean Wilcoxon Test Statistic ($\bar{t}$)	3.15	4.87	3.93	2.33	1.48	3.97	2.34	3.98	1.63	3.00	4.00
$\bar{t}/s(\bar{t})$[d]	6.37	4.70	4.16	2.41	2.25	6.23	3.25	6.46	1.05	4.99	4.96

[a] V = Value Line, M = Seasonal Martingale, S = Seasonal Submartingale, BJ = Box-Jenkins.

[b] Comparisons are favorable if Wilcoxon statistic in Table 3 is positive.

[c] Comparisons are statistically favorable if Wilcoxon statistic in Table 3 is positive and significant at the 5% level or better.

[d] Both $\bar{t}$ and $s(\bar{t})$ are computed using the number of comparisons in each column of the Table.

hypothesis tests on $\bar{t}$ and present $\bar{t}$ and $\bar{t}/s(\bar{t})$ without formal tests of significance. For the 52 comparisons involving V, the mean Wilcoxon test statistic is 3.25 and $\bar{t}/s(\bar{t})$ is 8.27.

Table 4A also decomposes the 52 comparisons of V with the time series models by forecast horizon, model and year.[15] The data show that Value Line's forecast superiority holds over all horizons studied with a tendency for its superiority to decline as horizon lengthens. V's predominance model-by-model is, as hypothesized, quite evident with somewhat less superiority over BJ than over M and S. Turning our attention to the 20 comparisons between V and BJ, V is superior in 10 of 11 cases in which the test statistic is significant. In 5 of the remaining 9 comparisons, the sign of the Wilcoxon test statistic favors V. For completeness, Table 4A summarizes Wilcoxon tests by year. Again we expect V to be superior, on average, but have no hypothesis concerning particular years. Comparisons unfavorable to V tend to be confined to 1974, but even in this year, 4 of the 5 statistically significant comparisons favor Value Line.

In summary, the evidence strongly supports the hypothesis that Value Line consistently makes significantly better predictions than time series models. The statistically significant experiments overwhelmingly favor Value Line. In the remaining experiments the majority of the Wilcoxon tests also favor Value Line, providing additional support for the hypothesis of analyst superiority.

Table 4B summarizes the 32 comparisons of BJ with the naive time series models. The mean Wilcoxon test statistic is 3.15 and $\bar{t}/s(\bar{t})$ equals 6.37. In 26 cases, there are significant differences with BJ statistically superior 24 times. BJ is superior to M and S in 3 of the remaining 6 comparisons. Hence, BJ is favored in 27 of 32 comparisons, providing strong support for the hypothesis that BJ predicts earnings better than *ad hoc* time series models.

Table 4B also summarizes comparisons involving BJ by horizon, model and year. BJ's superiority over the naive models is clearly evident over each forecast horizon with a tendency for its superiority to decline as horizon lengthens. In comparison to individual models, BJ outperforms both M and S with somewhat less dominance over S. Turning to comparisons by year, the superiority of BJ is consistent over time, with most of the comparisons unfavorable to BJ occurring in 1973. Even in this year, the mean Wilcoxon test statistic is 1.63 and 4 of the 6 significant comparisons favor BJ.[16]

In conclusion, the quarterly and the annual comparisons provide convincing evidence both of Value Line's superiority over each of the three time series models and BJ's superiority over the naive models. The quarterly results also show that V's superiority over the time series models and BJ's superiority over the naive models

15. The decomposition is an alternative to analysis of variance which is inapplicable to the error distribution (see fn. 8).

16. As noted earlier, the Wilcoxon tests should be insensitive to error definition. Wilcoxon test statistics were recomputed on annual and selected quarterly comparisons using three additional error measures, mean square error, root mean square error and relative error squared. The small changes in the test statistics left the results virtually unchanged. Parametric t-tests were also applied to the four error measures. Both the sign and magnitude of these test statistics were highly sensitive to error definition. The hypothesis tests using the parametric t-test most often gave results in disagreement with the Wilcoxon test when mean square error was chosen as the error definition. This may account for EG's results differing from ours.

are not confined to particular models, horizons, or years. The very general character of Value Line's superiority in predicting earnings, evidenced over all models, horizons, and years in 64 separate hypothesis tests involving sample sizes averaging 125, lends extraordinary support to the hypothesis of analyst superiority.

D. *Further Analysis*

The superiority of Value Line over time series models follows from the rational behavior of forecast producers and consumers and should be generalizable to other sources of analyst forecasts and other time periods. As a preliminary test of the sensitivity of our results to choice of analyst, we obtained predictions of 1975 annual earnings per share made by the Standard and Poor's Earnings Forecaster (SP) for each firm included in the 1975 annual earnings sample.[17] Wilcoxon tests of SP against M, S, and BJ favored SP, yielding t-statistics of 3.18, 2.85 and 1.45 respectively. These results are remarkably similar to those using Value Line.[18] This evidence suggests that Value Line's forecast superiority over time series models is not unique.

To ascertain whether the sample period posed unusual difficulties for time series earnings forecasting, a BJ model was fitted to the Quarterly Earnings Index of the Dow Jones Industrial Average over the 1951–1975 time period.[19] Average quarterly percentage errors ignoring sign produced by the BJ model for 1972–1975 were 7.31%, 6.61%, 9.99%, and 15.47% respectively. Since the mean and standard deviation of average percentage forecast errors over the 1951–1975 period were 10.14% and 4.38%, it appears that the 1972–1975 period was not a particularly difficult one in which to predict earnings. Indeed, from this standpoint, the 1972–1975 period is comparable to the "stable" years of the sixties, 1962–1967, studied by CM and EG.[20]

These results indicate that if appropriate hypothesis tests are applied to other analysts and time periods, the results are likely to parallel those using Value Line and the 1972–1975 time period.

E. *A Brief Investigation of Value Line Superiority*

To produce forecasts superior to time series models, Value Line must utilize information not contained in the time series of quarterly earnings. During the period between the most recent quarterly earnings announcement and the subsequent Value Line prediction, Value Line acquires incremental information which, if an important part of its total information set, may explain Value Line's

17. SP, published weekly, contains annual predictions made by Standard and Poor's and other investment firms. The SP prediction for each firm is that made by Standard and Poor's on the date closest to the Value Line prediction date.

18. V's t-statistics versus M, S, and BJ were 3.29, 3.11, and 1.28 respectively (See Table 2). A direct Wilcoxon test between V and SP favored $V(t=.77)$.

19. The sample period, 1972–1975, may appear "unusual" since it includes peacetime wage and price controls, high inflation and inventory profits, large changes in employment and new accounting requirements. If events arising during the sample period caused the earnings generating process to change, the forecast ability of the BJ modelling technique may be hampered, unintentionally favoring the analyst.

20. The average percentage errors were 12.67%, 10.71%, 7.03%, 4.93%, 6.08% and 5.26%, respectively for 1962–1967.

superiority. Information arising during this interval is likely to be most important for predicting next quarter's earnings. Assuming that the generation of this incremental information is positively related to the passage of time, earnings should be relatively easier to predict the further Value Line's prediction date is from the most recent earnings announcement date, and one quarter horizon forecast errors should be negatively related to the corresponding intervals.

To test this hypothesis, we obtained for the firms in the 1975 one quarter horizon sample their Value Line errors and the time intervals (7–70 days) since their most recent earnings announcements. A rank correlation was applied to these variables. The insignificantly negative Spearman rho which was obtained suggests that information obtained by Value Line during this interval has a negligible effect on its ability to predict next quarter's earnings.[21] This evidence is consistent with the hypothesis that Value Line's superiority can be attributed to its use of the information set available to it on the quarterly earnings announcement date, and not to the acquisition of information arising after the quarterly earnings announcement date.

III. Summary and Implications

Basic economic theory and the equilibrium employment of analysts, a higher cost factor than time series models, imply that analysts must produce better forecasts than time series models. Past studies ([9], [11]) of comparative earnings forecast accuracy have concluded otherwise but use inappropriate parametric tests and contain experimental biases. Using nonparametric statistics which provide proper yet powerful tests, we find that (1) BJ models consistently produce significantly better earnings forecasts than martingale and submartingale models; (2) Value Line Investment Survey consistently makes significantly better earnings forecasts than the BJ and naive time series models. The findings are in accord with rationality in the market for forecasts and the long-run equilibrium employment of analysts.

If market earnings expectations are rational [23], it follows that the best available earnings forecasts should be used to measure market earnings expectations. Given rational market expectations, our evidence of analyst superiority over time series models means that analysts' forecasts should be used in studies of firm valuation, cost of capital and the relationship between unanticipated earnings and stock price changes until forecasts superior to those of analysts are found.[22] Past findings ([2], [21]) that share price levels are significantly better explained by analysts' earnings

21. The lack of a significant negative correlation between prediction error and time since last announcement date may occur if the interval is intentionally lengthened by Value Line in order to acquire more information about the firms whose earnings are more difficult to predict. To test this possibility, we measured each firm's prediction "difficulty" by its average one quarter horizon percentage error ignoring sign yielded by its BJ model. No significant correlation was found between this variable and the time interval between the most recent quarterly earnings announcement and the Value Line prediction date.

22. In examining the relationship between unanticipated earnings and stock price changes, for example, the sign of the forecast error from a time series is often used ([7], [12], [13]) as a device for classifying unanticipated earnings into "favorable" or "unfavorable" categories. With this methodology, BJ and *V* classify earnings differently 213 times out of the 797 one quarter ahead forecasts in our sample.

forecasts than by those of time series models are consistent with our evidence and with market rationality.

The hypothesis of analyst superiority versus univariate time series models is derived from basic economic theory and is not limited to the case of earnings. It is therefore applicable to all types of forecasts subject to the market test. There is no presumption that other, non-market forecasts such as those made by corporate executives or government agencies should be better (or worse) than those generated by univariate time series models.

APPENDIX A

Sample Firms

Abbott Laboratories
Allegheny Ludlum Industries, Inc.
American Airlines, Inc.
Anaconda Company
Boeing Company
Borg-Warner Corporation
Braniff International Corporation
Caterpillar Tractor Company
Champion International Corporation
Chrysler Corporation
Clark Equipment Company
Colgate-Palmolive Company
Continental Can Company, Inc.
Curtiss-Wright Corporation
Cutler-Hammer, Inc.
Eastern Airlines, Incorporated
Eastman Kodak Company
Flintkote Company
Freeport Minerals Company
Fruehauf Corporation
GATX Corporation
General Electric Company
Goodrich (B. F.) Company
Gulf Oil Corporation
Homestake Mining Company
International Business Machines Corporation
International Paper Co.
Kennecott Copper Corporation
Leheigh Portland Cement Co.
Ligget Group Inc.
Lowenstein (M.) & Sons, Inc.
Nabisco, Inc.
National Distillers & Chemical Corporation
National Steel Corporation

Pan American World Airways, Inc.
Pepsico, Inc.
Phelps Dodge Corporation
Phillips Petroleum Co.
Pullman, Incorporated
Raybestos-Manhattan, Inc.
Republic Steel Corporation
Standard Brands, Inc.
Standard Oil Company of Indiana
Sterling Drug, Incorporated
St. Regis Paper Company
Timken Company
United States Gypsum Company
United States Steel Corporation
United Technologies Corp.
Wrigley (W. M.) Jr. Company

REFERENCES

1. W. H. Beaver. "The Information Content of the Magnitude of Unexpected Earnings," Unpublished Manuscript, 1974.
2. F. W. Bell. "The Relation of the Structure of Common Stock Prices to Historical, Expectational and Industrial Variables," *Journal of Finance* (March 1974), pp. 187–197.
3. H. Benishay. "Variability in Earnings-Price Ratios of Corporate Equities," *American Economic Review* (March 1961), pp. 81–94.
4. G. Benston. "Published Corporate Accounting Data and Stock Prices," *Empirical Research in Accounting: Selected Studies, 1967*. Supplement to Vol. 5, *Journal of Accounting Research*, pp. 1–54.
5. R. S. Bower and D. H. Bower. "Risk and the Valuation of Common Stock," *Journal of Political Economy* (May/June 1969), pp. 349–362.
6. G. E. P. Box and G. M. Jenkins. *Time Series Analysis: Forecasting and Control* (San Francisco: Holden-Day, 1970).
7. P. Brown and J. Kennelly. "The Informational Content of Quarterly Earnings: An Extension and Some Further Evidence," *Journal of Business* (July 1972), pp. 403–415.
8. W. J. Conover. *Practical Nonparametric Statistics* (New York: John Wiley & Sons, Inc., 1971).
9. J. G. Cragg and B. G. Malkiel. "The Consensus and Accuracy of Some Predictions of the Growth of Corporate Earnings," *Journal of Finance* (March 1968), pp. 67–84.
10. W. T. Dent and J. A. Swanson. "On Forecast Error in Autoregressive Integrated Moving Average Models," Working Paper No. 75-3, College of Business Administration, The University of Iowa, February 1975.
11. E. J. Elton and M. J. Gruber. "Earnings Estimates and the Accuracy of Expectational Data," *Management Science* (April 1972), pp. 409–424.
12. G. Foster. "Stock Market Reaction to Estimates of Earnings per Share by Company Officials," *Journal of Accounting Research* (Spring 1973), pp. 25–37.
13. ———. "Quarterly Accounting Data: Time Series Properties and Predictive-Ability Results," *Accounting Review,* (January 1977), pp. 1–21.
14. I. Friend and M. Puckett. "Dividends and Stock Prices," *American Economic Review* (September 1964), pp. 656–682.
15. J. R. Froeschle. "The Analysis of Seasonal Time Series," Doctoral Dissertation, The University of Iowa, 1975.
16. N. Gonedes. "Properties of Accounting Numbers: Models and Tests," *Journal of Accounting Research* (Autumn 1973), pp. 212–237.

17. W. L. Hays and R. L. Winkler. *Statistics: Probability, Inference and Decision* (New York: Holt, Rinehart and Winston, Inc., 1971).
18. R. C. Higgins. "Growth, Dividend Policy and Capital Costs in the Electric Utility Industry," *Journal of Finance* (September 1974), pp. 1189–1201.
19. J. E. Kiger. "An Empirical Investigation of NYSE Volume and Price Reactions to the Announcement of Quarterly Earnings," *Journal of Accounting Research* (Spring 1972), pp. 113–128.
20. R. H. Litzenberger and C. U. Rao. "Estimates of the Marginal Time Preference and Average Risk Aversion of Inventors in Electric Utility Shares 1960–66," *The Bell Journal of Economics and Management Science* (Spring 1971), pp. 265–277.
21. B. G. Malkiel and J. G. Cragg. "Expectations and the Structure of Share Prices," *American Economic Review* (September 1970), pp. 601–617.
22. R. G. May, "The Influence of Quarterly Earnings Announcements in Investor Decisions as Reflected in Common Stock Price Changes," *Empirical Research in Accounting: Selected Studies, 1971*. Supplement to Vol. 9, *Journal of Accounting Research*, pp. 119–163.
23. J. F. Muth. "Rational Expectations and the Theory of Price Movements," *Econometrica* (July 1961), pp. 315–335.
24. C. R. Nelson. "Rational Expectations and the Predictive Efficiency of Economic Models," *The Journal of Business* (July 1975), pp. 331–343.
25. H. Theil, *Applied Economic Forecasting* (Amsterdam: North-Holland Publishing Company, 1966).

BUSINESS INSIDER

Interest rate forecasters are shockingly wrong almost all of the time

AKIN OYEDELE
JUL. 8, 2015, 8:25 AM

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Most interest rate forecasters are wrong most of the time.

Very wrong.

The chart below is from Jeff Gundlach's presentation on Tuesday, comparing the US 10-year yield to median economist forecasts over the past five years.

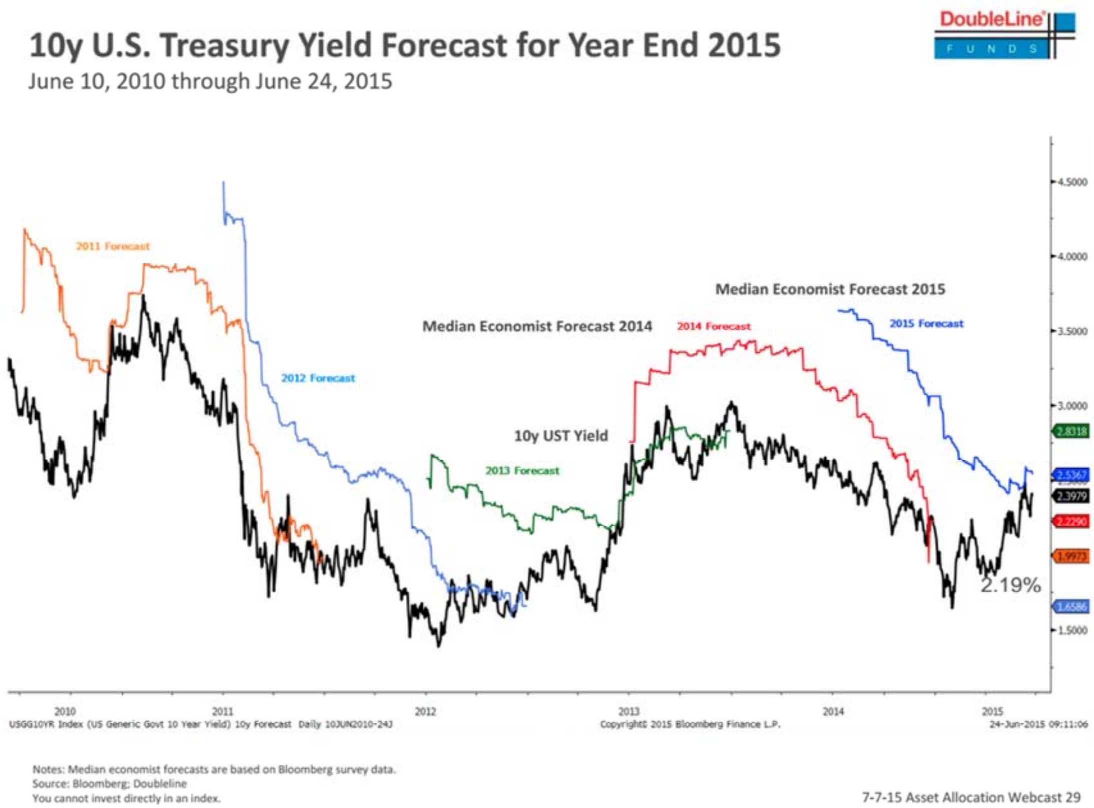
The black line is the 10-year yield, and the colored lines are the paths that economists thought rates would take.

Clearly, these forecasters were wrong most of the time, as there were only a few instances of convergence between both lines.

In 2012, forecasters were hugely bleak about the economy, and thought that interest rates would collapse the whole year. Rates ended the year higher than where they started.

Last year was particularly bad, when strategists became too optimistic that the Federal Reserve would hike rates.

This year, forecasters again thought rates would rise and as rates fell, so did those forecasts, which have now converged with interest rates.



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Forecasting US Equity Returns in the 21st Century

John Y. Campbell, Harvard University
July 2001

What returns should investors expect the US stock market to deliver on average during the next century? Does the experience of the last century provide a reliable guide to the future? In this short note I first discuss alternative methodologies for forecasting average future equity returns, then discuss current market conditions, and finally draw conclusions for long-term return forecasts. Throughout I work in real, that is inflation-adjusted, terms.

I. Methods for forecasting returns

1. Average past returns

Perhaps the simplest way to forecast future returns is to use some average of past returns. Very naturally, this method has been favored by many investors and analysts. However there are several difficulties with it.

a) *Geometric average or arithmetic average?* The geometric average return is the cumulative past return on US equities, annualized. Siegel (1998) studies long-term historical data on value-weighted US share indexes. He reports a geometric average of 7.0% over two different sample periods, 1802–1997 and 1871–1997. The arithmetic average return is the average of one-year past returns on US equities. It is considerably higher than the geometric average return, 8.5% over 1802–1997 and 8.7% over 1871–1997.[1]

When returns are serially uncorrelated, the arithmetic average represents the best forecast of future return in any randomly selected future year. For long holding periods, the best forecast is the arithmetic average compounded up appropriately. If one is making a 75-year forecast, for example, one should forecast a cumulative return of 1.085^{75} based on 1802–1997 data.

When returns are negatively serially correlated, however, the arithmetic average is not necessarily superior as a forecast of long-term future returns. To understand this, consider an extreme example in which prices alternate deterministically between 100 and 150. The return is 50% when prices rise, and -33% when prices fall. Over any even number of periods, the geometric average return is zero, but the arithmetic average return is 8.5%. In this case the arithmetic average return is misleading because it fails to take account of the fact that high returns always multiply a low initial price of 100, while low returns always multiply a high initial price of 150. The geometric average is a better indication of long-term future

[1] When returns are lognormally distributed, the difference between the two averages is approximately one-half the variance of returns. Since stock returns have an annual standard deviation of about 18% over these long periods, the predicted difference is $0.18^2/2 = 0.016$ or 1.6%. This closely matches the difference in the data.

prospects in this example.[2]

This point is not just a theoretical curiosity, because in the historical data summarized by Siegel, there is strong evidence that the stock market is mean-reverting. That is, periods of high returns tend to be followed by periods of lower returns. This suggests that the arithmetic average return probably overstates expected future returns over long periods.

b) *Returns are very noisy.* The randomness in stock returns is extreme. With an annual standard deviation of real return of 18%, and 100 years of past data, a single year's stock return that is only one standard deviation above average increases the average return by 18 basis points. A lucky year that is two standard deviations above average increases the average return by 36 basis points. Even when a century or more of past data is used, forecasts based on historical average returns are likely to change substantially from one year to the next.

c) *Realized returns rise when expected returns fall.* To the extent that expected future equity returns are not constant, but change over time, they can have perverse effects on realized returns. Suppose for example that investors become more risk-tolerant and reduce the future return that they demand from equities. If expected future cash flows are unchanged, this drives up prices and realized returns. Thus an estimate of future returns based on average past realized returns will tend to increase just as expected future returns are declining.

Something like this probably occurred in the late 1990's. A single good year can have a major effect on historical average returns, and several successive good years have an even larger effect. But it would be a mistake to react to the spectacular returns of 1995–99 by increasing estimates of 21st Century returns.

d) *Unpalatable implications.* Fama and French (2000) point out that average past US stock returns are so high that they exceed estimates of the return to equity (ROE) calculated for US corporations from accounting data. Thus if one uses average past stock returns to estimate the cost of capital, the implication is that US corporate investments have destroyed value; corporations should instead have been paying all their earnings out to stockholders. This conclusion is so hard to believe that it further undermines confidence in the average-return methodology.

One variation of the average-past-returns approach is worth discussing. One might take the view that average past equity returns in other countries provide relevant evidence about US equity returns. Standard international data from Morgan Stanley Capital International, available since the early 1970's, show that equity returns in most other industrialized countries have been about as high as those in the US. The exceptions are the heavily commodity-dependent markets of Australia and Canada, and the very small Italian market (Campbell 1999). Jorion and Goetzmann (1999) argue that other countries' returns were

[2] One crude way to handle this problem is to measure the annualized variance of returns over a period such as 20 years that is long enough for returns to be approximately serially uncorrelated, and then to adjust the geometric average up by one-half the annualized 20-year variance as would be appropriate if returns are lognormally distributed. Campbell and Viceira (2001, Figure 4.2) report an annualized 20-year standard deviation of about 14% in long-term annual US data, which would imply an adjustment of $0.14^2/2 = 0.010$ or 1.0%.

lower than US returns in the early 20th Century, but this conclusion appears to be sensitive to their omission of the dividend component of return (Dimson, Marsh, and Staunton 2000). Thus the use of international data does not change the basic message that the equity market has delivered high average returns in the past.

2. Valuation ratios

An alternative approach is to use valuation ratios—ratios of stock prices to accounting measures of value such as dividends or earnings—to forecast future returns. In a model with constant valuation ratios and growth rates, the famous Gordon growth model says that the dividend-price ratio

$$\frac{D}{P} = R - G, \tag{1}$$

where R is the discount rate or expected equity return, and G is the growth rate of dividends (equal to the growth rate of prices when the valuation ratio is constant). This formula can be applied either to price per share and conventional dividends per share, or to the total value of the firm and total cash paid out by the firm (including share repurchases). A less well-known but just as useful formula says that in steady state, where earnings growth comes from reinvestment of retained earnings which earn an accounting ROE equal to the discount rate R,

$$\frac{E}{P} = R. \tag{2}$$

Over long periods of time summarized by Siegel (1998), these formulas give results consistent with average realized returns. Over the period 1802–1997, for example, the average dividend-price ratio was 5.4% while the geometric average growth rate of prices was 1.6%. These numbers add to the geometric average return of 7.0%. Over the period 1871–1997 the average dividend-price ratio was 4.9% while the geometric average growth rate of prices was 2.1%, again adding to 7.0%. Similarly, Campbell and Shiller (2001) report that the average P/E ratio for S&P500 shares over the period 1872-2000 was 14.5. The reciprocal of this is 6.9%, consistent with average realized returns.

When valuation ratios and growth rates change over time, these formulas are no longer exactly correct. Campbell and Shiller (1988) and Vuolteenaho (2000) derive dynamic versions of the formulas that can be used in this context. Campbell and Shiller show, for example, that the log dividend-price ratio is a discounted sum of expected future discount rates, less a discounted sum of expected future dividend growth rates. In this note I will work with the simpler deterministic formulas.

II. Current market conditions

Current valuation ratios are wildly different from historical averages, reflecting the unprecedented bull market of the last 20 years, and particularly the late 1990's. The attached figure, taken from Campbell and Shiller (2001), illustrates this point. The bottom left panel shows the dividend-price ratio D/P in January of each year from 1872–2000. The long-term historical average is 4.7%, but D/P has fallen dramatically since 1982 to about 1.2% in January 2000 (and 1.4% today).

The dividend-price ratio may have fallen in part because of shifts in corporate financial policy. An increased tendency for firms to repurchase shares rather than pay dividends increases the growth rate of dividends per share, by shrinking the number of shares. Thus it increases G in the Gordon growth formula and reduces conventionally measured D/P. One way to correct for this is to add repurchases to conventional dividends. Recent estimates of this effect by Liang and Sharpe (1999) suggest that it may be an upward adjustment of 75 to 100 basis points, and more in some years. Of course, this is not nearly sufficient to explain the recent decline in D/P.

Alternatively, one can look at the price-earnings ratio. The top left panel of the figure shows P/E over the same period. This has been high in recent years, but there are a number of earlier peaks that are comparable. Close inspection of these peaks shows that they often occur in years such as 1992, 1934, and 1922 when recessions caused temporary drops in (previous-year) earnings. To smooth out this effect, Campbell and Shiller (2001), following Graham and Dodd (1934), advocate averaging earnings over 10 years. The price-averaged earnings ratio is illustrated in the top right panel of the figure. This peaked at 45 in January 2000; the previous peak was 28 in 1929. The decline in the S&P500 since January 2000 has only brought the ratio down to the mid-30's, still higher than any level seen before the late 1990's.

The final panel in the figure, on the bottom right, shows the ratio of current to 10-year average earnings. This ratio has been high in recent years, reflecting robust earnings growth during the 1990's, but it is not unprecedentedly high. The really unusual feature of the recent stock market is the level of prices, not the growth of earnings.

III. Implications for future returns

The implications of current valuations for future returns depend on whether the market has reached a new steady state, in which current valuations will persist, or whether these valuations are the result of some transitory phenomenon.

If current valuations represent a new steady state, then they imply a substantial decline in the equity returns that can be expected in the future. Using Campbell and Shiller's (2001) data, the unadjusted dividend-price ratio has declined by 3.3 percentage points from the historical average. Even adjusting for share repurchases, the decline is at least 2.3 percentage points. Assuming constant long-term growth of the economy, this would imply that the geometric average return on equity is no longer 7%, but 3.7% or at most 4.7%. Looking at the price-averaged earnings ratio, adjusting for the typical ratio of current to averaged earnings, gives an even lower estimate. Current earnings are normally 1.12 times averaged earnings; $1.12/35 = 0.032$, implying a 3.2% return forecast. These forecasts allow for only a very modest equity premium relative to the yield on long-term inflation-indexed bonds, currently about 3.5%, or the 3% safe real return assumed recently by the Trustees.

If current valuations are transitory, then it matters critically what happens to restore traditional valuation ratios. One possibility is that earnings and dividends are below their long-run trend levels; rapid earnings and dividend growth will restore traditional valuations without any declines in equity returns below historical levels. While this is always a possibility, Campbell and Shiller (2001) show that it would be historically unprecedented. The US stock market has an extremely poor record of predicting future earnings and dividend growth. Historically stock prices have increased relative to earnings during decades of rapid earnings growth, such as the 1920's, 1960's, or 1990's, as if the stock market anticipates that rapid earnings growth will continue in the next decade. However there is no systematic tendency for a profitable decade to be followed by a second profitable decade; the 1920's, for example, were followed by the 1930's and the 1960's by the 1970's. Thus stock market optimism often fails to be justified by subsequent earnings growth.[3]

A second possibility is that stock prices will decline or stagnate until traditional valuations are restored. This has occurred at various times in the past after periods of unusually high stock prices, notably the 1900's and 1910's, the 1930's, and the 1970's. This would imply extremely low and perhaps even negative returns during the adjustment period, and then higher returns afterwards.

The unprecedented nature of recent stock market behavior makes it impossible to base forecasts on historical patterns alone. One must also form a view about what happened to drive stock prices up during the 1980's and particularly the 1990's. One view is that there has been a structural decline in the equity premium, driven either by the correction of mistaken perceptions of risk (aided perhaps by the work of economists on the equity premium puzzle), or by the reduction of barriers to participation and diversification by small investors.[4] Economists such as McGrattan and Prescott (2001) and Jagannathan, McGrattan, and Scherbina (2001) argue that the structural equity premium is now close to zero, consistent with theoretical models in which investors effectively share risks and have modest risk aversion, and consistent with the view that the US market has reached a new steady state.

An alternative view is that the equity premium has declined only temporarily, either because investors irrationally overreacted to positive fundamental news in the 1990's (Shiller 2000), or because the strong economy made investors more tolerant of risk.[5] On this view the equity premium will return to historical levels, implying extremely poor near-term returns and higher returns in the more distant future after traditional valuations have been restored.

It is too soon to tell which of these views is correct, and I believe it is sensible to put some weight on each of them. That is, I expect valuation ratios to return part way but not

[3]Vuolteenaho (2000) notes, however, that US corporations were unusually profitable in the late 1990's and that profitability has some predictive power for future earnings growth.

[4]Heaton and Lucas (1999) model barriers of this sort. It is hard to get large effects of increased participation on stock prices unless initial participation levels are extremely low. Furthermore, one must keep in mind that what matters for pricing is the wealth-weighted participation rate, that is, the probability that a randomly selected dollar of wealth is held by an individual who can participate in the market. This is higher than the equal-weighted participation rate, the probability that a randomly selected individual can participate.

[5]Campbell and Cochrane (1999) present a model in which investors judge their well-being by their consumption relative to a recent average of past aggregate consumption. In this model investors are more risk-tolerant when consumption grows rapidly and they have a "cushion of comfort" relative to their minimum expectations. The Campbell-Cochrane model fits past cyclical variations in the stock market, which will likely continue in the future, but it is hard to explain the extreme recent movements using this model.

fully to traditional levels.[6] A rough guess for the long term, after the adjustment process is complete, might be a geometric average equity return of 5% to 5.5% or an arithmetic average return of 6.5% to 7%.

If equity returns are indeed lower on average in the future, it is likely that short-term and long-term real interest rates will be somewhat higher. That is, the total return to the corporate capital stock is determined primarily by the production side of the economy and by national saving and international capital flows; the division of total return between riskier and safer assets is determined primarily by investor attitudes towards risk. Reduced risk aversion then reduces the equity premium both by driving down the equity return and by driving up the riskless interest rate. The yield on long-term inflation-indexed Treasury securities (TIPS) is about 3.5%, while short-term real interest rates have recently averaged about 3%. Thus 3% to 3.5% would be a reasonable guess for safe real interest rates in the future, implying a long-run average equity premium of 1.5% to 2.5% in geometric terms or about 3% to 4% in arithmetic terms.

Finally, I note that it is tricky to use these numbers appropriately in policy evaluation. Average equity returns should never be used in base-case calculations without showing alternative calculations to reflect the possibilities that realized returns will be higher or lower than average. These calculations should include an alternative in which equities underperform Treasury bills. Even if the probability of underperformance is small over a long holding period, it cannot be zero or the stock market would be offering an arbitrage opportunity or "free lunch". Equally important, the bad states of the world in which underperformance occurs are heavily weighted by risk-averse investors. Thus policy evaluation should use a broad range of returns to reflect the uncertainty about long-run stock market performance.

[6] This compromise view also implies that negative serial correlation, or mean-reversion, is likely to remain a characteristic of stock returns in the 21st Century.

Bibliography

Campbell, John Y. and John H. Cochrane, 1999, "By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior", *Journal of Political Economy* 107, 205–251.

Campbell, John Y. and Robert J. Shiller, 1988, "The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors", *Review of Financial Studies* 1, 195–228.

Campbell, John Y. and Robert J. Shiller, 2001, "Valuation Ratios and the Long-Run Stock Market Outlook: An Update", NBER Working Paper No. 8221.

Campbell, John Y. and Luis M. Viceira, 2001, *Strategic Asset Allocation: Portfolio Choice for Long-Term Investors*, forthcoming Oxford University Press, New York, NY.

Dimson, Elroy, Paul Marsh, and Mike Staunton, 2000, *The Millennium Book: A Century of Investment Returns*, ABN Amro and London Business School, London.

Fama, Eugene and Kenneth R. French, 2000, "The Equity Premium", unpublished paper, University of Chicago and MIT.

Graham, Benjamin and David Dodd, 1934, *Security Analysis*, McGraw-Hill, New York, NY.

Heaton, John and Deborah Lucas, 1999, "Stock Prices and Fundamentals", *NBER Macroeconomics Annual* 213–242, MIT Press, Cambridge, MA.

Jagannathan, Ravi, Ellen R. McGrattan, and Anna Scherbina, 2001, "The Declining US Equity Premium", NBER Working Paper No. 8172.

Jorion, Philippe and William N. Goetzmann, 1999, "Global Stock Markets in the Twentieth Century", *Journal of Finance* 54, 953–980.

Liang, Nellie and Steven A. Sharpe, 1999, "Share Repurchases and Employee Stock Options and their Implications for S&P500 Share Retirements and Expected Returns", unpublished paper, Board of Governors of the Federal Reserve System.

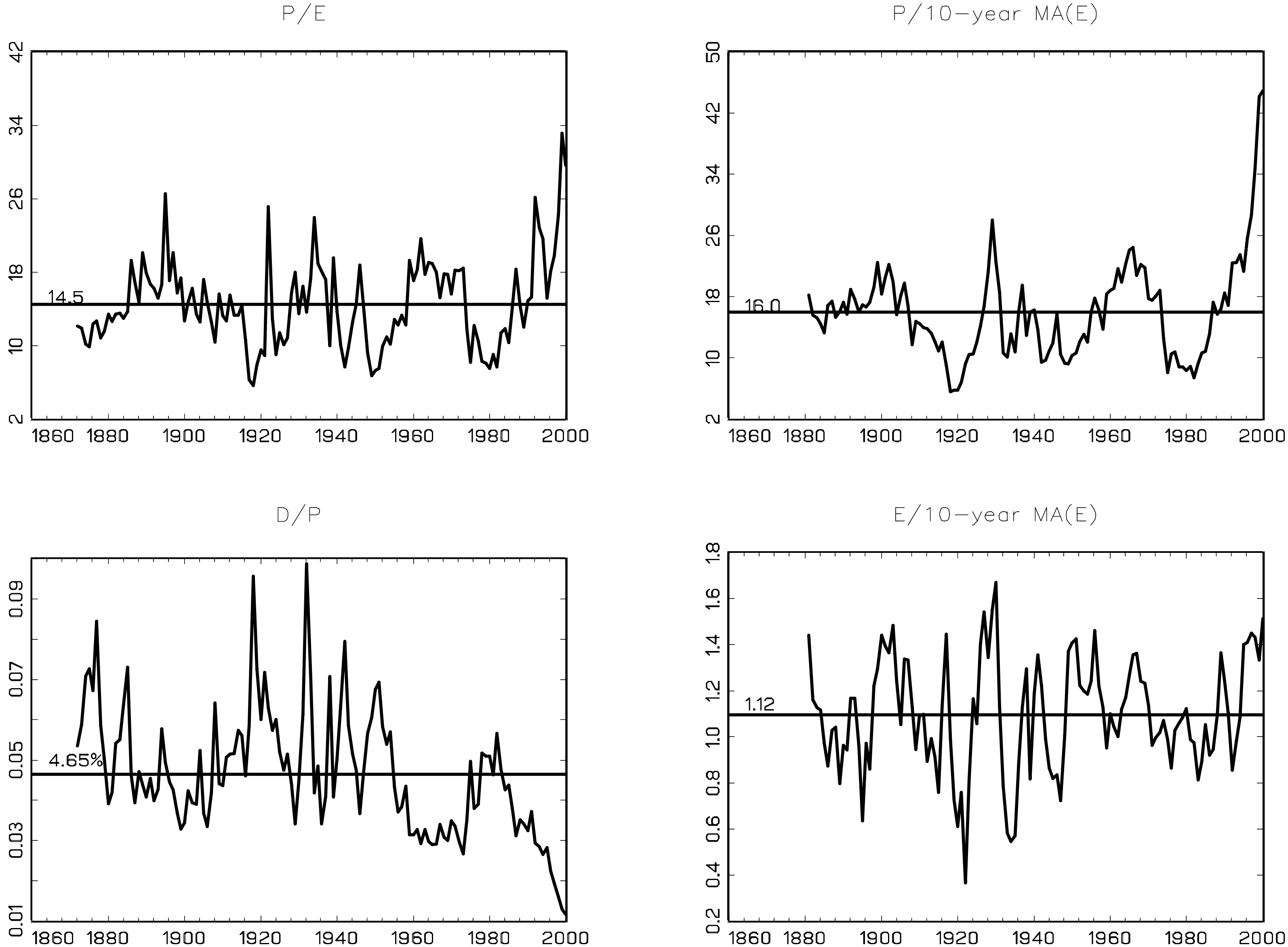
McGrattan, Ellen R., and Edward C. Prescott, 2001, "Is the Stock Market Overvalued?", NBER Working Paper No. 8077.

Shiller, Robert J., 2000, *Irrational Exuberance*, Princeton University Press, Princeton, NJ.

Siegel, Jeremy, 1998, *Stocks for the Long Run*, 2nd ed., McGraw-Hill, New York, NY.

Vuolteenaho, Tuomo, 2000, "Understanding the Aggregate Book-to-Market Ratio and its Implications to Current Equity-Premium Expectations", unpublished paper, Harvard University.

Figure 4. S&P Composite Stock Data, January Values 1872–1997



Viewpoint: Estimating the equity premium

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Abstract. Finance theory restricts the time-series behaviour of valuation ratios and links the cross-section of stock prices to the level of the equity premium. This can be used to strengthen the evidence for predictability in stock returns. Steady-state valuation models are useful predictors of stock returns, given the persistence in valuation ratios. A steady-state approach suggests that the world geometric average equity premium fell considerably in the late twentieth century, rose modestly in the early years of the twenty-first century, and was almost 4% at the end of March 2007. JEL classification: G12

Evaluer la prime des actions par rapport aux obligations. La théorie financière contraint le comportement diachronique des ratios de valorisation et relie transversalement les prix des actions au niveau de prime des actions sur les obligations. Voilà qui peut être utilisé pour renforcer la prédictibilité des rendements sur les actions. Les modèles de valorisation en régime permanent sont des prédicteurs utiles des rendements sur les actions, compte tenu du caractère stable des ratios de valorisation. Une approche en termes de régime permanent suggère que la moyenne géométrique mondiale de la prime des actions sur les obligations a chuté considérablement à la fin du 20e siècle, qu'elle a été modestement en hausse dans les premières années du 21e siècle, et qu'elle était à presque 4% à la fin de mars 2007.

The author is also affiliated with Arrowstreet Capital, LP, and NBER. This paper was presented in June 2007 as a State of the Art lecture at the Canadian Economics Association annual meeting at Dalhousie University in Halifax, Nova Scotia. A precursor was presented in January 2007 to the D-CAF Conference on Return Predictability at Copenhagen Business School. I am grateful to participants at both conferences, to John Cochrane, Jon Lewellen, Lubos Pastor, Ivo Welch, and Jeff Wurgler, and particularly to Angelo Melino for their thoughtful comments; to Bob Shiller, Moto Yogo, and my colleagues at Arrowstreet Capital, Sam Thompson and Tuomo Vuolteenaho, for joint research and many conversations on this subject; and to Alex Ogan, also of Arrowstreet Capital, for his able assistance with the data illustrated in figures 1 through 5.
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1. Introduction

What return should investors expect the stock market to deliver, above the interest rate on a safe short-term investment? In other words, what is a reasonable estimate of the equity premium?

This question is a basic one for investors who must decide how to allocate their portfolios to safe and risky assets. In the academic world, it has for over three decades played a central role in the development of asset pricing theory and financial econometrics. In the 1960s and 1970s, the efficient market hypothesis was interpreted to mean that the true equity premium was a constant. Investors might update their estimates of the equity premium as more data became available, but eventually these estimates should converge to the truth. This viewpoint was associated with the use of historical average excess stock returns to forecast future returns.

In the early 1980s, a number of researchers reported evidence that excess stock returns could be predicted by regressing them on lagged financial variables. In particular, valuation ratios that divide accounting measures of cash flow by market valuations, such as the dividend-price ratio, earnings-price ratio, or smoothed earnings-price ratio, appeared to predict returns. Value-oriented investors in the tradition of Graham and Dodd (1934) had always asserted that high valuation ratios are an indication of an undervalued stock market and should predict high subsequent returns, but these ideas did not carry much weight in the academic literature until authors such as Rozeff (1984), Fama and French (1988), and Campbell and Shiller (1988a,b) found that valuation ratios are positively correlated with subsequent returns and that the implied predictability of returns is substantial at longer horizons. Around the same time, several papers pointed out that yields on short- and long-term Treasury and corporate bonds are correlated with subsequent stock returns (Fama and Schwert 1977; Keim and Stambaugh 1986; Campbell 1987; Fama and French 1989).

These results suggested that the equity premium is not a constant number that can be estimated ever more precisely, but an unknown state variable whose value must be inferred at each point in time on the basis of observable data. Meanwhile, research in asset pricing theory made financial economists more comfortable with the idea that the equity premium can change over time even in an efficient market with rational investors, so that a time-varying equity premium does not necessarily require abandonment of the traditional paradigm of financial economics for a behavioural or inefficient-markets alternative. Campbell and Cochrane (1999), for example, showed that rational investors with habit formation preferences might become more averse to volatility in consumption and wealth, driving up the equilibrium equity premium, when the economy is weak.

During the 1990s, research continued on regressions predicting stock returns from valuation ratios (Kothari and Shanken 1997; Lamont 1998; Pontiff and Schall 1998) and interest rates (Hodrick 1992). However the 1990s also saw challenges to the new view that valuation ratios predict stock returns.

A first challenge came from financial econometricians, who began to express concern that the apparent predictability of stock returns might be spurious. Many of the predictor variables in the literature are highly persistent: Nelson and Kim (1993) and Stambaugh (1999) pointed out that persistence leads to biased coefficients in predictive regressions if innovations in the predictor variable are correlated with returns (as is strongly the case for valuation ratios, although not for interest rates). Under the same conditions the standard t-test for predictability has incorrect size (Cavanagh, Elliott, and Stock 1995). These problems are exacerbated if researchers are data mining, considering large numbers of variables and reporting only those results that are apparently statistically significant (Foster, Smith, and Whaley 1997; Ferson, Sarkissian, and Simin 2003). An active recent literature discusses alternative econometric methods for correcting the bias and conducting valid inference (Cavanagh, Elliott, and Stock 1995; Lewellen 2004; Torous, Valkanov, and Yan 2004; Campbell and Yogo 2006; Jansson and Moreira 2006; Polk, Thompson, and Vuolteenaho 2006; Ang and Bekaert 2007; Cochrane 2007).

A second challenge was posed by financial history. In the late 1990s valuation ratios were extraordinarily low, so regression forecasts of the equity premium became negative (Campbell and Shiller 1998). Yet stock returns continued to be high until after the turn of the millennium. Data from these years were sufficiently informative to weaken the statistical evidence for stock return predictability. Although low returns in the early 2000s have partially restored this evidence, Goyal and Welch (2003, 2007) and Butler, Grullon, and Weston (2005) have argued that overall, the out-of-sample forecasting power of valuation ratios is often worse than that of a traditional model predicting the equity premium using only the historical average of past stock returns.

The ultimate test of any predictive model is its out-of-sample performance. My personal experience using regression models to forecast stock returns in the late 1990s was humbling, although these models were partially vindicated by the stock market decline of the early 2000s. The lesson I draw from this experience is that one is more likely to predict stock returns successfully if one uses finance theory to reduce the number of parameters that must be freely estimated from the data and to restrict estimates of the equity premium to a reasonable range.

In the next section of this paper I show how finance theory can be used if one believes that valuation ratios, in particular the dividend-price ratio, are stationary around a constant mean. Even under stationarity, the persistence of valuation ratios has led researchers to concentrate on situations where valuation ratios have a root that is close to unity. In section 3 I discuss the limiting case where one believes that the dividend-price ratio follows a geometric random walk. I show that this case allows an even larger role for theory: it implies that one should forecast returns by adding a growth estimate to the dividend-price ratio, in the manner of the classic Gordon growth model. I argue that this approach has historically generated successful out-of-sample forecasts and is likely to do so in the future as well. In section 4 I apply this methodology to estimate the current equity premium for Canada, for the U.S., and for the world stock market as a whole. In section 5 I briefly discuss how finance theory can be used to predict the equity premium from the cross-section of stock prices. Section 6 concludes.

2. Regression-based return prediction with a stationary dividend-price ratio

When the dividend-price ratio is stationary, a basic tool for analysing stock returns is the loglinear approximate relation derived by Campbell and Shiller (1988a). This relation says that the log stock return r_{t+1}, the log stock price p_t, and the log dividend d_t approximately satisfy

$$\begin{aligned} r_{t+1} &= k + \rho p_{t+1} + (1-\rho)d_{t+1} - p_t \\ &= k + (d_t - p_t) + \Delta d_{t+1} - \rho(d_{t+1} - p_{t+1}), \end{aligned} \tag{1}$$

where ρ is a coefficient of loglinearization equal to the reciprocal of one plus the steady-state level of the dividend-price ratio. Thus ρ is slightly smaller than one; for annual U.S. data, $\rho = 0.96$ is a reasonable value, given an average dividend-price ratio in the late twentieth century of about 4% or 0.04 in levels. This equation says that proportional changes in stock prices have a larger effect on returns than equal proportional changes in dividends, because the level of dividends is small relative to the level of prices.

Equation (1) is a difference equation for the log dividend-price ratio. Solving it forward, imposing a condition that there are no explosive bubbles in stock prices, and taking expectations at time t allows us to interpret the dividend-price ratio as

$$d_t - p_t = \frac{k}{1-\rho} + E_t \sum_{j=0}^{\infty} \rho^j [r_{t+1+j} - \Delta d_{t+1+j}]. \tag{2}$$

This formula delivers a number of insights. First, it helps to motivate regressions of stock returns on the log dividend-price ratio. The ratio is a linear combination of discounted expectations of future stock returns and dividend growth. If dividend growth is not too predictable (and there is little direct evidence for long-term dividend predictability in U.S. data), and if the dynamics of discount rates are such that short- and long-term expected stock returns are highly correlated, then the log dividend-price ratio should be a good proxy for the expected stock return over the next period.

Second, equation (2) shows that in the absence of price bubbles, the log dividend-price ratio will be stationary if stock returns and dividend growth are stationary, conditions that seem quite plausible. In particular, if returns and dividend growth rates do not have time trends, then the log dividend-price ratio will not have a time trend either. (This model cannot be used to say what would happen if there were time trends in returns or dividend growth rates, because such trends would invalidate the linear approximation (1).) Third, however, persistent variation in returns or dividend growth rates can lead to persistent variation in the log dividend-price ratio even if that ratio is stationary.

The effect of persistence on predictive regressions has been highlighted by Stambaugh (1999). Stambaugh discusses the two-equation system,

$$r_{t+1} = \alpha + \beta x_t + u_{t+1} \tag{3}$$

$$x_{t+1} = \mu + \phi x_t + \eta_{t+1}, \tag{4}$$

where x_t can be any persistent predictor variable but attention focuses on the level or log of the dividend-price ratio.

OLS estimates of equation (3) in twentieth-century U.S. data, with the log dividend-price ratio $x_t = d_t - p_t$ as the explanatory variable and the annualized stock return as the dependent variable, tend to deliver estimates in the range 0.1 to 0.2. An estimate of 0.04, the historical average level of the dividend-price ratio, would imply that around the average, a percentage point increase in the level of the dividend-price ratio increases the expected stock return by one percentage point. The OLS estimates imply a sensitivity of the return to the dividend-price ratio that is several times greater than this. They imply that when the dividend-price ratio is unusually high, it tends to return to normal through increases in prices that magnify the effect on stock returns. Campbell and Shiller (1998) emphasize this pattern in the historical data.

To understand Stambaugh's concern about persistence, define

$$\gamma = \frac{\sigma_{u\eta}}{\sigma_\eta^2}. \tag{5}$$

The coefficient γ is the regression coefficient of return innovations on innovations to the predictor variable. In the case where the explanatory variable is the log dividend-price ratio, γ is negative because rising stock prices tend to be associated with a falling dividend-price ratio. More precisely, dividend growth is only weakly correlated with and much less volatile than stock returns, so from equation (1) γ is about $-\rho$, that is, slightly greater than -1.

Stambaugh points out that the bias in estimating the coefficient β is γ times the bias in estimating the persistence of the predictor variable, ϕ:

$$\mathrm{E}[\hat{\beta} - \beta] = \gamma \mathrm{E}[\hat{\phi} - \phi]. \tag{6}$$

This is significant because it has been understood since the work of Kendall (1954) that there is downward bias in estimates of ϕ of about $-(1 + 3\phi)/T$, where T is the sample size, primarily resulting from the fact that x_t has an unknown mean that must be estimated. With a highly persistent predictor variable and γ slightly greater than -1, the Stambaugh bias in $\hat{\beta}$ is almost $4/T$. With 50 years of data the bias is almost 0.08, substantial relative to the OLS estimates discussed above.

Recent responses to Stambaugh's critique have all used theory in one way or another. Lewellen (2004) first writes an expression for the bias conditional on the estimated persistence $\hat{\phi}$ and the true persistence ϕ:

$$E[\hat{\beta} - \beta \mid \hat{\phi}, \phi] = \gamma[\hat{\phi} - \phi]. \tag{7}$$

At first sight this expression does not seem particularly useful because we do not know the true persistence coefficient. However, Lewellen argues on the basis of theory that ϕ cannot be larger than one – the dividend-price ratio is not explosive – so the largest bias occurs when $\phi = 1$. He proposes the conservative approach of adjusting the estimated coefficient using this worst-case bias:

$$\hat{\beta}_{adj} = \hat{\beta} - \gamma(\hat{\phi} - 1). \tag{8}$$

In the data, the log dividend-price ratio appears highly persistent. That is, $\hat{\phi}$ is close to one; Lewellen reports a monthly estimate of 0.997 for the period 1946–2000, or about 0.965 on an annual basis. Lewellen's bias adjustment is therefore about 0.035, much smaller than Stambaugh's bias adjustment for a 50-year sample and somewhat smaller whenever the sample size is less than 114 years. Lewellen argues that stock returns are indeed predictable from the log dividend-price ratio, almost as much so as a naive researcher, unaware of Stambaugh's critique, might believe. Another way to express Lewellen's point is that data samples with spurious return predictability are typically samples in which the log dividend-price ratio appears to mean-revert more strongly than it truly does. In the historical data, the log dividend-price ratio has a root very close to unity – it barely seems to mean-revert at all – and thus we should not expect important spurious predictability in the historical data.

Cochrane (2007) responds to Stambaugh by directing attention to the inability of the log-dividend price ratio to forecast dividend growth. At first sight this response does not seem connected to Lewellen's, but in fact it is closely related. The Campbell-Shiller loglinearization (1) implies that r_{t+1}, Δd_{t+1}, $d_{t+1} - p_{t+1}$, and $d_t - p_t$ are deterministically linked. It follows that if we regress r_{t+1}, Δd_{t+1}, and $d_{t+1} - p_{t+1}$ onto $d_t - p_t$, the coefficients β, β_d, and ϕ are related by

$$\beta = 1 - \rho\phi + \beta_d, \tag{9}$$

where ρ is the coefficient of loglinearization from equation (1).

If we have prior knowledge about ϕ, then β and β_d are linked. For example, if $\rho = 0.96$ and we know that $\phi \leq 1$, then $\beta_d \leq \beta - 0.04$. If $\beta = 0$, then β_d must be negative and less than -0.04. The fact that regression estimates of β_d are close to zero is therefore indirect evidence that $\beta > 0$, in other words that stock returns are predictable – given our prior knowledge, based on theory, that the log dividend-price ratio is not explosive.

Another way to express Cochrane's point is that if the dividend-price ratio fails to predict stock returns, it will be explosive unless it predicts dividend growth. Since the dividend-price ratio cannot be explosive, the absence of predictable dividend growth strengthens the evidence for predictable returns.

Campbell and Yogo (2006) offer a third response to Stambaugh. They point out that if we knew persistence, we could reduce noise by adding the innovation to the predictor variable to the predictive regression, estimating

$$r_{t+1} = \alpha' + \beta x_t + \gamma(x_{t+1} - \phi x_t) + v_{t+1}. \tag{10}$$

The additional regressor, $(x_{t+1} - \phi x_t) = \eta_{t+1}$, is uncorrelated with the original regressor x_t but correlated with the dependent variable r_{t+1}. Thus, the regression (10) still delivers a consistent estimate of the original predictive coefficient β, but it does so with increased precision because it controls for some of the noise in unexpected stock returns.

Of course, in practice we do not know the persistence coefficient ϕ, but Campbell and Yogo argue that we can construct a confidence interval for it by inverting a unit root test. By doing this we 'de-noise' the return and get a more powerful test. The test delivers particularly strong evidence for predictability if we rule out a persistence coefficient $\phi > 1$ on prior grounds.

A way to understand Campbell and Yogo's results is to recall the challenge posed by the late 1990s. In that period, the dividend-price ratio was low, which led Campbell and Shiller (1998) to predict low stock returns based on a regression like (3). In fact, stock returns remained high until the early 2000s. These high returns were accompanied by falling dividend yields, despite the fact that the dividend yield was already below its historical mean. If we believe that the dividend yield was below its true mean and that it should be forecast to return to that mean rather than exploding away from it, then the late 1990s declines in the dividend-price ratio must have been unexpected. Unexpected declines in the dividend-price ratio are associated with unexpected high stock returns, accounting for the poor performance of the basic predictability regression in the late 1990s. The regression (10) corrects for this effect, limiting the negative influence of the late 1990s on the estimated predictive coefficient β.

The econometric issues discussed in this section have little effect on regressions that use nominal interest rates or yield spreads to predict excess stock returns. Although nominal interest rates are highly persistent, their innovations are not strongly correlated with innovations in stock returns, and thus the coefficient γ is close to zero for these variables, implying only a trivial bias in OLS regression estimates. Even papers that are sceptical of stock return predictability from the dividend-price ratio, such as Ang and Bekaert (2007), emphasize the strength of the statistical evidence that interest rates predict stock returns. The challenge in this case is primarily a theoretical one: to understand the economic forces that cause common variation in nominal interest rates and the equity premium.

All the papers discussed above combine prior knowledge with classical statistical methods. It is possible, of course, to use finance theory in an explicit Bayesian manner. Several recent papers have done this, notably Pastor and Stambaugh (2007) and Wachter and Warusawitharana (2007). Consistent with the results reported here, these papers find that tight priors on the persistence of the predictor variable tend to deliver stronger evidence for predictability of stock returns.

3. Steady-state return prediction

The papers discussed in the previous section address the question of whether the equity premium varies with market valuations, or whether it is constant. Even if one believes that the equity premium is time varying, however, there remains the important question of how best to estimate it at each point in time. Given the noise in stock returns, equity premium models with multiple free coefficients are hard to estimate and may fail out of sample because of errors in estimating the coefficients. Indeed, Goyal and Welch (2007) argue that almost all the regression models proposed in the recent literature fail to beat the historical sample mean when predicting excess stock returns out of sample.

In response to Goyal and Welch, Campbell and Thompson (2007) propose to use steady-state valuation models to estimate the equity premium. Such models tightly restrict the way in which historical data are used to predict future returns, and Campbell and Thompson find that they work well out of sample. Fama and French (2002) and Pastor, Sinha, and Swaminathan (2007) also use this approach to analyse the equity premium. The approach is analogous to the familiar procedure of forecasting the return on a bond, using its yield rather than its historical average return.

The classic steady-state model is the Gordon growth model, named after Canadian economist Myron Gordon. The model describes the level of the dividend-price ratio in a steady state with a constant discount rate and growth rate. Using upper-case letters to denote levels of variables, the Gordon growth model can be written as

$$\frac{D}{P} = R - G. \tag{11}$$

This formula can be used directly with historical dividend growth rates, but it can also be rewritten in several ways that suggest alternative empirical strategies for forecasting stock returns. First, one can substitute out growth by using the steady-state relation between growth and accounting return on equity,

$$G = \left(1 - \frac{D}{E}\right) ROE, \tag{12}$$

where D/E is the payout ratio, to obtain a growth-adjusted return forecast

$$\hat{R}_{DP} = \frac{D}{P} + \left(1 - \frac{D}{E}\right) ROE. \tag{13}$$

This return forecast is linear in D/P, with a slope coefficient of one and an intercept that is determined by the reinvestment rate and profitability. Importantly, neither the slope coefficient nor the intercept need to be estimated from noisy historical stock returns.

Second, one can restate the model in terms of the earnings-price ratio by using $D/P = (D/E)(E/P)$ to obtain

$$\hat{R}_{EP} = \left(\frac{D}{E}\right)\frac{E}{P} + \left(1 - \frac{D}{E}\right) ROE, \tag{14}$$

a payout-ratio-weighted average of the earnings-price ratio and the accounting return on equity. When return on equity equals the expected return, as might be the case in long-run equilibrium, then this implies that $\hat{R}_{EP} = E/P$.

Finally, one can rewrite the model in terms of the book-market ratio. Since $E/P = (B/M)ROE$,

$$\hat{R}_{BM} = ROE\left[1 + \frac{D}{E}\left(\frac{B}{M} - 1\right)\right]. \tag{15}$$

To use these formulas in practice, one must decide how to combine historical and contemporaneous data on the right-hand-side variables. Campbell and Thompson (2007) follow Fama and French (2002) by using historical average data on payouts and profitability, but differ from them by using current rather than historical average data on valuation ratios to obtain a return forecast conditional on the market's current valuation level. This procedure assumes that movements in valuation ratios, relative to historical cash flows, are explained by permanent changes in expected returns, so that each percentage point increase in the level of the dividend-price ratio generates a percentage point increase in the return forecast. It is a compromise between the view that valuation ratios are driven by changing forecasts of profitability, in which case the implied movements in returns would be smaller, and the view that valuation ratios are driven by *temporary* changes in discount rates, in which case the implied return movements would be larger, as discussed in the previous section.

Campbell and Thompson evaluate the out-of-sample performance of these models and several other variants over the period 1927–2005 and subsamples with breakpoints at 1956 and 1980. They find that steady-state valuation models typically perform better when more theoretical restrictions are imposed, and that they almost always outperform the historical mean return as a predictor of future returns. Dividend-based and earnings-based models, equations (13) and (14), generally appear to be more successful than the book-market model (15). In the next section I illustrate this approach using a model that averages both the dividend-price ratio and the recent history of earnings to generate a return forecast that is a blend of those from (13) and (14).

3.1. The Gordon model with a random walk dividend-price ratio

It may at first sight appear strange that steady-state valuation models based on the Gordon growth model perform well, given that they assume constant valuation ratios, while in the data valuation ratios vary in a highly persistent manner. It turns out, however, that a variant of the Gordon growth model can be derived using the assumption that the log dividend-price ratio follows a random walk. Under this assumption the Campbell-Shiller loglinear model, used in the previous section, breaks down because the dividend-price ratio has no fixed mean around which to take a loglinear approximation. However, in this case a suitable version of the original Gordon growth model is available to take the place of the Campbell-Shiller model.

To show this I assume, as in the Gordon growth model, that the dividend is known one period in advance. Then we can write

$$\frac{D_{t+1}}{P_t} = \exp(x_t), \tag{16}$$

where x_t now denotes the log dividend-price ratio using a forward or indicated dividend rather than a historical dividend. I assume that x_t follows a random walk:

$$x_t = x_{t-1} + \varepsilon_t. \tag{17}$$

Since the dividend growth rate is known one period in advance, I can write

$$\frac{D_{t+1}}{D_t} = 1 + G_t = \exp(g_t). \tag{18}$$

Finally, I assume that x_{t+1} and g_{t+1} are conditionally normal given time t information.

The definition of the stock return implies that

$$\begin{aligned} 1 + R_{t+1} &= \frac{P_{t+1} + D_{t+1}}{P_t} = \frac{D_{t+1}}{P_t} + \frac{D_{t+2}}{D_{t+1}}\frac{D_{t+1}}{P_t}\left(\frac{D_{t+2}}{P_{t+1}}\right)^{-1} \\ &= \exp(x_t)[1 + \exp(g_{t+1} - x_{t+1})]. \end{aligned} \tag{19}$$

The conditionally expected stock return can be calculated using the formula for the conditional expectation of lognormally distributed random variables and the martingale property that $\mathrm{E}_t\, x_{t+1} = x_t$:

$$\begin{aligned} E_t(1+R_{t+1}) &= \exp(x_t)[1+\mathrm{E}_t\exp(g_{t+1}-x_{t+1})] \\ &= \exp(x_t)\left[1+\exp\left(\mathrm{E}_t g_{t+1}-x_t+\sigma_g^2/2+\sigma_x^2/2-\sigma_{gx}\right)\right] \\ &= \frac{D_{t+1}}{P_t}+\exp(\mathrm{E}_t g_{t+1})\exp(\mathrm{Var}_t(p_{t+1}-p_t)/2). \end{aligned} \tag{20}$$

Finally, the right-hand side of (20) can be approximated using the facts that for small y, $\exp(y)\approx 1+y$, and that unexpected log stock returns are approximately equal to unexpected changes in log stock prices:

$$E_t(1+R_{t+1})\approx\frac{D_{t+1}}{P_t}+\exp(\mathrm{E}_t g_{t+1})+\frac{1}{2}\mathrm{Var}_t(r_{t+1}). \tag{21}$$

This equation expresses the expected stock return as the level of the dividend yield, plus geometric average dividend growth, plus one-half the variance of stock returns. In the original Gordon model, $\sigma_x^2=0$, so the variance of stock returns equals the variance of dividend growth. Since arithmetic average dividend growth equals geometric average dividend growth plus one-half the variance of dividend growth, in this case we get the original Gordon formula that the arithmetic average stock return equals dividend yield plus arithmetic average dividend growth.

If one subtracts half the variance of stock returns from each side of (20), one finds that the geometric average stock return equals the level of the dividend-price ratio plus the geometric average of dividend growth. Under the assumptions of the original Gordon model, the geometric implementation of the model is equivalent to an arithmetic implementation because stock returns and dividend growth have the same variance, so their geometric and arithmetic averages differ by the same amount. In the data, however, returns are much more volatile, so the geometric implementation and the arithmetic implementation are different. The analysis here shows that the geometric implementation is correct. Interestingly, this is exactly the way in which the model is used by Siegel (1994).

4. What is the equity premium today?

I now use a version of the above methodology, starting from equation (14), to estimate the equity premium. Following the previous discussion, I first estimate the conditional geometric average stock return, then subtract the real interest rate to get an equity premium number, and finally discuss the adjustment that is needed to convert from a geometric average to an arithmetic average equity premium. I look at data for the world as a whole (measured using the Morgan Stanley Capital International all-world index), and also for the U.S. and Canada, over the period from 1982 through the end of March 2007.

Figure 1 shows that for all three indices smoothed earnings-price ratios, with earnings smoothed over three years to eliminate cyclical noise, have fallen

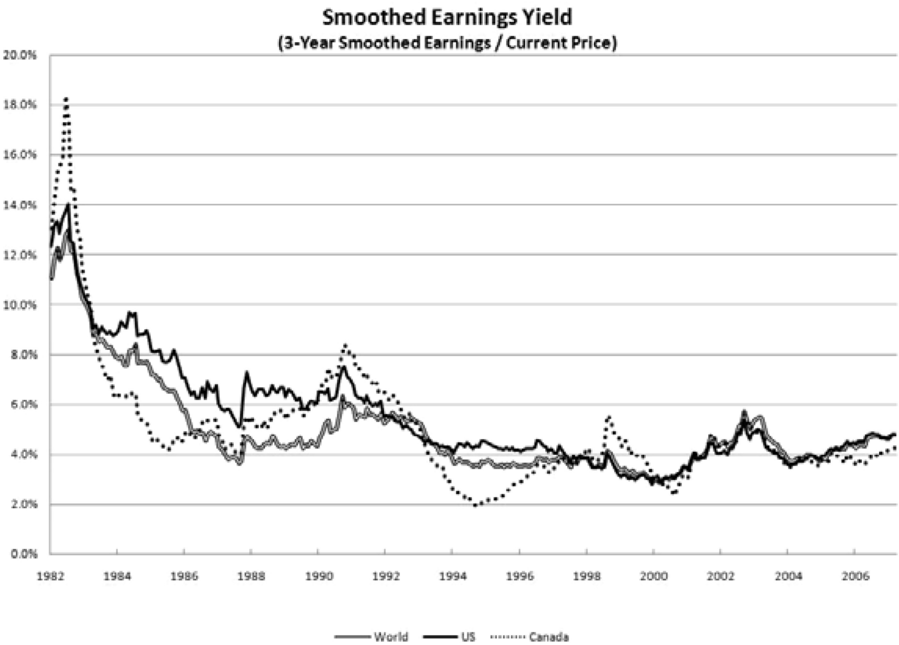

FIGURE 1 Three-year smoothed earnings-price ratios in the world, the U.S., and Canada

dramatically since the early 1980s and have been in the 3% to 5% range for the last ten years. During the same period, however, figure 2 shows that profitability has increased from a long-run historical average of around 6% to much higher values around 10%. Meanwhile, payout ratios have fluctuated widely around an average of about 50%.

In constructing a return forecast, it is desirable to combine historical earnings with some forward-looking measure of earnings. One possibility is to use analysts' earnings forecasts (Pastor, Sinha, and Swaminathan 2007); another is to use dividends. I average historical earnings, smoothed over three years, and the current dividend, divided by the payout rate, to construct a forward-looking measure of permanent earnings that can be used in equation (14).

When I put these numbers together, an earnings-based estimate of the real return on U.S. equities, assuming constant 6% real profitability and a 50% payout rate, was about 9% in the early 1980s and fell to just above 4% in the year 2000. Since then it has increased to slightly over 5%. This estimate assumes that profitability and payouts are best forecast to be constant; alternatively, if one uses the three-year moving average of profitability illustrated in figure 2, and a similar three-year moving average of the payout ratio, the current real return estimate increases by almost 4% to 9%, reflecting the high recent profitability and low payout ratios of U.S. corporations. At the world level, the current real return number is comparable to the U.S. number if a fixed profitability estimate

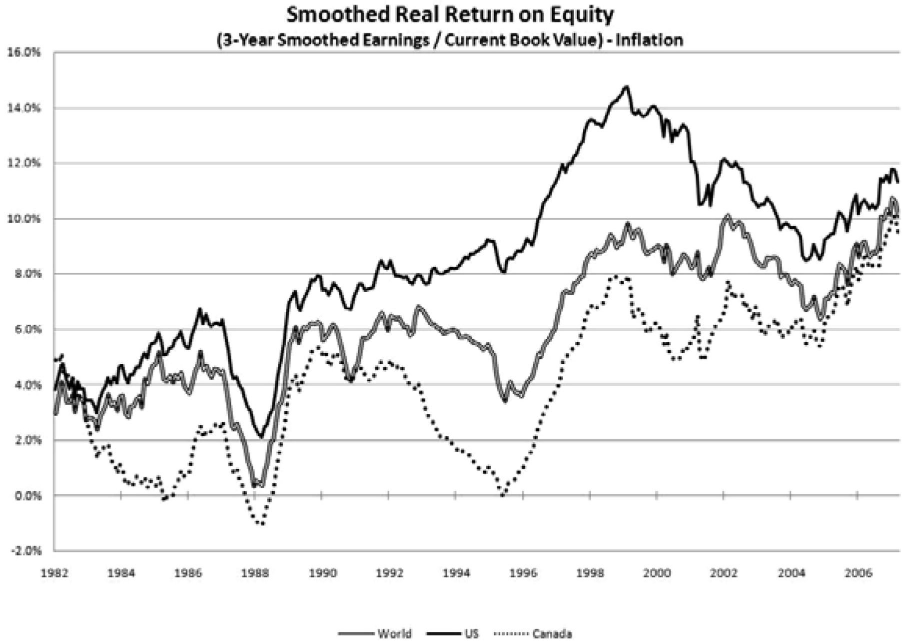

FIGURE 2 Three-year smoothed profitability in the world, the U.S., and Canada

is used, but the adjustment for recent profitability and payouts is much smaller, only slightly above 2%. The Canadian real return number is also very similar to that in the U.S. on the basis of fixed profitability, but lower Canadian profitability and higher payouts in the last few years imply that the use of recent data increases the estimated real return by less than 2%.

To convert these numbers into estimates of the equity premium, one needs to subtract a safe real interest rate. Figure 3 plots real yields on inflation-indexed bonds in three large markets, the U.K., the U.S., and Canada. The figure shows that the average real yield on inflation-indexed bonds across the three countries was about 3.5% in the 1990s but fell below 2% in the early 2000s. By the end of March 2007, it had recovered to just over 2%.

The implied current equity premium, assuming constant profitability and payouts, is just over 3%: 3.3% for the world as a whole, 3.2% for the U.S., and 3.1% for Canada. If instead one uses recent profitability and payouts, the current equity premium is 5.7% for the world as a whole, a startling 6.9% for the U.S., and 5.0% for Canada. Figures 4, 5, and 6 illustrate the history of the equity premium in the world, the U.S., and Canada under these two alternative assumptions.

Obviously a key question is whether the high profitability of global, and particularly U.S., corporations can be expected to continue. On the one hand, globalization has increased the supply of labour relative to capital, reducing wage pressure and increasing profitability; on the other hand, profitability has been increased

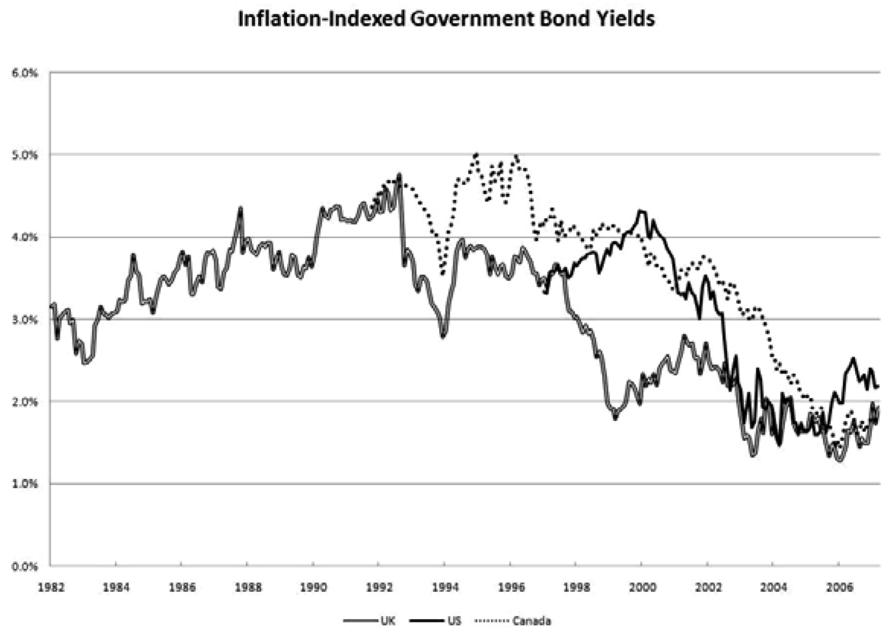

FIGURE 3 Long-term real interest rates in the U.K., the U.S., and Canada

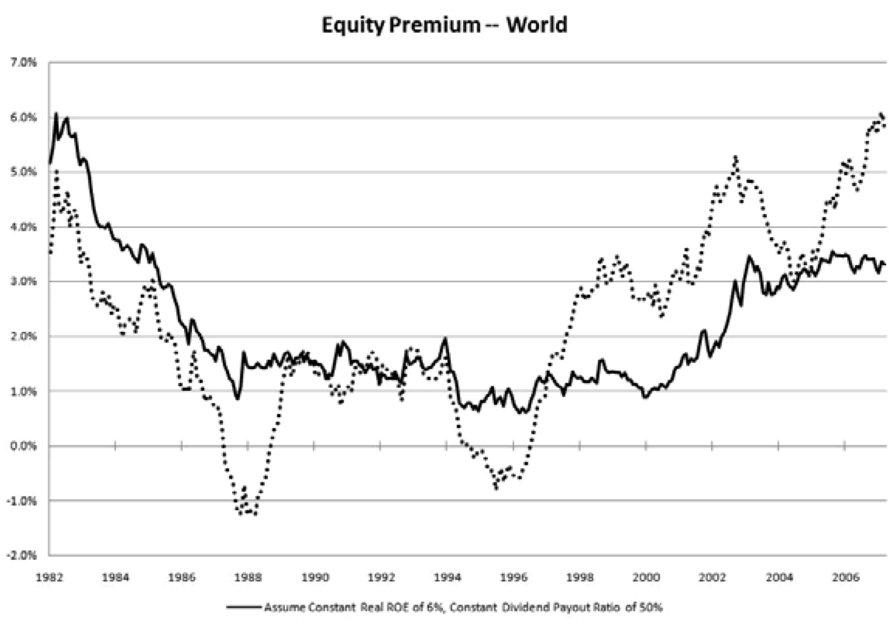

FIGURE 4 The world equity premium since 1982

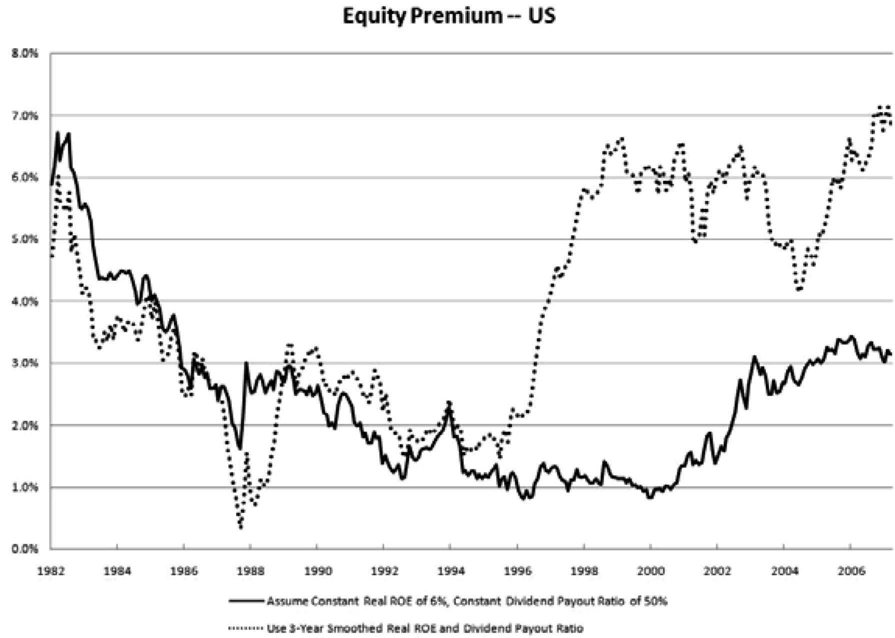

FIGURE 5 The U.S. equity premium since 1982

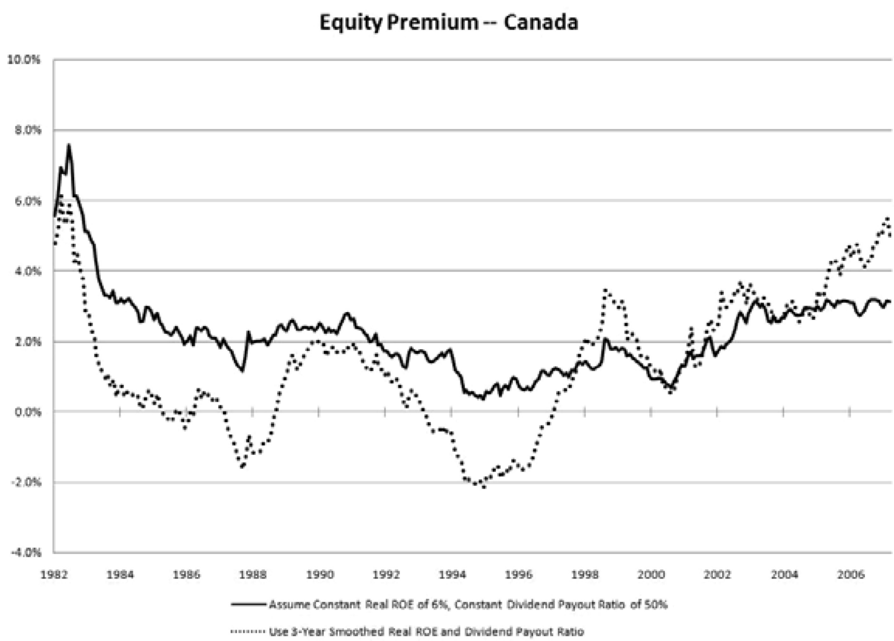

FIGURE 6 The Canadian equity premium since 1982

by favourable business cycle and political conditions that may not persist. Historically, profitability has shown temporary fluctuations and low payout rates (high reinvestment rates) have predicted declining profitability. Also, equity premium estimates based on current profitability and payout rates have been highly volatile, even turning negative on occasion. For both these reasons it seems wise to place considerably more weight on long-term averages than on recent data. If one puts a weight of 0.75 on the long-term average, with 0.25 on the recent data, the implied equity premium at the end of March 2007 is in the range 3.6% to 4.1%: 3.9% in the world as a whole, 4.1% in the U.S., and 3.6% in Canada. This number is a geometric average equity premium; for an arithmetic average, one should add one-half the variance of stock returns, or almost 1.3% if stock returns have a conditional standard deviation of 16%. The resulting arithmetic equity premium numbers are in the range 4.9% to 5.4%. Note that the equity premium is this high in large part because the safe real interest rate has declined over the past decade, as illustrated in figure 3.

These numbers are lower than historical average excess stock returns reported by Dimson, Marsh, and Staunton (2006). Using data for the period 1900–2005, Dimson, Marsh, and Staunton report geometric average equity premia of 4.7% for the world as a whole, 5.5% for the U.S., and 4.5% for Canada. The difference reflects two facts. First, historical average returns have been driven up by declining valuation ratios; this effect cannot be expected to continue in the future because valuation ratios should not have trends, a point emphasized by Fama and French (2002). Second, historical average returns were obtained by investors who paid lower stock prices and thus benefited from higher dividend-price ratios.

It is interesting to note that chief financial officers of major corporations, surveyed by Graham and Harvey (2007), have modest expectations of the equity premium, which implies that they do not expect recent profitability to continue. Their median estimate of the geometric average U.S. equity premium at the end of November 2006 was 3.4%, much closer to the constant-profitability number reported here than to the recent-profitability number and far below the historical average equity premium.

5. Return prediction with cross-sectional variables

Finance theory can also be used to predict excess stock returns using information in the cross-section of stock prices. This is valuable both to corroborate the predictions from aggregate valuation ratios and possibly as a way to pick up higher-frequency components of the equity premium that may be missed by a steady-state approach.

Polk, Thompson, and Vuolteenaho (2006) argue that if the Capital Asset Pricing Model (CAPM) is true, then a high equity premium implies low prices for stocks that have high betas with the aggregate market index. That is, high-beta stocks should be value stocks with low ratios of market prices to accounting measures of fundamental value. Reversing the argument, value stocks should tend to have high betas. This was true in the mid-twentieth-century, roughly from the 1930s through the 1950s, but in recent decades growth stocks have had higher betas than value stocks (Franzoni 2006). Polk, Thompson, and Vuolteenaho argue that this change in cross-sectional stock pricing reflects a decline in the equity premium. They construct a predictor of the aggregate market return, based on the relative pricing of high- and low-beta stocks, and show that it correlates well with the smoothed earnings-price ratio except in the early 1980s when inflation may have distorted the relationship.

It is possible to push this idea even further, exploiting the fact that the CAPM may not fully describe the cross-section of stock returns when returns are predictable in the time series. Merton (1973) developed an intertemporal CAPM (ICAPM) that showed that in the presence of time-varying expected returns, long-lived investors care not only about shocks to their wealth but also about shocks to the expected return on wealth. Intuitively, they value wealth not for its own sake but for the consumption stream it can provide; thus, they want to hedge against declines in the rate of return just as much as against declines in market value. Campbell (1993) implemented this idea using a vector autoregression (VAR) to break market movements into permanent movements driven by news about cash flows and temporary movements driven by news about discount rates. Long-lived investors are more concerned about the former than about the latter. Thus, stocks that covary with cash-flow news should have higher average returns than stocks that covary with discount-rate news, when betas with the overall market return are controlled for.

One of the main deviations from the CAPM in recent decades has been the value effect, the high average returns that value stocks have delivered despite their low market betas. If the ICAPM is to explain the value effect, it must be that value stocks covary with cash-flow news while growth stocks covary with discount-rate news. This implies that a moving average of past excess returns on growth stocks should be a good predictor of aggregate stock returns.

The value spread, the relative valuation of value and growth stocks (normally measured as the difference between the log book-market ratios of these two types of stocks) is one possible summary of past excess returns on growth stocks. Eleswarapu and Reinganum (2004) find that the value spread for small stocks predicts the aggregate market return, and Campbell and Vuolteenaho (2004) use the same variable in a VAR model to estimate and test the ICAPM. They find that the ICAPM explains the average returns of value and growth stocks much better than does the standard CAPM. Cohen, Polk, and Vuolteenaho (2006) and Campbell, Polk, and Vuolteenaho (2007) explore the robustness of these results, using both VAR-based and direct measures of cash-flow and discount-rate news. Empirically, the effect of including the small-stock value spread in a model of the equity premium is to lower the estimated equity premium at the turn of the millennium, when growth stocks were abnormally expensive relative to value stocks, and to increase it in 2006 and early 2007, when growth stocks were abnormally cheap.

All this work relies on theoretically motivated, but not fully restricted, time-series models of the aggregate market return. A natural next step is to use the theoretical restrictions of the ICAPM to jointly estimate a time-series model of the aggregate market return and a cross-sectional model of average stock returns. Campbell (1996) was an early implementation of this approach, but that paper did not find systematic deviations from the CAPM because it did not use the information in the relative prices of growth and value stocks. Recent research suggests that with the proper information variables and test assets, cross-sectional information can play an important role in a jointly estimated model of the equity premium.

6. Conclusion

In this paper I have tried to illustrate the usefulness of finance theory for statistical analysis of stock returns, in particular for estimation of the equity premium. The literature on this topic is vast, and inevitably I have neglected some important aspects. Five omissions deserve special mention.

First, I have not reviewed the simple but important point that excess stock returns should be difficult to predict, because highly predictable excess returns would imply extremely large profits for market-timing investors. Campbell and Thompson (2007) explore the mapping from R^2 statistics in predictive regressions to profits and welfare gains for market timers. The basic lesson is that investors should be suspicious of predictive regressions with high R^2 statistics, asking the old question, 'If you're so smart, why aren't you rich?'

Second, I have confined attention to short-term predictive regressions and have not considered direct forecasts of long-horizon returns. It has been known since Fama and French (1988) that long-horizon regressions often have higher R^2 statistics than short-horizon regressions, but their statistical properties are controversial. Campbell (2001) and Cochrane (2007) argue that in certain circumstances, long-horizon regressions can have superior power to detect predictability when in fact it exists.

Third, I have not discussed recent work that uses finance theory to infer the equity premium from the actions of market participants. Lettau and Ludvigson (2001), for example, argue that the level of consumption in relation to aggregate financial wealth and labour income reveals consumers' expectations of future stock returns. In a similar spirit Baker and Wurgler (2000) use the financing decisions of corporations to infer corporate managers' beliefs about expected stock returns.

Fourth, I have presented estimates of the equity premium without discussing the uncertainty of these estimates. I have suggested that finance theory can reduce our uncertainty about the equity premium, but a more formal Bayesian analysis would be needed to quantify this effect.

Finally, I have not attempted to review the important body of empirical work on the estimation of stock market risk. Mechanically, the volatility of stock returns determines the wedge between geometric and arithmetic average stock returns. Economically, both risk and return matter to investors, and it is plausible that changing risk is one factor that drives the changing equity premium. Merton (1980), Campbell (1987), French, Schwert, and Stambaugh (1987), Harvey (1989), and Glosten, Jagannathan, and Runkle (1993) are a few of the earlier papers that explore this relation. Recent contributions by Ghysels, Santa-Clara, and Valkanov (2005) and Pastor, Sinha, and Swaminathan (2007) find that the equity premium does covary positively with estimated risk, but that this effect does not explain the predictability of stock returns from valuation ratios or interest rates.

Despite the size and complexity of the literature on the equity premium, it has a simple unifying theme. Campbell, Lo, and MacKinlay (1997) argue that 'what distinguishes financial economics is the central role that uncertainty plays in both financial theory and its empirical implementation.' Theory tells us why stock returns are so hard to predict. But it also holds out the promise of better prediction than we can hope to achieve by purely statistical forecasting methods.

References

Ang, Andrew, and Geert Bekaert (2007) 'Stock return predictability: is it there?' *Review of Financial Studies* 20, 651–707

Baker, Malcolm, and Jeffrey Wurgler (2000) 'The equity share in new issues and aggregate stock returns,' *Journal of Finance* 55, 2219–57

Boudoukh, Jacob, Roni Michaely, Matthew Richardson, and Michael Roberts (2007) 'On the importance of measuring payout yield: Implications for empirical asset pricing,' *Journal of Finance* 62, 877–916

Butler, Alexander W., Gustavo Grullon, and James P. Weston (2005) 'Can managers forecast aggregate market returns?' *Journal of Finance* 60, 963–86

Campbell, John Y. (1987) 'Stock returns and the term structure,' *Journal of Financial Economics* 18, 373–99

— (1993) 'Intertemporal asset pricing without consumption data,' *American Economic Review* 83, 487–512

— (1996) 'Understanding risk and return,' *Journal of Political Economy* 104, 298–345

— (2001) 'Why long horizons? A study of power against persistent alternatives,' *Journal of Empirical Finance* 8, 459–91

Campbell, John Y., and John H. Cochrane (1999) 'By force of habit: A consumption-based explanation of aggregate stock market behavior,' *Journal of Political Economy* 107, 205–51

Campbell, John Y., and Robert J. Shiller (1988a) 'The dividend-price ratio and expectations of future dividends and discount factors,' *Review of Financial Studies* 1, 195–228

— (1988b), 'Stock prices, earnings, and expected dividends,' *Journal of Finance* 43, 661–76

— (1998), 'Valuation ratios and the long-run stock market outlook,' *Journal of Portfolio Management* 24(2), 11–26

Campbell, John Y., and Samuel B. Thompson (2007) 'Predicting excess stock returns out of sample: Can anything beat the historical average?' *Review of Financial Studies*, forthcoming

Campbell, John Y., and Tuomo O. Vuolteenaho (2004) 'Bad beta, good beta,' *American Economic Review* 94, 1249–75
Campbell, John Y., and Motohiro Yogo (2006) 'Efficient tests of stock return predictability,' *Journal of Financial Economics* 81, 27–60
Campbell, John Y., Andrew W. Lo, and A. Craig MacKinlay (1997) *The Econometrics of Financial Markets* (Princeton, NJ: Princeton University Press)
Campbell, John Y., Christopher Polk, and Tuomo O. Vuolteenaho (2007) 'Growth or glamour? Fundamentals and systematic risk in stock returns,' working paper, Harvard University and London School of Economics
Cavanagh, Christopher L., Graham Elliott, and James H. Stock (1995) 'Inference in models with nearly integrated regressors,' *Econometric Theory* 11, 1131–47
Cochrane, John H. (2007) 'The dog that did not bark: a defense of return predictability,' *Review of Financial Studies*, forthcoming
Cohen, Randolph B., Christopher Polk, and Tuomo O. Vuolteenaho (2006) 'The price is (almost) right,' working paper, Harvard University and Northwestern University
Dimson, Elroy, Paul Marsh, and Michael Staunton (2006) 'The worldwide equity premium: a smaller puzzle,' working paper, London Business School
Eleswarapu, Venkat R. and Marc R. Reinganum (2004) 'The predictability of aggregate stock market returns: evidence based on glamour stocks,' *Journal of Business* 77, 275–94
Fama, Eugene F., and Kenneth R. French (1988) 'Dividend yields and expected stock returns,' *Journal of Financial Economics* 22, 3–25
— (1989) 'Business conditions and expected returns on stocks and bonds,' *Journal of Financial Economics* 25, 23–49
— (2002) 'The equity premium,' *Journal of Finance* 57, 637–59
Fama, Eugene F., and G. William Schwert (1977) 'Asset returns and inflation,' *Journal of Financial Economics* 5, 115–46
Ferson, Wayne E., Sergei Sarkissian, and Timothy T. Simin (2003) 'Spurious regressions in financial economics?' *Journal of Finance* 58, 1393–413
Foster, F. Douglas, Tom Smith, and Robert E. Whaley (1997) 'Assessing goodness-of-fit of asset pricing models: the distribution of the maximal R^2,' *Journal of Finance* 52, 591–607
Franzoni, Francesco (2006) 'Where is beta going? The riskiness of value and small stocks,' working paper, HEC School of Management
French, Kenneth R., G. William Schwert, and Robert F. Stambaugh (1987) 'Expected stock returns and volatility,' *Journal of Financial Economics* 19, 3–29
Ghysels, Eric, Pedro Santa-Clara, and Rossen Valkanov (2005) 'There is a risk-return tradeoff after all,' *Journal of Financial Economics* 76, 509–48
Glosten, Lawrence R., Ravi Jagannathan, and David E. Runkle (1993) 'On the relation between the expected value and the volatility of the nominal excess return on stocks,' *Journal of Finance* 48, 1779–801
Goyal, Amit, and Ivo Welch (2003) 'Predicting the equity premium with dividend ratios,' *Management Science* 49, 639–54
— (2007) 'A comprehensive look at the empirical performance of equity premium prediction,' *Review of Financial Studies*, forthcoming
Graham, Benjamin, and David L. Dodd (1934) *Security Analysis*, 1st ed. (New York: McGraw-Hill)
Graham, John, and Campbell Harvey (2007) 'The equity risk premium in January 2007: evidence from the global CFO outlook survey,' working paper, Duke University
Harvey, Campbell (1989) 'Time-varying conditional covariances in tests of asset pricing models,' *Journal of Financial Economics* 24, 289–317
Hodrick, Robert J. (1992) 'Dividend yields and expected stock returns: alternative procedures for inference and measurement,' *Review of Financial Studies* 5, 257–86

Jansson, Michael, and Marcelo J. Moreira (2006) 'Optimal inference in regression models with nearly integrated regressors,' *Econometrica* 74, 681–715
Keim, Donald B., and Robert F. Stambaugh (1986) 'Predicting returns in the stock and bond markets,' *Journal of Financial Economics* 17, 357–90
Kendall, Maurice G. (1954) 'Note on bias in the estimation of autocorrelation,' *Biometrika* 41, 403–4
Kothari, S.P., and Jay Shanken (1997) 'Book-to-market, dividend yield, and expected market returns: a time-series analysis,' *Journal of Financial Economics* 44, 169–203
Lamont, Owen (1998) 'Earnings and expected returns,' *Journal of Finance* 53, 1563–87
Lettau, Martin, and Sydney Ludvigson (2001) 'Consumption, aggregate wealth, and expected stock returns,' *Journal of Finance* 56, 815–49
Lewellen, Jonathan (2004) 'Predicting returns with financial ratios,' *Journal of Financial Economics* 74, 209–35
Merton, Robert C. (1973) 'An intertemporal capital asset pricing model,' *Econometrica* 41, 867–87
— (1980) 'On estimating the expected return on the market: an exploratory investigation,' *Journal of Financial Economics* 8, 323–61
Nelson, Charles, and M. Kim (1993) 'Predictable stock returns: the role of small sample bias,' *Journal of Finance* 48, 641–61
Pastor, Lubos, and Robert F. Stambaugh (2007) 'Predictive systems: living with imperfect predictors,' NBER Working Paper 12814
Pastor, Lubos, Meenakshi Sinha, and Bhaskaran Swaminathan (2007) 'Estimating the intertemporal risk-return tradeoff using the implied cost of capital,' *Journal of Finance*, forthcoming
Polk, Christopher, Samuel Thompson, and Tuomo Vuolteenaho (2006) 'Cross-sectional forecasts of the equity premium,' *Journal of Financial Economics* 81, 101–41
Pontiff, Jeffrey, and Lawrence D. Schall (1998) 'Book-to-market ratios as predictors of market returns,' *Journal of Financial Economics* 49, 141–60
Rozeff, Michael S. (1984) 'Dividend yields are equity risk premiums,' *Journal of Portfolio Management* 11(1), 68–75
Siegel, Jeremy (1994) *Stocks for the Long Run* (New York: McGraw-Hill)
Stambaugh, Robert F. (1999) 'Predictive regressions,' *Journal of Financial Economics* 54, 375–421
Torous, Walter, Rossen Valkanov, and Shu Yan (2004) 'On predicting stock returns with nearly integrated explanatory variables,' *Journal of Business* 77, 937–66
Wachter, Jessica A., and Missaka Warusawitharana (2007) 'Predictable returns and asset allocation: should a skeptical investor time the market?' NBER Working Paper No.13165

Estimating the Real Rate of Return on Stocks Over the Long Term

Papers by

John Y. Campbell
Peter A. Diamond
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Presented to the
Social Security Advisory Board

August 2001

Social Security Advisory Board

An independent, bipartisan Board created by Congress and appointed by the President and the Congress to advise the President, the Congress, and the Commissioner of Social Security on matters related to the Social Security and Supplemental Security Income programs.

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INTRODUCTION

In recent years there have been a variety of proposals that would change the current Social Security system to include some form of investment of funds in private equities. These proposals include allowing or requiring individuals to use a portion of the payroll tax to fund individual investment accounts, either as part of the Social Security system or as an addition to it. They also include proposals to require the government to invest a portion of the Social Security Trust Funds in equities.

A key element in evaluating these proposals is the rate of return that can be expected on such investments. The members of the 1994-1996 Advisory Council on Social Security agreed to use a real annual rate of 7 percent (the average for the period 1900-1995) to compare the three plans put forward by the Council. The Office of the Chief Actuary (OCACT) of the Social Security Administration has continued to use 7 percent to evaluate proposals for investment in stocks. However, there is a question as to whether the historical rate for the last century should be used to make long-term projections over the coming decades or whether an alternative rate or range of rates is more appropriate.

This document includes papers by three distinguished economists that examine this important question, including the issue of how to reflect the higher risk inherent in stock investment relative to investment in U.S. Treasury securities. The papers are by John Campbell, Otto Eckstein Professor of Applied Economics at Harvard University; Peter Diamond, Institute Professor at the Massachusetts Institute of Technology; and John Shoven, Charles Schwab Professor of Economics at Stanford University. The Board is publishing them in order to make them available to policy makers and members of the public who are interested in the issue of how to ensure the long-term solvency of the Social Security system.

The papers (which have been updated for purposes of this document) were the basis for a discussion sponsored by the Social Security Advisory Board on May 31, 2001. The purpose of the discussion was to enable individuals from OCACT who have the responsibility of estimating the effects of changes in the Social Security system to hear a range of views on the likely real yields on equities over the long term. Participants in the discussion from OCACT included Stephen Goss, Chief Actuary; Alice Wade, Deputy Chief Actuary; Patrick Skirvin, Lead Economist; and Anthony Cheng, Economist.

Participants also included three other distinguished economists who were on the 1999 Technical Panel on Assumptions and Methods: Eugene Steuerle, Senior Fellow, The Urban Institute; Deborah Lucas, Professor of Finance, Northwestern University and currently Chief Economist, Congressional Budget Office; and Andrew Samwick, Assistant Professor of Economics, Dartmouth College. The 1999 Technical Panel, which was sponsored by the Advisory Board, was charged with reviewing the assumptions and methods used in the long-term projections of the Social Security Trust Funds. The Panel also examined the question of how to evaluate the returns and risks involved in stock market investments. The Panel's report was published by the Board in November 1999 and is available on the Board's Web site (www.ssab.gov).

Forecasting U.S. Equity Returns in the 21st Century

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Harvard University
July 2001

What returns should investors expect the U.S. stock market to deliver on average during the next century? Does the experience of the last century provide a reliable guide to the future? In this short note I first discuss alternative methodologies for forecasting average future equity returns, then discuss current market conditions, and finally draw conclusions for long-term return forecasts. Throughout I work in real, that is inflation-adjusted, terms.

I. Methods for Forecasting Returns

1. Average past returns

Perhaps the simplest way to forecast future returns is to use some average of past returns. Very naturally, this method has been favored by many investors and analysts. However there are several difficulties with it.

a) ***Geometric average or arithmetic average?*** The geometric average return is the cumulative past return on U.S. equities, annualized. Siegel (1998) studies long-term historical data on value-weighted U.S. share indexes. He reports a geometric average of 7.0% over two different sample periods, 1802-1997 and 1871-1997. The arithmetic average return is the average of one-year past returns on U.S. equities. It is considerably higher than the geometric average return, 8.5% over 1802-1997 and 8.7% over 1871-1997.[1]

When returns are serially uncorrelated, the arithmetic average represents the best forecast of future return in any randomly selected future year. For long holding periods, the best forecast is the arithmetic average compounded up appropriately. If one is making a 75-year forecast, for example, one should forecast a cumulative return of 1.085^{75} based on 1802-1997 data.

When returns are negatively serially correlated, however, the arithmetic average is not necessarily superior as a forecast of long-term future returns. To understand this, consider an extreme example in which prices alternate deterministically between 100 and 150. The return is 50% when prices rise, and -33% when prices fall. Over any even number of periods, the geometric average return is zero, but the arithmetic average return is 8.5%. In this case the arithmetic average return is misleading because it fails to take account of the fact that high returns always multiply a low initial price of 100, while low returns always multiply a high initial price of

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[1] When returns are lognormally distributed, the difference between the two averages is approximately one-half the variance of returns. Since stock returns have an annual standard deviation of about 18% over these long periods, the predicted difference is $0.18^2/2=0.016$ or 1.6%. This closely matches the difference in the data.

150. The geometric average is a better indication of long-term future prospects in this example.[2]

This point is not just a theoretical curiosity, because in the historical data summarized by Siegel, there is strong evidence that the stock market is mean-reverting. That is, periods of high returns tend to be followed by periods of lower returns. This suggests that the arithmetic average return probably overstates expected future returns over long periods.

b) ***Returns are very noisy.*** The randomness in stock returns is extreme. With an annual standard deviation of real return of 18%, and 100 years of past data, a single year's stock return that is only one standard deviation above average increases the average return by 18 basis points. A lucky year that is two standard deviations above average increases the average return by 36 basis points. Even when a century or more of past data is used, forecasts based on historical average returns are likely to change substantially from one year to the next.

c) ***Realized returns rise when expected returns fall.*** To the extent that expected future equity returns are not constant, but change over time, they can have perverse effects on realized returns. Suppose for example that investors become more risk-tolerant and reduce the future return that they demand from equities. If expected future cash flows are unchanged, this drives up prices and realized returns. Thus an estimate of future returns based on average past realized returns will tend to increase just as expected future returns are declining.

Something like this probably occurred in the late 1990's. A single good year can have a major effect on historical average returns, and several successive good years have an even larger effect. But it would be a mistake to react to the spectacular returns of 1995-99 by increasing estimates of 21st Century returns.

d) ***Unpalatable implications.*** Fama and French (2000) point out that average past U.S. stock returns are so high that they exceed estimates of the return to equity (ROE) calculated for U.S. corporations from accounting data. Thus if one uses average past stock returns to estimate the cost of capital, the implication is that U.S. corporate investments have destroyed value; corporations should instead have been paying all their earnings out to stockholders. This conclusion is so hard to believe that it further undermines confidence in the average-return methodology.

One variation of the average-past-returns approach is worth discussing. One might take the view that average past equity returns in other countries provide relevant evidence about U.S. equity returns. Standard international data from Morgan Stanley Capital International,

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[2] One crude way to handle this problem is to measure the annualized variance of returns over a period such as 20 years that is long enough for returns to be approximately serially uncorrelated, and then to adjust the geometric average up by one-half the annualized 20-year variance as would be appropriate if returns are lognormally distributed. Campbell and Viceira (2001, Figure 4.2) report an annualized 20-year standard deviation of about 14% in long-term annual U.S. data, which would imply an adjustment of $0.14^2/2=0.010$ or 1.0%.

available since the early 1970's, show that equity returns in most other industrialized countries have been about as high as those in the U.S. The exceptions are the heavily commodity-dependent markets of Australia and Canada, and the very small Italian market (Campbell 1999). Jorion and Goetzmann (1999) argue that other countries' returns were lower than U.S. returns in the early 20th Century, but this conclusion appears to be sensitive to their omission of the dividend component of return (Dimson, Marsh, and Staunton 2000). Thus the use of international data does not change the basic message that the equity market has delivered high average returns in the past.

2. Valuation ratios

An alternative approach is to use valuation ratios—ratios of stock prices to accounting measures of value such as dividends or earnings—to forecast future returns. In a model with constant valuation ratios and growth rates, the famous Gordon growth model says that the dividend-price ratio

$$\frac{D}{P} = R - G, \tag{1}$$

where R is the discount rate or expected equity return, and G is the growth rate of dividends (equal to the growth rate of prices when the valuation ratio is constant). This formula can be applied either to price per share and conventional dividends per share, or to the total value of the firm and total cash paid out by the firm (including share repurchases). A less well-known but just as useful formula says that in steady state, where earnings growth comes from reinvestment of retained earnings which earn an accounting ROE equal to the discount rate R,

$$\frac{E}{P} = R. \tag{2}$$

Over long periods of time summarized by Siegel (1998), these formulas give results consistent with average realized returns. Over the period 1802-1997, for example, the average dividend-price ratio was 5.4% while the geometric average growth rate of prices was 1.6%. These numbers add to the geometric average return of 7.0%. Over the period 1871-1997 the average dividend-price ratio was 4.9% while the geometric average growth rate of prices was 2.1%, again adding to 7.0%. Similarly, Campbell and Shiller (2001) report that the average P/E ratio for S&P 500 shares over the period 1872-2000 was 14.5. The reciprocal of this is 6.9%, consistent with average realized returns.

When valuation ratios and growth rates change over time, these formulas are no longer exactly correct. Campbell and Shiller (1988) and Vuolteenaho (2000) derive dynamic versions of the formulas that can be used in this context. Campbell and Shiller show, for example, that the log dividend-price ratio is a discounted sum of expected future discount rates, less a discounted sum of expected future dividend growth rates. In this note I will work with the simpler deterministic formulas.

II. Current Market Conditions

Current valuation ratios are wildly different from historical averages, reflecting the unprecedented bull market of the last 20 years, and particularly the late 1990's. The attached figure, taken from Campbell and Shiller (2001), illustrates this point. (See p. 9) The bottom left panel shows the dividend-price ratio *D/P* in January of each year from 1872-2000. The long-term historical average is 4.7%, but *D/P* has fallen dramatically since 1982 to about 1.2% in January 2000 (and 1.4% today).

The dividend-price ratio may have fallen in part because of shifts in corporate financial policy. An increased tendency for firms to repurchase shares rather than pay dividends increases the growth rate of dividends per share, by shrinking the number of shares. Thus it increases *G* in the Gordon growth formula and reduces conventionally measured *D/P*. One way to correct for this is to add repurchases to conventional dividends. Recent estimates of this effect by Liang and Sharpe (1999) suggest that it may be an upward adjustment of 75 to 100 basis points, and more in some years. Of course, this is not nearly sufficient to explain the recent decline in *D/P*.

Alternatively, one can look at the price-earnings ratio. The top left panel of the figure shows *P/E* over the same period. This has been high in recent years, but there are a number of earlier peaks that are comparable. Close inspection of these peaks shows that they often occur in years such as 1992, 1934, and 1922 when recessions caused temporary drops in (previous-year) earnings. To smooth out this effect, Campbell and Shiller (2001), following Graham and Dodd (1934), advocate averaging earnings over 10 years. The price-averaged earnings ratio is illustrated in the top right panel of the figure. This peaked at 45 in January 2000; the previous peak was 28 in 1929. The decline in the S&P 500 since January 2000 has only brought the ratio down to the mid-30's, still higher than any level seen before the late 1990's.

The final panel in the figure, on the bottom right, shows the ratio of current to 10-year average earnings. This ratio has been high in recent years, reflecting robust earnings growth during the 1990's, but it is not unprecedentedly high. The really unusual feature of the recent stock market is the level of prices, not the growth of earnings.

III. Implications for Future Returns

The implications of current valuations for future returns depend on whether the market has reached a new steady state, in which current valuations will persist, or whether these valuations are the result of some transitory phenomenon.

If current valuations represent a new steady state, then they imply a substantial decline in the equity returns that can be expected in the future. Using Campbell and Shiller's (2001) data, the unadjusted dividend-price ratio has declined by 3.3 percentage points from the historical average. Even adjusting for share repurchases, the decline is at least 2.3 percentage points. Assuming constant long-term growth of the economy, this would imply that the geometric average return on equity is no longer 7%, but 3.7% or at most 4.7%. Looking at the price-averaged earnings ratio, adjusting for the typical ratio of current to averaged earnings, gives an even lower estimate. Current earnings are normally 1.12 times averaged earnings; 1.12/35=0.032, implying a 3.2% return forecast. These forecasts allow for only a very modest equity premium relative to the yield on long-term inflation-indexed bonds, currently about 3.5%, or the 3% safe real return assumed recently by the Trustees.

If current valuations are transitory, then it matters critically what happens to restore traditional valuation ratios. One possibility is that earnings and dividends are below their long-run trend levels; rapid earnings and dividend growth will restore traditional valuations without any declines in equity returns below historical levels. While this is always a possibility, Campbell and Shiller (2001) show that it would be historically unprecedented. The U.S. stock market has an extremely poor record of predicting future earnings and dividend growth. Historically stock prices have increased relative to earnings during decades of rapid earnings growth, such as the 1920's, 1960's, or 1990's, as if the stock market anticipates that rapid earnings growth will continue in the next decade. However there is no systematic tendency for a profitable decade to be followed by a second profitable decade; the 1920's, for example, were followed by the 1930's and the 1960's by the 1970's. Thus stock market optimism often fails to be justified by subsequent earning growth.[3]

A second possibility is that stock prices will decline or stagnate until traditional valuations are restored. This has occurred at various times in the past after periods of unusually high stock prices, notably the 1900's and 1910's, the 1930's, and the 1970's. This would imply extremely low and perhaps even negative returns during the adjustment period, and then higher returns afterwards.

The unprecedented nature of recent stock market behavior makes it impossible to base forecasts on historical patterns alone. One must also form a view about what happened to drive stock prices up during the 1980's and particularly the 1990's. One view is that there has been a structural decline in the equity premium, driven either by the correction of mistaken perceptions of risk (aided perhaps by the work of economists on the equity premium puzzle), or by the reduction of barriers to participation and diversification by small investors.[4] Economists such as McGrattan and Prescott (2001) and Jagannathan, McGrattan, and Scherbina (2001) argue that the structural equity premium is now close to zero, consistent with theoretical models in which investors effectively share risks and have modest risk aversion, and consistent with the view that the U.S. market has reached a new steady state.

[3] Vuolteenaho (2000) notes, however, that U.S. corporations were unusually profitable in the late 1990's and that profitability has some predictive power for future earnings growth.

[4] Heaton and Lucas (1999) model barriers of this sort. It is hard to get large effects of increased participation on stock prices unless initial participation levels are extremely low. Furthermore, one must keep in mind that what matters for pricing is the wealth-weighted participation rate, that is, the probability that a randomly selected dollar of wealth is held by an individual who can participate in the market. This is higher than the equal-weighted participation rate, the probability that a randomly selected individual can participate.

An alternative view is that the equity premium has declined only temporarily, either because investors irrationally overreacted to positive fundamental news in the 1990's (Shiller 2000), or because the strong economy made investors more tolerant of risk.[5] On this view the equity premium will return to historical levels, implying extremely poor near-term returns and higher returns in the more distant future after traditional valuations have been restored.

It is too soon to tell which of these views is correct, and I believe it is sensible to put some weight on each of them. That is, I expect valuation ratios to return part way but not fully to traditional levels.[6] A rough guess for the long term, after the adjustment process is complete, might be a geometric average equity return of 5% to 5.5% or an arithmetic average return of 6.5% to 7%.

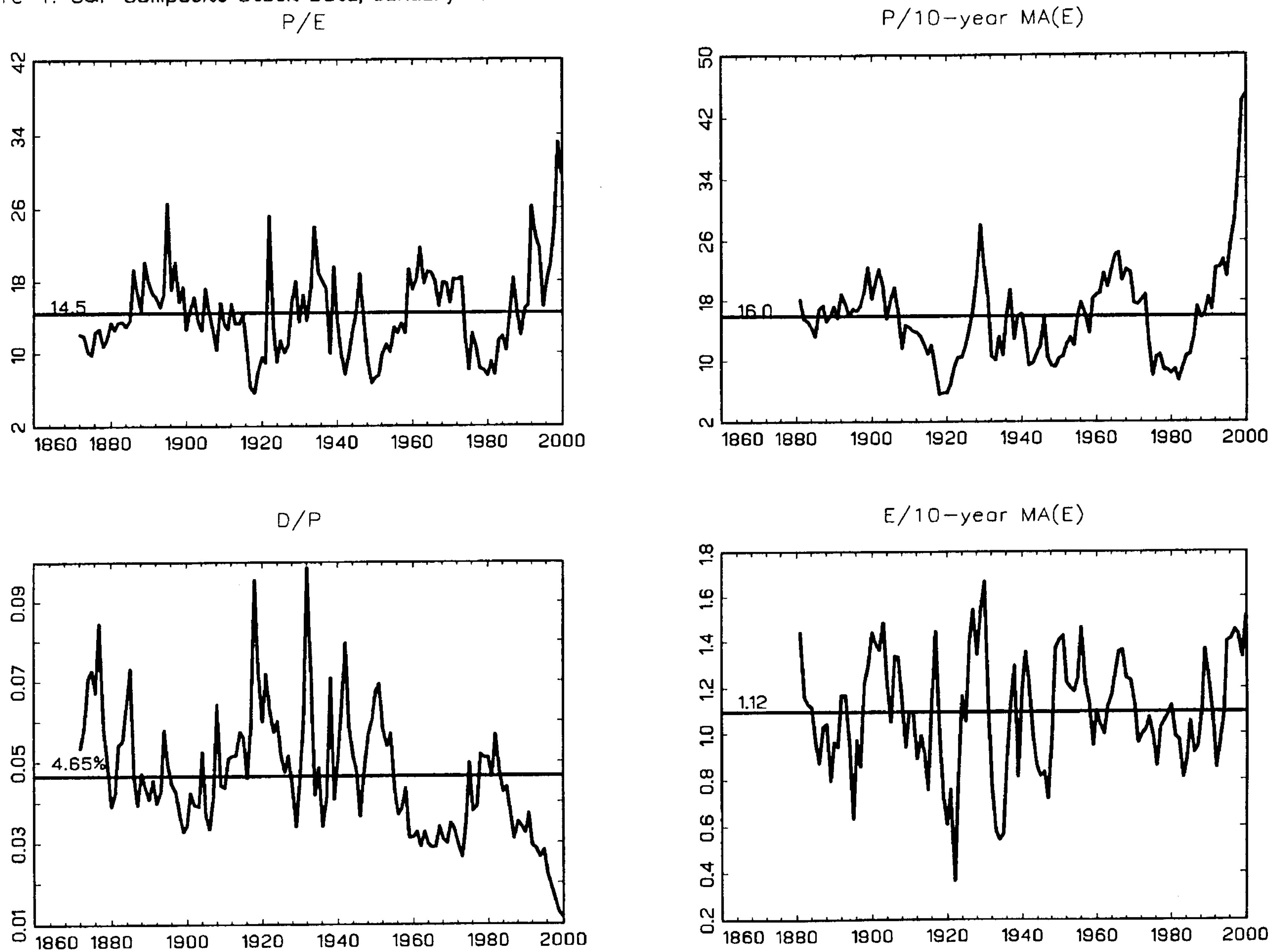
If equity returns are indeed lower on average in the future, it is likely that short-term and long-term real interest rates will be somewhat higher. That is, the total return to the corporate capital stock is determined primarily by the production side of the economy and by national saving and international capital flows; the division of total return between riskier and safer assets is determined primarily by investor attitudes towards risk. Reduced risk aversion then reduces the equity premium both by driving down the equity return and by driving up the riskless interest rate. The yield on long-term inflation-indexed Treasury securities (TIPS) is about 3.5%, while short-term real interest rates have recently averaged about 3%. Thus 3% to 3.5% would be a reasonable guess for safe real interest rates in the future, implying a long-run average equity premium of 1.5% to 2.5% in geometric terms or about 3% to 4% in arithmetic terms.

Finally, I note that it is tricky to use these numbers appropriately in policy evaluation. Average equity returns should never be used in base-case calculations without showing alternative calculations to reflect the possibilities that realized returns will be higher or lower than average. These calculations should include an alternative in which equities underperform Treasury bills. Even if the probability of underperformance is small over a long holding period, it cannot be zero or the stock market would be offering an arbitrage opportunity or "free lunch". Equally important, the bad states of the world in which underperformance occurs are heavily weighted by risk-averse investors. Thus policy evaluation should use a broad range of returns to reflect the uncertainty about long-run stock market performance.

[5] Campbell and Cochrane (1999) present a model in which investors judge their well-being by their consumption relative to a recent average of past aggregate consumption. In this model investors are more risk-tolerant when consumption grows rapidly and they have a "cushion of comfort" relative to their minimum expectations. The Campbell-Cochrane model fits past cyclical variations in the stock market, which will likely continue in the future, but it is hard to explain the extreme recent movements using this model.

[6] This compromise view also implies that negative serial correlation, or mean-reversion, is likely to remain a characteristic of stock returns in the 21st Century.

Figure 4. S&P Composite Stock Data, January Values 1872–1997



Bibliography

Campbell, John Y. and John H. Cochrane, 1999, "By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior", *Journal of Political Economy* 107, 205-251.

Campbell, John Y. and Robert J. Shiller, 1988, "The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors", *Review of Financial Studies* 1, 195-228.

Campbell, John Y. and Robert J. Shiller, 2001, "Valuation Ratios and the Long-Run Stock Market Outlook: An Update", NBER Working Paper No. 8221.

Campbell, John Y. and Luis M. Viceira, 2001, *Strategic Asset Allocation: Portfolio Choice for Long-Term Investors*, forthcoming Oxford University Press, New York, NY.

Dimson, Elroy, Paul Marsh, and Mike Staunton, 2000, *The Millennium Book: A Century of Investment Returns,* ABN Amro and London Business School, London.

Fama, Eugene and Kenneth R. French, 2000, "The Equity Premium", unpublished paper, University of Chicago and MIT.

Graham, Benjamin and David Dodd, 1934, *Security Analysis*, McGraw-Hill, New York, NY.

Heaton, John and Deborah Lucas, 1999, "Stock Prices and Fundamentals", *NBER Macroeconomics Annual* 213-242, MIT Press, Cambridge, MA.

Jagannathan, Ravi, Ellen R. McGrattan, and Anna Scherbina, 2001, "The Declining US Equity Premium", NBER Working Paper No. 8172.

Jorion, Philippe and William N. Goetzmann, 1999, "Global Stock Markets in the Twentieth Century", *Journal of Finance* 54, 953-980.

Liang, Nellie and Steven A. Sharpe, 1999, "Share Repurchases and Employee Stock Options and their Implications for S&P 500 Share Retirements and Expected Returns", unpublished paper, Board of Governors of the Federal Reserve System.

McGrattan, Ellen R., and Edward C. Prescott, 2001, "Is the Stock Market Overvalued?", NBER Working Paper No. 8077.

Shiller, Robert J., 2000, *Irrational Exuberance*, Princeton University Press, Princeton, NJ.

Siegel, Jeremy, 1998, *Stocks for the Long Run*, 2nd ed., McGraw-Hill, New York, NY.

Vuolteenaho, Tuomo, 2000, "Understanding the Aggregate Book-to-Market Ratio and its Implications to Current Equity-Premium Expectations", unpublished paper, Harvard University.

What Stock Market Returns to Expect for the Future: An Update

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Massachusetts Institute of Technology
July 23, 2001

This note updates the calculations in my previous analysis of this issue (Social Security Bulletin, 2000, vol. 63, no. 2, pp. 38-52).* The calculations address two issues. First, what are the implications of assuming an annual 7% real return on equities throughout the next 75 years (along with the assumptions in the Trustees' Report), as has been the practice in OCACT projections of Social Security reform proposals that include equities. While the numbers are changed some from those based on the end of 1998, calculations done for the end of 2000 and the end of the first quarter of 2001 continue to show that a 7% return throughout the next 75 years from these starting points is implausible.

Second, what are the implications for stock market values in ten years if there is to be a lower rate of return for the next decade, followed by a return to the historical average return thereafter. As before, the returns over the next decade need to be very low, indeed an unchanged nominal value for stocks at the end of the decade is roughly consistent with close to a 7% return thereafter.

The calculations reported here are based on the Gordon formula, relating stock values to returns and the growth of returns. A first step in considering stock market returns is to project the future net cash flow to stockholders. This is normally done in three steps. First is to estimate the current net cash flow. Second is to adjust that for reasons to believe that the long-run relationship to GDP may be different from the current relationship. And third is to assume a constant relationship to GDP given the first two steps.

The cash flow to holders of publicly traded stocks as a whole contains many pieces. Easy to measure is the flow of dividends. Then there is the cash flow arising from share repurchase. This happens in two ways – direct repurchase of a corporation's own shares and acquisition of the shares of other corporations for cash or debt. Sometimes acquired shares are retired and sometimes they are not. This may be a complication in estimation given how data are presented – I have not reviewed measurement in data sources.

In order to maintain any given fraction of the value of shares outstanding, there are also pieces that are equivalent to negative cash flows. When employees exercise stock options and so acquire shares at less than market value, there is a dilution of the stock value of existing owners. This can be approached by thinking about the excess of market value over exercise price or by considering the value of options that are given to employees.

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* See article beginning on p. 17.

I am grateful to Mauricio Soto for excellent research assistance, doing the calculations reported here. I am also grateful for financial support from the Retirement Research Center at Boston College.

Some existing firms go out of business while new firms are created. For considering the return on a given fraction of the entire outstanding traded stock, it is necessary to include the negative cash flow associated with additional traded companies. The direct cash flow of IPO's that are previously owned by individuals is such a negative cash flow. In addition, the value retained by the original owners also represents a dilution in the value of existing shareholders and also needs to be counted. Thus actual cash flow for new firms that were previously private needs to be increased by a multiplier – with 3 being a reasonable estimate. However, the analysis is different for new companies that are spin-offs from existing firms. The cash flow paid for them is a negative cash flow for shareholders as a whole. However, there is no need for a multiplier since the value of retained shares by corporations is retained by the aggregate of current shareholders. Thus there is a need to separate out these two types of IPO's. I have not seen an estimate separating these two parts.

In the methodology used in my previous paper, these various steps, along with any divergence of the current position from a steady state, were combined to produce a range of values referred to as adjusted dividend flow. In Table 1 are the implied ratios of stock market value to GDP at the end of the 75-year projection period based on stock market and GDP values at the end of 1998 and the assumptions in the 1999 Trustees' Report as well as values at the end of 2000 and end of the first quarter of 2001 and the assumptions in the 2001 Trustees' Report. The Table suggests that the 7 percent assumption throughout the next 75 years is not plausible in that it requires a rise in stock values to GDP that is implausible. The level of implausibility is not quite as high as two years ago, but it is still implausible. A sensitivity analysis is presented in Table 2 that varies the growth rate of GDP. Moderate increases in GDP growth above the levels assumed in the Trustees' Report still leave a 7% return throughout the next 75 years implausible.

Table 3 presents the size of the real drop in stock market values over the next ten years that are sufficient for the Gordon formula to yield a steady return of 7 percent thereafter (along with calculations for 6.5 and 6.0). Poor returns over the next ten years are needed for consistency with a higher ultimate long-run number, almost as poor as two years ago, for a given adjusted dividend level. Table 4 presents sensitivity analysis.

An important issue is whether it is more plausible to have a poor short-run return followed by a return to historic yields or to believe that the long-run ultimate return has dropped. Given the rest of the assumptions used by OCACT (particularly the assumption of a 3% real yield on long-term Treasuries), that is tantamount to a drop in the equity premium. I think many investors are not expecting as low a return as would be called for by the assumption that we are now in a steady state. Therefore, I continue to think a poor return over the next decade is a more plausible assumption. It seems sensible to lower the long-run return a little from the 7% historic norm in recognition of the unusually long period of very high returns that we have experienced (although one can wonder what would have happened in the late 20's and early 30's if Alan Greenspan had headed the Fed). Moreover, since it is impossible to predict timing of market corrections and it is sensible to work with a single rate of return for projection purposes, a lower rate of return is appropriate to correct for a period of lower returns even if the correction scenario returning all the way to 7% is right. Thus projection values around 6.0% or 6.5% seem to me appropriate for projection purposes. Of course, a wider band is important for high and low cost projections in order to show the extreme uncertainty associated with such a projection.

Table 1

Projections of the Ratio of Stock Market Value To GDP Assuming 7 Percent Real Return

End of 1998 Projections

	Adjusted Dividends			
	2.0%	2.5%	3.0%	3.5%
2073 Market to GDP	68.49	58.32	48.16	38.00
Ratio 2073 to Current	37.76	32.15	26.55	20.95

End of 2000 Projections

	Adjusted Dividends			
	2.0%	2.5%	3.0%	3.5%
2075 Market to GDP	44.93	37.73	30.54	23.34
Ratio 2075 to Current	26.47	22.23	17.99	13.75

End of First Quarter 2001 Projections

	Adjusted Dividends			
	2.0%	2.5%	3.0%	3.5%
2075 Market to GDP	39.54	33.29	27.03	20.77
Ratio 2075 to Current	26.81	22.57	18.33	14.08

Table 2

Projections of the Ratio of Stock Market Value To GDP Assuming 7 Percent Real Return

End of First Quarter 2001 Projections

	Adjusted Dividends			
	2.0%	2.5%	3.0%	3.5%
Under Current Projections				
2075 Market to GDP	39.54	33.29	27.03	20.77
Ratio 2075 to Current	26.81	22.57	18.33	14.08
GDP Growth 0.1% Higher				
2075 Market to GDP	36.34	30.43	24.51	18.60
Ratio 2075 to Current	24.64	20.63	16.62	12.61
GDP Growth 0.3% Higher				
2075 Market to GDP	30.65	25.37	20.08	14.79
Ratio 2075 to Current	20.78	17.20	13.61	10.02
GDP Growth 0.5% Higher				
2075 Market to GDP	25.81	21.07	16.34	11.60
Ratio 2075 to Current	17.50	14.29	11.08	7.86

*Assuming 7% stock yield, and using 2001 trustees projections.
** Using Estimated Market Value for April 1, 2001.

Table 3

Required Percentage Decline in Real Stock Prices Over the Following Ten Years To Justify a 7.0, 6.5, and 6.0 Percent Return Thereafter (end 1998)

Adjusted Dividend Yield	Long-run Return 7.0	6.5	6.0
2.0	55	51	45
2.5	44	38	31
3.0	33	26	18
3.5	21	13	4

Required Percentage Decline in Real Stock Prices Over the Following Ten Years To Justify a 7.0, 6.5, and 6.0 Percent Return Thereafter (end 2000)

Adjusted Dividend Yield	Long-run Return 7.0	6.5	6.0
2.0	53	48	42
2.5	41	35	28
3.0	29	22	13
3.5	17	9	-1

Source: Author's Calculations

Note: Derived from the Gordon Formula. Dividends are assumed to grow in line with GDP, which the OCACT assumed in 1999 is 2.0 percent over the next 10 years and 1.5 percent for the long run; and in 2001, 2.3 percent and then 1.6 percent.

Table 4

Required Percentage Decline in Real Stock Prices Over the Next Ten Years To Justify a 7.0, 6.5, and 6.0 Percent Return Thereafter (end 2000)

Under Current Projections

Adjusted Dividend Yield	Long-run Return 7.0	6.5	6.0
2.0	53	48	42
2.5	41	35	28
3.0	29	22	13
3.5	17	9	-1

GDP Growth 0.3% Higher Each Year

Adjusted Dividend Yield	Long-run Return 7.0	6.5	6.0
2.0	48	43	36
2.5	35	28	20
3.0	23	14	4
3.5	10	0	-12

Source: Author's Calculations

Note: Derived from the Gordon Formula. Dividends are assumed to grow in line with GDP, which the OACT assumes is 2.3 percent over the next 10 years. For long-run GDP growth, the OACT assumes 1.6 percent.

What Stock Market Returns to Expect for the Future?

Peter A. Diamond

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High stock prices, together with projected slow economic growth, are not consistent with the 7.0 percent return that the Office of the Chief Actuary has generally used when evaluating proposals with stock investments. Routes out of the inconsistency include assuming higher GDP growth, a lower long-run stock return, or a lower short-run stock return with a 7.0 percent return on a lower base thereafter. In short, either the stock market is overvalued and requires a correction to justify a 7.0 percent return thereafter, or it is correctly valued and the long-run return is substantially lower than 7.0 percent (or some combination of the two). This article argues that the former view is more convincing, since accepting the "correctly valued" hypothesis implies an implausibly small equity premium.

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I. Summary

In evaluating proposals for reforming Social Security that involve stock investments, the Office of the Chief Actuary (OCACT) has generally used a 7.0 percent real return for stocks. The 1994-96 Advisory Council specified that OCACT should use that return in making its 75-year projections of investment-based reform proposals. The assumed ultimate real return on Treasury bonds of 3.0 percent implies a long-run equity premium of 4.0 percent. There are two equity-premium concepts: the *realized* equity premium, which is measured by the actual rates of return; and the *required* equity premium, which investors expect to receive for being willing to hold available stocks and bonds. Over the past two centuries, the realized premium was 3.5 percent on average, but 5.2 percent for 1926 to 1998.

Some critics argue that the 7.0 percent projected stock returns are too high. They base their arguments on recent developments in the capital market, the current high value of the stock market, and the expectation of slower economic growth.

Increased use of mutual funds and the decline in their costs suggest a lower required premium, as does the rising fraction of the American public investing in stocks. The size of the decrease is limited, however, because the largest cost savings do not apply to the very wealthy and to large institutional investors, who hold a much larger share of the stock market's total value than do new investors. These trends suggest a lower equity premium for projections than the 5.2 percent of the past 75 years. Also, a declining required premium is likely to imply a temporary increase in the realized premium because a rising willingness to hold stocks tends to increase their price. Therefore, it would be a mistake during a transition period to extrapolate what may be a temporarily high realized return. In the standard (Solow) economic growth model, an assumption of slower long-run growth lowers the marginal product of capital if the savings rate is constant. But lower savings as growth slows should partially or fully offset that effect.

The present high stock prices, together with projected slow economic growth, are not consistent with a 7.0 percent return. With a plausible level of adjusted dividends (dividends plus net share repurchases), the ratio of stock value to gross domestic product (GDP) would rise more than 20-fold over 75 years. Similarly, the steady-state Gordon formula—that stock returns equal the adjusted dividend yield plus the growth rate of stock prices (equal to that of GDP)—suggests a return of roughly 4.0 percent to 4.5 percent. Moreover, when relative stock values have been high, returns over the following decade have tended to be low.

To eliminate the inconsistency posed by the assumed 7.0 percent return, one could assume higher GDP growth, a lower long-run stock return, or a lower short-run stock return with a 7.0 percent return on a lower base thereafter. For example, with an adjusted dividend yield of 2.5 percent to 3.0 percent, the market would have to decline about 35 percent to 45 percent in real terms over the next decade to reach steady state.

In short, either the stock market is overvalued and requires a correction to justify a 7.0 percent return thereafter, or it is correctly valued and the long-run return is substantially lower than 7.0 percent (or some combination). This article argues that the "overvalued" view is more convincing, since the "correctly valued" hypothesis implies an implausibly small equity premium. Although OCACT could adopt a lower rate for the entire 75-year period, a better approach would be to assume lower returns over the next decade and a 7.0 percent return thereafter.

II. Introduction

All three proposals of the 1994-96 Advisory Council on Social Security (1997) included investment in equities. For assessing the financial effects of those proposals, the Council members agreed to specify a 7.0 percent long-run real (inflation-adjusted) yield from stocks.[1] They devoted little attention to different short-run returns from stocks.[2] The Social Security Administration's Office of the Chief Actuary (OCACT) used this 7.0 percent return, along with a 2.3 percent long-run real yield on Treasury bonds, to project the impact of the Advisory Council's proposals.

Since then, OCACT has generally used 7.0 percent when assessing other proposals that include equities.[3] In the 1999 Social Security Trustees Report, OCACT used a higher long-term real rate on Treasury bonds of 3.0 percent.[4] In the first 10 years of its projection period, OCACT makes separate assumptions about bond rates for each year and assumes slightly lower real rates in the short run.[5] Since the assumed bond rate has risen, the assumed equity premium, defined as the difference between yields on equities and Treasuries, has declined to 4.0 percent in the long run.[6] Some critics have argued that the assumed return on stocks and the resulting equity premium are still too high.[7]

This article examines the critics' arguments and, rather than settling on a single recommendation, considers a range of assumptions that seem reasonable.[8] The article:

• Reviews the historical record on rates of return,

• Assesses the critics' reasons why future returns may be different from those in the historical record and examines the theory about how those rates are determined, and

• Considers two additional issues: the difference between gross and net returns, and investment risk.

Readers should note that in this discussion, a decline in the equity premium need not be associated with a decline in the return on stocks, since the return on bonds could increase. Similarly, a decline in the return on stocks need not be associated with a decline in the equity premium, since the return on bonds could also decline. Both rates of return and the equity premium are relevant to choices about Social Security reform.

III. Historical Record

Realized rates of return on various financial instruments have been much studied and are presented in Table 1.[9] Over the past 200 years, stocks have produced a real return of 7.0 percent per year. Even though annual returns fluctuate enormously, and rates vary significantly over periods of a decade or two, the return on stocks over very long periods has been quite stable (Siegel 1999).[10] Despite that long-run stability, great uncertainty surrounds both a projection for any particular period and the relevance of returns in any short period of time for projecting returns over the long run.

The equity premium is the difference between the rate of return on stocks and on an alternative asset—Treasury bonds, for the purpose of this article. There are two concepts of equity premiums. One is the *realized* equity premium, which is measured by the actual rates of return. The other is the *required* equity premium, which equals the premium that investors expect to get in exchange for holding available quantities of assets. The two concepts are closely related but different—significantly different in some circumstances.

The realized equity premium for stocks relative to bonds has been 3.5 percent for the two centuries of available data, but it has increased over time (Table 2).[11, 12] That increase has resulted

Table 1.
Compound annual real returns, by type of investment, 1802-1998 (in percent)

Period	Stocks	Bonds	Bills	Gold	Inflation
1802-1998	7.0	3.5	2.9	-0.1	1.3
1802-1870	7.0	4.8	5.1	0.2	0.1
1871-1925	6.6	3.7	3.2	-0.8	0.6
1926-1998	7.4	2.2	0.7	0.2	3.1
1946-1998	7.8	1.3	0.6	-0.7	4.2

Source: Siegel (1999).

Table 2.
Equity premiums: Differences in annual rates of return between stocks and fixed-income assets, 1802-1998

	Equity premium (percent)	
Period	With bonds	With bills
1802-1998	3.5	5.1
1802-1870	2.2	1.9
1871-1925	2.9	3.4
1926-1998	5.2	6.7
1946-1998	6.5	7.2

Source: Siegel (1999).

from a significant decline in bond returns over the past 200 years. The decline is not surprising considering investors' changing perceptions of default risk as the United States went from being a less-developed country (and one with a major civil war) to its current economic and political position, where default risk is seen to be virtually zero.[13]

These historical trends can provide a starting point for thinking about what assumptions to use for the future. Given the relative stability of stock returns over time, one might initially choose a 7.0 percent assumption for the return on stocks—the average over the entire 200-year period. In contrast, since bond returns have tended to decline over time, the 200-year number does not seem to be an equally good basis for selecting a long-term bond yield. Instead, one might choose an assumption that approximates the experience of the past 75 years—2.2 percent, which suggests an equity premium of around 5.0 percent. However, other evidence, discussed below, argues for a somewhat lower value.[14]

IV. Why Future Returns May Differ From Past Returns

Equilibrium and Long-Run Projected Rates of Return

The historical data provide one way to think about rates of return. However, thinking about how the future may be different from the past requires an underlying theory about how those returns are determined. This section lists some of the actions by investors, firms, and government that combine to determine equilibrium; it can be skipped without loss of continuity.

In asset markets, the demand by individual and institutional investors reflects a choice among purchasing stocks, purchasing Treasury bonds, and making other investments.[15] On the supply side, corporations determine the supplies of stocks and corporate bonds through decisions on dividends, new issues, share repurchases, and borrowing. Firms also choose investment levels. The supplies of Treasury bills and bonds depend on the government's budget and debt management policies as well as monetary policy. Whatever the supplies of stocks and bonds, their prices will be determined so that the available amounts are purchased and held by investors in the aggregate.

The story becomes more complicated, however, when one recognizes that investors base decisions about portfolios on their projections of both future prices of assets and future dividends.[16] In addition, market participants need to pay transactions costs to invest in assets, including administrative charges, brokerage commissions, and the bid-ask spread. The risk premium relevant for investors' decisions should be calculated net of transactions costs. Thus, the greater cost of investing in equities than in Treasuries must be factored into any discussion of the equity premium.[17] Differences in tax treatments of different types of income are also relevant (Gordon 1985; Kaplow 1994).

In addition to determining the supplies of corporate stocks and bonds, corporations also choose a debt/equity mix that affects the risk characteristics of both bonds and stocks. Financing a given level of investment more by debt and less by equity leaves a larger interest cost to be paid from the income of corporations before determining dividends. That makes both the debt and the equity more risky. Thus, changes in the debt/equity mix (possibly in response to prevailing stock market prices) should affect risk and, therefore, the equilibrium equity premium.[18]

Since individuals and institutions are generally risk averse when investing, greater expected variation in possible future yields tends to make an asset less valuable. Thus, a sensible expectation about long-run equilibrium is that the expected yield on equities will exceed that on Treasury bonds. The question at hand is how much more stocks should be expected to yield.[19] That is, assuming that volatility in the future will be roughly similar to volatility in the past, how much more of a return from stocks would investors need to expect in order to be willing to hold the available supply of stocks. Unless one thought that stock market volatility would collapse, it seems plausible that the premium should be significant. For example, equilibrium with a premium of 70 basis points (as suggested by Baker 1999a) seems improbable, especially since transactions costs are higher for stock than for bond investments. In considering this issue, one needs to recognize that a greater willingness to bear the risk associated with stocks is likely to be accompanied by greater volatility of stock prices if bond rates are unchanged. That is, fluctuations in expected growth in corporate profits will have bigger impacts on expected discounted returns (which approximate prices) when the equity premium, and so the discount rate, is lower.[20]

Although stocks should earn a significant premium, economists do not have a fully satisfactory explanation of why stocks have yielded so much more than bonds historically, a fact that has been called the equity-premium puzzle (Mehra and Prescott 1985; Cochrane 1997). Ongoing research is trying to develop more satisfactory explanations, but the theory still has inadequacies.[21] Nevertheless, to explain why the future may be different from the past, one needs to rely on some theoretical explanation of the past in order to have a basis for projecting a different future.

Commentators have put forth three reasons as to why future returns may be different from those in the historical record. First, past and future long-run trends in the capital market may imply a decline in the equity premium. Second, the current valuation of stocks, which is historically high relative to various benchmarks, may signal a lower future rate of return on equities. Third, the projection of slower economic growth may suggest a lower long-run marginal product of capital, which is the source of returns to financial assets. The first two issues are discussed in the context of financial markets; the third, in the context of physical assets. One should distinguish between arguments that suggest a lower equity premium and those that suggest lower returns to financial assets generally.

Equity Premium and Developments in the Capital Market

The capital market has experienced two related trends—the decrease in the cost of acquiring a diversified portfolio of stocks and the spread of stock ownership more widely in the economy. The relevant equity premium for investors is the equity premium net of the costs of investing. Thus, if the cost of investing in some asset decreases, that asset should have a higher price and a lower expected return gross of investment costs. The availability of mutual funds and the decrease in the cost of purchasing them should lower the equity premium in the future relative to long-term historical values. Arguments have also been raised about investors' time horizons and their understanding of financial markets, but the implications of those arguments are less clear.

Mutual Funds. In the absence of mutual funds, small investors would need to make many small purchases in different companies in order to acquire a widely diversified portfolio. Mutual funds provide an opportunity to acquire a diversified portfolio at a lower cost by taking advantage of the economies of scale in investing. At the same time, these funds add another layer of intermediation, with its costs, including the costs of marketing the funds.

Nevertheless, as the large growth of mutual funds indicates, many investors find them a valuable way to invest. That suggests that the equity premium should be lower in the future than in the past, since greater diversification means less risk for investors. However, the significance of the growth of mutual funds depends on the importance in total equity demand of "small" investors who purchase them, since this argument is much less important for large investors, particularly large institutional investors. According to recent data, mutual funds own less than 20 percent of U.S. equity outstanding (Investment Company Institute 1999).

A second development is that the average cost of investing in mutual funds has decreased. Rea and Reid (1998) report a drop of 76 basis points (from 225 to 149) in the average annual charge of equity mutual funds from 1980 to 1997. They attribute the bulk of the decline to a decrease in the importance of front-loaded funds (funds that charge an initial fee when making a deposit in addition to annual charges). The development and growth of index funds should also reduce costs, since index funds charge investors considerably less on average than do managed funds while doing roughly as well in gross rates of return. In a separate analysis, Rea and Reid (1999) also report a decline of 38 basis points (from 154 to 116) in the cost of bond mutual funds over the same period, a smaller drop than with equity mutual funds. Thus, since the cost of stock funds has fallen more than the cost of bond funds, it is plausible to expect a decrease in the equity premium relative to historical values. The importance of that decline is limited, however, by the fact that the largest cost savings do not apply to large institutional investors, who have always faced considerably lower charges.

A period with a declining required equity premium is likely to have a temporary increase in the realized equity premium. Assuming no anticipation of an ongoing trend, the divergence occurs because a greater willingness to hold stocks, relative to bonds, tends to increase the price of stocks. Such a price rise may yield a realized return that is higher than the required return.[22] The high realized equity premium since World War II may be partially caused by a decline in the required equity premium over that period. During such a transition period, therefore, it would be a mistake to extrapolate what may be a temporarily high realized return.

Spread of Stock Ownership. Another trend that would tend to decrease the equity premium is the rising fraction of the American public investing in stocks either directly or indirectly through mutual funds and retirement accounts (such as 401(k) plans). Developments in tax law, pension provision, and the capital markets have expanded the base of the population who are sharing in the risks associated with the return to corporate stock. The share of households investing in stocks in any form increased from 32 percent in 1989 to 41 percent in 1995 (Kennickell, Starr-McCluer, and Sundén 1997). Numerous studies have concluded that widening the pool of investors sharing in stock market risk should lower the equilibrium risk premium (Mankiw and Zeldes 1991; Brav and Geczy 1996; Vissing-Jorgensen 1997; Diamond and Geanakoplos 1999; Heaton and Lucas 2000). The importance of that trend must be weighted by the low size of investment by such new investors.[23]

Investors' Time Horizons. A further issue relevant to the future of the equity premium is whether the time horizons of investors, on average, have changed or will change.[24] Although the question of how time horizons should affect demands for assets raises subtle theoretical issues (Samuelson 1989), longer horizons and sufficient risk aversion should lead to greater willingness to hold stocks given the tendency for stock prices to revert toward their long-term trend (Campbell and Viceira 1999).[25]

The evidence on trends in investors' time horizons is mixed. For example, the growth of explicit individual retirement savings vehicles, such as individual retirement accounts (IRAs) and 401(k)s, suggests that the average time horizons of individual investors may have lengthened. However, some of that growth is at the expense of defined benefit plans, which may have longer horizons. Another factor that might suggest a longer investment horizon is the increase in equities held by institutional investors, particularly through defined benefit pension plans. However, the relevant time horizon for such holdings may not be the open-ended life of the plan but rather the horizon of the plans' asset managers, who may have career concerns that shorten the relevant horizon.

Other developments may tend to lower the average horizon. Although the retirement savings of baby boomers may currently add to the horizon, their aging and the aging of the population generally will tend to shorten horizons. Finally, individual stock ownership has become less concentrated (Poterba and Samwick 1995), which suggests a shorter time horizon because less wealthy investors might be less concerned about passing assets on to younger generations. Overall, without detailed calculations that would go beyond the scope of this article, it is not clear how changing time horizons should affect projections.

Investors' Understanding. Another factor that may affect the equity premium is investors' understanding of the properties of stock and bond investments. The demand for stocks might be affected by the popular presentation of material, such as Siegel (1998), explaining to the general public the difference between short- and long-run risks. In particular, Siegel highlights the risks, in real terms, of holding nominal bonds. While the creation of inflation-indexed Treasury bonds might affect behavior, the lack of wide interest in those bonds (in both the United States and the United Kingdom) and the failure to fully adjust future amounts for inflation generally (Shafir, Diamond, and Tversky 1997) suggest that nominal bonds will continue to be a major part of portfolios. Perceptions that those bonds are riskier than previously believed would then tend to decrease the required equity premium.

Popular perceptions may, however, be excessively influenced by recent events—both the high returns on equity and the low rates of inflation. Some evidence suggests that a segment of the public generally expects recent rates of increase in the prices of assets to continue, even when those rates seem highly implausible for a longer term (Case and Shiller 1988). The possibility of such extrapolative expectations is also connected with the historical link between stock prices and inflation. Historically, real stock prices have been adversely affected by inflation in the short run. Thus, the decline in inflation expectations over the past two decades would be associated with a rise in real stock prices if the historical pattern held. If investors and analysts fail to consider such a connection, they might expect robust growth in stock prices to continue without recognizing that further declines in inflation are unlikely. Sharpe (1999) reports evidence that stock analysts' forecasts of real growth in corporate earnings include extrapolations that may be implausibly high. If so, expectations of continuing rapid growth in stock prices suggest that the required equity premium may not have declined.

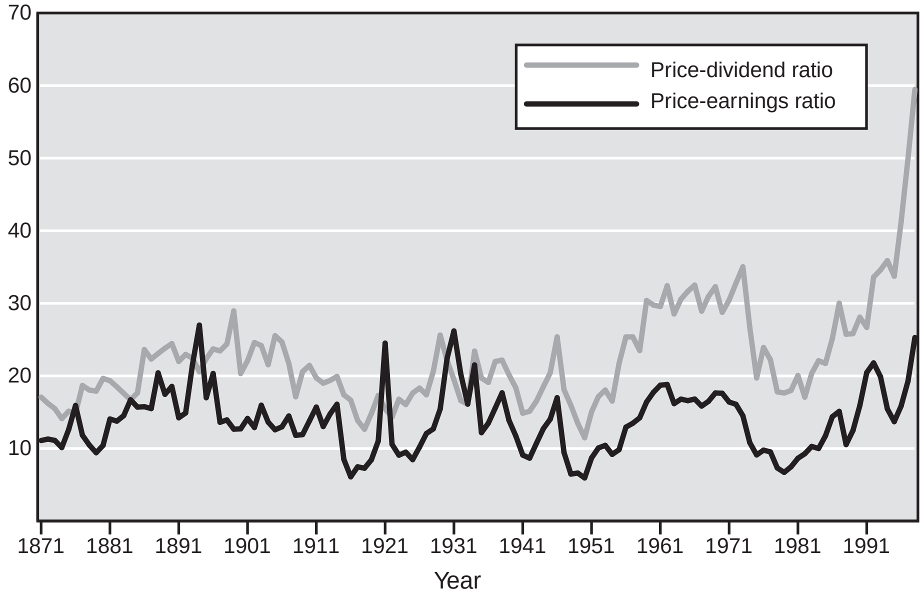
On balance, the continued growth and development of mutual funds and the broader participation in the stock market should contribute to a drop in future equity premiums relative to the historical premium, but the drop is limited.[26] Other factors, such as investors' time horizons and understanding, have less clear-cut implications for the equity premium.

Equity Premium and Current Market Values

At present, stock prices are very high relative to a number of different indicators, such as earnings, dividends, book values, and gross domestic product (GDP) (Charts 1 and 2). Some critics, such as Baker (1998), argue that this high market value, combined with projected slow economic growth, is not consistent with a 7.0 percent return. Possible implications of the high prices have also been the subject of considerable discussion in the finance community (see, for example, Campbell and Shiller 1998; Cochrane 1997; Philips 1999; and Siegel 1999).

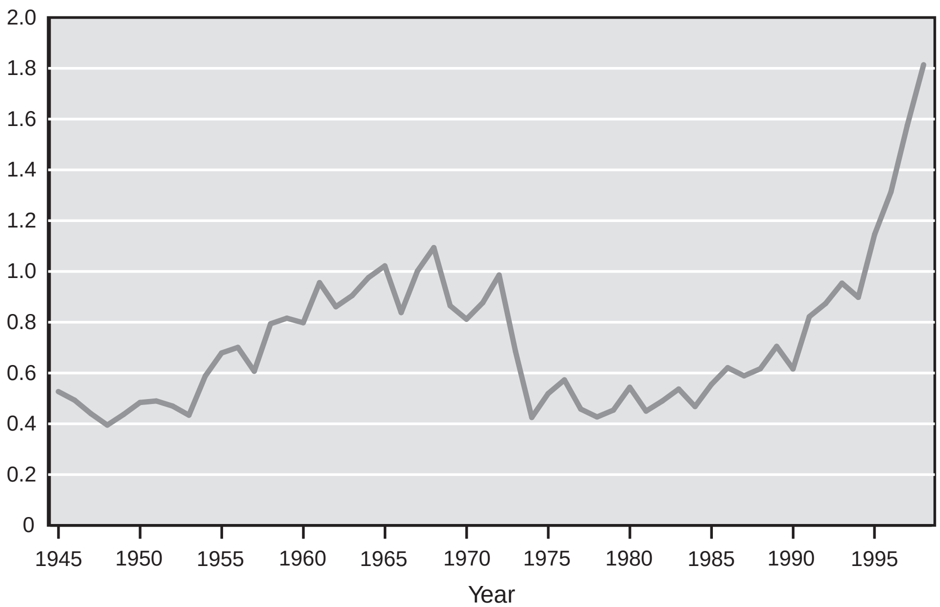
The inconsistency of current share prices and 7.0 percent real returns, given OCACT's assumptions for GDP growth, can be illustrated in two ways. The first way is to project the ratio of the stock market's value to GDP, starting with today's values and given assumptions about the future. The second way is to ask what must be true if today's values represent a steady state in the ratio of stock values to GDP.

Chart 1.
Price-dividend ratio and price-earnings ratio, 1871-1998



Source: Robert Shiller, Yale University. Available at www.econ.yale.edu/~shiller/data/chapt26.html.
Note: These ratios are based on Standard and Poor's Composite Stock Price Index.

Chart 2.
Ratio of market value of stocks to gross domestic product,1945-1998



Source: Bureau of Economic Analysis data from the national income and product accounts and federal flow of funds.

The first calculation requires assumptions for stock returns, adjusted dividends (dividends plus net share repurchases),[27] and GDP growth. For stock returns, the 7.0 percent assumption is used. For GDP growth rates, OCACT's projections are used. For adjusted dividends, one approach is to assume that the ratio of the aggregate adjusted dividend to GDP would remain the same as the current level. However, as discussed in the accompanying box, the current ratio seems too low to use for projection purposes. Even adopting a higher, more plausible level of adjusted dividends, such as 2.5 percent or 3.0 percent, leads to an implausible rise in the ratio of stock value to GDP—in this case, a more than 20-fold increase over the next 75 years. The calculation derives each year's capital gains by subtracting projected adjusted dividends from the total cash flow to shareholders needed to return 7.0 percent on that year's share values. (See Appendix A for an alternative method of calculating this ratio using a continuous-time differential equation.)

A second way to consider the link between stock market value, stock returns, and GDP is to look at a steady-state relationship. The Gordon formula says that stock returns equal the ratio of adjusted dividends to prices (or the adjusted dividend yield) plus the growth rate of stock prices.[28] In a steady state, the growth rate of prices can be assumed to equal that of GDP. Assuming an adjusted dividend yield of roughly 2.5 percent to 3.0 percent and projected GDP growth of 1.5 percent, the Gordon equation implies a stock return of roughly 4.0 percent to 4.5 percent, not 7.0 percent. Those lower values would imply an equity premium of 1.0 percent to 1.5 percent, given OCACT's assumption of a 3.0 percent yield on Treasury bonds. Making the equation work with a 7.0 percent stock return, assuming no change in projected GDP growth, would require an adjusted dividend yield of roughly 5.5 percent—about double today's level.[29]

For such a large jump in the dividend yield to occur, one of two things would have to happen—adjusted dividends would have to grow much more rapidly than the economy, or stock prices would have to grow much less rapidly than the economy (or even decline). But a consistent projection would take a very large jump in adjusted dividends, assuming that stock prices grew along with GDP starting at today's value. Estimates of recent values of the adjusted dividend yield range from 2.10 percent to 2.55 percent (Dudley and others 1999; Wadhwani 1998).[30]

Even with reasons for additional growth in the dividend yield, which are discussed in the box on projecting future dividends, an implausible growth of adjusted dividends is needed if the short- and long-term returns on stocks are to be 7.0 percent. Moreover, historically, very low values of the dividend yield and earnings-price ratio have been followed primarily by adjustments in stock prices, not in dividends and earnings (Campbell and Shiller 1998).

If the ratio of aggregate adjusted dividends to GDP is unlikely to change substantially, there are three ways out of the internal inconsistency between the market's current value and OCACT's assumptions for economic growth and stock returns. One can:

- Assume higher GDP growth, which would decrease the implausibility of the calculations described above for either the ratio of market value to GDP or the steady state under the Gordon equation. (The possibility of more rapid GDP growth is not explored further in this article.[31])

Projecting Future Adjusted Dividends

This article uses the concept of adjusted dividends to estimate the dividend yield. The adjustment begins by adding the value of net share repurchases to actual dividends, since that also represents a cash flow to stockholders in aggregate. A further adjustment is then made to reflect the extent to which the current situation might not be typical of the relationship between dividends and gross domestic product (GDP) in the future. Three pieces of evidence suggest that the current ratio of dividends to GDP is abnormally low and therefore not appropriate to use for projection purposes.

First, dividends are currently very low relative to corporate earnings—roughly 40 percent of earnings compared with a historical average of 60 percent. Because dividends tend to be much more stable over time than earnings, the dividend-earnings ratio declines in a period of high growth of corporate earnings. If future earnings grow at the same rate as GDP, dividends will probably grow faster than GDP to move toward the historical ratio.[1] On the other hand, earnings, which are high relative to GDP, might grow more slowly than GDP. But then, corporate earnings, which have a sizable international component, might grow faster than GDP.

Second, corporations are repurchasing their outstanding shares at a high rate. Liang and Sharpe (1999) report on share repurchases by the 144 largest (nonbank) firms in the Standard and Poor's 500. From 1994 to 1998, approximately 2 percent of share value was repurchased, although Liang and Sharpe anticipate a lower value in the future. At the same time, those firms were issuing shares because employees were exercising stock options at prices below the share values, thus offsetting much of the increase in the number of shares outstanding. Such transfers of net wealth to employees presumably reflect past services. In addition, initial public offerings (IPOs) represent a negative cash flow from stockholders as a whole. Not only the amount paid for stocks but also the value of the shares held by insiders represents a dilution relative to a base for long-run returns on all stocks. As a result, some value needs to be added to the current dividend ratio to adjust for net share repurchases, but the exact amount is unclear. However, in part, the high rate of share repurchase may be just another reflection of the low level of dividends, making it inappropriate to both project much higher dividends in the near term and assume that all of the higher share repurchases will continue. Exactly how to project current numbers into the next decade is not clear.

Finally, projected slow GDP growth, which will plausibly lower investment levels, could be a reason for lower retained earnings in the future. A stable level of earnings relative to GDP and lower retained earnings would increase the ratio of adjusted dividends to GDP.[2]

In summary, the evidence suggests using an "adjusted" dividend yield that is larger than the current level. Therefore, the illustrative calculations in this article use adjusted dividend yields of 2.0 percent, 2.5 percent, 3.0 percent, and 3.5 percent. (The current level of dividends without adjustment for share repurchases is between 1.0 percent and 2.0 percent.)

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[1] For example, Baker and Weisbrot (1999) appear to make no adjustment for share repurchases or for current dividends being low. However, they use a dividend payout of 2.0 percent, while Dudley and others (1999) report a current dividend yield on the Wilshire 5000 of 1.3 percent.

[2] Firms might change their overall financing package by changing the fraction of net earnings they retain. The implications of such a change would depend on why they were making it. A long-run decrease in retained earnings might merely be increases in dividends and borrowing, with investment held constant. That case, to a first approximation, is another application of the Modigliani-Miller theorem, and the total stock value would be expected to fall by the decrease in retained earnings. Alternatively, a change in retained earnings might signal a change in investment. Again, there is ambiguity. Firms might be retaining a smaller fraction of earnings because investment opportunities were less attractive or because investment had become more productive. These issues tie together two parts of the analysis in this article. If slower growth is associated with lower investment that leaves the return on capital relatively unchanged, then what financial behavior of corporations is required for consistency? Baker (1999b) makes such a calculation; it is not examined here.

- Adopt a long-run stock return that is considerably less than 7.0 percent.
- Lower the rate of return during an intermediate period so that a 7.0 percent return could be applied to a lower market value base thereafter.

A combination of the latter two alternatives is also possible.

In considering the prospect of a near-term market decline, the Gordon equation can be used to compute the magnitude of the drop required over, for example, the next 10 years in order for stock returns to average 7.0 percent over the remaining 65 years of OCACT's projection period (see Appendix B). A long-run return of 7.0 percent would require a drop in real prices of between 21 percent and 55 percent, depending on the assumed value of adjusted dividends (Table 3).[32] That calculation is relatively sensitive to the assumed rate of return—for example, with a long-run return of 6.5 percent, the required drop in the market falls to a range of 13 percent to 51 percent.[33]

The two different ways of restoring consistency—a lower stock return in all years or a near-term decline followed by a return to the historical yield—have different implications for Social Security finances. To illustrate the difference, consider the contrast between a scenario with a steady yield of 4.25 percent derived by using current values for the Gordon equation as described above (the steady-state scenario) and a scenario in which stock prices drop by half immediately and the yield on stocks is 7.0 percent thereafter (the market-correction scenario).[34] First, dollars newly invested in the future (that is, after any drop in share prices) earn only 4.25 percent per year under the steady-state scenario, compared with 7.0 percent per year under the market-correction scenario. Second, even for dollars currently in the market, the long-run yield differs under the two scenarios when the returns on stocks are being reinvested.

Under the steady-state scenario, the yield on dollars currently in the market is 4.25 percent per year over any projected time period; under the market-correction scenario, the annual rate of return depends on the time horizon used for the calculation.[35] After one year, the latter scenario has a rate of return of –46 percent. By the end of 10 years, the annual rate of return with the latter scenario is –0.2 percent; by the end of 35 years, 4.9 percent; and by the end of 75 years, 6.0 percent. Proposals for Social Security generally envision a gradual buildup of stock investments, which suggests that those investments would fare better under the market-correction scenario. The importance of the difference between scenarios depends also on the choice of additional changes to Social Security, which affect how long the money can stay invested until it is needed to pay benefits.

Given the different impacts of these scenarios, which one is more likely to occur? The key issue is whether the current stock market is overvalued in the sense that rates of return are likely to be lower in the intermediate term than in the long run. Economists have divergent views on this issue.

Table 3.
Required percentage decline in real stock prices over the next 10 years to justify a return of 7.0, 6.5, and 6.0 percent thereafter

	Percentage decline to justify a long-run return of—		
Adjusted dividend yield	7.0	6.5	6.0
2.0	55	51	45
2.5	44	38	31
3.0	33	26	18
3.5	21	13	4

Source: Author's calculations.
Note: Derived from the Gordon formula. Dividends are assumed to grow in line with gross domestic product (GDP), which the Office of the Chief Actuary (OCACT) assumes is 2.0 percent over the next 10 years. For long-run GDP growth, OCACT assumes 1.5 percent.

One possible conclusion is that current stock prices signal a significant drop in the long-run required equity premium. For example, Glassman and Hassett (1999) have argued that the equity premium will be dramatically lower in the future than it has been in the past, so that the current market is not overvalued in the sense of signaling lower returns in the near term than in the long run.[36] Indeed, they even raise the possibility that the market is "undervalued" in the sense that the rate of return in the intermediate period will be higher than in the long run, reflecting a possible continuing decline in the required equity premium. If their view is right, then a 7.0 percent long-run return, together with a 4.0 percent equity premium, would be too high.

Others argue that the current stock market values include a significant price component that will disappear at some point, although no one can predict when or whether it will happen abruptly or slowly. Indeed, Campbell and Shiller (1998) and Cochrane (1997) have shown that when stock prices (normalized by earnings, dividends, or book values) have been far above historical ratios, the rate of return over the following decade has tended to be low, and the low return is associated primarily with the price of stocks, not the growth of dividends or earnings.[37] Thus, to project a steady rate of return in the future, one needs to argue that this historical pattern will not repeat itself. The values in Table 3 are in the range suggested by the historical relationship between future stock prices and current price-earnings and price-dividend ratios (see, for example, Campbell and Shiller 1998).

Therefore, either the stock market is overvalued and requires a correction to justify a 7.0 percent return thereafter, or it is correctly valued and the long-run return is substantially lower than 7.0 percent. (Some combination of the two is also possible.) Under either scenario, stock returns would be lower than 7.0 percent for at least a portion of the next 75 years. Some evidence suggests, however, that investors have not adequately considered that possibility.[38] The former view is more convincing, since accepting the “correctly valued” hypothesis implies an implausibly small long-run equity premium. Moreover, when stock values (compared with earnings or dividends) have been far above historical ratios, returns over the following decade have tended to be low. Since this discussion has no direct bearing on bond returns, assuming a lower return for stocks over the near- or long-term also means assuming a lower equity premium.

In short, given current stock values, a constant 7.0 percent return is not consistent with OCACT’s projected GDP growth.[39] However, OCACT could assume lower returns for a decade, followed by a return equal to or about 7.0 percent.[40] In that case, OCACT could treat equity returns as it does Treasury rates, using different projection methods for the first 10 years and for the following 65. This conclusion is not meant to suggest that anyone is capable of predicting the timing of annual stock returns, but rather that this is an approach to financially consistent assumptions. Alternatively, OCACT could adopt a lower rate of return for the entire 75-year period.

Marginal Product of Capital and Slow Growth

In its long-term projections, OCACT assumes a slower rate of economic growth than the U.S. economy has experienced over an extended period. That projection reflects both the slowdown in labor force growth expected over the next few decades and the slowdown in productivity growth since 1973.[41] Some critics have suggested that slower growth implies lower projected rates of return on both stocks and bonds, since the returns to financial assets must reflect the returns on capital investment over the long run. That issue can be addressed by considering either the return to stocks directly, as discussed above, or the marginal product of capital in the context of a model of economic growth.[42]

For the long run, the returns to financial assets must reflect the returns on the physical assets that support the financial assets. Thus, the question is whether projecting slower economic growth is a reason to expect a lower marginal product of capital. As noted above, this argument speaks to rates of return generally, not necessarily to the equity premium.

The standard (Solow) model of economic growth implies that slower long-run economic growth with a constant savings rate will yield a lower marginal product of capital, and the relationship may be roughly point-for-point (see Appendix C). However, the evidence suggests that savings rates are not unaffected by growth rates. Indeed, growth may be more important for savings rates than savings are for growth rates. Bosworth and Burtless (1998) have observed that savings rates and long-term rates of income growth have a persistent positive association, both across countries and over time. That observation suggests that if future economic growth is slower than in the past, savings will also be lower. In the Solow model, low savings raise the marginal product of capital, with each percentage-point decrease in the savings rate increasing the marginal product by roughly one-half of a percentage point in the long run. Since growth has fluctuated in the past, the stability in real rates of return to stocks, as shown in Table 1, suggests an offsetting savings effect, preserving the stability in the rate of return.[43]

Focusing directly on demographic structure and the rate of return rather than on labor force growth and savings rates, Poterba (1998) does not find a robust relationship between demographic structure and asset returns. He does recognize the limited power of statistical tests based on the few "effective degrees of freedom" in the historical record. Poterba suggests that the connection between demography and returns is not simple and direct, although such a connection has been raised as a possible reason for high current stock values, as baby boomers save for retirement, and for projecting low future stock values, as they finance retirement consumption. Goyal (1999) estimates equity premium regressions and finds that changes in population age structure add significant explanatory power. Nevertheless, using a vector autoregression approach, his analysis predicts no significant increase in *average* outflows over the next 52 years. That occurs despite the retirement of baby boomers. Thus, both papers reach the same conclusion—that demography is not likely to effect large changes in the long-run rate of return.

Another factor to consider in assessing the connection between growth and rates of return is the increasing openness of the world economy. Currently, U.S. corporations earn income from production and trade abroad, and individual investors, while primarily investing at home, also invest abroad. It is not clear that putting the growth issue in a global context makes much difference. On the one hand, since other advanced economies are also aging, increased economic connections with other advanced countries do not alter the basic analysis. On the other hand, although investment in the less-developed countries may preserve higher rates, it is not clear either how much investment opportunities will increase or how to adjust for political risk. Increasing openness further weakens the argument for a significant drop in the marginal product of capital, but the opportunities abroad may or may not be realized as a better rate of return.

On balance, slower projected growth may reduce the return on capital, but the effect is probably considerably less than one-for-one. Moreover, this argument relates to the overall return to capital in an economy, not just stock returns. Any impact would therefore tend to affect returns on both stocks and bonds similarly, with no directly implied change in the equity premium.[44]

V. Other Issues

This paper has considered the gross rate of return to equities and the equity premium generally. Two additional issues arise in considering the prospect of equity investment for Social Security: how gross returns depend on investment strategy and how they differ from net returns; and the degree of risk associated with adding stock investments to a current all-bond portfolio.

Gross and Net Returns

A gross rate of return differs from a net return because it includes transactions costs such as brokerage charges, bid-ask spreads, and fees for asset management.[45]

If the Social Security trust fund invests directly in equities, the investment is likely to be in an index fund representing almost all of the equities outstanding in the United States. Thus, the analysis above holds for that type of investment. Although some critics have expressed concern that political influence might cause deviations from a broad-based indexing strategy, the evidence suggests that such considerations would have little impact on the expected rate of return (Munnell and Sundén 1999).

If the investment in stocks is made through individual accounts, then individuals may be given some choice either about the makeup of stock investment or about varying the mix of stocks and bonds over time. In order to consider the rate of return on stocks held in such individual accounts, one must consider the kind of portfolio choices individuals might make, both in the composition of the stock portfolio and in the timing of purchases and sales. Given the opportunity, many individuals would engage in numerous transactions, both among stocks and between stocks and other assets (attempts to time the market).

The evidence suggests that such transactions reduce gross returns relative to risks, even before factoring in transactions costs (Odean 1998). Therefore, both the presence of individual accounts with choice and the details of their regulation are likely to affect gross returns. On average, individual accounts with choice are likely to have lower gross returns from stocks than would direct trust fund investment.

Similarly, the cost of administration as a percentage of managed assets varies depending on whether there are individual accounts and how they are organized and regulated (National Academy of Social Insurance 1998; Diamond 2000). Estimates of that cost vary from 0.5 basis points for direct trust fund investment to 100 to150 basis points for individually organized individual accounts, with government-organized individual accounts somewhere in between.

Investment Risk of Stocks

The Office of the Chief Actuary's projections are projections of plausible long-run scenarios (ignoring fluctuations). As such, they are useful for identifying a sizable probability of future financial needs for Social Security. However, they do not address different probabilities for the trust fund's financial condition under different policies.[46] Nor are they sufficient for normative evaluation of policies that have different distributional or risk characteristics.

Although investment in stocks entails riskiness in the rate of return, investment in Treasury bonds also entails risk. Therefore, a comparison of those risks should consider the distribution of outcomes—concern about risk should not be separated from the compensation for bearing risk. That is, one needs to consider the probabilities of both doing better and doing worse as a result of holding some stocks. Merely observing that stocks are risky is an inadequate basis for policy evaluations. Indeed, studies of the historical pattern of returns show that portfolio risk decreases when some stocks are added to a portfolio consisting only of nominal bonds (Siegel 1998). Furthermore, many risks affect the financial future of Social Security, and investing a small portion of the trust fund in stocks is a small risk for the system as a whole relative to economic and demographic risks (Thompson 1998).

As long as the differences in risk and expected return are being determined in a market and reflect the risk aversion of market participants, the suitability of the trust fund's portfolio can be considered in terms of whether Social Security has more or less risk aversion than current investors. Of course, the "risk aversion" of Social Security is a derived concept, based on the risks to be borne by future beneficiaries and taxpayers, who will incur some risk whatever portfolio Social Security holds. Thus, the question is whether the balance of risks and returns looks better with one portfolio than with another. The answer is somewhat complex, since it depends on how policy changes in taxes and benefits respond to economic and demographic outcomes. Nevertheless, since individuals are normally advised to hold at least some stocks in their own portfolios, it seems appropriate for Social Security to also hold some stocks when investing on their behalf, at least in the long run, regardless of the rates of return used for projection purposes (Diamond and Geanakoplos 1999).[47]

VI. Conclusion

Of the three main bases for criticizing OCACT's assumptions, by far the most important one is the argument that a constant 7.0 percent stock return is not consistent with the value of today's stock market and projected slow economic growth. The other two arguments—pertaining to developments in financial markets and the marginal product of capital—have merit, but neither suggests a dramatic change in the equity premium.

Given the high value of today's stock market and an expectation of slower economic growth in the future, OCACT could adjust its stock return projections in one of two ways. It could assume a decline in the stock market sometime over the next decade, followed by a 7.0 percent return for the remainder of the projection period. That approach would treat equity returns like Treasury rates, using different short- and long-run projection methods for the first 10 years and the following 65 years. Alternatively, OCACT could adopt a lower rate of return for the entire 75-year period. That approach may be more acceptable politically, but it obscures the expected pattern of returns and may produce misleading assessments of alternative financing proposals, since the appropriate uniform rate to use for projection purposes depends on the investment policy being evaluated.

Notes

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[1] This 7.0 percent real rate of return is gross of administrative charges.

[2] To generate short-run returns on stocks, the Social Security Administration's Office of the Chief Actuary (OCACT) multiplied the ratio of one plus the ultimate yield on stocks to one plus the ultimate yield on bonds by the annual bond assumptions in the short run.

[3] An exception was the use of 6.75 percent for the President's proposal evaluated in a memorandum on January 26, 1999.

[4] This report is formally called the *1999 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds.*

[5] For OCACT's short-run bond projections, see Table II.D.1 in the 1999 Social Security Trustees Report.

[6] This article was written in the summer of 1999 and uses numbers appropriate at the time. The 2000 Trustees Report uses the same assumptions of 6.3 percent for the nominal interest rate and 3.3 percent for the annual percentage change in the consumer price index. The real wage is assumed to grow at 1.0 percent, as opposed to 0.9 percent in the 1999 report.

[7] See, for example, Baker (1999a) and Baker and Weisbrot (1999). This article only considers return assumptions given economic growth assumptions and does not consider growth assumptions.

[8] This article does not analyze the policy issues related to stock market investment either by the trust fund or through individual accounts. Such an analysis needs to recognize that higher expected returns in the U.S. capital market come with higher risk. For the issues relevant for such a policy analysis, see National Academy of Social Insurance (1998).

[9] Ideally, one would want the yield on the special Treasury bonds held by Social Security. However, this article simply refers to published long-run bond rates.

[10] Because annual rates of return on stocks fluctuate so much, a wide band of uncertainty surrounds the best statistical estimate of the average rate of return. For example, Cochrane (1997) notes that over the 50 years from 1947 to 1996, the excess return of stocks over Treasury bills was 8 percent, but, assuming that annual returns are statistically independent, the standard statistical confidence interval extends from 3 percent to 13 percent. Using a data set covering a longer period lowers the size of the confidence interval, provided one is willing to assume that the stochastic process describing rates of return is stable for the longer period. This article is not concerned with that uncertainty, only with the appropriate rate of return to use for a central (or intermediate) projection. For policy purposes, one must also look at stochastic projections (see, for example, Copeland, VanDerhei, and Salisbury 1999; and Lee and Tuljapurkar 1998). Despite the value of stochastic projections, OCACT's central projection plays an important role in thinking about policy and in the political process. Nevertheless, when making a long-run projection, one must realize that great uncertainty surrounds any single projection and the relevance of returns in any short period of time.

[11] Table 2 also shows the equity premiums relative to Treasury bills. Those numbers are included only because they arise in other discussions; they are not referred to in this article.

[12] For determining the equity premium shown in Table 2, the rate of return is calculated assuming that a dollar is invested at the start of a period and the returns are reinvested until the end of the period. In contrast to that geometric average, an arithmetic average is the average of the annual rates of return for each of the years in a period. The arithmetic average is larger than the geometric average. Assume, for example, that a dollar doubles in value in year 1 and then halves in value from year 1 to year 2. The geometric average over the 2-year period is zero; the arithmetic average of +100 percent and –50 percent annual rates of return is +25 percent. For projection purposes, one looks for an estimated rate of return that is suitable for investment over a long period. Presumably the best approach would be to take the arithmetic average of the rates of return that were each the geometric average for different historical periods of the same length as the average investment period within the projection period. That calculation would be close to the geometric average, since the variation in 35- or 40-year geometric

rates of return, which is the source of the difference between arithmetic and geometric averages, would not be so large.

[13] In considering recent data, some adjustment should be made for bond rates being artificially low in the 1940s as a consequence of war and postwar policies.

[14] Also relevant is the fact that the real rate on 30-year Treasury bonds is currently above 3.0 percent.

[15] Finance theory relates the willingness to hold alternative assets to the expected risks and returns (in real terms) of the different assets, recognizing that expectations about risk and return are likely to vary with the time horizon of the investor. Indeed, time horizon is an oversimplification, since people are also uncertain about when they will want to have access to the proceeds of those investments. Thus, finance theory is primarily about the difference in returns to different assets (the equity premium) and needs to be supplemented by other analyses to consider the expected return to stocks.

[16] With Treasury bonds, investors can easily project future nominal returns (since default risk is taken to be virtually zero), although expected real returns depend on projected inflation outcomes given nominal yields. With inflation-protected Treasury bonds, investors can purchase bonds with a known real interest rate. Since those bonds were introduced only recently, they do not play a role in interpreting the historical record for projection purposes. Moreover, their importance in future portfolio choices is unclear.

[17] In theory, for determining asset prices at which markets clear, one wants to consider marginal investments. Those investments are made up of a mix of marginal portfolio allocations by all investors and by marginal investors who become participants (or nonparticipants) in the stock and/or bond markets.

[18] This conclusion does not contradict the Modigliani-Miller theorem. Different firms with the same total return distributions but different amounts of debt outstanding will have the same total value (stock plus bond) and so the same total expected return. A firm with more debt outstanding will have a higher expected return on its stock in order to preserve the total expected return.

[19] Consideration of equilibrium suggests an alternative approach to analyzing the historical record. Rather than looking at realized rates of return, one could construct estimates of expected rates of return and see how they have varied in the past. That approach has been taken by Blanchard (1993). He concluded that the equity premium (measured by expectations) was unusually high in the late 1930s and 1940s and, since the 1950s, has experienced a long decline from that unusually high level. The high realized rates of return over this period are, in part, a consequence of a decline in the equity premium needed for people to be willing to hold stocks. In addition, the real expected returns on bonds have risen since the 1950s, which should have moderated the impact of a declining equity premium on expected stock returns. Blanchard examines the importance of inflation expectations and attributes some of the recent trend to a decline in expected inflation. He concluded that the premium in 1993 appeared to be around 2 percent to 3 percent and would probably not move much if inflation expectations remain low. He also concluded that decreases in the equity premium were likely to involve both increases in expected bond rates and decreases in expected rates of return on stocks.

[20] If current cash returns to stockholders are expected to grow at rate g, with projected returns discounted at rate r, this fundamental value is the current return divided by $(r - g)$. If r is smaller, fluctuations in long-run projections of g result in larger fluctuations in the fundamental value.

[21] Several explanations have been put forth, including: (1) the United States has been lucky, compared with stock investment in other countries, and realized returns include a premium for the possibility that the U.S. experience might have been different; (2) returns to actual investors are considerably less than the returns on indexes that have been used in analyses; and (3) individual preferences are different from the simple models that have been used in examining the puzzle.

[22] The timing of realized returns that are higher than required returns is somewhat more complicated, since recognizing and projecting such a trend will tend to boost the price of equities when the trend is recognized, not when it is realized.

[23] Nonprofit institutions, such as universities, and defined benefit plans for public employees now hold more stock than in the past. Attributing the risk associated with that portfolio to the beneficiaries of those institutions would further expand the pool sharing in the risk.

[24] More generally, the equity premium depends on the investment strategies being followed by investors.

[25] This tendency, known as mean reversion, implies that a short period of above-average stock returns is likely to be followed by a period of below-average returns.

[26] To quantify the importance of these developments, one would want to model corporate behavior as well as

investor behavior. A decline in the equity premium reflects a drop to corporations in the "cost of risk" in the process of acquiring funds for risky investment. If the "price per unit of risk" goes down, corporations might respond by selecting riskier investments (those with a higher expected return), thereby somewhat restoring the equity premium associated with investing in corporations.

[27] In considering the return to an individual from investing in stocks, the return is made up of dividends and a (possible) capital gain from a rise in the value of the shares purchased. When considering the return to all investment in stocks, one needs to consider the entire cash flow to stockholders, including dividends and net share repurchases by the firms. That suggests two methods of examining the consistency of any assumed rate of return on stocks. One is to consider the value of all stocks outstanding. If one assumes that the value of all stocks outstanding grows at the same rate as the economy (in the long run), then the return to all stocks outstanding is that rate of growth plus the sum of dividends and net share repurchases, relative to total share value. Alternatively, one can consider ownership of a single share. The assumed rate of return minus the rate of dividend payment then implies a rate of capital gain on the single share. However, the relationship between the growth of value of a single share and the growth of the economy depends on the rate of share repurchase. As shares are being repurchased, remaining shares should grow in value relative to the growth of the economy. Either approach can be calculated in a consistent manner. What must be avoided is an inconsistent mix, considering only dividends and also assuming that the value of a single share grows at the same rate as the economy.

[28] Gordon (1962). For an exposition, see Campbell, Lo, and MacKinlay (1997).

[29] The implausibility refers to total stock values, not the value of single shares—thus, the relevance of net share repurchases. For example, Dudley and others (1999) view a steady equity premium in the range of 1.0 percent to 3.0 percent as consistent with current stock prices and their projections. They assume 3.0 percent GDP growth and a 3.5 percent real bond return, both higher than the assumptions used by OCACT. Wadhwani (1998) finds that if the S&P 500 is correctly valued, he has to assume a negative risk premium. He considers various adjustments that lead to a higher premium, with his "best guess" estimate being 1.6 percent. That still seems too low.

[30] Dudley and others (1999) report a current dividend yield on the Wilshire 5000 of 1.3 percent. They then make an adjustment that is equivalent to adding 80 basis points to that rate for share repurchases, for which they cite Campbell and Shiller (1998). Wadhwani (1998) finds a current expected dividend yield of 1.65 percent for the S&P 500, which he adjusts to 2.55 percent to account for share repurchases. For a discussion of share repurchases, see Cole, Helwege, and Laster (1996).

[31] Stock prices reflect investors' assumptions about economic growth. If their assumptions differ from those used by OCACT, then it becomes difficult to have a consistent projection that does not assume that investors will be surprised.

[32] In considering these values, note the observation that a fall of 20 percent to 30 percent in advance of recessions is typical for the U.S. stock market (Wadhwani 1998). With OCACT assuming a 27 percent rise in the price level over the next decade, a 21 percent decline in real stock prices would yield the same nominal prices as at present.

[33] The importance of the assumed growth rate of GDP can be seen by redoing the calculations in Table 3 for a growth rate that is one-half of a percent larger in both the short and long runs. Compared with the original calculations, such a change would increase the ratios by 16 percent.

[34] Both scenarios are consistent with the Gordon formula, assuming a 2.75 percent adjusted dividend yield (without a drop in share prices) and a growth of dividends of 1.5 percent per year.

[35] With the steady-state scenario, a dollar in the market at the start of the steady state is worth 1.0425^t dollars t years later, if the returns are continuously reinvested. In contrast, under the market-correction scenario, a dollar in the market at the time of the drop in prices is worth $(1/2)(1.07^t)$ dollars t years later.

[36] The authors appear to assume that the Treasury rate will not change significantly, so that changes in the equity premium and in the return to stocks are similar.

[37] One could use equations estimated on historical prices to check the plausibility of intermediate-run stock values with the intermediate-run values needed for plausibility for the long-run assumptions. Such a calculation is not considered in this article. Another approach is to consider the value of stocks relative to the replacement cost of the capital that corporations hold, referred to as Tobin's q. That ratio has fluctuated considerably and is currently unusually high. Robertson and Wright (1998) have analyzed the ratio and concluded that a cumulative real decline in the stock market over the first decades of the 21st century has a high probability.

[38] As Wadhwani (1998, p. 36) notes, "Surveys of individual investors in the United States regularly suggest that they expect returns above 20 percent, which is obviously unsustainable. For example, in a survey conducted by Montgomery Asset Management in 1997, the typical mutual fund investor expected annual returns from the

stock market of 34 percent over the next 10 years! Most U.S. pension funds operate under actuarial assumptions of equity returns in the 8-10 percent area, which, with a dividend yield under 2 percent and nominal GNP growth unlikely to exceed 5 percent, is again, unsustainably high."

[39] There is no necessary connection between the rate of return on stocks and the rate of growth of the economy. There is a connection among the rate of return on stocks, the current stock prices, dividends relative to GDP, and the rate of growth of the economy.

[40] The impact of such a change in assumptions on actuarial balance depends on the amount that is invested in stocks in the short term relative to the amount invested in the long term. The levels of holdings at different times depend on both the speed of initial investment and whether stock holdings are sold before very long (as would happen with no other policy changes) or whether, instead, additional policies are adopted that result in a longer holding period, possibly including a sustained sizable portfolio of stocks. Such an outcome would follow if Social Security switched to a sustained level of funding in excess of the historical long-run target of just a contingency reserve equal to a single year's expenditures.

[41] "The annual rate of growth in total labor force decreased from an average of about 2.0 percent per year during the 1970s and 1980s to about 1.1 percent from 1990 to 1998. After 1998 the labor force is projected to increase about 0.9 percent per year, on average, through 2008, and to increase much more slowly after that, ultimately reaching 0.1 percent toward the end of the 75-year projection period" (Social Security Trustees Report, p. 55). "The Trustees assume an intermediate trend growth rate of labor productivity of 1.3 percent per year, roughly in line with the average rate of growth of productivity over the last 30 years" (Social Security Trustees Report, p. 55).

[42] Two approaches are available to answer this question. Since the Gordon formula, given above, shows that the return to stocks equals the adjusted dividend yield plus the growth of stock prices, one needs to consider how the dividend yield is affected by slower growth. In turn, that relationship will depend on investment levels relative to corporate earnings. Baker (1999b) makes such a calculation, which is not examined here. Another approach is to consider the return on physical capital directly, which is the one examined in this article.

[43] Using the Granger test of causation (Granger 1969), Carroll and Weil (1994) find that growth causes saving but saving does not cause growth. That is, changes in growth rates tend to precede changes in savings rates but not vice versa. For a recent discussion of savings and growth, see Carroll, Overland, and Weil (2000).

[44] One can also ask how a change in policy designed to build and maintain a larger trust fund in a way that significantly increases national saving might affect future returns. Such a change would plausibly tend to lower rates of return. The size of that effect depends on the size of investment increases relative to available investment opportunities, both in the United States and worldwide. Moreover, it depends on the response of private saving to the policy, including the effect that would come through any change in the rate of return. There is plausibly an effect here, although this article does not explore it. Again, the argument speaks to the level of rates of return generally, not to the equity premium.

[45] One can also ask how changed policies might affect future returns. A change in portfolio policy that included stocks (whether in the trust fund or in individual accounts) would plausibly lower the equity premium somewhat. That effect could come about through a combination of a rise in the Treasury rate (thereby requiring a change in tax and/or expenditure policy) and a fall in expected returns on stocks. The latter depends on both the underlying technology of available returns to real investments and the effect of portfolio policy on national saving. At this time, research on this issue has been limited, although it is plausible that the effect is not large (Bohn 1998; Abel 1999; Diamond and Geanakoplos 1999).

[46] For stochastic projections, see Copeland, VanDerhei, and Salisbury (1999); and Lee and Tuljapurkar (1998). OCACT generally provides sensitivity analysis by doing projections with several different rates of return on stocks.

[47] Cochrane (1997, p. 32) reaches a similar conclusion relative to individual investment: "We could interpret the recent run-up in the market as the result of people finally figuring out how good an investment stocks have been for the last century, and building institutions that allow wise participation in the stock market. If so, future returns are likely to be much lower, but there is not much one can do about it but sigh and join the parade."

Bibliography

Abel, Andrew B. 1999. *The Social Security Trust Fund, The Riskless Interest Rate, and Capital Accumulation.* NBER Working Paper 6991. Cambridge, Mass.: National Bureau of Economic Research.

Advisory Council on Social Security. 1997. *Report of the 1994-1996 Advisory Council on Social Security*. Vol. 1, *Findings and Recommendations*. Washington, D.C.

Baker, Dean. 1998. "Saving Social Security in Three Steps." Briefing Paper, Economic Policy Institute, Washington, D.C.

_____. 1999a. "Two Cheers for Clinton's Social Security Plan." *The American Prospect,* Vol. 10, No. 44, pp. 82-85.

_____.1999b. Letter to Martin Feldstein, May 15. Available at www.preamble.org.

Baker, Dean, and Mark Weisbrot. 1999. *Social Security: The Phony Crisis*. Chicago, Ill.: University of Chicago Press.

Blanchard, Olivier J. 1993. "Movements in the Equity Premium." *Brookings Papers on Economic Activity*, No. 2, pp. 75-138.

Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds. 1999. *1999 Annual Report.* Washington, D.C.: U.S. Government Printing Office.

Bohn, Henning. 1998. "Social Security Reform and Financial Markets." In Federal Reserve Bank of Boston, *Social Security Reform: Links to Saving, Investment, and Growth*. Boston, Mass.: Federal Reserve Bank of Boston.

Bosworth, Barry, and Gary Burtless. 1998. "Social Security Reform in a Global Context." In Federal Reserve Bank of Boston, *Social Security Reform: Links to Saving, Investment, and Growth*. Boston, Mass.: Federal Reserve Bank of Boston.

Brav, Alon, and Christopher C. Geczy. 1996. "An Empirical Resurrection of the Simple Consumption CAPM with Power Utility." Working Paper, University of Chicago.

Campbell, John Y.; Andrew W. Lo; and A. Craig MacKinlay. 1997. *The Econometrics of Financial Markets*. Princeton, N.J.: Princeton University Press.

Campbell, John Y., and Robert J. Shiller. 1998. "Valuation Ratios and the Long-Run Stock Market Outlook." *Journal of Portfolio Management*, Vol. 24, No. 2, pp. 11-26.

Campbell, John Y., and Luis M. Viceira. 1999. "Consumption and Portfolio Decisions When Expected Returns Are Time Varying." *Quarterly Journal of Economics* (May), pp. 433-495.

Carroll, Christopher D.; Jody Overland; and David N. Weil. 2000. "Saving and Growth with Habit Formation." *American Economic Review*, Vol. 90, No. 3, pp. 341-355.

Carroll, Christopher D., and David N. Weil. 1994. "Saving and Growth: A Reinterpretation." *Carnegie-Rochester Conference Series on Public Policy,* No. 40, pp. 133-192.

Case, Karl E., and Robert J. Shiller. 1988. "The Behavior of Home Buyers in Boom and Post-Boom Markets." *New England Economic Review* (November/December), pp. 29-46.

Cochrane, John H. 1997. "Where is the Market Going? Uncertain Facts and Novel Theories." *Economic Perspectives,* Vol. 21, Federal Reserve Bank of Chicago. (Also published as NBER Working Paper 6207, Cambridge, Mass.: National Bureau of Economic Research.)

Cole, Kevin; Jean Helwege; and David Laster. 1996. "Stock Market Valuation Indicators: Is This Time Different?" *Financial Analysts Journal,* Vol. 52, No. 3, pp. 56-64.

Copeland, Craig; Jack VanDerhei; and Dallas L. Salisbury. 1999. *Social Security Reform: Evaluating Current Proposals: Latest Results of the EBRI SSASIM2 Policy Simulation Model*. EBRI Issue Brief 210. Washington, D.C.: Employee Benefit Research Institute.

Diamond, Peter. 1999. *Issues in Privatizing Social Security*. Cambridge, Mass.: MIT Press.

_______. 2000. "Administrative Costs and Equilibrium Charges with Individual Accounts." In *Administrative Aspects of Investment-Based Social Security Reform*, edited by John B. Shoven. Chicago and London: University of Chicago Press, pp. 137-162.

Diamond, Peter, and John Geanakoplos. 1999. *Social Security Investment in Equities I: Linear Case*. Working Paper 2. Center for Retirement Research at Boston College, Chestnut Hill, Mass.

Dudley, William; Jan Hatzius; Joanne Hill; Rajib Pal; and Maria Tsu. 1999. "An Analysis of Social Security Trust Fund Investment into Equities." Goldman Sachs Global Economics Paper 18, New York.

Glassman, James K., and Kevin A. Hassett. 1999. *Dow 36,000*. New York: Times Business.

Gordon, Myron. 1962. *The Investment, Financing, and Valuation of the Corporation.* Homewood, Ill.: Irwin.

Gordon, Roger. 1985. "Taxation of Corporate Capital Income: Tax Revenues versus Tax Distributions." *Quarterly Journal of Economics,* Vol. 100, No. 1, pp. 1-27.

Goyal, Amit. 1999. "Demographics, Stock Market Flows, and Stock Returns." Anderson Graduate School of Management, University of California at Los Angeles. Unpublished.

Granger, C.W.J. 1969. "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods." *Econometrica*, Vol. 37, No. 3, pp. 424-438.

Heaton, John, and Deborah Lucas. 2000. "Stock Prices and Fundamentals." In *NBER Macroeconomics Annual,* edited by Ben S. Bernanke and Julio Rotemberg. Cambridge, Mass.: MIT Press.

Investment Company Institute. 1999. *Mutual Fund Fact Book* (May), p. 22. Available at www.ici.org.

Kaplow, Louis. 1994. "Taxation and Risk-taking: A General Equilibrium Perspective." *National Tax Journal,* Vol. 47, pp. 789-798.

Kennickell, Arthur B.; Martha Starr-McCluer; and Annika Sundén. 1997. "Family Finances in the U.S.: Recent Evidence from the Survey of Consumer Finances." *Federal Reserve Bulletin,* Vol. 83 (June), pp. 1-24.

Lee, Ronald, and Shripad Tuljapurkar. 1998. "Stochastic Forecasts for Social Security." In *Frontiers in the Economics of Aging*, edited by David Wise. Chicago, Ill.: University of Chicago Press, pp. 393-420.

Liang, J. Nellie, and Steven A. Sharpe. 1999. "Share Repurchases and Employee Stock Options and Their Implications for S&P 500 Share Retirements and Expected Returns." Division of Research and Statistics, Federal Reserve Board, Washington, D.C. Unpublished.

Mehra, Rajnish, and Edward Prescott. 1985. "The Equity Premium Puzzle." *Journal of Monetary Economics*, Vol. 15, pp. 145-161.

Mankiw, N.G., and S. Zeldes. 1991. "The Consumption of Stockholders and Non-Stockholders." *Journal of Financial Economics*, Vol.17, pp. 211-219.

Munnell, Alicia, and Annika Sundén (with the assistance of Cynthia Perry and Ryan Kling). 1999. *Investment Practices of State and Local Pension Funds: Implications for Social Security*. Working Paper 1. Center for Retirement Research at Boston College, Chestnut Hill, Mass.

National Academy of Social Insurance. 1998. *Evaluating Issues in Privatizing Social Security.* Report of the Panel on Privatization of Social Security. Available at www.nasi.org and as Diamond 1999.

Odean, Terrance. 1998. "Do Investors Trade Too Much?" Graduate School of Management,University of California, Davis. Unpublished.

Philips, Thomas K. 1999. "Why Do Valuation Ratios Forecast Long-Run Equity Returns?" *Journal of Portfolio Management*, Vol. 25, No. 3, pp. 39-44.

Poterba, James M. 1998. "Population Age Structure and Asset Returns: An Empirical Investigation." Department of Economics, Massachusetts Institute of Technology, Cambridge, Mass. Unpublished.

Poterba, James M., and Andrew A. Samwick. 1995. "Stock Ownership Patterns, Stock Market Fluctuations, and Consumption." *Brookings Papers on Economic Activity*, No. 2, pp. 295-372.

Rea, John D., and Brian K. Reid. 1998. *Trends in the Ownership Cost of Equity Mutual Funds*. Perspective, Vol. 4, No. 3. Washington, D.C.: Investment Company Institute.

_______.1999. *Total Shareholder Cost of Bond and Money Market Mutual Funds*. Perspective, Vol. 5, No. 3. Washington, D.C.: Investment Company Institute.

Robertson, Donald, and Stephen Wright. 1998. "The Good News and the Bad News about Long-Run Stock Market Returns." Faculty of Economics and Politics, University of Cambridge. Unpublished.

Samuelson, Paul A. 1989. "A Case at Last for Age-Phased Reduction in Equity." *Proceedings of the National Academy of Sciences*, Vol. 86, pp. 9048-9051.

Shafir, Eldar; Peter Diamond; and Amos Tversky. 1997. "Money Illusion." *Quarterly Journal of Economics*, Vol. 112, No. 2, pp. 341-374.

Sharpe, Steven. 1999. "Stock Prices, Expected Returns, and Inflation." Federal Reserve Board, Washington, D.C. Unpublished.

Siegel, Jeremy J. 1998. *Stocks for the Long Run*. New York: McGraw Hill, p. 318.

_______. 1999. "The Shrinking Equity Premium: Historical Facts and Future Forecasts." Wharton School, University of Pennsylvania, Philadelphia, Pa. Unpublished.

Thompson, Lawrence. 1998. *Older and Wiser: The Economics of Public Pensions*. Washington, D.C.: Urban Institute Press.

Vissing-Jorgensen, Annette. 1997. "Limited Stock Market Participation." Department of Economics, Massachusetts Institute of Technology, Cambridge, Mass. Unpublished.

Wadhwani, Sushil B. 1998. "The U.S. Stock Market and the Global Economic Crisis." Tudor Investment Corporation, New York. Unpublished.

Appendix A:

Alternative Method for Determining the Ratio of Stock Value to GDP

Variables

r …… rate of return on stocks
g …… rate of growth of both GDP and dividends
a …… adjusted dividend yield at time 0
$P(t)$ … aggregate stock value at time t
$Y(t)$ … GDP at time t
$D(t)$ … dividends at time t

Equations

$$Y(t) = Y(0)e^{gt}$$

$$D(t) = D(0)e^{gt} = aP(0)e^{gt}$$

$$dP(t)/dt = rP - D(t) = rP - aP(0)e^{gt}$$

Solving the differential equation, we have:

$$\begin{aligned} P(t) &= P(0)\{(r-g-a)e^{rt} + ae^{gt}\}/(r-g) \\ &= P(0)\{e^{rt} - (a/(r-g))(e^{rt} - e^{gt})\} \end{aligned}$$

Taking the ratio of prices to GDP, we have:

$$\begin{aligned} P(t)/Y(t) &= \{P(0)/Y(0)\}\{(r-g-a)e^{(r-g)t} + a\}/(r-g) \\ &= \{P(0)/Y(0)\}\{(e^{(r-g)t} - (a/(r-g))(e^{(r-g)t} - 1)\} \end{aligned}$$

Consistent with the Gordon formula, a constant ratio of P/Y (that is, a steady state) follows from $r = g + a$. As a non-steady-state example—with values of .07 for r, .015 for g, and .03 for a—$P(75)/Y(75) = 28.7P(0)/Y(0)$.

Appendix B:

Calculation Using the Gordon Equation

In discrete time, once we are in a steady state, the Gordon growth model relates a stock price P at time t to the expected dividend D in the following period, the rate of growth of dividends G, and the rate of return on the stock R. Therefore, we have:

$$P_t = D_{t+1}/(R-G) = (1+G)D_t/(R-G)$$

We denote values after a decade (when we are assumed to be in a steady state) by P' and D' and use an "adjusted" initial dividend that starts at a ratio X times current stock prices. Thus, we assume that dividends grow at the rate G from the "adjusted" current value for 10 years, where G coincides with GDP growth over the decade. We assume that dividends grow at G' thereafter, which coincides with long-run GDP growth. Thus, we have:

$$\begin{aligned} P'/P &= (1+G')D'/((R-G')P) \\ &= (1+G')D(1+G)^{10}/((R-G')P) \\ &= X(1+G')(1+G)^{10}/(R-G') \end{aligned}$$

For the basic calculation, we assume that R is .07, G is .02, G' is .015. In this case, we have:

$$P'/P = 22.5X$$

Thus, for initial ratios of adjusted dividends to stock prices of .02, .025, .03, and .035, P'/P equals .45, .56, .67 and .79, respectively. Subtracting those numbers from 1 yields the required decline in the real value of stock prices as shown in the first column of Table 3. Converting them into nominal values by multiplying by 1.27, we have values of .57, .71, and .86. If the long-run stock return is assumed to be 6.5 percent instead of 7.0 percent, the ratio P'/P is higher and the required decline is smaller. Increasing GDP growth also reduces the required decline. Note that the required declines in stock values in Table 3 is the decline in real values; the decline in nominal terms would be less.

Appendix C:

A Cobb-Douglas Solow Growth Model in Steady State

Variables

Y .... output
K .... capital
L .... labor
a .... growth rate of Solow residual
g .... growth rate of both K and Y
n .... growth rate of labor
b .... share of labor
s .... savings rate
c .... depreciation rate
$MP(K)$ ... marginal product of capital

Equations

$$\log[Y] = at + b\log[L] + (1 - b)\log[K]$$
$$(dL/dt)/L = n$$
$$(dY/dt)/Y = (dK/dt)/K = g$$
$$dK/dt = sY - cK$$
$$(dK/dt)/K = sY/K - c$$
$$Y/K = (g + c)/s$$
$$MP(K) = (1 - b)Y/K = (1 - b)(g + c)/s$$
$$g = a + bn + (1 - b)g$$
$$g = (a + bn)/b$$
$$MP(K) = (1 - b)\{(a + bn)/(bs) + c/s\}$$
$$dMP(K)/da = (1 - b)/(bs)$$
$$dg/da = 1/b$$

Assume that the share of labor is .75 and the gross savings rate is .2. Then the change in the marginal product of capital from a change in the growth rate is:

(Note that these are gross savings, not net savings. But the corporate income tax reduces the return to savers relative to the return to corporate capital, so the derivative should be multiplied by roughly 2/3.)

$$dMP(K)/dg = (dMP(K)/da)/(dg/da) = (1 - b)/s == .25/.2$$

Similarly, we can consider the effect of a slowdown in labor force growth on the marginal product of capital:

$$dMP(K)/dn = (1-b)/s$$

$$dg/dn = 1$$

$$dMP(K)/dg = (dMP(K)/dn)/(dg/dn) = (1-b)/s == .25/.2$$

(This is the same expression as when the slowdown in economic growth comes from a drop in technical progress.)

Turning to the effects of changes in the savings rate, we have:

$$dMP(K)/ds = -MP(K)/s == .5$$

Thus, the savings rate has a large impact on the marginal product of capital as well.

Both of these effects are attenuated to the extent that the economy is open and rates of return in the United States change less because some of the effect occurs abroad.

What Are Reasonable Long-Run Rates of Return to Expect on Equities?

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July 20, 2001

I. Introduction

The average inflation-adjusted rate of return on large capitalization stocks from 1926-2000 was 9.7 percent (Ibbotson (2001)). Over the same period of time, the average real return on Treasury Bills was 0.8 percent while it was 2.7 percent on long-term U.S. government bonds. The premium of stocks over long-term government bonds was 7.0 percent.[1]

The question of interest is not what happened in the past, but what is likely to happen over the next fifty or seventy-five years. Will stocks once again outperform bonds by 7 percent? One needs to be humble when predicting the stock market, although ironically it may be easier to look further into the future than it is to predict what will happen over the next few months or years. In the very long-run, stock returns are more likely to be driven by fundamentals, while in the short-run price movements can appear to have a life of their own.

There are a number of reasons to expect the return on stocks and the premium of the return of stocks over bonds to be lower than over the last three-fourths of the twentieth century. This paper reviews those reasons and concludes with an estimate of the expected long-run real rate of return for equities and an implied equity premium.

II. Dividends Are Obsolete

Traditional equity valuation models (Gordon(1962)) are based on the value of shares being equal to the present value of future dividends. This leads to the result that the expected return to holding stocks is equal to the current dividend yield plus the growth rate in dividend payments. This basic structure is behind most analysis of long-run stock returns today (see, for example, Campbell and Shiller (2001)). The problem with this framework is that dividends are only one way for the corporate sector to transfer money to shareholders and a particularly tax inefficient way at that (Shoven (1987)). Dividend payments are fully taxable for investors who do not have their equity sheltered in pension accounts or other tax deferred or exempt vehicles. In contrast, companies can buy their own shares from their shareholders and achieve the same cash transfer with much lower taxation. With a share repurchase, some of the money is treated as a return of basis and the rest is treated as a capital gain. The tax saving can be enormous. Companies began to take advantage of share repurchases in a significant way in the mid-1980s. In recent years the

[1] All of these numbers are arithmetic averages. The geometric mean real return on large capitalization stocks was 7.7%, whereas it was 2.2% on long-term government bonds. The geometric premium of stocks over long-term government bonds was thus 5.5%.

aggregate amount of share repurchases has exceeded dividends and is currently running at about \$150 billion per year (Liang and Sharpe (1999)). Clearly share repurchases can no longer be treated as a footnote in a story primarily concerned with dividends as a mechanism for transferring cash to shareholders. Companies can also buy the shares of other companies. The extreme form of this is a cash merger. Once again, cash is transferred from companies to shareholders, affecting the valuation of shares. While it is hard to get precise information on the amounts involved, the cash transferred to shareholders via cash mergers is almost certainly even larger than the amount in share repurchases. The point of this is to emphasize that dividends are a choice variable and dividend-price ratios should not be a fundamental building block of share valuation or long-run shareholder return. In fact, it is not clear that companies founded in the 1980s and later will ever pay dividends in the same way as older companies.

III. The Model

The original Gordon model had the intrinsic value of the firm depending on dividends and the growth rate of dividends such that

$$V = \frac{D}{k - g}$$
$$or$$
$$k = \frac{D}{V} + g$$

where $\boldsymbol{V}$ is the intrinsic value of the equity, $\boldsymbol{D}$ is the cash dividends, $\boldsymbol{k}$ is capital asset pricing model required rate of return for equity of this risk class, and $\boldsymbol{g}$ is the growth rate of dividends.

The modernized Gordon model can be represented as

$$k = \theta\frac{E}{P} + (1 - \theta)\rho$$

where $\boldsymbol{k}$ is the expected real return to equity, θ is the fraction of earnings paid out to shareholders via dividends or share repurchases, $\boldsymbol{E}$ is earnings per share, $\boldsymbol{P}$ is the current share price and ρ is the ROE (return on equity).[2] The first right hand side term replaces the dividend yield of the Gordon model with the cash-from-earnings yield including share repurchases. The second term on the right hand side is simply the growth rate of future cash flows and indicates that it depends on the amount of retained earnings and the rate of return associated with those retained earnings.[3] This equation is an identity if the various parameters in it remain constant. On the other hand, the observed realized rate of return to holding equity can deviate widely from the value given in the equation if the parameters (particularly the earnings-price ratio) change.

[2] Share repurchases can be added to the cash flow yield as in the equation in the paper or added to the growth rate term, but not both. Investors who don't participate in a share repurchase benefit from owning a growing fraction of the company. Investors taken as a group receive the cash from a share repurchase just like a dividend. The company's opportunities are the same after the payment of an equivalent amount in dividends or share repurchases.

[3] I have not required ρ to equal k in the long-run steady state, although an argument could be made that they should be equated. If they are equal, then the expected return to equity is independent of payout policy and is simply equal to the reciprocal of the P-E ratio.

IV. Steady State Returns

The model just presented gives the steady state real returns that investors can expect to receive from equity markets. The steady state assumption is that aggregate corporate earnings, aggregate dividends, the total market capitalization of stocks, the total money used for share repurchases, and GDP all grow at the same long-run rate. In such a scenario, the price-earnings ratio would remain stable. However, the role of share repurchases would continue to be very important. Due to the declining number of shares, stock prices, dividends per share, and earnings per share would all grow at a rate faster than GDP and the other aggregates. The equilibrium real rate of return to owning stock would be the total of three terms: the dividend rate, the share repurchase rate, and the steady-state growth rate of aggregates in the economy including GDP. That is,

$$k = \frac{D}{P} + \frac{S}{P} + g$$

where S is share repurchases and g is the common steady-state growth rate of economic aggregates. This is simply a different way to write the equation of the previous section. It does highlight that real share prices would go up at the rate of g plus the rate of net share repurchases. To make the equivalence with the previous formulation clear note that

$$\theta\frac{E}{P} = \frac{D}{P} + \frac{S}{P} and (1-\theta)\rho = g$$

V. The Big Question: Future P-E Ratios

The very difficult question is whether the current price-earnings ratio of roughly 25 represents a new steady-state level. Of course, no one would assume that fluctuations in price-earnings ratios will cease, but will 25 be the average level for the next 50 or 75 years? My guess is that the long-run steady state level for the price-earnings ratio will be somewhere between its current level (24 as I write this on July 20, 2001) and its average level over the past 75 years of approximately 15. A reasonable guess would be that P-E ratios might average 20 over the next 50 to 75 years. What would be the consequences of a steady-state P-E ratio of 20 on real expected stock returns? That means that ***(E/P)*** would average .05. Firms pay out somewhere between half and three-fourths of their earnings as dividends and net share repurchases, so a reasonable value for θ is 0.625. The ROE of retained earnings is approximately 8 percent, so ρ can be set at that level. [4] Substituting these values into the model gives

$$k = (.625)(.05) + (.375)(.08) = .03125 + .03 = .06125$$

This model and these parameters predict the expected long-run real return to equity to be 6.125 percent.

[4] This value is roughly consistent with the rate of return to corporate capital reported in Poterba (1997).

From its current levels, the S&P 500 would not have to crash to reach a P-E level of 20. In fact, the current S&P forecast for next year's earnings of the S&P 500 is $62.88, so the market is currently selling at 19.3 times next year's predicted earnings. That means that if the market were to go up 3.5 percent over the next year and the 2002 earnings forecasts panned out exactly, then by mid-2002 the market would be selling for exactly 20 times earnings. Obviously, there are other combinations of earnings realizations and price appreciation that would allow the market to equilibrate at a P-E of 20 over the next couple of years.

What would be the consequences of a long run average price-earnings ratio of 15 rather than 20? This would put the P-E ratio close to its average level for the past 75 years. In the short-run this implies that the current market is almost 40 percent overvalued and would indicate that near-term stock returns might be quite poor. On the other hand, once the correction is completed and the equilibrium P-E ratio of 15 is established the real rate of return to equities could average slightly better than 7 percent. If we stick with the assumption that ρ is .08, the expected real return to equity would be in the 7 to 7.5 percent range for all reasonable cash-payout rates (i.e. for all reasonable values of θ).

So, we see that the assumed equilibrium price-earnings rate is important. It should be noted that a near-term market correction to bring about a P-E ratio of 15 would not hurt the proposed Social Security individual accounts as long as it occurred before they had accumulated significant balances. In general, the fact that the individual accounts do not yet exist and will have small balances over the next several years even if they are established soon means that the timing of returns matters a lot. Low returns over the next several years followed by high returns would be much better for the balances in these new Social Security individual accounts than high returns first followed by low ones. There is a big difference between the circumstances of someone who has a lot of wealth but is not saving and someone who is just starting to systematically accumulate assets. The non-saving wealth holder is indifferent to the order of returns. However, the systematic saver has little at stake early in his or her accumulation period, but much more at stake later. Even if real stock returns average 6.0 percent over the next 50 years, the Social Security individual account holders would prefer a pattern where the real returns averaged 2.0 percent for the first decade and 7.0 percent thereafter rather than a pattern of 10.0 percent in the first decade and 5.0 percent thereafter.

VI. The Long-Run Outlook for Equity Rates of Return

My own estimate for the long-run real return to equities looking forward is 6 to 6.5 percent. I come to that using roughly the parameters chosen above. If the P-E ratio fluctuates around 20, the cash payouts to shareholders should range from 3 to 3.5 percent. I am relatively optimistic about the possible steady-state growth rate of GDP and would choose 3 percent for that number.[5]

[5] It should be noted that the Trustees are projecting long-run average growth in aggregate labor income of slightly less than 2 percent. If 2 percent were the steady-state growth rate rather than three percent, then that would lower my prediction for equilibrium real stock returns by 0.5 percent. The reason that a one-percent drop in the economy wide growth rate would not lower stock returns by a full one percent is that the lower growth rate would require lower retained earnings and permit a higher rate of payout of earnings. For example, you then could support a value of θ of .75 with an E-P ratio of .05 and a value of ρ of .08.

That leads me to my 6 to 6.5 percent real rate of return range. While this is the range that I would choose as the expected return to equities, it does not indicate the degree of uncertainty about actual outcomes over the next 50-75 years. I think there is a great deal of uncertainty about long-run equity returns. A range of outcomes as wide as 2.0 to 10.0 percent would not strike me as unreasonable. Even this wide range of possible outcomes indicates that the 9.7 percent real return that stocks actually earned over the 1926-2000 period is quite unlikely to be repeated.

VII. Why Won't Equity Returns Be As Good in the 21st Century?

Why is it somewhat unlikely that the future returns will be as favorable as the past returns? There actually are quite a few reasons. First, share prices went up faster in the last twenty years than the value of the underlying capital. This relative price appreciation of paper claims to real assets is unlikely to continue over the long haul. Second, of the entire world's equity markets, the American market was the strongest over the last 75 years (see, Jorion and Goetzmann (1999)). While we might come in first again over the next half or three-quarters of a century, one shouldn't count on it. Third, the nature of stockholders has changed dramatically over the last few decades, with far more of the market being held by pension accounts. Whereas stock holdings used to be concentrated amongst the superrich, there has been a noticeable democratization of shareholding over the post World War II period. While it is speculative to be sure, one could argue that the degree of risk aversion displayed in the market has decreased as the market has become more democratic. Fourth, the changing demographics with the increase in the number of elderly relative to the number of working age adults can dampen the demand for financial assets (Schieber and Shoven (1997) and Abel (2001)).[6] Fifth, stock returns in the past may have been enhanced due to low *ex-post* real returns of long-term bonds. These low real returns were due to unexpectedly high inflation, particularly in the 1960s and 1970s. The total impact of these and other arguments is an equity premium that is likely to be considerably smaller than that observed since 1926.

VIII. The Equity Premium Will Be Lower Because Real Interest Rates Are Higher

The real return on long-run (30-year) inflation-indexed Treasury securities (TIPS) today is about 3.5 percent. Presumably the expected real return on regular nominal Treasury bonds is at least as high. If one uses my central guess for the average real return on equity markets of 6.0 to 6.5 percent, that leaves an equity premium on the order of 2.5 to 3.0 percent. Of course, real interest rates may drift down from current levels, increasing the equity premium. In fact, Social Security currently assumes that long-term government bonds will yield 3.0 percent in the future. That strikes me as reasonable and would not cause me to materially change my 6.0 to 6.5 percent range for the expected long-run real return on equities. Obviously, that leaves an equity premium of 3.0 to 3.5 percent, far lower than experienced during the last three-fourths of the 20th Century.

[6] For a skeptical view on the impact of demographics on asset prices see Poterba (2001).

IX. Which Rate To Use for Projections?

The next issue is whether one should use the expected equity returns to estimate the future balance of an equity portfolio or should one use the return on safe inflation-indexed government securities. On balance, I favor using the safe bond return on the argument that the extra expected return on equities is compensated for by the extra variance in the outcomes. Both the expected and median return for equities is almost certainly greater than for safe bonds. However, in order for markets to be in equilibrium, the poor equity outcomes must be worse than bond returns. Therefore, a scenario analysis for equity investments would, in my opinion, have to include outcomes worse than bonds as well as those better than for a bond portfolio. I find it preferable to simply calculate the outcomes with a safe investment strategy such as 100 percent Treasury Inflation-Protected Securities and then state that the expected outcome would be higher with stocks in the portfolio but that the risk would be correspondingly greater. The "no free lunch" saying is as true in finance as in the rest of the economy. The extra return of a stock heavy portfolio is matched by the extra riskiness (MaCurdy and Shoven (2000)).

One aside that the discussion of equity premium brings up is the useful role that government bonds play in anchoring financial returns and in providing a relatively risk-free asset alternative. The discussion in Washington of eliminating the publicly held federal debt should at least consider the value of such debt to financial markets. Another point worth remembering is that the traditional pay-as-you-go defined benefit structure is not without risk. The risks of a PAYGO system depend on fertility rates, immigration rates, mortality rates, labor force participation, and worker productivity. The risks of the defined benefit program are not perfectly correlated with the risks of individual accounts invested in private securities. One of the strongest arguments in favor of individual accounts is risk diversification. Clearly more work should be done to quantify the covariance between financial returns and the factors influencing the sustainability of a PAYGO system.

X. Conclusions

My best guess for a real equity return over a long-horizon is 6.0 to 6.5 percent per year. I suggest that Social Security lower its intermediate assumption for real equity returns from its current level of 7.0 percent to 6.5 percent or slightly lower. The narrowness of my range for the expected return does not represent a high degree of certainty about the actually realized real return on equities over the next 50-75 years. Throughout this note I have used terms like "best guess." That was totally intentional. Even if forecasting stock returns is easier over long horizons, it still isn't science. To put this concretely, I think that there is something like a 5 percent chance that real stock returns over the next 50 years will be worse than 2.5 percent and there is similarly something like a 5 percent chance that they will exceed 9.5 percent. While it is possible that stocks will underperform bonds over that horizon, it is quite unlikely. However, I think there is only a very slight chance that stocks will outperform bonds in the future by as much as they have in the past. That is, the equity premium is likely to be lower than it has been. My own best guess for the equity premium (stock return over the return on long-term government bonds) is 3.0 to 3.5 percent.

References

Abel, Andrew B., "Will Bequests Attenuate the Predicted Meltdown in Stock Prices When Baby Boomers Retire?" National Bureau of Economic Research Working Paper No. 8131, February 2001.

Campbell, John Y. and Robert J. Shiller, "Valuation Ratios and the Long-Run Stock Market Outlook: An Update," National Bureau of Economic Research Working Paper No. 8221, April 2001.

Gordon, Myron J., *The Investment, Financing and Valuation of the Corporation*, Irwin, Homewood, Illinois, 1962.

Ibbotson Associates, *Stocks, Bonds, Bills and Inflation – 2001 Yearbook*, Ibbotson Associates, Inc., Chicago, 2001.

Jorion, Philippe and William N. Goetzmann, "Global Stock Markets in the Twentieth Century," *Journal of Finance*, Volume 54, No. 3, 1999, pp.953-980.

MaCurdy, Thomas E. and John B. Shoven, "Asset Allocation and Risk Allocation: Can Social Security Improve Its Future Solvency Problem by Investing in Private Securities?" in *Risk Aspects of Investment-Based Social Security Reform*, John Y. Campbell and Martin Feldstein, eds., NBER-University of Chicago Press, 2001, pp. 11-40.

Liang, J. Nellie and Steven A. Sharpe, "Share Repurchases and Employee Stock Options and Their Implications for S&P 500 Share Retirements and Expected Returns," Federal Reserve Board Working Paper, 1999.

Poterba, James M., "The Rate of Return to Corporate Capital and Factor Shares: New Estimates Using Revised National Income Accounts and Capital Stock Data." National Bureau of Economic Research Working Paper No. 6263, November 1997.

Poterba, James M., "Demographic Structure and Asset Returns," *Review of Economic and Statistics*, forthcoming, 2001

Schieber, Sylvester and John Shoven, "The Consequences of Population Aging on Private Pension Fund Saving and Asset Markets," in *Public Policy Toward Pensions*, Sylvester Schieber and John Shoven, eds., A Twentieth Century Fund Book, 1997, pp. 219-246.

Shoven, John B., "The Tax Consequences of Share Repurchases and Other Non-dividend Cash Payments to Equity Owners," in *Tax Policy and the Economy*, Lawrence H. Summers, ed., Volume 1, 1987, pp. 29-54.

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John Y. Campbell grew up in Oxford, England, and received a B.A from Oxford in 1979. He came to the United States to attend graduate school, earning his Ph. D. from Yale in 1984. He spent the next ten years teaching at Princeton, moving to Harvard in 1994 to become the first Otto Eckstein Professor of Applied Economics. Campbell has co-edited the *American Economic Review* and currently edits the *Review of Economics and Statistics*; he is a Fellow of the Econometric Society and the American Academy of Arts and Sciences, and a Research Associate and former Director of the Program in Asset Pricing at the National Bureau of Economic Research. His research concerns asset markets, the macroeconomy, and the links between them. His graduate-level textbook on empirical finance, *The Econometrics of Financial Markets*, written with Andrew Lo and Craig MacKinlay, was published by Princeton University Press in 1997. His latest book on *Strategic Asset Allocation: Portfolio Choice for Long-Term Investors*, with Luis Viceira, will be published by Oxford University Press in 2001. Campbell is also a founding partner of Arrowstreet Capital, LP, a quantitative asset management firm in Cambridge, Massachusetts.

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Peter Diamond is an Institute Professor at the Massachusetts Institute of Technology, where he has taught since 1966. He received his B.A. in Mathematics from Yale University in 1960 and his Ph.D. in Economics from M.I.T. in 1963. He has been President of the Econometric Society and Vice-President of the American Economic Association. He is a Founding Member and member of the Board of the National Academy of Social Insurance, where he has been President and Chair of the Board. He is a Fellow of the American Academy of Arts and Sciences and a Member of the National Academy of Sciences. He has written on behavioral economics, public finance, social insurance, uncertainty and search theories, and macroeconomics. He was Chair of the Panel on Privatization of Social Security of the National Academy of Social Insurance, whose report, *Issues in Privatizing Social Security* has been published by M.I.T. Press. He has written about social security in Chile, Germany, Italy, the Netherlands, Sweden and the U.S.

John B. Shoven

John Shoven is a member of Stanford University's Economics Department, where he holds the Charles R. Schwab Professorship. The holder of a Ph.D. in economics from Yale University, Dr. Shoven has been at Stanford since 1973, serving as Chairman of the Economics Department from 1986 to 1989, as Director of the Center for Economic Policy Research from 1989 to 1993, and as Dean of the School of Humanities and Sciences form 1993 to 1998. An expert on tax policy, Dr. Shoven was a consultant for the U.S. Treasury Department from 1975 to 1988. The author of approximately eighty professional articles and ten books, he has been a visiting professor at Harvard University, the London School of Economics, Kyoto University and Monash University. In 1995 he was elected a fellow of the American Academy of Arts and Sciences. Dr. Shoven has participated in various Hoover Programs and conferences, including the 1997 symposium "Facing the Age Wave," at which he addressed the taxing of pensions as an illustration of tax policy that seems to have gone awry and that may limit the most important form of savings in America. He also contributed a chapter to the book that resulted from the symposium.

Appendix

Equity Yield Assumptions Used by the Office of the Chief Actuary, Social Security Administration, to Develop Estimates for Proposals with Trust Fund and/or Individual Account Investments

Stephen C. Goss
Chief Actuary
May 8, 2001

Initial Assumptions in 1995

The Office of the Chief Actuary (OCACT) has been making estimates for proposals including investments in equities since 1995. A memorandum dated May 12, 1995 presented estimates for the Kerrey-Simpson proposal which included both individual accounts (with the opportunity for equity investment) and provision for investment of 25 percent of OASDI trust fund assets in equities. The assumed average real annual yield on equities for these estimates was 7 percent, consistent with the assumption developed for estimates being produced concurrently for the 1994-96 Advisory Council on Social Security.

Historical analysis of equity yields during the 20th century using Ibbottson data was provided to the Council by Joel Dickson of the Vanguard Group. Based on this analysis, the Advisory Council members and the OCACT agreed that the 7-percent average annual real yield experienced for the 20th century, particularly for the period beginning 1926, seemed to represent a reasonable assumption for an average real yield over long periods in the future as had occurred in the past. It was recognized that this average yield level was recorded rather consistently over long periods of time in the past which incorporated complete market cycles. The work of Dr. Jeremy Siegel of the Wharton School was also noted as supporting a long-term average yield on equities of about 7 percent.

Council Chairman Edward Gramlich noted that the equity market was then currently priced at a level above the historical average, as indicated by relatively high price-to-earnings (PE) ratios. However, it was agreed that in the future market cycles would continue, likely resulting in yields for investments made in successive future years that would average close to the average yields of the past. Estimates produced for the three proposals developed for the Advisory Council (included in Appendix 2 of Volume 1 of the Council's Report) used a 7-percent average real equity yield as an intermediate assumption. Estimates were also produced assuming that equities would achieve a long-term average yield no higher than the yield on long-term U.S. Government marketable securities (Treasury securities), in order to illustrate both the sensitivity of estimates to this assumption and the uncertainty about the likely average yield on equities for even very long periods of time in the future. For individual account proposals, analysis of expected benefit levels and money's worth was also provided using a higher average real annual equity-yield assumption of about 9.6 percent. This higher average yield reflected the arithmetic mean, rather than the geometric mean (which was 7 percent), of historical data for annual yields. It was suggested by Dr. Dickson that financial analysts generally use the arithmetic mean yield as a basis for illustrating likely expected yield on investments. It was observed that this approach was consistent with assuming that future annual yields would occur as if drawn at random, independently from the distribution of past annual yields.

Estimates for the Kerrey-Simpson proposal and for the Advisory Council proposals were based on the intermediate assumptions of the 1995 Trustees Report, including an assumption of an average annual future real yield of 2.3 percent for Treasury securities. Thus, an equity premium over long-term Treasury securities of 4.7 percentage points was implicitly assumed. It was noted that the historical average equity premium was higher, because the average real yield on Treasury securities was lower than 2.3 percent for the past.

Assumptions Since 1995

Since 1995, the OCACT has continued to use an assumption that average annual real yield on equities will be about 7 percent for investments made in future years. Because the Trustees have gradually increased their assumption for the average future real yield on Treasury securities from 2.3 to 3.0 percent, the implicit equity premium has been reduced from 4.7 to 4 percentage points. In addition, OCACT has continued to provide estimates using lower assumed equity yields for all proposals, in order to illustrate the uncertainty and sensitivity of these estimates.

While it has been recognized that the equity market has continued to be priced at levels above the historical average (as indicated by PE ratios) since 1995, future cycles have been assumed to continue as in the past, so that the average real yield on equity investments made in future years will vary but will still average at a level similar to the past. While an “overpriced” current market suggests that current equity investments may be expected to achieve lower than average real yield, investments made in future years, when the price of stocks may have dropped to a cyclical low, may be expected to achieve a higher than average real yield. Market trends for 2000 and 2001 suggest that the equity market is no longer as “overpriced” as it had been in late 1999, supporting the assumption that future market cycles and average PE ratios may indeed continue to mirror the past.

OCACT has recognized that future equity yields will depend on the future return to capital and many other factors, as it has in the past. Based on the Trustees assumptions in the 2001 Trustees Report, labor productivity is projected to continue to increase in the future at a rate similar to past average growth over long periods of time. This assumption implies that capital deepening (increasing ratio of capital to labor) in the U.S. economy will also continue to trend at about the same rate as in the past. This is believed to be consistent with the assumption that real equity returns and the return to capital will be similar in the future to those in the past. On this basis, OCACT believes that assumption of a future average real equity yield of about 7 percent is consistent with the Trustees assumptions.

Other Views

Some have suggested that slower growth in the U.S. labor force in the future may result in accelerated capital deepening based on an assumed continuation in the historical rate of growth in domestic capital investment, and thus a lower future return to capital (and lower equity yields) in the U.S. economy. Specifically, this would imply that capital investment would grow to levels higher than could be accommodated with current technology while maintaining the marginal product of capital at a maximum. While this may be plausible (if investors have nowhere else to invest and are willing to accept a lower return), it would also imply a higher rate of growth in labor productivity than in the past, and thus would be inconsistent with current Trustees assumptions.

A more compelling argument may be that the general investor may see equities as less risky in the future than in the past, or may be less averse to the level of risk that is present. This attitude would be consistent with a higher level of equity prices, higher PE ratios, lower dividend ratios (to price), and thus a lower real yield on equities (see Diamond 1999). However, OCACT believes that the perception in 1999 that equities will be consistently less risky in the future than in the past may already have been dispelled by price changes since 1999. In the future, OCACT believes that it is likely that stocks will be viewed as risky to about the same extent as in the past, over long periods of time.

Growth in the Total Value of the Equity Market

The assumption that future PE ratios will average at about the same level as in the past implies that the AGGREGATE price of all equities outstanding will grow at the same rate as for aggregate corporate earnings, and thus for GDP. This means that a slower future rate of growth in labor force and GDP (as projected by the Trustees) implies a slower future growth rate for aggregate stock value. In order to be consistent with a continuation of the past equity yield of 7 percent, this would imply that the dividend ratio will be higher in the future, offsetting the lower growth in corporate sales (GDP) and earnings, and thus share values. This would seem to be a reasonable consequence of slower labor force growth. Slower growth in employment from one year to the next means that the share of each year's corporate earnings that must be retained for investment in a growing workforce is reduced. These corporate earnings may reasonably be assumed to be distributed in the form of dividends, providing an equity yield that compensates for the slower increase in equity price.

An alternative assumption might be that corporate earnings that would be retained for a faster growing work force might be invested by the corporation abroad, thus effectively expanding labor and output offshore. This would result in increases in corporate output (although not in domestic GDP) and corporate earnings that would in turn support higher increases in equity prices, and thus total equity yield.

THE SOCIAL SECURITY ADVISORY BOARD

Establishment of the Board

In 1994, when the Congress passed legislation establishing the Social Security Administration as an independent agency, it also created a 7-member bipartisan Advisory Board to advise the President, the Congress, and the Commissioner of Social Security on matters relating to the Social Security and Supplemental Security Income (SSI) programs. The conference report on this legislation passed both Houses of Congress without opposition. President Clinton signed the Social Security Independence and Program Improvements Act of 1994 into law on August 15, 1994 (P.L. 103-296).

Advisory Board members are appointed to 6-year terms, made up as follows: 3 appointed by the President (no more than 2 from the same political party); and 2 each (no more than one from the same political party) by the Speaker of the House (in consultation with the Chairman and Ranking Minority Member of the Committee on Ways and Means) and by the President pro tempore of the Senate (in consultation with the Chairman and Ranking Minority Member of the Committee on Finance). Presidential appointees are subject to Senate confirmation. Board members serve staggered terms. There is currently one vacancy on the Board.

The Chairman of the Board is appointed by the President for a 4-year term, coincident with the term of the President, or until the designation of a successor.

Members of the Board

Stanford G. Ross, Chairman

Stanford Ross is a partner in the law firm of Arnold & Porter, Washington, D.C. He has dealt extensively with public policy issues while serving in the Treasury Department, on the White House domestic policy staff, as Commissioner of Social Security, and as Public Trustee of the Social Security and Medicare Trust Funds. He is a Founding Member and a former Director and President of the National Academy of Social Insurance. He has provided technical assistance on Social Security and tax issues under the auspices of the International Monetary Fund, World Bank, and U.S. Treasury Department to various foreign countries. He has taught at the law schools of Georgetown University, Harvard University, New York University, and the University of Virginia, and has been a Visiting Fellow at the Hoover Institution, Stanford University. He is the author of many papers on Social Security and Federal taxation subjects. Term of office: October 1997 to September 2002.

Jo Anne Barnhart

Jo Anne Barnhart is a political consultant and public policy consultant to State and local governments on welfare and social services program design, policy, implementation, evaluation, and legislation. From 1990 to 1993 she served as Assistant Secretary for Children and Families, Department of Health and Human Services, overseeing more than 65 programs, including Aid to Families with Dependent Children, the Job Opportunities and Basic Skills Training program, Child Support Enforcement, and various child care programs. Previously, she was Minority Staff Director for the U.S. Senate Committee on Governmental Affairs, and legislative assistant for domestic policy issues for Senator William V. Roth. Ms. Barnhart served as Political Director for the National Republican Senatorial Committee. First term of office: March 1997 to September 1998; current term of office: October 1998 to September 2004.

Martha Keys

Martha Keys served as a U.S. Representative in the 94th and 95th Congresses. She was a member of the House Ways and Means Committee and its Subcommittees on Health and Public Assistance and Unemployment Compensation. Ms. Keys also served on the Select Committee on Welfare Reform. She served in the executive branch as Special Advisor to the Secretary of Health, Education, and Welfare and as Assistant Secretary of Education. She was a member of the 1983 National Commission (Greenspan) on Social Security Reform. Martha Keys is currently consulting on public policy issues. She has held executive positions in the non-profit sector, lectured widely on public policy in universities, and served on the National Council on Aging and other Boards. Ms. Keys is the author of *Planning for Retirement: Everywoman's Legal Guide*. First term of office: November 1994 to September 1999; current term of office: October 1999 to September 2005.

David Podoff

David Podoff is visiting Associate Professor at the Department of Economics and Finance at the Baruch College of the City University of New York. Recently, he was Minority Staff Director and Chief Economist for the Senate Committee on Finance. Previously, he also served as the Committee's Minority Chief Health and Social Security Counselor and Chief Economist. In these positions on the Committee he was involved in major legislative debates with respect to the long-term solvency of Social Security, health care reform, the constitutional amendment to balance the budget, the debt ceiling, plans to balance the budget, and the accuracy of inflation measures and other government statistics. Prior to serving with the Finance Committee he was a Senior Economist with the Joint Economic Committee and directed various research units in the Social Security Administration's Office of Research and Statistics. He has taught economics at the University of Massachusetts and the University of California at Santa Barbara. He received his Ph.D. in economics from the Massachusetts Institute of Technology and a B.B.A. from the City University of New York. Term of office: October 2000 to September 2006.

Sylvester J. Schieber

Sylvester Schieber is Director of the Research and Information Center at Watson Wyatt Worldwide, where he specializes in analysis of public and private retirement policy issues and the development of special surveys and data files. From 1981 to 1983, Mr. Schieber was the Director of Research at the Employee Benefit Research Institute. Earlier, he worked for the Social Security Administration as an economic analyst and as Deputy Director at the Office of Policy Analysis. Mr. Schieber is the author of numerous journal articles, policy analysis papers, and several books including: *Retirement Income Opportunities in An Aging America: Coverage and Benefit Entitlement; Social Security: Perspectives on Preserving the System;* and *The Real Deal: The History and Future of Social Security*. He served on the 1994-1996 Advisory Council on Social Security. He received his Ph.D. from the University of Notre Dame. Term of office: January 1998 to September 2003.

Gerald M. Shea

Gerald M. Shea is currently assistant to the president for Government Affairs at the AFL-CIO. He previously held several positions within the AFL-CIO, serving as the director of the policy office with responsibility for health care and pensions, and also in various executive staff positions. Before joining the AFL-CIO, Mr. Shea spent 21 years with the Service Employees International Union as an organizer and local union official in Massachusetts and later on the national union's staff. He was a member of the 1994-1996 Advisory Council on Social Security. Mr. Shea serves as a public representative on the Joint Commission on the Accreditation of Health Care Organizations, is a founding Board member of the Foundation for Accountability, Chair of the RxHealth Value Project, and is on the Board of the Forum for Health Care Quality and Measurement. He is a graduate of Boston College. First term of office: January 1996 to September 1997; current term of office: October 2000 to September 2004.

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by Willard T. Carleton and Josef Lakonishok

Risk and Return on Equity: The Use and Misuse of Historical Estimates

The task of estimating a company's expected return typically involves an initial estimate of the market's expected return. This, in turn, is usually based on summary statistics about risk premiums drawn from historical average returns. The approach appears simple, but the underlying complexities may trip up unwary analysts.

The authors demonstrate how choice of measurement period, averaging method, portfolio weighting and risk-free rate can cause the equity risk premium to vary from 0.9 to 24.9 per cent. Over the 1926-80 period, for example, the arithmetic mean annual return on an equally weighted portfolio was 17.1 per cent; the geometric mean annual return on a corresponding value-weighted portfolio was 9.1 per cent. Furthermore, differences in historical returns between industries, and company size effects within industries, are also substantial.

FINANCIAL ANALYSTS HAVE come to rely heavily on summary statistics drawn from historical returns on common stocks.[1] Typically, these returns, aggregated over time and over securities, have been compared with historical returns on lower-risk assets such as Treasury bills or U.S. government bonds to provide estimates of the stock market's average risk premium on equities.[2] The considerable complexity underlying the aggregate data seems to have been ignored, for the most part, in practice.

The consequences of ignoring complexity can be substantial in dollar terms. For example, the book value of Duke Power Company's common equity is about $2.4 billion. Each percentage point in estimates of its cost of equity capital thus translates into $24 million of earnings per year, when applied as an earnings rate on book equity. And the differences between estimates of costs of equity generated by different "readings" of historical returns could easily amount to several percentage points—or multiples of $24 million per year—in required earnings.

This article attempts to introduce some caution into the uncritical acceptance and use of aggregated historical return differentials. Using return data for the period 1926–80, we present tables showing how mean or risk-adjusted stock returns are affected by the following dimensions of historical return measurement and presentation:

- geometric vs. arithmetic mean returns,
- equally weighted vs. value-weighted stock portfolios,
- time periods chosen,
- bills vs. bonds as the base for the market risk premium,
- industry risk-adjusted return differentials,
- effect of data point intervals on industry risk adjustments,
- the significance of some industry "alphas,"
- size effects within industries.

We used as our main data base the monthly

1. Footnotes appear at end of article.

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Table I Annualized Historical Returns and Standard Deviations on Market Portfolios

	Geometric Mean		*Arithmetic Mean*		*Standard Deviation*	
Period	*Val. Wtd.*	*Eq. Wtd.*	*Val. Wtd.*	*Eq. Wtd.*	*Val. Wtd.*	*Eq. Wtd.*
1926–80	9.1%	12.5%	11.4%	17.1%	21.9%	33.1%
1931–80	9.5	14.4	11.7	18.7	21.3	32.7
1936–80	10.2	13.4	11.8	16.6	18.7	26.8
1941–80	11.4	14.9	12.8	17.7	17.6	25.4
1946–80	10.6	12.2	12.0	14.7	17.7	23.8
1951–80	10.8	13.0	12.3	15.6	18.3	24.7
1956–80	8.9	11.9	10.3	14.7	18.0	25.4
1961–80	8.7	12.2	10.1	15.1	17.9	25.4
1966–80	7.2	11.2	8.9	14.6	19.3	28.2
1971–80	9.1	13.3	11.1	16.9	21.3	29.0
1976–80	15.9	26.3	16.7	27.1	15.2	15.0

CRSP tape, which contains monthly stock returns for all NYSE companies and for various monthly stock indexes. We used the Compustat tape, which provides summaries of financial statements of all major U.S. corporations, to construct firm size measures.[3] The monthly returns on Treasury bills and long-term government bonds constructed by Ibbotson and Sinquefield were also used.

Overall Equity Market Results

Assume that our analytical task is to forecast the expected rate of return (alternatively, the required rate of return) on a given stock. Most such forecasts involve estimation of the expected return on the market and the return on some "risk-free" asset (or, alternatively, the difference between the two as the market's risk premium) and the risk of the particular stock. We therefore start by estimating the expected return on the market as a whole, defining the market portfolio conventionally as a portfolio that includes only common stock.[4]

Table I presents data on annual historical returns and standard deviations for two widely used market portfolios—the value-weighted Fisher index and the equally weighted Fisher index.[5] The results are presented for various periods, all of which have 1980 as an ending date. We selected 1980 to reflect the point of view of an analyst today who is trying to decide how far back into historical data he must go to develop averages that validly represent current investors' beliefs about the future.

Computing Average Returns

The annual returns in Table I are aggregated across time based on both geometric mean and arithmetic mean computations. For example, the value-weighted geometric mean of 9.1 per cent for the 1926–80 period is derived in the following way:

$$[(1 + r_{1926})(1 + r_{1927}) \cdot \cdot \cdot (1 + r_{1980})]^{1/55} - 1,$$

where r denotes the annual rate of return. The comparable arithmetic mean of 11.4 per cent is derived as:

$$(r_{1926} + r_{1927} + \cdot \cdot \cdot\ r_{1980})/55.$$

The difference between the two means of 2.3 per cent is substantial and is directly related to the variability of the return series. The differences between the means would be more pronounced in the case of individual securities, because of their higher variability.

Which of the two means should be used? The truth is, each is appropriate under particular circumstances. The geometric mean measures changes in wealth over more than one period on a buy and hold (with dividends reinvested) strategy. If the average investor rebalanced his portfolio every period, the geometric mean would not be a correct representation of his portfolio's performance over time. The arithmetic mean would provide a better measure of typical performance over a single historical period (in the example, one year).

Portfolio Weights

The differences between returns on a value-weighted index, or portfolio, and those on an equally weighted index are even more striking than the differences between arithmetic and geometric means. For the 1926–80 period, the equally weighted market portfolio had an average mean return of 17.1 per cent versus 11.4 per cent for the value-weighted portfolio. The geometric means of the two portfolios are closer

Table II Annualized Historical Returns and Standard Deviations on Long-Term Government Bonds and Treasury Bills

	Bonds		Bills		Standard Deviation	
Period	*Geo. Mean*	*Arith. Mean*	*Geo. Mean*	*Arith. Mean*	*Bonds*	*Bills*
1926–80	3.0%	3.2%	2.8%	2.8%	5.7%	2.7%
1931–80	2.8	3.0	2.7	2.8	5.9	2.8
1936–80	2.6	2.7	3.0	3.0	5.6	2.8
1941–80	2.3	2.4	3.4	3.4	5.8	2.8
1946–80	2.0	2.2	3.8	3.9	6.0	2.7
1951–80	2.2	2.3	4.3	4.4	6.4	2.6
1956–80	2.3	2.5	4.9	4.9	6.8	2.5
1961–80	2.6	2.8	5.5	5.6	6.4	2.4
1966–80	2.6	2.9	6.3	6.4	7.3	2.2
1971–80	4.0	4.2	6.8	6.8	6.9	2.5
1976–80	1.9	2.1	7.8	7.8	8.3	2.9

(12.5 versus 9.1 per cent) because the equally weighted portfolio has a higher standard deviation than the value-weighted portfolio (33.1 vs. 21.9 per cent).[6]

Again, which index should be used? The value-weighted index obviously provides a better measure of stock market performance in general, hence of the experience of investors as a whole. The difference between AT&T and a small NYSE company cannot be ignored; investors have committed more funds to AT&T than they have to many smaller companies. Equally weighted indexes are very simple to construct and understand, but they probably make no more sense than an index constructed by weighting companies according to the length of their names. Nonetheless, equally weighted indexes may have their uses in determining expected rates of return for specific companies.

Equally weighted indexes give much more weight to smaller companies, and smaller companies are in general riskier than larger companies, so part of the average return difference between the two types of indexes can be explained by risk differences. However, only part of the small firm-large firm return difference can be explained by the conventional measures of risk, beta and unsystematic risk; for reasons still not fully understood, stocks of small companies have outperformed those of large companies on a risk-adjusted basis.[7] (Note that any use of historical return characteristics for forward-looking purposes requires a belief that history tends to repeat itself.) In determining expected rates of return, company size cannot therefore be ignored, and an equally weighted index may be appropriate for certain companies and for particular uses of expected market return estimates.[8] Clearly, investment strategies based on portfolios of small firms fall into this category.

Finally, Table I shows that, with the exception of the 1976–80 results, choice of starting year makes a difference of up to about 4 per cent per year in average equity return for each of the four portfolio measures. The 1976–80 period represents a special case noted by many analysts: During the later part of the decade, probably because of unanticipated changes in inflation and interest rates, average stock returns *and* their variability substantially exceeded their average long-term values.

Choice of Risk-Free Rates

To estimate the equity market's *expected* risk premium (or forward-looking average), one usually computes the *historical* average return on lower-risk securities such as Treasury bills or U.S. government bonds.[9] The difference between the equity and bill or bond historical average provides an estimate of the market risk premium.

The logic of this procedure is straightforward: Expected rates of return on bills, bonds and stocks vary over time, reflecting common underlying changes in interest rates. Over short periods of time, realized return differences between stocks and bills, or between stocks and bonds, will vary because of random and unanticipated repricing of assets. Over a sufficiently large number of observations (number of years), however, investors realize, on average, the return differential consistent with the greater risk of common stocks—i.e., an amount equal to the expected risk premium.

Table II provides historical returns on Treasury bills and long-term U.S. government bonds. For these fixed income securities, the differences between geometric and arithmetic

Table III Annualized Equity Premium Estimates

	Arithmetic Means				Geometric Means			
	– Bonds		– Bills		– Bonds		– Bills	
Period	*Val. Wtd.*	*Eq. Wtd.*	*Val. Wtd.*	*Eq. Wtd.*	*Val. Wtd.*	*Eq. Wtd.*	*Val. Wtd.*	*Eq. Wtd.*
1926–80	8.2%	13.9%	8.6%	14.3%	6.1%	9.3%	6.3%	9.7%
1931–80	8.7	15.7	8.9	15.9	6.7	11.4	6.8	11.7
1936–80	9.1	13.9	8.8	13.6	7.6	10.7	7.2	8.2
1941–80	10.4	15.2	9.4	14.2	9.1	10.4	8.0	8.0
1946–80	9.7	12.5	8.0	10.8	8.6	10.0	6.8	6.8
1951–80	9.9	13.3	7.8	11.2	8.6	10.7	6.5	6.5
1956–80	7.8	12.2	5.4	9.8	6.6	9.4	4.0	4.0
1961–80	7.3	12.3	4.5	9.5	6.1	9.4	3.2	3.2
1966–80	6.0	11.7	2.5	8.2	4.6	7.4	0.9	0.9
1971–80	6.9	12.7	4.3	10.1	5.1	9.1	2.3	2.3
1976–80	14.6	24.9	8.9	19.2	14.0	24.2	8.1	8.1

mean rates of return are very small, reflecting the small variability of the return series. For the total 1926–80 period, the arithmetic mean return on long-term government bonds is 3.2 per cent, versus 2.8 per cent for Treasury bills. For any period starting after 1936, however, Treasury bills show higher returns.

The superior performance of Treasury bills is especially striking in the more recent periods. From 1971 through 1980, for example, the average return on long-term government bonds was 4.2 per cent, versus 6.8 per cent for Treasury bills. The main contributor to this behavior was unexpected inflation, which led to higher than expected interest rates, hence lower bond prices. Unanticipated capital losses on bonds offset coupon income, producing lower realized returns.

Assuming that more history is better than less for purposes of estimating the market risk premium, there still remains the serious question of whether to base the premium on Treasury bills or on long-term government bonds. Again, the means will depend on the ends.

Advocates of the Capital Asset Pricing Model (CAPM) routinely employ the stock-bill average return differential. Aside from questions relating to the model's conceptual validity, the stock-bill spread is appropriate for uses involving short-term investment horizons. But the one-period CAPM is valid for multiperiod environments only under implausible and rigid assumptions. And expected market return estimates based on risk premium computations may be used to value expenditures for irreversible, long-term investments (nuclear power generating plants, for example); in these cases, the stock-bond return differential may provide a more appropriate measure of the average long-term risk premium.[10]

Table III presents annual risk premium estimates for equally weighted and value-weighted market portfolios based on Treasury bills and long-term government bonds. There are a number of choices and the differences between them are not trivial. Depending on the particular time period, method of weighting, method of averaging, and risk-free rate used, the market equity risk premium ranges from 0.9 to 24.9 per cent per year.[11]

Equity Returns and Risk Adjustments by Industry

Now that we have estimated the equity market portfolio's risk premium, we can make some adjustments for the difference in risk between our company and a typical company in the market portfolio. The CAPM relates return to risk as follows:

$$E(R_i) = R_f + [E(R_m) - R_f]\beta_i,$$

where:

$E(R_i)$ = the expected return on company i,
R_f = the risk-free rate,
$E(R_m)$ = the expected return on the market portfolio, and
β_i = the company's systematic risk, or beta.

The remaining task, under the CAPM, is to determine the company's beta. Our confidence in choice of any given historical data representation to estimate the market risk premium is at this point somewhat shaken, however. A natural step may be to examine the return experiences of similar firms, given that we are not sure about how to determine a market risk premium, hence expected return. In addition, even in the CAPM framework, it may be appropriate to look at groups of companies or industries, rather than at individual companies.

Thus, rather than concentrate on various issues critical in the case of individual securities (such as measurement error and coefficient instability), we will focus our analysis on the industry level. This will facilitate the presentation of results and enable us to demonstrate better the possible reason for differences in return experiences.[12]

We grouped the sample companies into 15 industries based on their two-digit Standard Industrial Classification codes. Table IV gives the number of companies in each industry. Table V provides for each industry annual geometric returns, arithmetic returns and standard deviations of returns for the 1926–80 period. Three beta coefficients, three intercept (alpha) coefficients, and three coefficients of determination (R-squares) are also presented. Table VI shows the same results for the 1971–80 period. These coefficients were estimated from the following regression:

$$R_{it} - R_{ft} = \alpha_i + \beta_i[R_{mt} - R_{ft}) + e_{it},$$

where R_{it}, R_{ft} and R_{mt} are the period t returns for industry i (each security received the same weight), the risk-free rate (Treasury bill returns), and the return on the market portfolio (equally weighted Fisher index), respectively. Thus the differences between the three sets of coefficients result from differences in the estimation intervals (monthly, quarterly or annual).[13]

Table IV Industry Classifications

Industry	*SIC Code*
1. Mining	10-14
2. Construction	15-17
3. Food	20-21
4. Textile	22-23
5. Paper	24-27
6. Chemicals	28
7. Petroleum	29
8. Rubber	30-31
9. Metals	32-34
10. Machinery	35-39
11. Transportation	40-49
12. Wholesale Trade	50-51
13. Retail Trade	52-59
14. Finance	60-67
15. Services	70-89

Beta and Estimation Intervals

For the 1971–80 period, 10 of the 15 industries exhibit differences in betas of at least 0.1. For the mining industry, the monthly beta is 0.83, the annual 0.63; for the petroleum industry, the quarterly beta is 0.50, the annual 0.73. Assuming an annual risk premium of about 8 per cent, a 0.1 difference in betas will create a 0.8 per cent difference in expected returns; not much in the abstract, perhaps, but one that translates into \$1.9 million per year in earnings for Duke Power if beta is used to determine its return on book equity.

The coefficients of determination at the indus-

Table V Returns and Risk Measures by Industries, 1926–1980

Industry	*Geo. Mean*[a]	*Arith. Mean*[a]	*Stan. Dev.*[a]	*Beta (1)*[b]	*Beta (3)*[b]	*Beta (12)*[b]	*Alpha (1)*[b]	*Alpha (3)*[b]	*Alpha (12)*[b]	*R^2 (1)*[b]	*R^2 (3)*[b]	*R^2 (12)*[b]
Mining	16.1	21.7	38.7	1.02	1.10	1.03	3.54[c]	2.91[d]	4.10	0.87	0.92	0.78
Construction	7.2	20.1	62.0	1.43	1.72	1.53	−3.17	−6.09	−4.80	0.60	0.78	0.66
Food	11.9	15.0	27.6	0.75	0.71	0.80	1.33[d]	1.45[d]	0.83	0.92	0.94	0.92
Textile	10.6	16.8	38.7	1.04	1.13	1.11	−1.69[d]	−2.22[c]	−1.93	0.90	0.95	0.89
Paper	13.0	18.4	37.6	1.01	1.07	1.10	0.60	0.12	−0.12	0.92	0.96	0.93
Chemicals	12.7	16.1	28.6	0.86	0.82	0.83	1.33[d]	1.61[c]	1.55[c]	0.92	0.96	0.92
Petroleum	14.7	18.9	31.3	0.80	0.74	0.81	4.28[c]	4.35[c]	4.65[c]	0.71	0.82	0.73
Rubber	10.6	16.8	39.2	1.06	1.10	1.12	−1.94	−2.02[d]	−2.10	0.89	0.95	0.89
Metals	12.2	17.8	38.9	1.11	1.13	1.13	−0.72	−0.96	−1.30	0.96	0.98	0.93
Machinery	12.5	18.4	37.6	1.09	1.07	1.11	−0.24	0.04	−0.40	0.97	0.98	0.96
Transportation	10.4	14.5	29.9	0.99	0.95	0.81	−1.33	−0.68	0.37	0.89	0.91	0.80
Wholesale Trade	11.4	16.7	35.9	0.83	0.91	1.02	1.33	0.28	−0.82	0.69	0.84	0.89
Retail Trade	10.7	16.3	36.1	0.90	0.87	1.01	−0.60	−0.28	−1.03	0.88	0.91	0.86
Finance	11.4	15.8	30.1	0.99	0.94	0.85	−0.60	0.00	1.02	0.94	0.95	0.84
Services	13.0	19.9	40.6	1.04	1.03	1.09	0.84	1.45	1.47	0.86	0.91	0.79
Average	11.9	17.5	36.8	0.99	1.02	1.02	0.24	0.08	0.10	0.86	0.92	0.85

[a] Annualized percentages.
[b] The number in parentheses is the length of the estimation interval—monthly, quarterly or yearly.
[c] Statistical significance of 5 per cent for a two-tailed test.
[d] Statistical significance of 10 per cent for a two-tailed test.

Table VI Returns and Risk Measures by Industry, 1971–1980

	Geo. Mean[a]	Arith Mean[a]	Stan. Dev.[a]	Beta (1)[b]	Beta (3)[b]	Beta (12)[b]	Alpha (1)[a,b]	Alpha (3)[a,b]	Alpha (12)[a,b]	R^2 (1)[b]	R^2 (3)[b]	R^2 (12)[b]
Mining	24.8	29.4	38.2	0.83	0.70	0.63	12.42[c]	13.43[c]	17.54	0.55	0.51	0.23
Construction	20.1	26.6	41.4	1.21	1.29	1.31	5.79[d]	6.01	6.65	0.86	0.88	0.83
Food	12.6	15.0	25.1	0.81	0.81	0.83	0.24	0.80	−0.15	0.92	0.92	0.91
Textile	7.6	14.3	41.9	1.13	1.17	1.34	−5.41[c]	−5.14[d]	−6.11	0.87	0.88	0.86
Paper	11.6	15.0	28.6	0.99	1.03	0.96	−1.33	−1.61	−1.64	0.94	0.96	0.95
Chemicals	13.7	15.4	20.0	0.81	0.77	0.66	1.33	1.29	1.94	0.86	0.91	0.91
Petroleum	20.7	24.4	31.5	0.69	0.50	0.73	9.25[d]	10.42[d]	10.16	0.49	0.40	0.45
Rubber	11.6	16.4	33.5	1.01	1.02	1.10	−1.45	−1.33	−1.53	0.88	0.89	0.90
Metals	14.8	17.3	25.0	1.01	0.94	0.83	1.33	1.89	2.02	0.94	0.95	0.93
Machinery	16.2	21.2	34.1	1.15	1.18	1.17	2.30	0.08	2.47[c]	0.96	0.96	0.99
Transportation	10.9	13.4	24.3	0.72	0.68	0.82	−0.84	−0.76	−1.83	0.87	0.87	0.97
Wholesale Trade	12.7	17.7	34.0	1.19	1.24	1.13	−1.09	−1.16	−0.50	0.94	0.94	0.92
Retail Trade	8.4	14.4	38.9	1.13	1.26	1.15	−4.91	−5.01[d]	−5.62	0.92	0.94	0.86
Finance	8.9	13.4	30.3	1.06	1.05	1.00	−4.41[d]	−4.06[d]	−3.46	0.89	0.92	0.91
Services	15.2	22.1	38.6	1.28	1.38	1.28	1.09	1.15	2.78	0.94	0.95	0.93
Average	14.0	18.4	32.4	1.00	1.00	1.00	0.84	0.96	1.52	0.86	0.86	0.84

[a] Annualized percentages.
[b] The number in parentheses is the length of the estimation interval—monthly, quarterly or yearly.
[c] Statistical significance of 5 per cent for a two-tailed test.
[d] Statistical significance of 10 per cent for a two-tailed test.

try level are extremely high. For the 1926–80 period, the averages across industry are 0.86, 0.92 and 0.85 for the monthly, quarterly and annual intervals, respectively. Although there is some indication of a better fit for quarterly data, the differences are not large enough to decide on the basis of statistical fit that quarterly data should be used to estimate betas.

We should note that the results in Tables V and VI probably underestimate the impact of estimation intervals on betas of individual companies. We used intervals of one month or longer. Betas estimated from daily or weekly data are subject to biases caused by trading patterns; there are no biases in estimated betas for NYSE securities when monthly data are used.[14] Furthermore, our betas are estimated at the level of industries, not individual securities; differences due to beta estimation intervals are partially suppressed when industry aggregates are employed.[15]

Estimation Intervals and Alpha

According to the CAPM, the theoretical intercept, or alpha, should be zero; estimated deviations from zero should be attributable to conventional estimation problems; and the intercept should be irrelevant in generating industry or company expected returns. Given that our beliefs in CAPM are somewhat shaken, however, the question is whether to retain or discard the intercept when expected returns are being generated.[16]

For the 1926–80 period and the monthly intercept, a two-tailed test shows two intercepts to be different from zero at the 5 per cent significance level and three at the 10 per cent level; 10 intercepts are not significantly different from zero. One approach to the development of an expected industry rate of return would be to discard the intercepts, especially the 10 that are not significantly different from zero, statistically. We feel that this procedure errs. What we want for an expected return estimate is an unbiased point estimate; if the regression equation were correctly specified, retaining estimated beta while discarding estimated alpha would obviously produce bias in estimated expected rate of return.[17]

Unfortunately, the size of the intercepts indicates that the effect on expected industry returns is substantial. For the rubber industry, for example, the monthly intercept is −1.94 per cent per year. Also, Table V indicates that differences in estimation intervals produce differences in intercepts. For the finance industry, the monthly intercept is −0.6 per cent, while the annual intercept is 1.02 per cent per year.

There is one other problem. A high (low) intercept may simply result from a series of unexpectedly favorable (unfavorable) circumstances in the past. For the 1971–80 period, the intercept of the oil industry was 9.25 per cent per year—but a 9.25 per cent intercept for the industry in the future is not a proposition most analysts would accept. The high intercept reflects the misspecification of the return-generating process being used; the intercept captures factors omitted by the model. Unfortunately, the market model regression cannot provide additional insight about the size and origin of such factors.

The intercept can have a substantial effect on expected returns. Table VII presents estimates of the expected return for the construction industry, under a CAPM framework. The returns—based on the results of Table VI, an assumed market risk premium of 8 per cent and a risk-free rate of 9 per cent—range from 18.68 to 26.13 per cent. At the level of individual securities, the effects will be even greater.

Table VII Expected Return Estimates for the Construction Industry

	Without Intercept	*With Intercept*
Monthly Data Interval	18.68%	24.47%
Quarterly Data Interval	19.32%	25.33%
Annual Data Interval	19.48%	26.13%

Industry Size and Risk Effects

Our examination of equally weighted and value-weighted portfolios suggested the existence of a company size effect on stock returns. Are the effects of size on historical return experience present within industries? The presence of size effects within industries would vastly complicate the estimation of company expected returns.

Tables VIII, IX and X describe in some detail the role of company size within industries. We analyzed the periods 1961–80, 1966–80, 1971–80 and 1976–80, but given the similarity of results, we present here only those for the whole period (Table VIII) and for the last 10 years (Table IX). We measured size by the market value of the common stock as of December 31, and estimated its effect by dividing the companies within the 13 given industries into four size groups, based on their size at the end of the previous year.[18]

Table VIII indicates an almost perfect relation between size and return. For *all* 13 industries, the smallest companies (designated size Group 1) had higher annual returns (on the basis of both arithmetic and geometric means) than the largest companies (size Group 4). Based on the summary in Table X, the difference between Groups 1 and 4 in arithmetic mean across industries for 1961–80 amounts to 11.1 per cent per year (22.3–11.2 per cent).

An almost perfect monotonic relation exists, not only between size and returns, but also between size and risk, as the betas and standard deviations in Tables IX and X indicate. From Table X, the average beta and standard deviation for the smallest companies are 1.14 and 36.7 per cent, respectively, for 1961–80; the corresponding numbers for the largest companies are 0.79 and 23.8 per cent.

Table VIII Returns and Risk Measures by Industries and Size, 1961–1980

Industry	*Size Group*	*Size*	*Geo. Mean*	*Arith. Mean*	*Stan. Dev.*	*Beta*	*Alpha*
Metals	1	29	16.9	20.3	28.9	1.17	0.31*
	2	66	12.4	15.2	25.2	1.04	0.02
	3	169	8.1	10.7	24.3	0.98	−0.28*
	4	822	7.2	8.8	19.0	0.86	−0.30*
Machinery	1	27	17.0	23.5	41.0	1.36	0.27*
	2	78	11.9	16.3	31.9	1.23	−0.08
	3	220	10.9	14.4	28.7	1.09	−0.11
	4	2356	9.1	11.9	24.6	0.88	−0.16**
Transportation	1	63	15.3	17.6	23.5	0.83	0.31*
	2	170	10.9	12.6	20.3	0.73	0.03
	3	396	8.1	9.6	18.1	0.66	−0.14
	4	1800	5.8	7.0	16.8	0.60	−0.28*
Trade	1	23	14.2	21.0	41.9	1.26	0.10
	2	62	12.4	18.0	36.9	1.16	−0.01
	3	157	10.2	14.9	33.8	1.02	−0.13
	4	1186	7.4	11.1	28.8	0.87	−0.28*
Finance	1	29	14.4	19.6	34.3	1.36	0.16
	2	88	14.2	18.9	33.9	1.06	0.18
	3	272	10.3	13.0	23.9	0.95	−0.09
	4	1362	10.3	12.0	19.7	0.78	−0.01
Services	1	36	16.6	22.9	38.9	1.33	0.31*
	2	74	12.0	18.1	37.7	1.28	−0.05
	3	141	12.0	17.0	32.9	1.21	−0.02
	4	381	7.9	14.8	40.9	1.14	−0.30*

(Table continued)

Table VIII continued

Industry	Size Group	Size	Geo. Mean	Arith. Mean	Stan. Dev.	Beta	Alpha
Mining	1	40	25.6	34.2	55.1	1.06	1.11*
	2	121	22.2	26.0	32.3	0.79	0.94*
	3	292	18.7	21.8	29.4	0.84	0.63*
	4	1341	16.6	19.5	26.7	0.77	0.49*
Food	1	29	16.6	19.9	29.3	0.92	0.40*
	2	101	13.9	17.0	27.2	0.90	0.19*
	3	363	9.4	12.0	25.0	0.81	−0.11
	4	1428	8.8	10.3	18.2	0.62	−0.07
Textile	1	18	13.1	20.8	45.4	1.22	0.07
	2	43	11.0	16.2	36.1	1.13	−0.08
	3	87	9.1	15.0	36.8	1.01	−0.18**
	4	265	7.9	13.0	33.2	0.96	−0.26*
Paper	1	34	17.4	22.4	38.4	1.18	0.36*
	2	91	11.0	14.4	27.5	1.02	−0.07
	3	300	10.6	13.1	24.2	0.94	−0.06
	4	1344	6.7	8.6	21.0	0.83	−0.32*
Chemicals	1	50	16.4	19.8	28.8	1.11	0.30*
	2	184	11.7	13.8	21.6	0.94	0.01
	3	565	12.3	13.8	18.6	0.80	0.12
	4	2537	6.3	7.2	14.2	0.61	−0.23*
Petroleum	1	134	19.6	24.4	34.5	0.94	0.67*
	2	906	20.4	23.3	26.2	0.72	0.81*
	3	2763	15.2	17.7	25.0	0.55	0.55**
	4	8369	13.5	15.6	22.9	0.50	0.43**
Rubber	1	25	19.1	24.4	37.1	1.12	0.54*
	2	57	9.0	12.9	27.9	1.06	−0.20**
	3	212	10.3	14.5	32.9	0.93	−0.07
	4	847	2.5	5.2	23.5	0.85	−0.63*

* Statistical significance of 5 per cent for a two-tailed test.
** Statistical significance of 10 per cent for a two-tailed test.

Table IX Returns and Risk Measures by Industries and Size, 1971–1980

Industry	Size Group	Size	Geo. Mean	Arith. Mean	Stan. Dev.	Beta	Alpha
Metals	1	27	18.6	21.2	27.2	1.22	0.35*
	2	64	17.1	19.4	24.2	1.00	0.30*
	3	162	10.5	13.6	26.7	0.96	−0.18
	4	730	9.8	11.6	21.1	0.83	−0.17
Machinery	1	24	20.8	27.1	40.0	1.40	0.47*
	2	77	16.4	21.4	34.4	1.22	0.18
	3	229	13.6	18.3	33.2	1.06	0.02
	4	2517	9.9	13.3	27.6	0.83	−0.16
Transportation	1	61	14.9	18.1	28.2	0.85	0.19
	2	163	12.0	14.7	25.9	0.72	0.03
	3	387	8.3	10.4	22.7	0.66	−0.22
	4	1660	6.1	8.0	20.7	0.57	−0.34**
Trade	1	22	12.2	19.5	43.2	1.35	−0.14
	2	63	12.3	18.7	40.9	1.25	−0.13
	3	167	9.1	14.9	38.8	1.04	−0.31
	4	1171	4.0	8.8	34.1	0.90	−0.64*
Finance	1	31	15.1	20.8	35.0	1.54	0.09
	2	91	10.3	15.5	33.2	1.06	−0.22
	3	299	8.3	12.2	28.6	0.94	−0.32**
	4	1352	9.3	11.5	22.0	0.74	−0.16
Services	1	27	17.1	24.5	40.8	1.35	0.25
	2	64	12.3	20.1	40.4	1.40	−0.13
	3	148	13.7	20.1	36.6	1.21	0.03
	4	502	11.0	18.5	41.2	1.13	−0.16
Mining	1	50	27.9	36.2	57.9	1.03	1.26*
	2	149	26.3	31.0	37.9	0.82	1.16*
	3	396	24.0	28.0	35.4	0.80	0.99*
	4	2039	18.2	21.9	30.8	0.69	0.58

(Table continued)

Table IX continued

Industry	Size Group	Size	Geo. Mean	Arith. Mean	Stan. Dev.	Beta	Alpha
Food	1	29	18.9	22.1	30.2	0.94	0.46*
	2	118	17.6	20.2	27.1	0.90	0.37*
	3	436	7.9	11.2	29.3	0.79	−0.30*
	4	1733	8.4	10.1	19.9	0.60	−0.17
Textile	1	17	11.5	20.9	52.0	1.30	−0.12
	2	40	4.5	9.9	38.5	1.10	−0.64*
	3	83	2.1	7.9	37.3	0.98	−0.80*
	4	276	4.5	10.8	37.2	0.97	−0.61*
Paper	1	34	15.2	18.9	30.3	1.21	0.12
	2	97	10.5	15.4	32.9	0.99	−0.18
	3	326	12.4	15.5	28.8	0.89	0.00
	4	1500	6.9	9.6	25.4	0.79	−0.36*
Chemicals	1	50	18.7	22.2	30.2	1.08	0.40*
	2	211	13.0	15.3	23.0	0.87	0.05
	3	682	13.8	15.7	21.0	0.73	0.18
	4	2969	5.9	7.0	15.9	0.56	−0.30
Petroleum	1	158	22.0	29.1	42.0	0.95	0.77**
	2	1134	20.4	24.5	32.0	0.73	0.75**
	3	3526	22.5	25.5	29.5	0.47	1.07*
	4	9044	16.2	19.2	28.3	0.49	0.57
Rubber	1	23	22.9	30.6	46.7	1.18	0.74*
	2	52	9.9	14.7	30.4	1.05	−0.20
	3	210	10.8	15.7	37.3	0.94	−0.12
	4	739	−0.6	3.2	28.9	0.85	−0.98*

* Statistical significance of 5 per cent for a two-tailed test.
** Statistical significance of 10 per cent for a two-tailed test.

Table X Returns and Risk Measures Averaged Across Industries, by Size Groups

Period	Size	Geo. Mean	Arith. Mean	Stan. Dev.	Beta	Alpha
1961–80	41	17.1	22.3	36.7	1.14	0.38*
	157	13.3	17.1	29.6	1.01	0.13
	457	11.1	14.4	27.2	0.91	0.01
	1849	8.5	11.2	23.8	0.79	−0.15**
1971–80	43	18.1	23.9	38.8	1.18	0.37*
	179	14.1	18.5	32.3	1.01	0.10
	542	12.1	16.1	31.1	0.88	0.00
	2019	8.4	11.8	27.1	0.77	−0.22*

* Statistical significance of 5 per cent by two-tailed test.
** Statistical significance of 10 per cent by two-tailed test.

Does Alpha Depend on Size?

Did small companies outperform large companies on a risk-adjusted basis? The last column in each table presents the industry alphas, which should theoretically equal zero. Higher intercepts for the smaller companies would suggest superior performance on a risk-adjusted basis. For both 1961–80 and 1971–80 periods, the smallest companies in all 13 industries outperformed the largest. The 1961–80 difference in intercepts between the smallest and the largest group sizes, summarized over all industries in Table X, is 0.53 per cent per month, which translates to 6.55 per cent per year (statistically significant at the 5 per cent level). For 1971–80, the difference is 7.31 per cent per year (also significant at the 5 per cent level).

Our results regarding the effect of size on industry returns are consistent with results of previous studies that did not examine differential returns within industries.[19] As noted, the presence of intraindustry size effects vastly complicates estimation of expected returns for individual companies. Whether the purpose is capital budgeting, rate of return regulation, or investment strategy, the analyst has to decide to include or ignore the size effect. We have no theory that adequately explains the phenomenon, so it is tempting to assume that it will not persist in the future. But discarding it is to deny historical reality and, in the framework of CAPM-based market model regressions, to produce biased return estimates.

Implications for Analysts

The practical applications of expected return estimates entail serious financial consequences (especially in the case of utility regulation). Given our incomplete understanding of how stock returns are determined, we think it is delusionary and misleading not to acknowledge the complexities just under the surface of simple historical average returns. On empirical grounds, if no other, it would appear that the popular recipe of, say, 8 per cent times company beta, added to a bill yield, may not be robust enough for general use.

Footnotes

1. For among other tasks, development of capital budgeting discount rates; estimation of equilibrium stock prices in order to measure deviations against which speculative trading can take place; and estimation of costs of equity capital for utilities, to be employed in rate hearings.
2. See, for example, R.G. Ibbotson and R.A. Sinquefield, *Stocks, Bonds, Bills, and Inflation: The Past (1926–1976) and the Future (1977–2000)* (Charlottesville, Va.: The Financial Analysts Research Foundation, 1977); *Stocks, Bonds, Bills, and Inflation: Historical Returns (1926–1978)* (Charlottesville, Va.: The Financial Analysts Research Foundation, 1979); and *Stocks, Bonds, Bills and Inflation: The Past and the Future* (Charlottesville, Va.: The Financial Analysts Research Foundation, 1982).
3. The Compustat tape provides data only for companies that exist currently. For example, the 1980 Compustat tape provides data only for companies that existed in 1980. The Research Compustat tape was used to provide data on companies that went out of existence.
4. For purposes of this article, we will not deal with the well known problems associated with the validity of a portfolio that excludes such important assets as bonds and real estate. For a comprehensive discussion of these issues see R.R. Roll, "A Critique of the Asset Pricing Theory's Tests, Part I: On Past and Potential Testability of the Theory," *Journal of Financial Economics*, March 1977, pp. 129–176.
5. For a complete description of the Fisher Index, see Lawrence Fisher and James Lorie, "Rates of Return on Investments in Common Stocks: The Year-by-Year Record, 1926–65," *Journal of Business*, July 1968, pp. 291–316. These indexes are available on the CRSP tapes and are adjusted for all changes in capitalization.
6. The difference between the equally weighted and value-weighted indexes would be even larger if AMEX and OTC companies had been included.
7. For a discussion of these issues, see Richard Roll, "A Possible Explanation of the Small Firm Effect," *Journal of Finance*, September 1981, pp. 879–888.
8. There is a further complication we do not pursue in this article, which arises in the context of estimation of expected rates of return for an average investor on an after-tax basis. Everything else constant, companies with high variability in returns provide investors with a higher tax subsidy. This subsidy is related to the distinction made by the IRS between long-term and short-term capital gains. These issues are discussed by George Constantinides, "Optimal Stock Trading with Personal Taxes: Implications for Prices and the Abnormal January Returns" (July 1982).
9. Note the greater returns of equities (Table I) over bonds (Table II) and bonds over bills (Table II), historically consistent with conventional descriptions of their relative risks.
10. For a discussion, see W.T. Carleton, "A Highly Personal Note on the Use of the CAPM in Public Utility Rate Cases," *Financial Management*, Autumn 1978, pp. 57–59, and W.T. Carleton, D.R. Chambers and J. Lakonishok, "Inflation Risk and Regulatory Lag," *Journal of Finance*, May 1983, pp. 419–436.
11. A further complication in the search for a market risk premium is that the variance of the market realized return series changes over time. We do not pursue this topic, as this article is addressed to the fairly typical user of historical returns observed in practice. For an exploration of the issues, see R.C. Merton, "On Estimating the Expected Return on the Market: An Exploratory Investigation," *Journal of Financial Economics*, December 1980, pp. 323–361.
12. It should be pointed out at this stage that a popular alternative to the CAPM for deriving expected returns is based on observing the past performance of similar companies—companies from the same industry.
13. All the computations were repeated for the various time intervals discussed in Table I. Because the results were qualitatively similar we present only the findings for the total period, 1926–80, and the last 10 years, 1971–80.
14. The biases arise from trading patterns and are discussed by E. Dimson, "Risk Measurement When Shares are Subject to Infrequent Trading," *Journal of Financial Economics*, June 1979, pp. 197–226 and M. Scholes and J. Williams, "Estimating Betas from Non-Synchronous Data," *Journal of Financial Economics*, December 1977, pp. 309–327. H. Stoll and R. Whaley ("Transactions Costs and

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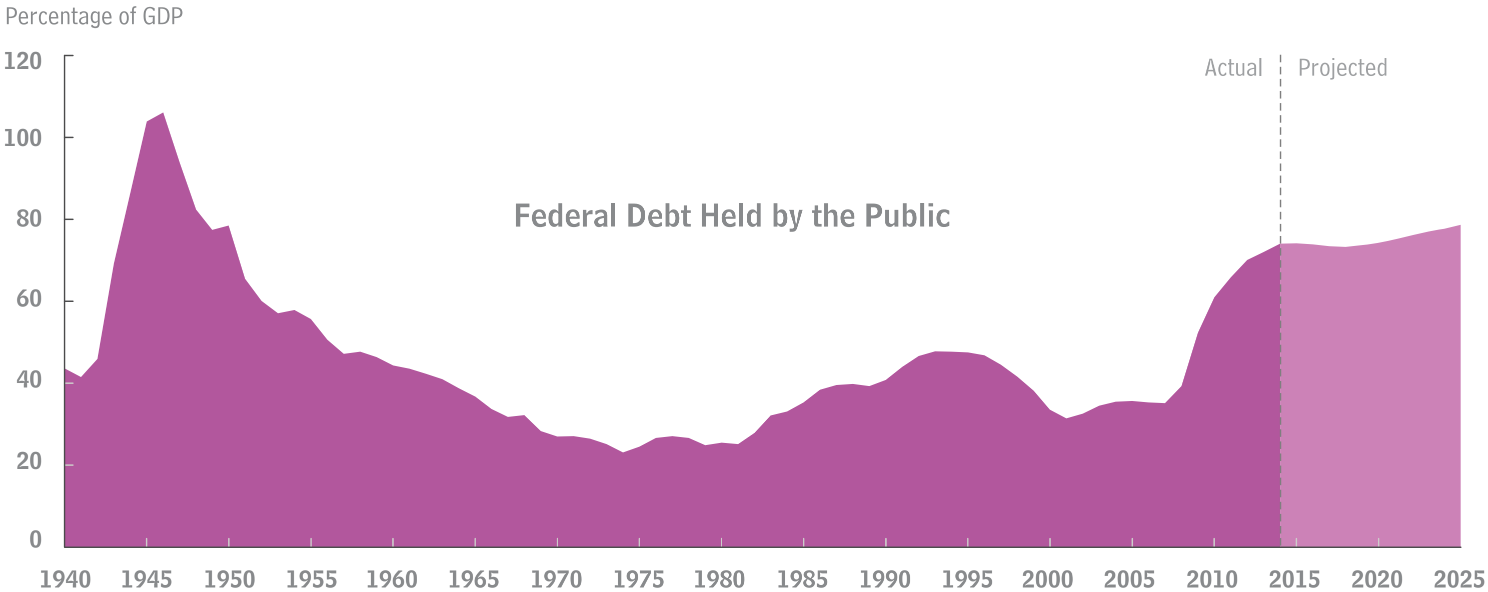
CONGRESSIONAL BUDGET OFFICE

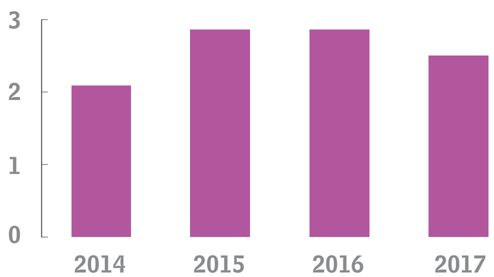
CBO

The Budget and Economic Outlook: 2015 to 2025



Growth Rate of GDP

Percentage Points, Adjusted for Inflation



Largest Contributors to the Growth Rate of GDP

Percentage Points, Adjusted for Inflation

JANUARY 2015

Notes

Unless otherwise indicated, all years referred to in describing the budget outlook are federal fiscal years (which run from October 1 to September 30), and years referred to in describing the economic outlook are calendar years.

Numbers in the text and tables may not add up to totals because of rounding. Also, some values are expressed as fractions to indicate numbers rounded to amounts greater than a tenth of a percentage point.

Some figures in this report have vertical bars that indicate the duration of recessions. (A recession extends from the peak of a business cycle to its trough.)

The economic forecast was completed in early December 2014, and, unless otherwise indicated, estimates presented in Chapter 2 and Appendix F of this report are based on information available at that time.

As referred to in this report, the Affordable Care Act comprises the Patient Protection and Affordable Care Act (Public Law 111-148), the health care provisions of the Health Care and Education Reconciliation Act of 2010 (P.L. 111-152), and the effects of subsequent judicial decisions, statutory changes, and administrative actions.

Supplemental data for this analysis are available on CBO's website (www.cbo.gov/publication/49892), as is a glossary of common budgetary and economic terms (www.cbo.gov/publication/42904).

Contents

Summary

The federal budget deficit, which has fallen sharply during the past few years, is projected to hold steady relative to the size of the economy through 2018. Beyond that point, however, the gap between spending and revenues is projected to grow, further increasing federal debt relative to the size of the economy—which is already historically high.

Those projections by the Congressional Budget Office, based on the assumption that current laws governing taxes and spending will generally remain unchanged, are built upon the agency's economic forecast. According to that forecast, the economy will expand at a solid pace in 2015 and for the next few years—to the point that the gap between the nation's output and its potential (that is, maximum sustainable) output will be essentially eliminated by the end of 2017. As a result, the unemployment rate will fall a little further, and more people will be encouraged to enter or stay in the labor force. Beyond 2017, CBO projects, real (inflation-adjusted) gross domestic product (GDP) will grow at a rate that is notably less than the average growth during the 1980s and 1990s.

Rising Deficits After 2018 Are Projected to Gradually Boost Debt Relative to GDP

CBO estimates that the deficit for this fiscal year will amount to $468 billion, slightly less than the deficit in 2014 (see Summary Table 1). At 2.6 percent of GDP, this year's deficit is projected to be the smallest relative to the nation's output since 2007 but close to the 2.7 percent that deficits have averaged over the past 50 years.

Although the deficits in CBO's baseline projections remain roughly stable as a percentage of GDP through 2018, they rise after that. The deficit in 2025 is projected to be $1.1 trillion, or 4.0 percent of GDP, and cumulative deficits over the 2016–2025 period are projected to total $7.6 trillion. CBO expects that federal debt held by the public will amount to 74 percent of GDP at the end of this fiscal year—more than twice what it was at the end of 2007 and higher than in any year since 1950 (see Summary Figure 1). By 2025, in CBO's baseline projections, federal debt rises to nearly 79 percent of GDP.

Outlays

In CBO's projections, outlays rise from a little more than 20 percent of GDP this year (which is about what federal spending has averaged over the past 50 years) to a little more than 22 percent in 2025 (see Summary Figure 2 on page 4). Four key factors underlie that increase:

- The retirement of the baby-boom generation,
- The expansion of federal subsidies for health insurance,
- Increasing health care costs per beneficiary, and
- Rising interest rates on federal debt.

Consequently, under current law, spending will grow faster than the economy for Social Security; the major health care programs, including Medicare, Medicaid, and subsidies offered through insurance exchanges; and net interest costs. In contrast, mandatory spending other than that for Social Security and health care, as well as both defense and nondefense discretionary spending, will shrink relative to the size of the economy. By 2019, outlays in those three categories taken together will fall below the percentage of GDP they were from 1998 through 2001, when such spending was the lowest since at least 1940 (the earliest year for which comparable data have been reported).

Summary Table 1.

CBO's Baseline Budget Projections

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
							In Billions of Dollars							
Revenues	3,021	3,189	3,460	3,588	3,715	3,865	4,025	4,204	4,389	4,591	4,804	5,029	18,652	41,670
Outlays	3,504	3,656	3,926	4,076	4,255	4,517	4,765	5,018	5,337	5,544	5,754	6,117	21,540	49,310
Deficit	**-483**	**-468**	**-467**	**-489**	**-540**	**-652**	**-739**	**-814**	**-948**	**-953**	**-951**	**-1,088**	**-2,887**	**-7,641**
Debt Held by the Public at the End of the Year	12,779	13,359	13,905	14,466	15,068	15,782	16,580	17,451	18,453	19,458	20,463	21,605	n.a.	n.a.
							As a Percentage of Gross Domestic Product							
Revenues	17.5	17.7	18.4	18.2	18.1	18.1	18.0	18.1	18.1	18.2	18.2	18.3	18.1	18.2
Outlays	20.3	20.3	20.8	20.7	20.7	21.1	21.4	21.6	22.0	21.9	21.8	22.3	21.0	21.5
Deficit	**-2.8**	**-2.6**	**-2.5**	**-2.5**	**-2.6**	**-3.0**	**-3.3**	**-3.5**	**-3.9**	**-3.8**	**-3.6**	**-4.0**	**-2.8**	**-3.3**
Debt Held by the Public at the End of the Year	74.1	74.2	73.8	73.4	73.3	73.7	74.3	75.0	76.1	76.9	77.7	78.7	n.a.	n.a.

Source: Congressional Budget Office.

Note: GDP = gross domestic product; n.a. = not applicable.

Revenues

Revenues are projected to rise significantly by 2016, buoyed by the expiration of several provisions of law that reduced tax liabilities and by the ongoing economic expansion. In CBO's projections, based on current law, revenues equal about 18½ percent of GDP in 2016 and remain between 18 percent and 18½ percent through 2025. Revenues at that level would represent a greater share of the economy than their 50-year average of about 17½ percent of GDP but would still be less than outlays by growing amounts over the course of the decade. Revenues from the individual income tax are expected to rise relative to GDP—mostly because people's income will move into higher tax brackets as income gains outpace inflation, to which those brackets are indexed. But those increases are expected to be offset by reductions relative to GDP in revenues from the corporate income tax and other sources.

Changes From CBO's Previous Budget Projections

The deficit that CBO now estimates for 2015 is essentially the same as what the agency projected in August.[1] CBO's estimate of outlays this year has declined by $94 billion, or about 3 percent, from the August projection because of a number of developments, including higher-than-expected receipts from auctions of licenses to use the electromagnetic spectrum for commercial purposes. But CBO's estimate of revenues has dropped almost as much—by $93 billion, also about 3 percent—mostly because of the enactment of legislation that retroactively extended a host of expired tax provisions through December 2014.

Over the 2015–2024 period, deficits are now projected to total about $175 billion less than CBO's August estimate for that period. The current projections of revenues and outlays for those years are both lower than previously estimated, outlays a little more so.

The Longer-Term Outlook

When CBO last issued long-term budget projections (in July 2014), it projected that, under current law, debt would exceed 100 percent of GDP 25 years from now and would continue on an upward trajectory thereafter—a trend that could not be sustained.[2] (The 10-year

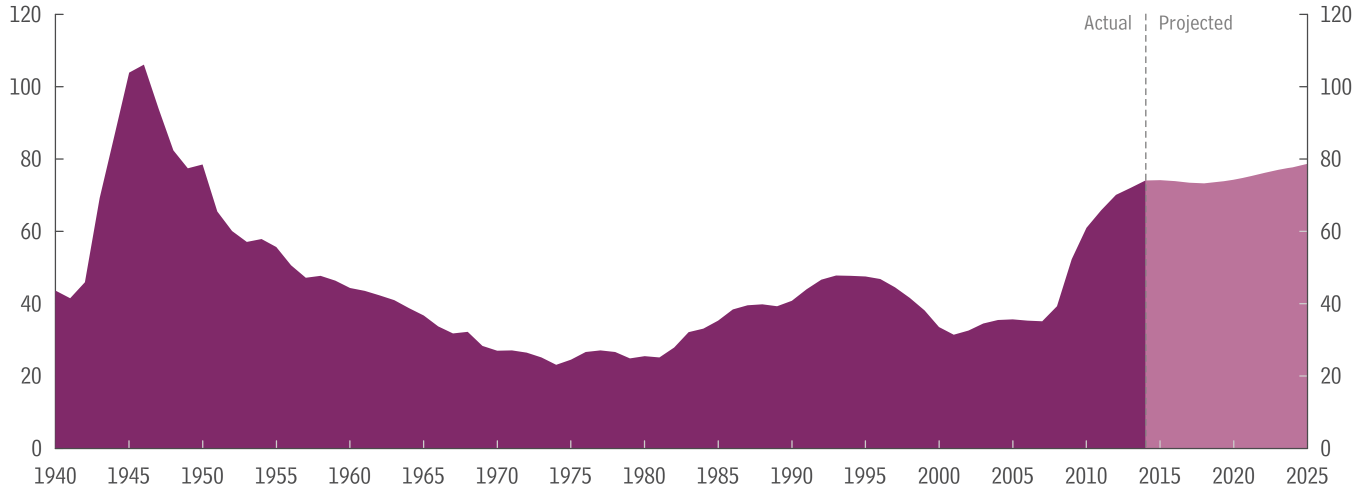
1. See Congressional Budget Office, *An Update to the Budget and Economic Outlook: 2014 to 2024* (August 2014), www.cbo.gov/publication/45653.

2. See Congressional Budget Office, *The 2014 Long-Term Budget Outlook* (July 2014), www.cbo.gov/publication/45471.

Summary Figure 1.

Federal Debt Held by the Public

Percentage of Gross Domestic Product



Source: Congressional Budget Office.

projections presented here do not materially change that outlook.)[3] Such large and growing federal debt would have serious negative consequences, including increasing federal spending for interest payments; restraining economic growth in the long term; giving policymakers less flexibility to respond to unexpected challenges; and eventually heightening the risk of a fiscal crisis.

The Economy Will Grow at a Solid Pace Over the Next Few Years

CBO anticipates that, under current law, economic activity will expand at a solid pace in 2015 and over the next few years—reducing the amount of underused resources, or "slack," in the economy.

Economic Growth Over the Next Few Years

In CBO's estimation, increases in consumer spending, business investment, and residential investment will drive the economic expansion this year and over the next few years. The growth in those categories of spending will derive mainly from increases in hourly compensation, rising wealth, the recent decline in crude oil prices, and a step-up in the rate of household formation (as people are more willing and able to set up new homes). As measured by the change from the fourth quarter of the previous year, real GDP will grow by about 3 percent in 2015 and 2016 and by 2½ percent in 2017, CBO expects (see Summary Figure 3).

The Degree of Slack in the Economy Over the Next Few Years

The difference between actual GDP and CBO's estimate of potential GDP—which is a measure of slack for the whole economy—was about 2 percent of potential GDP at the end of 2014. During the next few years, CBO expects, actual GDP will rise more rapidly than its potential, gradually eliminating that slack. For the labor market in particular, CBO anticipates that slack will dissipate by the end of 2017. By CBO's projections, increased hiring will reduce the unemployment rate from 5.7 percent in the fourth quarter of 2014 to 5.3 percent in the fourth quarter of 2017, which is close to the expected natural rate of unemployment (that is, the rate arising from all sources except fluctuations in the overall demand for goods and services). That increased hiring will also encourage more people to enter or stay in the labor force, boosting the labor force participation rate (which is the percentage of people who are working or actively looking for work).

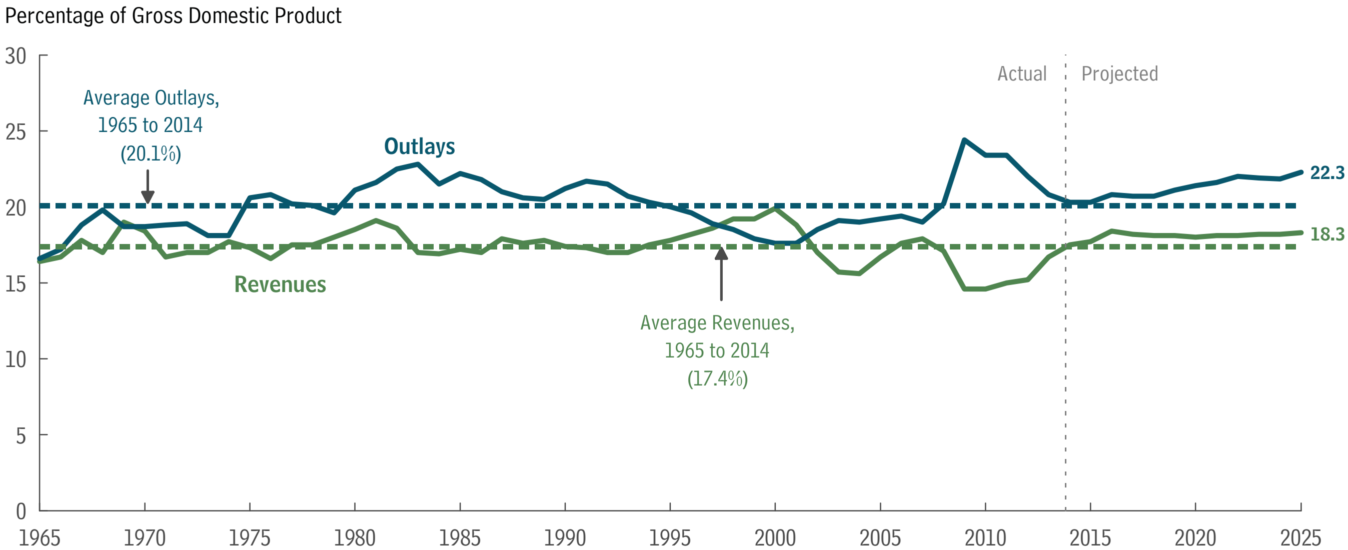
Economic Growth in Later Years

The agency's projections beyond the next few years are not based on estimates of cyclical developments in the

3. CBO's current projection of debt as a percentage of GDP in 2024 is quite close to that used as the starting point for the projections in *The 2014 Long-Term Budget Outlook*.

Summary Figure 2.

Total Revenues and Outlays



Source: Congressional Budget Office.

economy, because the agency does not attempt to predict economic fluctuations that far into the future; instead, those projections are based on estimates of underlying factors that affect the economy's productive capacity.

For 2020 through 2025, CBO projects that real GDP will grow by an average of 2.2 percent per year—a rate that matches the agency's estimate of the potential growth of the economy in those years. Potential output is expected to grow much more slowly than it did during the 1980s and 1990s primarily because the labor force is anticipated to expand more slowly than it did then. Growth in the potential labor force will be held down by the ongoing retirement of the baby boomers; by a relatively stable labor force participation rate among working-age women, after sharp increases from the 1960s to the mid-1990s; and by federal tax and spending policies set in current law.

Inflation and Interest Rates

The elimination of slack in the economy will eventually remove the downward pressure on the rate of inflation and on interest rates that has existed for the past several years. By CBO's estimates, the rate of inflation as measured by the price index for personal consumption expenditures will move up gradually to the Federal Reserve's goal of 2 percent, hitting that mark in 2017 and beyond. Interest rates on Treasury securities, which have been exceptionally low since the recession, will rise considerably in the next few years, CBO expects, but remain lower than they were, on average, in previous decades. Between 2020 and 2025, the projected interest rates on 3-month Treasury bills and 10-year Treasury notes are 3.4 percent and 4.6 percent, respectively.

Changes From CBO's Previous Economic Projections

Last August, CBO projected real GDP growth averaging 2.7 percent per year for 2014 through 2018; CBO now anticipates that real GDP growth will average 2.5 percent annually over that period. The revision mainly reflects a reduction in CBO's estimate of potential output and therefore of the current amount of slack in the economy. On the basis of the current projection of potential output, CBO now forecasts that real GDP in 2024 will be roughly 1 percent lower than the level estimated in August. In addition, the sharper-than-anticipated drop in the unemployment rate in the second half of last year caused CBO to lower its projection of that rate for the next few years.

Summary Figure 3.

Actual Values and CBO's Projections of Key Economic Indicators

Sources: Congressional Budget Office; Bureau of Economic Analysis; Bureau of Labor Statistics; Federal Reserve.

Notes: Real gross domestic product is the output of the economy adjusted to remove the effects of inflation. The unemployment rate is a measure of the number of jobless people who are available for work and are actively seeking jobs, expressed as a percentage of the labor force. The overall inflation rate is based on the price index for personal consumption expenditures; the core rate excludes prices for food and energy.

Data are annual. For real GDP growth and inflation, actual data are plotted through 2013; the values for 2014 reflect CBO's estimates for the third and fourth quarters and do not incorporate data released by the Bureau of Economic Analysis since early December 2014. For the unemployment and interest rates, actual data are plotted through 2014.

For real GDP growth and inflation, percentage changes in GDP and prices are measured from the fourth quarter of one calendar year to the fourth quarter of the next.

GDP = gross domestic product.

CHAPTER

1

The Budget Outlook

If current laws remain in place, the federal budget deficit will total $468 billion in fiscal year 2015, the Congressional Budget Office estimates, slightly less than the deficit of $483 billion posted for fiscal year 2014. This will mark the sixth consecutive year in which the deficit—at 2.6 percent of gross domestic product (GDP)—has declined relative to the size of the economy since peaking at 9.8 percent in 2009 (see Figure 1-1). Nevertheless, debt held by the public will remain at 74 percent of GDP in 2015, CBO estimates, about the same as last year but higher than in any year between 1951 and 2013.

CBO constructs its 10-year baseline projections of federal revenues and spending under the assumption that current laws generally remain unchanged, following rules for those projections set in law.[1] That approach reflects the fact that CBO's baseline is not intended to be a forecast of budgetary outcomes; rather, it is meant to provide a neutral benchmark that policymakers can use to assess the potential effects of policy decisions.

Under that assumption:

- Revenues as a share of GDP are projected to grow by two-thirds of one percentage point over the next year—from 17.7 percent in 2015 to 18.4 percent in 2016—and then remain near that level through 2025. The jump next year results primarily from the expiration of certain tax provisions that reduce tax liabilities; if all of those provisions were extended, as they have regularly been in recent years, the increase in revenues from 2015 to 2016 would be much smaller, and revenues throughout the projection period would be lower as a share of GDP.
- Outlays as a share of GDP are projected to rise significantly more than revenues over the coming decade—by two percentage points, from 20.3 percent in 2015 to 22.3 percent in 2025. The increase in outlays reflects substantial growth in the cost of benefit programs that are targeted toward the elderly, related to health care, or both, as well as a sharp rise in payments of interest on the government's debt; those increases would more than offset a significant projected decline in discretionary spending relative to the size of the economy.
- The projected deficit remains roughly stable as a percentage of GDP at about 2.5 percent through 2018 and then starts on an upward trajectory, growing from 3.0 percent of GDP in 2019 to 4.0 percent in 2025 (see Table 1-1). By the end of that period, CBO projects, annual deficits would be well above the average of 2.7 percent of GDP over the past 50 years.[2]

That pattern of initially stable deficits followed by higher deficits for the remainder of the projection period would cause debt held by the public to follow a similar trajectory. Relative to the nation's output, debt held by the

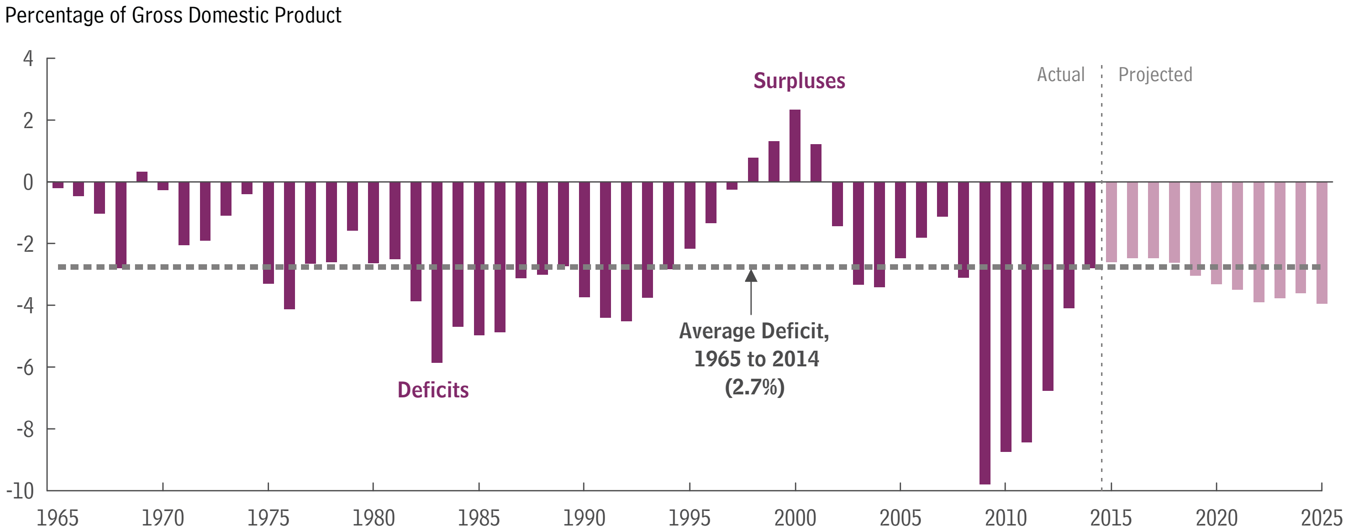
1. Section 257 of the Balanced Budget and Emergency Deficit Control Act of 1985 (the Deficit Control Act) specifies the rules for developing baseline projections.

2. In previous publications, CBO has generally cited a 40-year historical average for various categories of the federal budget. CBO has lengthened the period to cover the past 50 years in part because sufficient historical data are now available to allow for such calculations. (Data for certain categories of spending within the federal budget—such as for mandatory and discretionary outlays—are only available beginning in 1962.) In addition, the longer period captures years with both unusually high and unusually low values for most budget categories without giving excessive weight to any of those years. Using different historical periods would produce different averages, however. For example, the average deficit over the past 40 years was 3.2 percent of GDP, and the average for the 40 years ending in 2007—thus excluding the deficits recorded during the most recent recession and its aftermath—was noticeably lower at 2.3 percent of GDP.

Figure 1-1.

Total Deficits or Surpluses

As percentages of gross domestic product, projected deficits in CBO's baseline hold steady through 2018 but then grow as mandatory spending and interest payments rise and revenues remain essentially flat.



Source: Congressional Budget Office.

public is projected to be roughly constant between 2015 and 2020 but to rise thereafter, reaching 79 percent of GDP at the end of 2025.

Although federal debt relative to the size of the economy is projected to increase only modestly over the next decade, it is already high by historical standards: As recently as the end of 2007, debt held by the public was equal to just 35 percent of GDP, but by 2012 it had ballooned to 70 percent of GDP. Throughout the 10-year period that CBO's baseline projections span, federal debt remains greater relative to GDP than at any time since just after World War II. Such high and rising debt would have serious negative consequences for both the economy and the federal budget, including the following:

- When interest rates rise to more typical levels, as CBO expects will happen in the next few years (see Chapter 2), federal spending on interest payments will increase considerably.

- When the federal government borrows, it increases the overall demand for funds, which generally raises the cost of borrowing and reduces lending to businesses and other entities; the eventual result would be a smaller stock of capital and lower output and income than would otherwise be the case, all else being equal.

- The large amount of debt might restrict policymakers' ability to use tax and spending policies to respond to unexpected future challenges, such as economic downturns or financial crises.

- Continued growth in the debt might lead investors to doubt the government's willingness or ability to pay its obligations, which would require the government to pay much higher interest rates on its borrowing.[3]

Projected deficits and debt for the coming decade reflect some of the long-term budgetary challenges facing the nation. The aging of the population, the rising costs of health care, and the expansion in federal subsidies for health insurance that is now under way will substantially boost federal spending on Social Security and the government's major health care programs relative to GDP over the next 10 years. Moreover, the pressures of an aging population and rising costs of health care will continue to increase during the following decades. Unless the laws governing those programs are changed—or the increased spending is accompanied by corresponding reductions in

3. For a discussion of the consequences of elevated debt, see Congressional Budget Office, *Choices for Deficit Reduction: An Update* (December 2013), pp. 9–10, www.cbo.gov/publication/44967.

Table 1-1.

Deficits Projected in CBO's Baseline

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Revenues	3,021	3,189	3,460	3,588	3,715	3,865	4,025	4,204	4,389	4,591	4,804	5,029	18,652	41,670
Outlays	3,504	3,656	3,926	4,076	4,255	4,517	4,765	5,018	5,337	5,544	5,754	6,117	21,540	49,310
Total Deficit	**-483**	**-468**	**-467**	**-489**	**-540**	**-652**	**-739**	**-814**	**-948**	**-953**	**-951**	**-1,088**	**-2,887**	**-7,641**
Net Interest	229	227	276	332	410	480	548	606	664	722	777	827	2,046	5,643
Primary Deficit[a]	-254	-241	-191	-157	-130	-172	-191	-208	-283	-231	-173	-261	-841	-1,998
Memorandum (As a percentage of GDP):														
Total Deficit	-2.8	-2.6	-2.5	-2.5	-2.6	-3.0	-3.3	-3.5	-3.9	-3.8	-3.6	-4.0	-2.8	-3.3
Primary Deficit[a]	-1.5	-1.3	-1.0	-0.8	-0.6	-0.8	-0.9	-0.9	-1.2	-0.9	-0.7	-0.9	-0.8	-0.9
Debt Held by the Public at the End of the Year	74.1	74.2	73.8	73.4	73.3	73.7	74.3	75.0	76.1	76.9	77.7	78.7	n.a.	n.a.

Source: Congressional Budget Office.

Note: GDP = gross domestic product; n.a. = not applicable.

a. Excludes net interest.

other spending relative to GDP, by sufficiently higher tax revenues, or by a combination of those changes—debt will rise sharply relative to GDP after 2025.[4]

In addition, holding discretionary spending within the limits required under current law—an assumption that underlies these projections—may be quite difficult. The caps on discretionary budget authority established by the Budget Control Act of 2011 (Public Law 112-25) and subsequently amended will reduce such spending to an unusually small amount relative to the size of the economy.[5] With those caps in place, CBO projects, discretionary spending will equal 5.1 percent of GDP in 2025; by comparison, the lowest share for discretionary spending in any year since 1962 (the earliest year for which such data have been reported) was 6.0 percent in 1999, and that share has averaged 8.8 percent over the past 50 years. (Nevertheless, total federal spending would constitute a larger share of GDP than its average during the past 50 years because of higher spending on Social Security, Medicare, Medicaid, other health insurance subsidies for low-income people, and interest payments on the debt.) Because the allocation of discretionary spending is determined by annual appropriation acts, lawmakers have not yet decided which specific government services and benefits would be reduced or constrained to meet the overall limits.

The baseline budget outlook has changed little since August 2014, when CBO last published its 10-year projections.[6] At that time, deficits projected under current law totaled about 3 percent of GDP over the 2015–2024 period, or $7.2 trillion. In CBO's latest baseline, deficits are projected to be about $175 billion smaller over those 10 years but still total about 3 percent of GDP. The agency has reduced its projection of total revenues by 1.0 percent through 2024, but projected outlays have decreased by 1.2 percent. Revisions to the economic

4. For a more detailed discussion of the long-term budget situation, see Congressional Budget Office, *The 2014 Long-Term Budget Outlook* (July 2014), www.cbo.gov/publication/45471.

5. Budget authority is the authority provided by law to incur financial obligations that will result in immediate or future outlays of federal funds.

6. For CBO's previous baseline budget projections, see Congressional Budget Office, *An Update to the Budget and Economic Outlook: 2014 to 2024* (August 2014), www.cbo.gov/publication/45653.

outlook account for roughly half of the change in both categories.

Although CBO's baseline does not incorporate potential changes in law, this chapter shows how some alternative policies would affect the budget over the next 10 years. For example, CBO has constructed a policy alternative under which funding for overseas contingency operations—that is, military operations and related activities in Afghanistan and other countries—would continue to decline through 2019 and then grow at the rate of inflation through 2025. Under that alternative, spending for such operations over the 2016–2025 period would be about $450 billion less than the amount projected in the baseline (which incorporates the assumption that funding grows at the rate of inflation throughout the projection period). Other alternative policies would result in larger deficits than those in the baseline. For example, continuing certain tax policies that were recently extended through 2014 but have since expired would lower revenues by about $900 billion over the 2016–2025 period. (For more details, see "Alternative Assumptions About Fiscal Policy" on page 23.)

A Review of 2014

In fiscal year 2014, the budget deficit dropped once again, to $483 billion—nearly 30 percent less than the $680 billion shortfall recorded in 2013. Revenues rose by $246 billion (or 9 percent) and outlays increased by $50 billion (or 1 percent). As a percentage of GDP, the deficit dropped from 4.1 percent in 2013 to 2.8 percent in 2014.

Revenues

Receipts from each of the major revenue sources—individual income taxes, payroll taxes, and corporate income taxes—and remittances from the Federal Reserve all rose relative to the size of the economy in 2014. Total revenues increased from 16.7 percent of GDP in 2013 to 17.5 percent in 2014, close to the average for the past 50 years of 17.4 percent.[7]

Individual income taxes, the largest revenue source, rose by $78 billion (or 6 percent), from 7.9 percent of GDP in 2013 to 8.1 percent in 2014. That percentage of GDP is the highest since 2007 and is larger than the percentage recorded in any other year since 2001. The increase in receipts largely reflected gains in both 2013 and 2014 in wages and salaries as well as in nonwage income. The gains in wages also boosted payroll taxes, the second largest revenue source, which increased by $76 billion (or 8 percent), from 5.7 percent of GDP to 5.9 percent. Part of that increase occurred because the rate for employees' share of the Social Security payroll tax that was in effect during the first quarter of fiscal year 2014—that is, October 2013 through December 2013—was higher than that in effect during the same period the year before, following the expiration of the 2 percentage-point cut in that rate at the end of calendar year 2012.

Revenues from corporate income taxes and remittances from the Federal Reserve also rose relative to GDP. Corporate tax receipts increased by $47 billion (or 17 percent) in 2014, from 1.6 percent of GDP to 1.9 percent, reflecting growth in taxable profits. Remittances to the Treasury from the Federal Reserve rose by $23 billion (or 31 percent), from 0.5 percent of GDP to 0.6 percent, mostly because the central bank's portfolio of securities was larger and the yield on that portfolio was higher. Those remittances are the largest ever, both in dollars and as a share of GDP.

Outlays

After declining over the preceding two years, federal spending rose in 2014—by $50 billion—to $3.5 trillion. Nevertheless, at 20.3 percent of GDP, outlays were lower as a share of the nation's output than in any year since 2008. By comparison, outlays have averaged 20.1 percent of GDP over the past 50 years.[8]

Mandatory Spending. After remaining largely unchanged over the previous three years, outlays for mandatory programs (which include spending for benefit programs and certain other payments to people, businesses, nonprofit institutions, and state and local governments) rose by $65 billion (or 3.2 percent) in 2014. By comparison, mandatory outlays grew at an average annual rate of 5.6 percent during the preceding decade (between 2003 and 2013).

Major Health Care Programs. Federal spending for the major health care programs—Medicare (net of receipts

7. Looking at different historical periods, total revenues averaged 17.3 percent of GDP over the past 40 years and 17.7 percent over the 40 years ending in 2007.

8. Total outlays averaged 20.5 percent of GDP over the past 40 years and 19.9 percent over the 40 years ending in 2007.

from premiums and certain payments from states), Medicaid, the Children's Health Insurance Program, and subsidies offered through health insurance exchanges and related spending—equaled $831 billion in 2014, $63 billion (or 8.3 percent) more than the total for such spending in 2013. The largest increase was for Medicaid outlays, which grew by $36 billion (or 13.6 percent) last year, mostly because a little more than half the states expanded eligibility for Medicaid coverage under the provisions of the Affordable Care Act (ACA).[9] Similarly, subsidies for health insurance purchased through the exchanges that were established by the ACA first became available in January 2014. Outlays for those subsidies, along with related spending, totaled $15 billion last year; in 2013, related spending was only $1 billion (primarily for grants to states to establish exchanges).

In contrast, Medicare outlays continued to grow at a modest rate in 2014. In total, outlays for that program rose by $14 billion (or 2.8 percent) last year, slightly higher than the rate of growth in 2013 (after adjusting for a shift in the timing of certain payments) and less than the rate of growth in the number of Medicare beneficiaries. Over the past four years, Medicare spending has grown at an average annual rate of only 3.1 percent, compared with average annual growth of 3.6 percent in the number of beneficiaries.

Outlays for the Children's Health Insurance Program totaled $9 billion in both 2013 and 2014.

Social Security. Outlays for Social Security totaled $845 billion in 2014, $37 billion (or 4.6 percent) more than payments in 2013. Beneficiaries received a 1.5 percent cost-of-living adjustment in January (which applied to three-quarters of the fiscal year); the increase in the previous year was 1.7 percent. In addition, the number of people receiving benefits grew by 2.0 percent.

Fannie Mae and Freddie Mac. Payments to the Treasury from Fannie Mae and Freddie Mac dropped from $97 billion in 2013 to $74 billion in 2014. That reduction was primarily the result of differences in the timing and magnitude of revaluations of certain tax assets held by each entity. Those reassessments boosted the net worth of both entities and increased the size of the payments to the Treasury from Fannie Mae and Freddie Mac. Fannie Mae's revaluation increased its fiscal 2013 payment to Treasury by about $50 billion; Freddie Mac's revaluation boosted its fiscal 2014 payment by about half that amount. Such payments are recorded as reductions in outlays.

Higher Education. Mandatory outlays for higher education include the net (negative) subsidies for direct student loans issued in the current year, revisions to the subsidy costs of loans made in previous years, and mandatory spending for the Federal Pell Grant Program. Last year, the Treasury recorded outlays of –$12 billion for those higher education programs, compared with outlays of -$26 billion recorded in 2013—thereby accounting for a net increase in outlays of $14 billion. Most of that net increase occurred because in 2014 there was a small upward revision to the subsidy costs of loans made in previous years while in 2013 there was a large downward revision.

Outlays were negative for direct student loans because, over the life of the loans made in 2014, the expected amounts received by the government are greater than the expected payments by the government, as measured on a discounted present-value basis—pursuant to the Federal Credit Reform Act.[10] In particular, the interest rates charged to borrowers of student loans are well above the interest rates the federal government pays to borrow money; therefore, even after accounting for anticipated loan defaults, the federal government is expected to receive more (on a present-value basis) in loan repayments and interest than it disburses for such loans.

Federal Housing Administration's Loan Guarantee Programs. In 2013, the Department of Housing and Urban Development recorded mandatory outlays of nearly $33 billion related to the Federal Housing Administration's loan guarantee programs. That outlay total for 2013 mostly reflects the revisions to the estimated costs

9. See Appendix B for more information about the provisions of the ACA that affect health insurance coverage.

10. Under that act, a program's subsidy costs are calculated by subtracting the discounted present value of the government's projected receipts from the discounted present value of its projected payments. The estimated subsidy costs can be increased or decreased in subsequent years to reflect updated assessments of the payments and receipts associated with the program. Present value is a single number that expresses a flow of current and future income (or payments) in terms of an equivalent lump sum received (or paid) today. The present value depends on the rate of interest (the discount rate) that is used to translate future cash flows into current dollars.

of guarantees provided in previous years. (Such revisions in the estimated costs of prior loan guarantees are recorded each year.) In 2014, the department recorded a much smaller increase in such costs, only $0.7 billion—a year-over-year reduction in mandatory outlays of $32 billion.

Unemployment Compensation. Spending for unemployment compensation dropped for the fourth consecutive year in 2014. The authority to pay emergency benefits expired at the end of December 2013, and the number of people receiving first-time payments of regular unemployment benefits fell to 7.2 million from 8.1 million the year before. As a result, outlays for unemployment compensation dropped by $25 billion last year, to $44 billion, equal to the program's spending in 2008.

Deposit Insurance. In 2014, the premium payments that insured financial institutions made to the Federal Deposit Insurance Corporation (FDIC) throughout the year exceeded the FDIC's spending by $14 billion (thereby reducing the government's net outlays by that amount). In contrast, net outlays for deposit insurance in 2013 totaled a positive $4 billion, in part because financial institutions prepaid in 2010 the premiums that would otherwise have been due during the first half of 2013. In addition, some excess premiums that had previously been paid by certain institutions were refunded in 2013; no such refunds were paid in 2014. As a result, net outlays for deposit insurance decreased by $18 billion in 2014.

Discretionary Spending. Discretionary outlays fell by $23 billion (or 2.0 percent) in 2014—the fourth consecutive year that such outlays have declined. Defense outlays dropped by $30 billion (or 4.8 percent), marking the third consecutive year of decline after increasing at an average annual rate of 6 percent over the previous five years. Spending was down across all major categories, and about 80 percent of the overall decline was attributable to reduced spending by the Army. Measured as a share of GDP, outlays for defense were 3.5 percent in 2014, down from 3.8 percent in 2013.

In contrast, nondefense discretionary outlays rose for the first time since 2010, increasing by $7 billion (or 1.1 percent) last year. A $7 billion decrease in the receipts credited to the Federal Housing Administration boosted net discretionary outlays by that amount. Spending for Pell grants and campus-based aid was also $7 billion higher than in the previous year. In the other direction, spending from funds provided in the American Recovery and Reinvestment Act of 2009 (ARRA, P.L. 111-5) dropped by $8 billion in 2014. (By the end of 2014, roughly 95 percent of the discretionary funding provided by ARRA had been spent.)

Net Interest. Outlays for the budget category "net interest" consist of interest paid on Treasury securities and other interest that the government pays minus the interest that it collects from various sources. Such outlays rose from $221 billion in 2013 to $229 billion in 2014, an increase of nearly 4 percent. Because interest rates over the past few years have been very low by historical standards, those amounts are similar to the net interest outlays 15 to 20 years ago, when the government's debt was much smaller.

The Budget Outlook for 2015

If there are no changes in laws governing taxes and spending, the budget deficit will decline by $16 billion in fiscal year 2015, to $468 billion, CBO estimates (see Table 1-2). At 2.6 percent of GDP, this year's deficit will be close to the average recorded over the past 50 years.

Revenues

CBO projects that if current laws remain unchanged, revenues will increase by $168 billion (or 5.6 percent) in 2015, reaching $3.2 trillion. As a share of GDP, revenues are projected to edge up from 17.5 percent in 2014 to 17.7 percent in 2015, a little above the average recorded over the past 50 years.

The anticipated increase in revenues as a percentage of GDP in 2015 stems primarily from an expected increase in individual income tax receipts—to 8.3 percent of GDP, from 8.1 percent in 2014. That rise largely reflects two factors: an increase in average tax rates (total taxes as a percentage of total income) as economic growth increases people's income faster than the inflation-indexed tax brackets grow (the phenomenon called real bracket creep) and growth in distributions from tax-deferred retirement accounts, whose balances have been boosted in the past few years by strong stock market gains.

A number of provisions that reduce tax liabilities expired at the end of 2014, a development that would ordinarily increase corporate and individual income tax payments starting this year. But those provisions had previously

Table 1-2.

CBO's Baseline Budget Projections

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
								In Billions of Dollars						
Revenues														
Individual income taxes	1,395	1,503	1,644	1,746	1,832	1,919	2,017	2,124	2,235	2,352	2,477	2,606	9,158	20,952
Payroll taxes	1,024	1,056	1,095	1,136	1,179	1,227	1,281	1,337	1,391	1,449	1,508	1,573	5,917	13,175
Corporate income taxes	321	328	429	437	453	450	447	450	459	472	488	506	2,216	4,591
Other	282	302	292	269	251	269	280	293	305	318	330	345	1,361	2,952
Total	**3,021**	**3,189**	**3,460**	**3,588**	**3,715**	**3,865**	**4,025**	**4,204**	**4,389**	**4,591**	**4,804**	**5,029**	**18,652**	**41,670**
On-budget	2,285	2,426	2,667	2,763	2,858	2,974	3,099	3,242	3,389	3,550	3,722	3,906	14,362	32,171
Off-budget[a]	736	763	793	824	857	891	926	962	1,001	1,040	1,081	1,124	4,291	9,499
Outlays														
Mandatory	2,096	2,255	2,475	2,563	2,653	2,816	2,968	3,137	3,363	3,486	3,616	3,891	13,474	30,967
Discretionary	1,179	1,175	1,176	1,182	1,193	1,221	1,248	1,276	1,310	1,336	1,361	1,400	6,019	12,701
Net interest	229	227	276	332	410	480	548	606	664	722	777	827	2,046	5,643
Total	**3,504**	**3,656**	**3,926**	**4,076**	**4,255**	**4,517**	**4,765**	**5,018**	**5,337**	**5,544**	**5,754**	**6,117**	**21,540**	**49,310**
On-budget	2,798	2,914	3,143	3,244	3,366	3,570	3,752	3,938	4,185	4,314	4,441	4,715	17,075	38,667
Off-budget[a]	706	742	784	832	889	948	1,012	1,080	1,152	1,230	1,313	1,402	4,465	10,643
Deficit (-) or Surplus	**-483**	**-468**	**-467**	**-489**	**-540**	**-652**	**-739**	**-814**	**-948**	**-953**	**-951**	**-1,088**	**-2,887**	**-7,641**
On-budget	-513	-489	-476	-481	-508	-595	-653	-696	-796	-764	-719	-809	-2,713	-6,496
Off-budget[a]	30	21	9	-8	-32	-57	-87	-118	-152	-190	-232	-279	-174	-1,144
Debt Held by the Public	12,779	13,359	13,905	14,466	15,068	15,782	16,580	17,451	18,453	19,458	20,463	21,605	n.a.	n.a.
Memorandum:														
Gross Domestic Product	17,251	18,016	18,832	19,701	20,558	21,404	22,315	23,271	24,261	25,287	26,352	27,456	102,810	229,438
								As a Percentage of Gross Domestic Product						
Revenues														
Individual income taxes	8.1	8.3	8.7	8.9	8.9	9.0	9.0	9.1	9.2	9.3	9.4	9.5	8.9	9.1
Payroll taxes	5.9	5.9	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.8	5.7
Corporate income taxes	1.9	1.8	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.8	2.2	2.0
Other	1.6	1.7	1.5	1.4	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total	**17.5**	**17.7**	**18.4**	**18.2**	**18.1**	**18.1**	**18.0**	**18.1**	**18.1**	**18.2**	**18.2**	**18.3**	**18.1**	**18.2**
On-budget	13.2	13.5	14.2	14.0	13.9	13.9	13.9	13.9	14.0	14.0	14.1	14.2	14.0	14.0
Off-budget[a]	4.3	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.2	4.1
Outlays														
Mandatory	12.2	12.5	13.1	13.0	12.9	13.2	13.3	13.5	13.9	13.8	13.7	14.2	13.1	13.5
Discretionary	6.8	6.5	6.2	6.0	5.8	5.7	5.6	5.5	5.4	5.3	5.2	5.1	5.9	5.5
Net interest	1.3	1.3	1.5	1.7	2.0	2.2	2.5	2.6	2.7	2.9	3.0	3.0	2.0	2.5
Total	**20.3**	**20.3**	**20.8**	**20.7**	**20.7**	**21.1**	**21.4**	**21.6**	**22.0**	**21.9**	**21.8**	**22.3**	**21.0**	**21.5**
On-budget	16.2	16.2	16.7	16.5	16.4	16.7	16.8	16.9	17.2	17.1	16.9	17.2	16.6	16.9
Off-budget[a]	4.1	4.1	4.2	4.2	4.3	4.4	4.5	4.6	4.8	4.9	5.0	5.1	4.3	4.6
Deficit (-) or Surplus	**-2.8**	**-2.6**	**-2.5**	**-2.5**	**-2.6**	**-3.0**	**-3.3**	**-3.5**	**-3.9**	**-3.8**	**-3.6**	**-4.0**	**-2.8**	**-3.3**
On-budget	-3.0	-2.7	-2.5	-2.4	-2.5	-2.8	-2.9	-3.0	-3.3	-3.0	-2.7	-2.9	-2.6	-2.8
Off-budget[a]	0.2	0.1	*	*	-0.2	-0.3	-0.4	-0.5	-0.6	-0.8	-0.9	-1.0	-0.2	-0.5
Debt Held by the Public	74.1	74.2	73.8	73.4	73.3	73.7	74.3	75.0	76.1	76.9	77.7	78.7	n.a.	n.a.

Source: Congressional Budget Office.

Note: n.a. = not applicable; * = between -0.05 and 0.05 percent.

a. The revenues and outlays of the Social Security trust funds and the net cash flow of the Postal Service are classified as off-budget.

been set to expire at the end of 2013 and were retroactively extended for a year by the Tax Increase Prevention Act of 2014 (Division A of P.L. 113-295), which was enacted in December 2014. Because that extension occurred so late in the year, some corporate and, to a much lesser extent, individual taxpayers probably made tax payments in 2014 that will be refunded this year when they file tax returns.

Outlays

In the absence of changes to laws governing federal spending, outlays in 2015 will total $3.7 trillion, CBO estimates, $152 billion more than spending in 2014. That rise would represent an increase of 4.3 percent, about half a percentage point less than the average rate of growth experienced between 2003 and 2013. Outlays are projected to total 20.3 percent of GDP this year, the same percentage as in 2014.

Mandatory Spending. Under current law, spending for mandatory programs will rise by $158 billion (or 7.6 percent) in 2015, CBO estimates, amounting to 12.5 percent of GDP, up from the 12.2 percent recorded in 2014.

Major Health Care Programs. Outlays for the federal government's major health care programs will increase by $82 billion (or nearly 10 percent) this year, CBO estimates. Medicaid spending is expected to continue its recent trend of strong growth, primarily because of the optional expansion of coverage authorized by the ACA. CBO expects that more people in states that have already expanded Medicaid eligibility under the ACA will enroll in the program and that more states will expand Medicaid eligibility. All told, CBO projects that, under current law, enrollment in the program will increase by about 4 percent and outlays will climb by $34 billion (or about 11 percent) in 2015; the projected rate of growth in outlays is less than the 14 percent increase recorded in 2014 but well above the 6 percent rate of growth experienced in 2013.

Similarly, subsidies that help people who meet income and other eligibility criteria purchase health insurance through exchanges and meet their cost-sharing requirements, along with related spending, are expected to increase by $30 billion this year, reaching a total of $45 billion (see Appendix B). That growth largely reflects a significant increase in the number of people expected to purchase coverage through exchanges in 2015 and the fact that subsidies for that coverage will be available for the entire fiscal year in 2015. (Last year the subsidies did not become available until January 2014.)

CBO estimates that Medicare's outlays will continue to grow slowly in 2015 under current law, increasing by $17 billion (or 3.4 percent). The projected growth rate is a little higher than last year's rate but about half the average annual increase of roughly 7 percent experienced between 2003 and 2013. That projection of spending for Medicare reflects the assumption that the fees that physicians receive for their services will be reduced by about 21 percent in April 2015 as required under current law. If lawmakers override those scheduled reductions—as they have routinely done in the past—and keep physician fees at their current levels instead, spending on Medicare in 2015 will be $6 billion more than the amount projected in CBO's baseline.

Fannie Mae and Freddie Mac. Transactions between the Treasury and Fannie Mae and Freddie Mac will again reduce federal outlays in 2015, CBO estimates, but by nearly $50 billion less than in 2014. The payments from those entities to the Treasury are projected to total $26 billion this year, compared with $74 billion last year. That drop is partly because Freddie Mac's payments were boosted by nearly $24 billion in fiscal year 2014 as a result of a onetime revaluation of certain tax assets. In addition, financial institutions are expected to make fewer payments to Fannie Mae and Freddie Mac in 2015 to settle allegations of fraud in connection with residential mortgages as well as certain other securities.

Social Security. CBO anticipates that, under current law, Social Security outlays will increase by $38 billion (or 4.5 percent) in 2015, a rate of increase similar to last year's growth. This January's cost-of-living adjustment was slightly higher (1.7 percent) than the increase in January 2014, whereas the projected growth in the number of beneficiaries (1.9 percent) is slightly lower.

Receipts From Spectrum Auctions. Under current law, the Federal Communications Commission (FCC) intermittently auctions licenses to use the electromagnetic spectrum for commercial purposes. CBO estimates that net offsetting receipts from such auctions will total $41 billion in 2015, compared with $1 billion for licenses auctioned last year. In 2014, the FCC auctioned a set of licenses that were primarily of value to a single firm. By contrast, the licenses auctioned in fiscal year

2015 covered more bandwidth and had more desirable characteristics than those offered in 2014, which spurred intense competition among several large telecommunications firms, driving up receipts to the government.

Discretionary Spending. Discretionary budget authority enacted for 2015 totals $1,120 billion, which is $13 billion (or 1 percent) less than such funding totaled in 2014. Although the limits set for budget authority for defense by the Bipartisan Budget Act of 2013 (P.L. 113-67) were about the same in 2015 as they were in 2014, overall funding for defense declined by $20 billion (or 3.3 percent) this year because of a reduction in appropriations for overseas contingency operations, which are not constrained by those caps. Funding for nondefense discretionary programs is $8 billion (or 1.5 percent) higher than in 2014.

If no additional appropriations are enacted for this year, discretionary outlays will fall by $4 billion (or 0.3 percent) from the 2014 amounts, CBO projects. Defense outlays will again decline in 2015, largely because spending for overseas contingency operations will drop. All told, defense spending is expected to fall by $13 billion (or 2.2 percent), about half the rate of decrease recorded in 2014. The largest reductions are for procurement, operation and maintenance, and personnel; outlays for each category are expected to decline by $4 billion. As a result, defense outlays will total $583 billion in 2015, CBO estimates.

Outlays for nondefense programs are expected to rise by $9 billion (or 1.5 percent) this year, to a total of $592 billion. That amount is the net result of a number of relatively small increases and decreases to various programs.

Net Interest. Outlays for net interest will be nearly unchanged in 2015, falling by $3 billion (or 1 percent), to $227 billion, CBO estimates, primarily because Treasury interest rates remain very low. At 1.3 percent of GDP, such outlays would be well below their 50-year average of 2.0 percent.

CBO's Baseline Budget Projections for 2016 to 2025

CBO constructs its baseline in accordance with provisions set forth in the Balanced Budget and Emergency Deficit Control Act of 1985 and the Congressional Budget and Impoundment Control Act of 1974. For the most part, those laws require that the agency's baseline projections incorporate the assumption that current laws governing taxes and spending in future years remain in place.

Under that assumption, CBO projects that the budget deficit would remain near 2.5 percent of GDP through 2018. But beginning in 2019, the deficit is projected to increase in most years, both in dollar terms and as a share of the economy, reaching 4.0 percent of GDP by 2025.

The pattern of stable deficits over the next several years followed by generally rising deficits through 2025 is the result, in part, of shifts in the timing of certain payments from one fiscal year to another because scheduled payment dates will fall on a weekend; without those shifts, the deficit would reach a low of 2.3 percent of GDP in 2016 and then increase throughout the rest of the projection period.[11]

Revenues

If current laws remain unchanged, revenues are estimated to increase by 8.5 percent in 2016—in part because various tax provisions that had expired at the end of 2013 were recently extended through 2014 and have subsequently expired again (see Chapter 4 for more details on those changes). As a result, revenues are anticipated to rise to 18.4 percent of GDP in 2016, an increase of 0.7 percentage points.

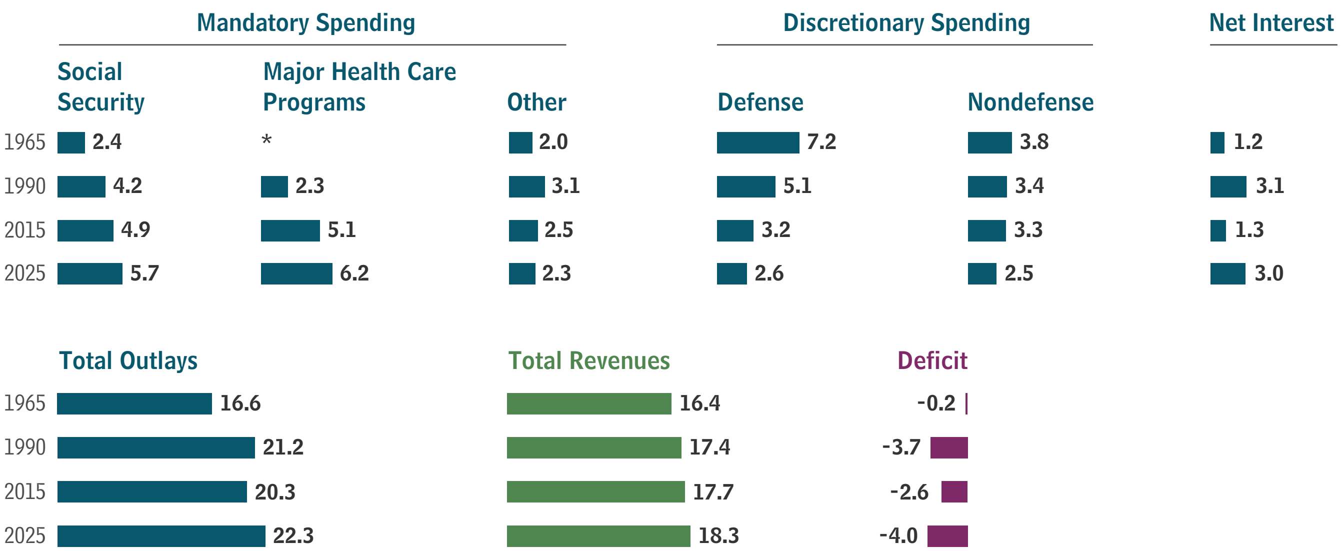
From 2017 through 2025, revenues in CBO's baseline remain between 18.0 and 18.3 percent of GDP, largely reflecting offsetting movements in individual and corporate income taxes and remittances from the Federal Reserve. Individual income taxes are projected to generate increasing revenues relative to the size of the economy, growing from 8.7 percent of GDP in 2016 to 9.5 percent in 2025. The increase stems mostly from real bracket creep, a phenomenon in which growth in real, or inflation-adjusted, income of individuals pushes more income into higher tax brackets. In addition, taxable distributions from tax-deferred retirement accounts are expected to grow more rapidly than GDP as the population ages in coming years. Labor income is also projected to grow

11. Because October 1 will fall on a weekend in 2016, 2017, 2022, and 2023, certain payments that are due on those days will instead be made at the end of September, thus shifting them into the previous fiscal year.

Figure 1-2.

Spending and Revenues Projected in CBO's Baseline, Compared With Levels in 1965 and 1990

Percentage of Gross Domestic Product



Source: Congressional Budget Office.

Notes: Major health care programs consist of Medicare, Medicaid, the Children's Health Insurance Program, and subsidies for health insurance purchased through exchanges and related spending. (Medicare spending is net of premiums paid by beneficiaries and other offsetting receipts.)

* = between zero and 0.05 percent.

faster than GDP over this period, further boosting income tax collections.

In contrast, corporate income tax receipts and remittances from the Federal Reserve are projected to decline relative to the size of the economy after this year or next. Corporate income tax receipts are projected to decline as a share of GDP after 2016 largely because of an anticipated drop in domestic economic profits relative to GDP, the result of growing labor costs and rising interest payments on businesses' debt. Remittances from the Federal Reserve, which have been very high by historical standards since 2010 because of changes in the size and composition of the central bank's portfolio of securities, decline to more typical levels in CBO's projections starting in 2016.

Outlays

Outlays in CBO's baseline grow to nearly 21 percent of GDP in 2016, remain roughly steady as a share of GDP through 2018, and then follow an upward trend, reaching 22.3 percent of GDP by 2025.[12] Although the 10-year baseline projections do not fully reflect the long-term budgetary pressures facing the United States, those pressures are evident in the path of federal outlays over the next decade. Because of the aging of the population, rising health care costs, and a significant expansion in eligibility for federal subsidies for health insurance, outlays for Social Security and the federal government's major health care programs are projected to rise substantially relative to the size of the economy over the next 10 years (see Figure 1-2). In addition, growing debt and rising interest rates will boost net interest payments. Specifically, in CBO's baseline:

- Outlays for Social Security are projected to remain at 4.9 percent of GDP in 2016 and 2017 but then climb to 5.7 percent of GDP by 2025.

- Outlays for the major health care programs—Medicare (net of receipts from premiums and certain payments from states), Medicaid, the Children's

12. Without the shifts in the timing of certain payments, outlays would increase relative to GDP in each year of the projection period, CBO estimates.

Health Insurance Program, and subsidies offered through health insurance exchanges and related spending—soon exceed outlays for Social Security. Spending for those programs is estimated to total 5.3 percent of GDP in 2016 and to grow rapidly in coming years, reaching 6.2 percent of GDP in 2025.

- Net interest equals 1.5 percent of GDP in 2016, but rising interest rates and mounting debt cause that total to double as a percentage of GDP by 2025.

Those three components of the budget account for nearly 85 percent of the total increase in outlays (in nominal terms) over the coming decade (see Figure 1-3). By the end of the projection period, they would be the largest categories of spending in the budget.

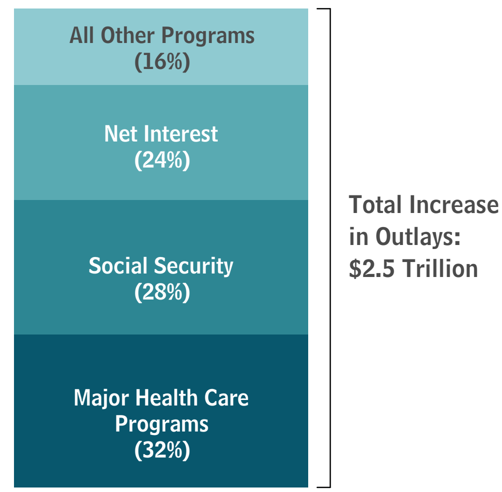
In contrast, under current law, all other spending will decrease from 9.2 percent of GDP in 2016 to 7.4 percent in 2025, CBO projects. That decline is projected to occur because spending for many of the other mandatory programs is expected to rise roughly with inflation (which is projected to be well below the rate of growth of nominal GDP) and because most discretionary funding is capped through 2021 at amounts that increase more slowly than GDP.

Mandatory Spending. The Deficit Control Act requires CBO's projections for most mandatory programs to be made in keeping with the assumption that current laws continue unchanged.[13] Thus, CBO's baseline projections for mandatory spending reflect expected changes in the economy, demographics, and other factors, as well as the across-the-board reductions in certain mandatory programs that are required under current law.

Mandatory spending (net of offsetting receipts, which reduce outlays) is projected to increase by close to 10 percent in 2016, reaching 13.1 percent of GDP. That growth is partially the result of a few unusual circumstances:

Figure 1-3.

Components of the Total Increase in Outlays in CBO's Baseline Between 2015 and 2025



Source: Congressional Budget Office.

Note: Major health care programs consist of Medicare, Medicaid, the Children's Health Insurance Program, and subsidies for health insurance purchased through exchanges and related spending. (Medicare spending is net of premiums paid by beneficiaries and other offsetting receipts.)

- Receipts from the auctioning of licenses to use a portion of the electromagnetic spectrum—which are recorded as offsets to mandatory outlays—are anticipated to reduce such outlays by $41 billion in 2015. However, the net receipts associated with those auctions are expected to drop to near zero in 2016 because spending related to making the frequencies auctioned this year available for commercial uses will largely offset the receipts being collected. Beyond 2016, net receipts will total $18 billion over the remainder of the projection period.

- October 1, 2016, falls on a weekend, so certain payments that are scheduled for the first of the month will be made in September, shifting about $37 billion in mandatory outlays from fiscal year 2017 to fiscal year 2016.

- Cash payments from Fannie Mae and Freddie Mac to the Treasury will be recorded in the budget as reducing outlays by $26 billion in 2015, CBO estimates. However, the transactions of those two entities are not treated on a cash basis in CBO's baseline after the current year but are considered

13. The Deficit Control Act specifies some exceptions. For example, spending programs whose authorizations are set to expire are assumed to continue if they have outlays of more than $50 million in the current year and were established at or before enactment of the Balanced Budget Act of 1997. Programs established after that law was enacted are not automatically assumed to continue but are considered individually by CBO in consultation with the House and Senate Budget Committees.

instead as credit programs of the government.[14] Reflecting that difference in treatment, outlays for Fannie Mae and Freddie Mac in 2016 are estimated to total $3 billion, a net increase in spending of $29 billion. (On a cash basis, outlays in 2016 would be similar to those in 2015.)

If not for those factors, mandatory outlays would increase by 5 percent in 2016. In the years beyond 2016, mandatory spending is projected to grow at an average rate of about 5 percent annually, reaching 14.2 percent of GDP in 2025 (compared with 12.2 percent in 2014).

Over the entire 10-year period, spending for Social Security is projected to rise at an average annual rate of 5.9 percent; for the major health care programs, 6.4 percent; and for all other programs and activities in the mandatory category, 3.2 percent.

Discretionary Spending. For discretionary spending, CBO's baseline incorporates the caps on such funding that are currently in place through 2021 and then reflects the assumption that funding keeps pace with inflation in later years; the elements of discretionary funding that are not constrained by the caps, such as appropriations for overseas contingency operations, are assumed to increase with inflation throughout the next decade.

Discretionary outlays are estimated to remain virtually unchanged from 2015 through 2017 and then to grow at an average annual rate of 2.1 percent after 2017; that rate is roughly half of the projected growth rate of nominal GDP. As a result, spending for both defense and nondefense discretionary programs is projected to fall relative to GDP under CBO's baseline assumptions. Outlays for defense are projected to drop from 3.1 percent of GDP in 2016 to 2.6 percent in 2025, 2.4 percentage points below the average share they represented from 1965 through 2014 and the lowest share in any year since before 1962 (which is the earliest year for which such data have been reported). For nondefense discretionary spending, outlays are projected to drop from 3.1 percent of GDP in 2016 to 2.5 percent in 2025, 1.3 percentage points below the average from 1965 through 2014 and also the lowest share in any year since before 1962.

Net interest. Under CBO's baseline assumptions, net interest payments increase from $227 billion, or 1.3 percent of GDP, in 2015 to $827 billion, or 3.0 percent of GDP, in 2025—the highest ratio since 1996. Two factors drive that sharp increase—rising interest rates and growing debt. The interest rate paid on 3-month Treasury bills will rise from 0.1 percent in 2015 to 3.4 percent in 2018 and subsequent years, and the rate on 10-year Treasury notes will increase from 2.6 percent in 2015 to 4.6 percent in 2020 and subsequent years. Meanwhile, debt held by the public will increase, according to CBO's projections, from 74.2 percent of GDP at the end of 2015 to 78.7 percent at the end of 2025.

Federal Debt

Federal debt held by the public consists mostly of securities that the Treasury issues to raise cash to fund the federal government's activities and to pay off its maturing liabilities.[15] The Treasury borrows money from the public by selling securities in the capital markets; that debt is purchased by various buyers in the United States, by private investors overseas, and by the central banks of other countries. Of the $12.8 trillion in federal debt held by the public at the end of 2014, 52 percent ($6.7 trillion) was held by domestic investors and 48 percent ($6.1 trillion) was held by foreign investors.[16] Other measures of federal debt are sometimes used for various purposes, such as to provide a more comprehensive picture of the

14. Because the government placed Fannie Mae and Freddie Mac into conservatorship in 2008 and now controls their operations, CBO considers the activities of those two entities to be governmental. Therefore, for the 10-year period that follows the current fiscal year, CBO projects the subsidy costs of the entities' new activities using procedures similar to those specified in the Federal Credit Reform Act of 1990 for determining the costs of federal credit programs but with adjustments to reflect the market risk associated with those activities. The Administration, by contrast, considers Fannie Mae and Freddie Mac to be outside of the federal government for budgetary purposes and records cash transactions between those entities and the Treasury as federal outlays or receipts. (In CBO's view, those transactions are intragovernmental.) To provide CBO's best estimate of what the Treasury will ultimately report as the federal deficit for 2015, CBO's current baseline includes an estimate of the cash receipts from the two entities to the Treasury for this year (while retaining its risk-adjusted projections of subsidy costs for later years).

15. A small amount of debt held by the public is issued by other agencies, mainly the Tennessee Valley Authority.

16. The largest U.S. holders of Treasury debt are the Federal Reserve System (18 percent), individual households (6 percent), and mutual funds (6 percent); investors in China and Japan have the largest foreign holdings of Treasury securities, accounting for nearly 20 percent of U.S. public debt. For additional information, see Congressional Budget Office, *Federal Debt and Interest Costs* (December 2010), Chapter 1, www.cbo.gov/publication/21960.

Table 1-3.

Federal Debt Projected in CBO's Baseline

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Debt Held by the Public at the Beginning of the Year	11,983	12,779	13,359	13,905	14,466	15,068	15,782	16,580	17,451	18,453	19,458	20,463
Changes in Debt Held by the Public												
Deficit	483	468	467	489	540	652	739	814	948	953	951	1,088
Other means of financing	314	112	79	72	62	62	59	57	54	52	55	54
Total	797	580	546	561	602	714	798	870	1,002	1,005	1,006	1,142
Debt Held by the Public at the End of the Year	**12,779**	**13,359**	**13,905**	**14,466**	**15,068**	**15,782**	**16,580**	**17,451**	**18,453**	**19,458**	**20,463**	**21,605**
Debt Held by the Public at the End of the Year (As a percentage of GDP)	74.1	74.2	73.8	73.4	73.3	73.7	74.3	75.0	76.1	76.9	77.7	78.7
Memorandum:												
Debt Held by the Public Minus Financial Assets[a]												
In billions of dollars	11,544	12,011	12,450	12,909	13,420	14,044	14,754	15,540	16,458	17,382	18,303	19,360
As a percentage of GDP	66.9	66.7	66.1	65.5	65.3	65.6	66.1	66.8	67.8	68.7	69.5	70.5
Gross Federal Debt[b]	17,792	18,472	19,126	19,831	20,576	21,404	22,294	23,227	24,244	25,247	26,231	27,288
Debt Subject to Limit[c]	17,781	18,462	19,115	19,820	20,565	21,392	22,281	23,214	24,231	25,234	26,217	27,275
Average Interest Rate on Debt Held by the Public (Percent)[d]	1.8	1.7	2.0	2.3	2.7	3.0	3.3	3.5	3.6	3.7	3.8	3.8

Source: Congressional Budget Office.

Note: GDP = gross domestic product.

a. Debt held by the public minus the value of outstanding student loans and other credit transactions, cash balances, and other financial instruments.

b. Federal debt held by the public plus Treasury securities held by federal trust funds and other government accounts.

c. The amount of federal debt that is subject to the overall limit set in law. Debt subject to limit differs from gross federal debt mainly because most debt issued by agencies other than the Treasury and the Federal Financing Bank is excluded from the debt limit. That limit was most recently set at $17.2 trillion but has been suspended through March 15, 2015. On March 16, the debt limit will be raised to its previous level plus the amount of federal borrowing that occurred while the limit was suspended.

d. The average interest rate is calculated as net interest divided by debt held by the public.

government's financial condition or to account for debt held by federal trust funds.

Debt Held by the Public. Debt held by the public increased by about $800 billion in 2014, reaching 74 percent of GDP, higher than the amount recorded in 2013 (72 percent) or in any other year since 1950. As recently as 2007, such debt equaled 35 percent of GDP. Under the assumptions that govern CBO's baseline, the federal government is projected to borrow another $8.8 trillion from 2015 through 2025, pushing debt held by the public up to 79 percent of GDP by the end of the projection period (see Table 1-3).

That amount of debt relative to the size of the economy would be the highest since 1950 and more than double the average of 38 percent experienced over the 1965–2014 period or the average of 34 percent experienced over the 40 years ending in 2007, before the recent sharp increase in debt. By historical standards, debt that high—and heading higher—would have significant consequences for the budget and the economy:

- The nation's net interest costs would be very high (after interest rates move up to more typical levels) and rising.

- National saving would be held down, leading to more borrowing from abroad and less domestic investment, which in turn would decrease income in the United States compared with what it would be otherwise.

- Policymakers' ability to use tax and spending policies to respond to unexpected challenges—such as economic downturns, financial crises, or natural disasters—would be constrained. As a result, such challenges could have worse effects on the economy and people's well-being than they would otherwise.

- The risk of a fiscal crisis would be higher. During such a crisis, investors would lose so much confidence in the government's ability to manage its budget that the government would be unable to borrow funds at affordable interest rates.

The amount of money the Treasury borrows by selling securities (net of the maturing securities it redeems) is determined primarily by the annual budget deficit. However, several factors—collectively labeled "other means of financing" and not directly included in budget totals—also affect the government's need to borrow from the public. Those factors include changes in the government's cash balance and investments in the Thrift Savings Plan's G fund, as well as the cash flows associated with federal credit programs (such as student loans) because only the subsidy costs of those programs (calculated on a present-value basis) are reflected in the budget deficit.

CBO projects that the increase in debt held by the public will exceed the deficit in 2015 by $112 billion, mainly because the government will need cash to finance new student loans and other credit programs. The same is true for each year from 2016 to 2025: CBO estimates that the government will need to borrow about $60 billion more per year, on average, during that period than the budget deficits would suggest.

Other Measures of Federal Debt. Three other measures are sometimes used in reference to federal debt:

Debt held by the public less financial assets subtracts from debt held by the public the value of the government's financial assets, such as student loans. That measure provides a more comprehensive picture of the government's financial condition and its overall impact on credit markets than does debt held by the public. Calculating the measure is not straightforward, however, because neither the financial assets to be included nor the method for evaluating them is well defined. Under CBO's baseline assumptions, that measure is smaller than debt alone but varies roughly in line with it.

Gross federal debt consists of debt held by the public and debt issued to government accounts (for example, the Social Security trust funds). The latter type of debt does not directly affect the economy and has no net effect on the budget. In CBO's projections, debt held by the public is expected to increase by $8.8 trillion between the end of 2014 and the end of 2025, and debt held by government accounts is estimated to rise by $0.7 trillion. As a result, gross federal debt is projected to rise by $9.5 trillion over that period and to total $27.3 trillion at the end of 2025. About one-fifth of that sum would be debt held by government accounts.

Debt subject to limit is the amount of debt that is subject to the statutory limit on federal borrowing; it is virtually identical to gross federal debt. The amount of outstanding debt subject to limit is now about $18.0 trillion; under current law, it is projected to reach $27.3 trillion at the end of 2025.

Currently, there is no statutory limit on the issuance of new federal debt because the Temporary Debt Limit Suspension Act (P.L. 113-83) suspended the debt ceiling through March 15, 2015. Under the act, the debt limit after that date will equal the previous limit of $17.2 trillion plus the amount of borrowing accumulated during the suspension of the limit.

Therefore, if the current suspension is not extended and a higher debt limit is not specified in law before March 16, 2015, the Treasury will have no room to borrow under standard borrowing procedures beginning on that date. To avoid a breach in the debt ceiling, the Treasury would begin employing its well-established toolbox of so-called extraordinary measures to allow continued borrowing for a limited time. CBO anticipates that the Treasury would probably exhaust those measures in September or October of this year. If that occurred, the Treasury would soon run out of cash and be unable to fully pay its obligations, a development that would lead to delays of payments for government activities, a default on the government's debt obligations, or both. However, the government's cash flows cannot be predicted with certainty, and the actual cash flows during the coming months will affect the dates on which the Treasury would exhaust the extraordinary measures and the date on which it would run out of cash.[17]

Changes in CBO's Baseline Since August 2014

CBO completed its previous set of baseline projections in August 2014. Since then, the agency has reduced its estimate of the deficit in 2015 by $2 billion. The agency has also lowered its baseline projection of the cumulative deficit from 2015 through 2024 by $175 billion, from $7.2 trillion to $7.0 trillion (see Appendix A). Almost all of that reduction occurs in the projections for fiscal years 2016 through 2018; baseline deficits for other years are nearly unchanged. A number of different factors led to those changes: Legislation enacted since last August caused CBO to lower projected deficits through 2024 by $91 billion; a revised economic outlook reduced them by $38 billion; and other, technical changes decreased projected deficits by an additional $46 billion (see Table 1-4).

Those relatively small changes to the overall baseline totals reflect larger, but nearly offsetting, changes to baseline revenues and outlays, as both revenues and outlays are lower than CBO projected in August.

CBO has reduced its estimate of cumulative revenues through 2024 by $415 billion (or 1.0 percent) since last August:

- More than half of that change ($234 billion) stems from changes to the economic outlook, primarily slightly lower projections of economic growth.
- Technical changes, which reflect new information from tax returns, recent tax collections, new analysis of elements of the projections, and other factors, have reduced projected revenues by $137 billion over the period; the largest reductions were in projected receipts from corporate income taxes.
- Legislation enacted since August has reduced projected revenues by $81 billion in 2015 and boosted them by $38 billion between 2016 and 2024, a net reduction of $44 billion. Those legislative changes result almost entirely from the Tax Increase Prevention Act of 2014, which retroactively extended—through 2014—a host of tax provisions that reduce tax liabilities and that had expired at the end of 2013.

Projected outlays through 2024 have declined by $590 billion (or 1.2 percent) since August, more than offsetting the decrease in projected revenues:

- The revised economic outlook accounted for $272 billion of that reduction. The largest reductions were in projected spending for Social Security (down by $110 billion) and net interest costs (reduced by $147 billion, excluding debt-service costs) because CBO now anticipates lower inflation this year and lower interest rates over much of the projection period.
- A variety of technical changes, primarily to estimates for mandatory programs, further reduced outlays by $70 billion in 2015 and by $184 billion between 2015 and 2024.
- Finally, legislation enacted since August lowered projected outlays through 2024 by $134 billion. Much of that decrease occurs because the current projections are based on 2015 appropriations, whereas the August baseline reflected 2014 appropriations. The amount of funding for overseas contingency operations in 2015 is less than the amount provided for 2014, and the projections throughout the 10-year period are extrapolated from that lower funding.

Uncertainty in Budget Projections

Even if federal laws remained unchanged for the next decade, actual budgetary outcomes would differ from CBO's baseline projections because of unanticipated changes in economic conditions and in a host of other factors that affect federal spending and revenues. The agency aims for its projections to be in the middle of the distribution of possible outcomes given the baseline assumptions about federal tax and spending policies, while recognizing that there will always be deviations from any such projections.

CBO's projections of outlays depend on the agency's economic projections for the coming decade, including forecasts for such variables as interest rates, inflation, and

17. For more information on the debt limit and extraordinary measures, see Congressional Budget Office, *Federal Debt and the Statutory Limit* (November 2013), www.cbo.gov/publication/44877.

Table 1-4.

Changes in CBO's Baseline Projections of the Deficit Since August 2014

Billions of Dollars

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total 2015-2019	Total 2015-2024
Deficit in CBO's August 2014 Baseline	-469	-556	-530	-560	-661	-737	-820	-946	-957	-960	-2,777	-7,196
Changes												
Legislative												
Revenues	-81	18	11	7	5	1	*	-1	-2	-2	-40	-44
Outlays	1	-10	-9	-13	-12	-17	-17	-18	-19	-20	-44	-134
Subtotal[a]	-82	28	20	21	17	18	17	17	17	18	4	91
Economic												
Revenues	29	11	-17	-34	-36	-39	-43	-40	-36	-29	-47	-234
Outlays	-25	-26	-29	-22	-28	-31	-30	-28	-27	-26	-130	-272
Subtotal[a]	54	37	12	-12	-8	-8	-13	-12	-9	-3	83	38
Technical												
Revenues	-40	7	-11	-6	-11	-20	-9	-15	-16	-16	-61	-137
Outlays	-70	-16	-21	-17	-12	-8	-11	-7	-11	-9	-137	-184
Subtotal[a]	30	24	10	11	1	-12	2	-8	-5	-6	75	46
Total Effect on the Deficit[a]	**2**	**89**	**41**	**20**	**9**	**-3**	**6**	**-2**	**4**	**9**	**161**	**175**
Deficit in CBO's January 2015 Baseline	-468	-467	-489	-540	-652	-739	-814	-948	-953	-951	-2,615	-7,021
Memorandum:												
Total Effect on Revenues	-93	37	-17	-33	-43	-58	-52	-56	-53	-46	-149	-415
Total Effect on Outlays	-94	-52	-58	-53	-52	-55	-58	-54	-57	-55	-310	-590

Source: Congressional Budget Office.

Note: * = between -$500 million and zero.

a. Negative numbers indicate an increase in the deficit; positive numbers indicate a decrease in the deficit.

the growth of real GDP. Discrepancies between those forecasts and actual economic outcomes can result in significant differences between baseline budgetary projections and budgetary outcomes. For instance, CBO's baseline economic forecast anticipates that interest rates on 3-month Treasury bills will increase from 0.9 percent in fiscal year 2016 to 3.4 percent in fiscal year 2018 and subsequent years and that interest rates on 10-year Treasury notes will rise from 3.2 percent to 4.6 percent in 2020 and subsequent years. If interest rates on all types of Treasury securities were 1 percentage point higher or lower each year from 2016 through 2025 and all other economic variables were unchanged, cumulative outlays projected for the 10-year period would be about $1.3 trillion higher or lower (excluding changes in the costs of servicing the federal debt) and revenues would be $0.1 trillion higher or lower. (For further discussion of how some key economic projections affect budget projections, see Appendix C.)

Uncertainty also surrounds myriad technical factors that can substantially affect CBO's baseline projections of outlays. For example, spending per enrollee for Medicare and Medicaid is very difficult to predict. If per capita costs in those programs rose 1 percentage point faster or slower per year than CBO has projected for the next decade, total federal outlays for Medicare (net of receipts from premiums) and Medicaid would be roughly $900 billion higher or lower for that period. The effects of the Affordable Care Act are another source of significant uncertainty. To estimate the effects of the law's broad changes to the nation's health care and health insurance systems, CBO and the staff of the Joint Committee on Taxation (JCT) have made projections concerning an array of programs and institutions, some of which—such as the health insurance exchanges—have been in place only for a year.

Projections of revenues are quite sensitive to many economic and technical factors. Revenues depend on total amounts of wages and salaries, corporate profits, and other income, all of which are encompassed by CBO's economic projections. For example, if the growth of real GDP and taxable income was 0.1 percentage point higher or lower per year than in CBO's baseline projections, revenues would be roughly $290 billion higher or lower over the 2016–2025 period.

In addition, forecasting the amount of revenue that the government will collect from taxpayers for a given amount of total income requires technical estimates of the distribution of income and of many aspects of taxpayers' behavior. For example, estimates are required of the amounts of deductions and credits that people will receive and the amount of income in the form of capital gains they will realize from selling assets. Differences between CBO's judgments about such behavior and actual outcomes can lead to significant deviations from the agency's baseline projections of revenues.

Even relatively small deviations in revenues and outlays compared to CBO's projections could have a substantial effect on budget deficits. For example, if revenues projected for 2025 were too high by 5 percent (that is, if average annual growth in revenues during the coming decade was about 0.5 percentage points less than CBO estimated) and outlays projected for mandatory programs were too low by 5 percent, the deficit for that year would be about $450 billion greater than the $1.1 trillion in CBO's baseline; if GDP matched CBO's projection, that larger deficit would be 5.6 percent of GDP rather than the 4.0 percent in the baseline. Outcomes could differ by larger amounts and in the other direction as well.

Alternative Assumptions About Fiscal Policy

CBO's baseline budget projections—which are constructed in accordance with provisions of law—are intended to show what would happen to federal spending, revenues, and deficits if current laws generally remained unchanged. Future legislative action, however, could lead to markedly different budgetary outcomes.

To assist policymakers and analysts who may hold differing views about the most useful benchmark against which to consider possible changes to laws, CBO has estimated the effects on budgetary projections of some alternative assumptions about future policies (see Table 1-5). The discussion below focuses on how those policy actions would directly affect revenues and outlays. Such changes would also influence the costs of servicing the federal debt (shown separately in the table).

Military and Diplomatic Operations in Afghanistan and Other War-Related Activities

One alternative path addresses spending for operations in Afghanistan and similar activities, sometimes called overseas contingency operations. The outlays projected in the baseline come from budget authority provided for those purposes in 2014 and prior years that has not been used, the $74 billion in budget authority provided for 2015, and the $822 billion that is projected to be appropriated over the 2016–2025 period (under the assumption that annual funding is set at $74 billion with adjustments for anticipated inflation, in accordance with the rules governing baseline projections).[18]

In coming years, the funding required for overseas contingency operations—in Afghanistan or other countries—might be smaller than the amounts projected in the baseline if the number of deployed troops and the pace of operations diminished. For that reason, CBO has formulated a budget scenario that anticipates a reduction in the number of U.S. military personnel deployed abroad for military actions and a concomitant reduction in diplomatic operations and foreign aid. Many other scenarios—some costing more and some less—are also possible.

In 2014, the number of U.S. active-duty, reserve, and National Guard personnel deployed for military and diplomatic operations that have been designated as overseas contingency operations averaged about 110,000, CBO estimates. In this alternative scenario, the average number of military personnel deployed for such purposes would decline over the next two years from roughly 90,000 in 2015 to 50,000 in 2016 and to 30,000 in 2017 and thereafter. (Those numbers could represent various allocations of forces around the world.) Under that scenario, and assuming that the extraordinary funding for diplomatic operations and foreign aid declines at a similar rate, total discretionary outlays over the 2016–2025

18. Funding for overseas contingency operations in 2015 includes $64 billion for military operations and indigenous security forces and $9 billion for diplomatic operations and foreign aid.

Table 1-5.

Budgetary Effects of Selected Policy Alternatives Not Included in CBO's Baseline

Billions of Dollars

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Policy Alternatives That Affect Discretionary Outlays													
Reduce the Number of Troops Deployed for Overseas Contingency Operations to 30,000 by 2017[a]													
Effect on the deficit[b]	0	12	28	39	46	51	53	55	56	57	58	175	454
Debt service	0	*	1	2	4	6	8	11	14	16	19	13	81
Increase Discretionary Appropriations at the Rate of Inflation After 2015[c]													
Effect on the deficit[b]	0	-20	-30	-36	-41	-47	-52	-57	-62	-66	-69	-174	-480
Debt service	0	*	-1	-2	-4	-6	-8	-11	-14	-17	-20	-14	-83
Freeze Most Discretionary Appropriations at the 2015 Amount[d]													
Effect on the deficit[b]	0	-7	4	25	49	74	100	128	155	184	216	145	929
Debt service	0	*	*	*	2	5	8	13	20	27	35	7	111
Policy Alternative That Affects Mandatory Outlays													
Maintain Medicare's Payment Rates for Physicians at the Current Rate[e]													
Effect on the deficit[b]	-6	-9	-10	-10	-11	-13	-14	-15	-16	-16	-17	-54	-131
Debt service	*	*	*	-1	-2	-2	-3	-3	-4	-5	-6	-5	-27
Policy Alternative That Affects Both Discretionary and Mandatory Outlays													
Prevent the Automatic Spending Reductions Specified in the Budget Control Act[f]													
Effect on the deficit[b]	n.a.	-63	-91	-99	-103	-106	-106	-109	-115	-119	-99	-462	-1,010
Debt service	n.a.	-1	-3	-7	-12	-16	-21	-27	-32	-38	-43	-39	-200

Continued

period would be $454 billion less than the amount in the baseline, CBO estimates.[19]

Other Discretionary Spending

Policymakers could vary discretionary funding in many ways from the amounts projected in the baseline. For example, if appropriations grew each year through 2025 at the same rate as inflation after 2015 rather than being constrained by the caps, discretionary spending would be $480 billion higher for that period than it is in the baseline. If, by contrast, lawmakers kept appropriations for 2016 through 2025 at the nominal 2015 amount, total discretionary outlays would be $929 billion lower over that period. Under that scenario (sometimes called a freeze in regular appropriations), total discretionary spending would fall from 6.5 percent of GDP in fiscal year 2015 to 4.3 percent in 2025. (Such spending is already projected to fall to 5.1 percent of GDP in 2025 under CBO's baseline, reflecting the caps on most new discretionary funding through 2021 and adjustments for inflation after 2021.)

Medicare's Payments to Physicians

Spending for Medicare is constrained by a rate-setting system—called the sustainable growth rate—for the fees that physicians receive for their services. If the system is allowed to operate as currently structured, physicians' fees

19. The reduction in budget authority under this alternative is similar to those arising from some proposals to cap discretionary appropriations for overseas contingency operations. Such caps could result in reductions in CBO's baseline projections of discretionary spending. However, those reductions might simply reflect policy decisions that have already been made or would be made in the absence of caps. Moreover, if future policymakers believed that national security required appropriations above the capped levels, they would almost certainly provide emergency appropriations that would not, under current law, be counted against the caps.

Table 1-5. **Continued**

Budgetary Effects of Selected Policy Alternatives Not Included in CBO's Baseline

Billions of Dollars

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Policy Alternative That Affects the Tax Code													
Extend Expiring Tax Provisions[g]													
Effect on the deficit[b]	-42	-109	-78	-73	-93	-88	-88	-89	-91	-94	-97	-440	-898
Debt service	*	-2	-5	-8	-13	-17	-21	-26	-31	-36	-41	-45	-200
Memorandum:													
Outlays for Overseas Contingency Operations in CBO's Baseline	83	78	75	75	76	78	79	81	83	84	86	382	797
Deficit in CBO's Baseline	-468	-467	-489	-540	-652	-739	-814	-948	-953	-951	-1,088	-2,887	-7,641

Sources: Congressional Budget Office; staff of the Joint Committee on Taxation.

Notes: Negative numbers indicate an increase in the deficit; positive numbers indicate a decrease in the deficit.

n.a. = not applicable; * = between -$500 million and $500 million.

a. For this alternative, CBO does not extrapolate the $74 billion in budget authority for military operations, diplomatic activities, and aid to Afghanistan and other countries provided for 2015. Rather, the alternative incorporates the assumption that funding for overseas contingency operations declines from $50 billion in 2016 to a low of $25 billion in 2019. Thereafter, such funding would slowly increase, reaching about $30 billion per year by the end of the projection period—for a total of $300 billion over the 2016–2025 period.

b. Excludes debt service.

c. These estimates reflect the assumption that appropriations will not be constrained by caps set by the Budget Control Act of 2011 as amended and will instead grow at the rate of inflation from their 2015 level. Discretionary funding related to federal personnel is inflated using the employment cost index for wages and salaries; other discretionary funding is inflated using the gross domestic product price index.

d. This option reflects the assumption that appropriations other than those for overseas contingency operations would generally be frozen at the 2015 level through 2025.

e. Medicare's payment rates for physicians' services are scheduled to drop by 21 percent on April 1, 2015, and to change by small amounts in subsequent years. In this alternative, payment rates are assumed to continue at their current levels through 2025.

f. The Budget Control Act of 2011 specified that if lawmakers did not enact legislation originating from the Joint Select Committee on Deficit Reduction that would reduce projected deficits by at least $1.2 trillion, automatic procedures would go into effect to reduce both discretionary and mandatory spending during the 2013–2021 period. Those procedures are now in effect and take the form of equal cuts (in dollar terms) in funding for defense and nondefense programs. For the 2016–2021 period, the automatic procedures lower the caps on discretionary budget authority specified in the Budget Control Act (caps for 2014 and 2015 were revised by the Bipartisan Budget Act of 2013); for the 2022–2025 period, CBO has extrapolated the reductions estimated for 2021. Nonexempt mandatory programs will be reduced through sequestration; those provisions have been extended through 2024. The budgetary effects of this option cannot be combined with those of any of the other alternatives that affect discretionary spending, except for the one to reduce the number of troops deployed for overseas contingency operations.

g. These estimates are mainly from the staff of the Joint Committee on Taxation and are preliminary. They reflect the impact of extending about 70 tax provisions that either expired on December 31, 2014, or are scheduled to expire by December 31, 2025. Nearly all of those provisions have been extended previously; some, such as the research and experimentation tax credit, have been extended multiple times.

will be reduced by about 21 percent in April 2015 and will both increase and decrease by small amounts in subsequent years, CBO projects. If, instead, lawmakers overrode those scheduled reductions—as they have every year since 2003—spending on Medicare might be greater than the amounts projected in CBO's baseline. For example, holding payment rates through 2025 at current levels would raise outlays for Medicare (net of premiums paid by beneficiaries) by $6 billion in 2015 and by $131 billion (or nearly 2 percent) between 2016 and 2025. The net effects of such a change in payment rates for physicians on spending for Medicare and on the deficit would depend on whether lawmakers offset the effects of the change, as they often have done in the past, with other changes to reduce deficits.

Automatic Spending Reductions

The Budget Control Act put in place automatic procedures to reduce discretionary and mandatory spending through 2021. Those procedures require equal reductions (in dollar terms) in defense and nondefense spending. Subsequent legislation extended the required reductions to mandatory spending (a process called sequestration) through 2024. If lawmakers chose to prevent those automatic cuts each year—starting in 2016—without making other changes that reduced spending, total outlays over the 2016–2025 period would be $1.0 trillion (or about 2 percent) higher than the amounts in CBO's baseline. Total discretionary outlays would be $845 billion (or 6.7 percent) higher, and outlays for mandatory programs—most of which are not subject to sequestration—would be $164 billion (or 0.5 percent) higher.[20]

Revenues

A host of tax provisions—many of which have been extended repeatedly—have recently expired or are scheduled to expire over the next decade. If all of those provisions were permanently extended, CBO and JCT estimate, revenues would be lower and, although a much smaller effect, outlays for refundable tax credits would be higher, by a total of $898 billion over the 2016–2025 period.

Most of those tax provisions were recently extended retroactively through 2014 and have subsequently expired. They include a provision allowing certain businesses to immediately deduct 50 percent of new investments in equipment, which JCT estimates accounts for $224 billion of the budgetary effects of extending all of the provisions over the next 10 years. The budgetary cost of extending all of the tax provisions would be higher in the latter part of the 10-year period than in the first few years because certain provisions affecting refundable tax credits are scheduled to expire at the end of 2017. Extending those provisions would boost outlays for refundable credits and reduce revenues by a total of $200 billion over the 2019–2025 period. (Payments for refundable credits are typically made a year after the applicable tax year.)

The Long-Term Budget Outlook

Beyond the coming decade, the fiscal outlook is significantly more worrisome. In CBO's most recent long-term projections—which extend through 2039—budget deficits rise steadily under the extended baseline, which follows CBO's 10-year baseline projections for the first decade and then extends the baseline concept for subsequent years.[21] Although long-term budget projections are highly uncertain, the aging of the population, the growth in per capita spending on health care, and the ongoing expansion of federal subsidies for health insurance would almost certainly push up federal spending significantly relative to GDP after 2025 if current laws remained in effect. Federal revenues also would continue to increase relative to GDP under current law, but they would not keep pace with outlays. As a result, public debt would exceed 100 percent of GDP by 2039, CBO estimates, about equal to the percentage recorded just after World War II.

Such high and rising debt relative to the size of the economy would dampen economic growth and thus reduce people's income compared with what it would be otherwise. It would also increasingly restrict policymakers' ability to use tax and spending policies to respond to unexpected challenges and would boost the risk of a fiscal crisis, in which the government would lose its ability to borrow at affordable rates.

Moreover, debt would still be on an upward path relative to the size of the economy in 2039, a trend that would ultimately be unsustainable. To avoid the negative consequences of high and rising federal debt and to put debt on a sustainable path, lawmakers will have to make significant changes to tax and spending policies—letting revenues rise more than they would under current law, reducing spending for large benefit programs below the projected amounts, or adopting some combination of those approaches.

20. Because of interactions between the effects of different policy options, the estimated budgetary effects of this option cannot be added to the estimated budgetary effects of any of the other alternatives that affect discretionary spending except for the one to reduce the number of troops deployed for overseas contingency operations.

21. See Congressional Budget Office, *The 2014 Long-Term Budget Outlook* (July 2014), www.cbo.gov/publication/45471. Federal debt in 2024 under CBO's current baseline is a little lower than the amount the agency previously projected for that year, but the long-term outlook remains about the same.

CHAPTER

2

The Economic Outlook

The Congressional Budget Office anticipates that, under the assumption that current laws governing federal taxes and spending generally remain in place, economic activity will expand at a solid pace in 2015 and the next few years. As measured by the change from the fourth quarter of the previous year, real (inflation-adjusted) gross domestic product (GDP) will grow by 2.9 percent this year, by another 2.9 percent in 2016, and by 2.5 percent in 2017, CBO expects. By comparison, the agency estimates that real GDP increased by 2.1 percent in 2014—the net result of a decline in the first quarter and brisk growth later in the year (see Box 2-1).

Economic expansion this year and over the next few years will be driven by increases in consumer spending, business investment, and residential investment, CBO expects. In addition, government purchases of goods and services are expected to contribute slightly to growth in 2016 and 2017. By contrast, net exports are projected to impose a drag on growth in 2015 and 2016 but to contribute to growth thereafter.

CBO expects the pace of output growth to reduce the quantity of underused resources, or "slack," in the economy over the next few years. The difference between actual GDP and CBO's estimate of potential (that is, maximum sustainable) GDP—which is a measure of slack for the whole economy—was about 2 percent of potential GDP at the end of 2014, but the agency expects that gap to be essentially eliminated by the second half of 2017. CBO also expects slack in the labor market—which is indicated by such factors as the elevated unemployment rate and a relatively low rate of labor force participation—to dissipate over the next few years. In particular, the agency projects that increased hiring will reduce the unemployment rate from 5.7 percent in the fourth quarter of 2014 to 5.3 percent in the fourth quarter of 2017. Also, the increased hiring will encourage some people to enter or stay in the labor force, in CBO's estimation. That will slow the decline in labor force participation, which arises from underlying demographic trends and federal policies, but it will also slow the fall of the unemployment rate.

Over the next few years, reduced slack in the economy will diminish the downward pressure on inflation and interest rates. Nevertheless, because slack is expected to dissipate only slowly—and because of a strengthening dollar, broadly held expectations for low inflation, and a recent sharp decline in oil prices (which put downward pressure on energy costs)—CBO expects the rate of inflation, as measured by the price index for personal consumption expenditures (PCE), to stay below the Federal Reserve's goal of 2 percent during the next few years. CBO anticipates that the interest rate on 3-month Treasury bills will remain near zero until the second half of 2015 and then rise to 3½ percent by 2018. The agency further expects that the rate on 10-year Treasury notes will rise from an average of 2½ percent last year to 4½ percent by 2019.

CBO's projections for the period from 2020 through 2025 exclude possible cyclical developments in the economy, because the agency does not attempt to predict the timing or magnitude of such developments so far in the future. CBO projects that real GDP will grow by an average of 2.2 percent per year from 2020 through 2025—a rate that matches the agency's estimate of the growth of potential output in those years. CBO anticipates that output will grow much more slowly than it did during the 1980s and 1990s, primarily because the labor force is expected to grow more slowly than it did then. The lingering effects of the recent recession and of the ensuing slow recovery are also expected to cause GDP to be lower from 2020 through 2025 than it would otherwise have

Box 2-1.

Data Released Since Early December

In this chapter, the Congressional Budget Office's estimates of economic output in 2014 and economic projections for this year and future years are based on data available in early December 2014. Since then, revised and newly released data indicate that the growth of real (inflation-adjusted) gross domestic product (GDP) was stronger during the second half of 2014 than CBO had estimated. In addition, interest rates on long-term Treasury securities have been lower and oil prices have declined further since mid-December than CBO had anticipated.

The unexpected strength in economic activity in the second half of last year and the continued decline in oil prices suggest that output may grow more this year than CBO forecast. Lower interest rates, taken alone, have the same implication; however, lower rates may reflect a worsening in the outlook for global growth among some observers, and diminished prospects for growth in other countries would weigh on growth in the United States. Providing a small offset to the positive effects, a larger-than-expected increase in the exchange value of the dollar since mid-December points to slightly weaker net exports this year than CBO forecast. Moreover, labor market developments in December were mixed: The decline in the unemployment rate and the increase in payroll employment were larger than CBO had expected, but there was a surprisingly low rate of labor force participation and unexpectedly weak growth of average hourly earnings.

All told, the newly available data suggest that slack in the economy may dissipate a little more quickly than CBO had anticipated. A preliminary assessment of that new information does not significantly alter CBO's view of potential (or maximum sustainable) GDP, but it does suggest that the difference between GDP and potential GDP at the end of 2014 was roughly one-quarter of one percentage point smaller than the estimate that CBO made for the forecast presented here.

been. CBO projects that the unemployment rate between 2020 and 2025 will average 5.4 percent and that inflation (as measured by the PCE price index) will be 2.0 percent. Over the same period, the projected interest rates on 3-month Treasury bills and 10-year Treasury notes are 3.4 percent and 4.6 percent, respectively.

Recognizing that economic forecasts are always uncertain, CBO constructs its forecasts to be in the middle of the distribution of possible outcomes for the economy, given the federal fiscal policies that are embodied in current law. Nevertheless, even if fiscal policies remain as they are projected under current law, many developments—such as unforeseen changes in the housing and labor markets, in business confidence, and in international conditions—could cause economic outcomes to differ substantially from those that CBO has projected.

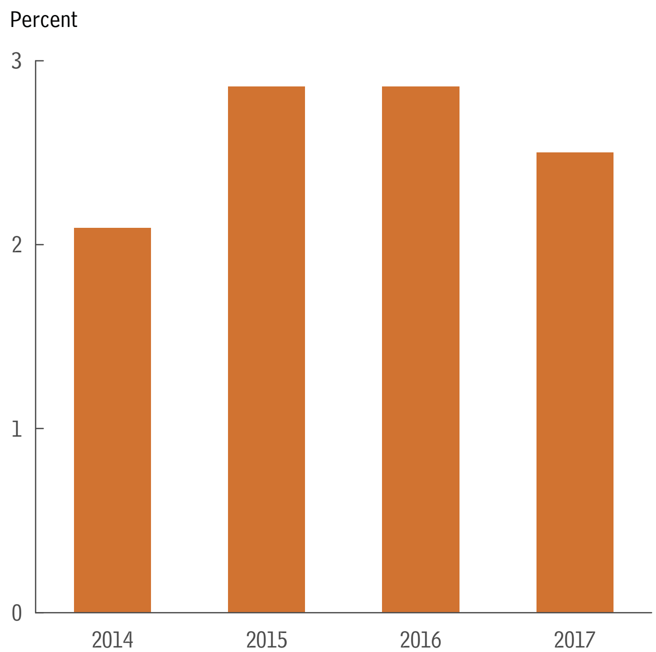
CBO's current economic projections differ in a number of ways from its most recent previous ones, which it published in August 2014. For instance, for the period from 2014 through 2018, CBO now projects real GDP growth averaging 2.5 percent annually, a rate roughly 0.2 percentage points lower than the rate projected in August. The principal reason for that difference is that CBO has revised downward its estimates of potential output and consequently its estimate of the current amount of slack in the economy. Also as a result of the downward revision to estimated potential output, CBO currently forecasts that real GDP will be roughly 1 percent lower in 2024 than it did in August. In addition, CBO now projects lower rates of unemployment for the next several years than it did in August.

CBO's current economic projections do not differ much from the projections of other forecasters. They are generally very similar to those of the *Blue Chip* consensus, which is based on the forecasts of about 50 private-sector economists. CBO's projections also differ only slightly from the forecasts made by the Federal Reserve that were

Figure 2-1.

Projected Growth in Real GDP

Economic activity will expand at a solid pace in 2015 and over the next few years, CBO projects.



Source: Congressional Budget Office.

Notes: Real gross domestic product is the output of the economy adjusted to remove the effects of inflation.

Data are annual. The percentage change in real GDP is measured from the fourth quarter of one calendar year to the fourth quarter of the next year.

The value for 2014 does not incorporate data released by the Bureau of Economic Analysis since early December 2014.

GDP = gross domestic product.

presented at the December 2014 meeting of the Federal Open Market Committee.

The Economic Outlook for 2015 Through 2019

CBO expects output to grow faster in the next few years than it has in the past few years—at an annual rate of 2.9 percent over the next two years and then by 2.5 percent in 2017 (see Figure 2-1 and Table 2-1). By comparison, the agency estimates that annual GDP growth averaged about 2¼ percent over the past three years. CBO anticipates that consumer spending and investment will be the primary contributors to the growth of output over the next few years. In CBO's projections, the changes in fiscal policy that will occur under current law have little effect on growth in the near term; monetary policy supports growth this year and over the next few years, but by smaller degrees over time. The agency also expects that output growth will be boosted this year by the steep decline in crude oil prices in the second half of 2014 (see Box 2-2).

CBO expects slack in the labor market to keep diminishing from 2015 through 2017. In the agency's projections, the greater demand for workers lowers the unemployment rate through 2017 and contributes to faster growth in hourly labor compensation; those developments are expected to encourage more people to enter, reenter, or remain in the labor force. CBO anticipates that the rate of inflation will remain low this year but rise over the next few years as the economy strengthens and as shifts in the supply of and demand for crude oil—as expected in oil futures markets—begin to push oil prices up. However, CBO expects the rate of inflation to remain below the Federal Reserve's longer-term goal of 2 percent until 2017.

Those projections for 2015 through 2017 are based on CBO's forecasts of cyclical developments in the economy. In contrast, the agency's projections for the 2020–2025 period are based primarily on average historical relationships—for example, the average historical relationship of output to potential output and of the unemployment rate to the natural rate of unemployment (the rate arising from all sources except fluctuations in the overall demand for goods and services). The projections of output and of the unemployment rate for the intervening years, 2018 and 2019, represent transition paths toward those average historical relationships.

Federal Fiscal Policy

Changes in federal fiscal policy (that is, the government's tax and spending policies) that result from current law will have little effect on the growth of the economy this year, because of three small and largely offsetting effects:

- The dollar value of federal purchases, relative to the size of the economy, will be lower this year than in 2014, slowing GDP growth slightly, CBO estimates.

Table 2-1.

CBO's Economic Projections for Calendar Years 2015 to 2025

	Estimated, 2014	Forecast 2015	Forecast 2016	Forecast 2017	Projected Annual Average 2018–2019	Projected Annual Average 2020–2025
		Percentage Change From Fourth Quarter to Fourth Quarter				
Gross Domestic Product						
Real (Inflation-adjusted)	2.1	2.9	2.9	2.5	2.1	2.1
Nominal	4.0	4.2	4.6	4.5	4.2	4.2
Inflation						
PCE price index	1.3	1.4	1.9	2.0	2.0	2.0
Core PCE price index[a]	1.5	1.8	1.9	1.9	2.0	2.0
Consumer price index[b]	1.2 [c]	1.5	2.3	2.3	2.4	2.4
Core consumer price index[a]	1.7 [c]	2.1	2.2	2.3	2.3	2.3
GDP price index	1.8	1.3	1.7	1.9	2.0	2.0
Employment Cost Index[d]	2.3	2.7	3.2	3.6	3.6	3.4
		Fourth-Quarter Level (Percent)				
Unemployment Rate	5.7 [c]	5.5	5.4	5.3	5.5 [e]	5.4 [f]
		Percentage Change From Year to Year				
Gross Domestic Product						
Real	2.2	2.8	3.0	2.7	2.1	2.2
Nominal	3.9	4.5	4.6	4.6	4.2	4.2
Inflation						
PCE price index	1.4	1.1	1.9	1.9	2.0	2.0
Core PCE price index[a]	1.4	1.7	1.9	1.9	2.0	2.0
Consumer price index[b]	1.6 [c]	1.1	2.2	2.3	2.4	2.4
Core consumer price index[a]	1.7 [c]	2.0	2.2	2.3	2.3	2.3
GDP price index	1.6	1.6	1.6	1.9	2.0	2.0
Employment Cost Index[d]	2.0	2.7	3.0	3.5	3.6	3.4
		Calendar Year Average				
Unemployment Rate (Percent)	6.2 [c]	5.5	5.4	5.3	5.4	5.4
Payroll Employment (Monthly change, in thousands)[g]	234 [c]	184	148	111	69	78
Interest Rates (Percent)						
Three-month Treasury bills	* [c]	0.2	1.2	2.6	3.5	3.4
Ten-year Treasury notes	2.5 [c]	2.8	3.4	3.9	4.4	4.6
Tax Bases (Percentage of GDP)						
Wages and salaries	42.7	42.6	42.6	42.7	42.8	43.0
Domestic economic profits	9.9	10.0	9.7	9.4	8.8	8.0

Sources: Congressional Budget Office; Bureau of Labor Statistics; Federal Reserve.

Notes: Estimated values for 2014 do not reflect the values for GDP and related series released by the Bureau of Economic Analysis since early December 2014.

Economic projections for each year from 2015 to 2025 appear in Appendix F.

GDP = gross domestic product; PCE = personal consumption expenditures; * = between zero and 0.05 percent.

a. Excludes prices for food and energy.

b. The consumer price index for all urban consumers.

c. Actual value for 2014.

d. The employment cost index for wages and salaries of workers in private industries.

e. Value for 2019.

f. Value for 2025.

g. Calculated as the monthly average of the fourth-quarter-to-fourth-quarter change in payroll employment.

Box 2-2.

The Effect of the Recent Drop in Oil Prices on U.S. Output

Oil prices have fallen markedly since the Congressional Budget Office completed its previous forecast in August 2014. The prices of two major varieties of crude oil, West Texas Intermediate and Brent, stood at $60 and $65 per barrel, respectively, in early December 2014, when CBO finalized its economic forecast. Those prices were roughly $40 per barrel lower than when CBO finalized its projection in the summer, and the lowest in nearly six years.[1] Prices for crude oil in futures markets in early December signaled an end to the decline in prices in early 2015; prices were then expected to return to a modest upward trajectory. Still, futures markets suggested that crude oil deliverable in 2020 would cost about $20 per barrel less than those markets suggested when the summer forecast was completed. On the basis of those readings, CBO incorporated into its current forecast an estimate that the reduction in oil prices since August 2014 would raise real (inflation-adjusted) gross domestic product (GDP) in the United States slightly this year and have a very small positive effect on GDP in the longer term.

Since early December, crude oil prices have declined by a further $15 per barrel, and crude oil futures market prices for 2020 have declined by a further $7 per barrel. That further reduction in oil prices, taken by itself, suggests that output may grow faster this year than CBO forecast.

The Near Term

CBO estimates that the declines in oil prices for immediate and future delivery that occurred between August and December 2014 will raise real GDP in the United States by 0.3 percent at the end of 2015. The decline in expected future oil prices will also raise GDP during the 2016–2019 period, but by less than in 2015 because of the anticipated partial rebound in those prices.

The boost to GDP over the next five years will be the net effect of two partly offsetting sets of factors. On the one hand, the drop in oil prices has several positive effects. It has lowered the prices of petroleum products, including gasoline. As a result, U.S. households will have savings on purchases of petroleum products that they can spend on other goods and services, raising GDP. Also, when businesses that use petroleum products pass some of their lower costs on to consumers in the form of lower prices, U.S. households can similarly use their savings on those items to increase consumption. Furthermore, the large and sudden decline in gasoline prices appears to have raised consumer confidence, which provides an additional boost to household spending. Some of the additional consumer spending will result in higher imports, boosting output in other countries rather than in the United States; but most of the additional spending will be on U.S. goods and services, which will boost U.S. GDP, as will greater domestic investment by firms responding to the increase in demand for goods and services.

On the other hand, U.S. GDP will be reduced because lower oil prices reduce the incentive for domestic oil producers to explore and develop additional resources. That reduced incentive will dampen the oil producers' investment in 2015; indeed, CBO projects that such investment will decline this year after rapid growth in recent years. Lower oil prices also reduce the wealth of U.S. households that own stock in oil producers or otherwise own oil-related assets, which reduces spending by those households (although that response is estimated to be much smaller than the increase in spending by other U.S. households mentioned above).

The Longer Term

In CBO's projection, lower oil prices have a very small positive effect on GDP between 2020 and 2025, when real GDP is projected to depend on the quantity of labor and capital supplied to the U.S. economy and on the productivity of that labor and capital. In particular, lower oil prices are expected to have a small positive impact on the productivity of labor and capital. That increase also will be the result of two partly offsetting effects. The lower price of one input into production, energy, will lead firms to use more of that input and thus make other inputs more productive. However, lower oil prices will reduce investment in the development of shale resources—that is, crude oil trapped in shale and certain other dense rock formations. In CBO's view, the development of shale resources boosts the productivity of labor and capital in the mining sector, so less development means a smaller boost.[2] However, CBO estimates that the shale projects that are abandoned or are not undertaken because of lower oil prices will be the least productive ones, so their abandonment will have little effect on GDP.

1. The decline in prices resulted from a mismatch between changes in consumption and production. In particular, European and Chinese consumption slowed; Libyan supplies increased, following significant declines that resulted from a civil war; and the growth of U.S. oil production outpaced expectations. In addition, OPEC (Organization of the Petroleum Exporting Countries) decided in November 2014 not to cut production.

2. For a discussion of the impact of shale resources on GDP, see Congressional Budget Office, *The Economic and Budgetary Effects of Producing Oil and Natural Gas From Shale* (December 2014), www.cbo.gov/publication/49815.

- However, the growing number of people who will receive Medicaid coverage or subsidies through health insurance exchanges because of the Affordable Care Act (ACA)—along with the resulting rise in health insurance coverage—will both stimulate greater demand for health care and allow lower-income households that gain subsidized coverage to increase their spending on other goods and services, slightly boosting GDP growth.[1]

- In addition, the recent retroactive extension through 2014 of various tax provisions that had expired at the end of 2013 is projected to make businesses' tax payments in 2015 smaller than they would otherwise have been and, as a result, to provide a small boost to output growth this year. (Those provisions, which reduced the tax liabilities of individuals and corporations, include bonus depreciation allowances, which permit certain businesses to deduct the cost of new investments from taxable income more rapidly than they could otherwise.)

By contrast, changes in federal fiscal policy restrained output growth in the past several years. For example, in 2013, they reduced growth by roughly 1½ percentage points, according to CBO's estimates, primarily because tax rates on some income increased when certain tax provisions expired and because the federal government cut its purchases of goods and services (relative to the size of the economy) as sequestration under the Budget Control Act of 2011 (Public Law 112-25) took effect. In 2014, changes in fiscal policy reduced output growth by an estimated one-quarter of one percentage point. The main reason was that extended unemployment insurance expired at the end of 2013. Also, the temporary expiration of bonus depreciation at the end of 2013 increased tax payments and may have discouraged investment by firms that did not expect bonus depreciation to be retroactively extended through 2014. In addition, continued reductions in federal purchases (relative to the size of the economy) restrained the demand for goods and services.

From 2016 through 2019, changes in federal fiscal policy that result from current law will affect the economy in different ways.[2] The stimulus provided by the automatic stabilizers in the federal budget (that is, provisions of law that automatically decrease revenues or increase outlays when the economy weakens) will continue to wane as the economy improves and will therefore provide a smaller boost to the demand for goods and services.[3] Collections of corporate and individual income taxes will rise because of the expiration at the end of 2014 of bonus depreciation and other tax provisions, reducing GDP. In addition, rising income will push some taxpayers into higher tax brackets over time, which will reduce their incentive to work and thus reduce labor supply and GDP.

The ACA will also affect the labor market in coming years and therefore affect output.[4] The largest impact of the ACA on the labor market, especially as slack diminishes, will be that some provisions of the act raise effective tax rates on earnings and thus reduce the amount of labor that some workers choose to supply. That effect occurs partly because the health insurance subsidies that the act provides through the Medicaid expansion and the exchanges are phased out for people with higher income, creating an implicit tax on additional earnings by some people, and partly because the act directly imposes higher taxes on the labor income of other people.

Monetary Policy and Interest Rates

CBO expects that, over the next few years, the Federal Reserve will gradually reduce the extent to which monetary policy supports economic growth. In CBO's forecast, the federal funds rate—the interest rate that financial institutions charge each other for overnight loans of their monetary reserves—rises from 0.1 percent at the end of 2014 to 0.6 percent by the end of 2015 and then settles at 3.7 percent in 2019. CBO expects the Federal Reserve to achieve that increase by raising the interest rate that it pays banks on their deposits at the Federal Reserve (the interest rate on overnight reserves) and by selling and repurchasing some securities on a temporary basis (in what are known as reverse repurchase agreements).

1. For CBO's current estimates of how the ACA will affect health insurance coverage, see Appendix B.

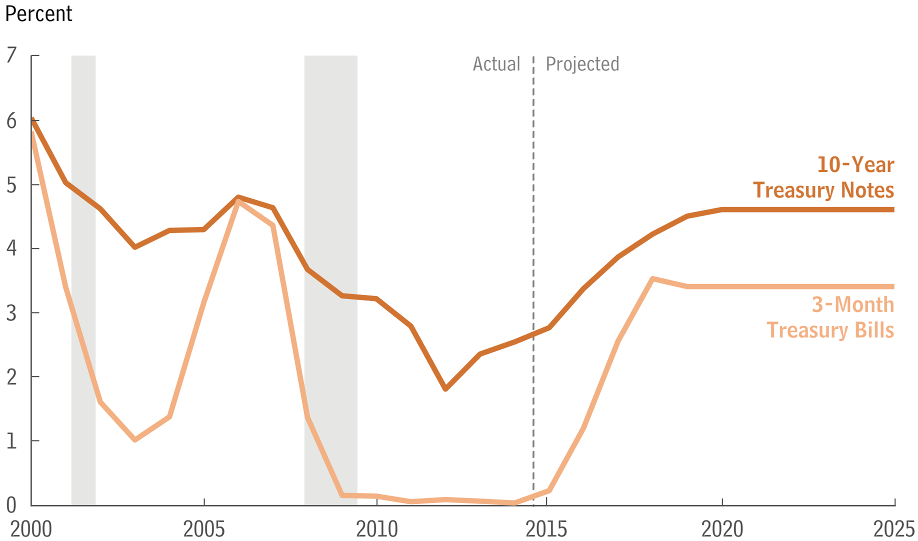
2. The effects described in this paragraph and the following one are incorporated into CBO's projections; however, the agency has not separately quantified the impact that each would have.

3. All else being equal, automatic stabilizers affect the demand for goods and services by changing the amount of taxes that households and businesses pay and the transfer payments that households receive. The change in demand, in turn, affects businesses' decisions to gear up production and hire workers, changing income and demand further. For CBO's current estimates of the automatic stabilizers' effects on the federal budget, see Appendix D.

4. For more information, see Congressional Budget Office, *The Budget and Economic Outlook: 2014 to 2024* (February 2014), Appendix C, www.cbo.gov/publication/45010.

Figure 2-2.

Interest Rates on Treasury Securities



Over the next several years, interest rates are projected to be pushed up by a tightening of monetary policy by the Federal Reserve and by market participants' expectations of an improving economy.

Sources: Congressional Budget Office; Federal Reserve.

Note: Data are annual. Actual data are plotted through 2014.

CBO projects the interest rate on three-month Treasury bills to remain near zero until mid-2015, to increase to 2.6 percent in 2017, and to be 3.4 percent in 2019 (see Figure 2-2). CBO's projections for short-term interest rates were broadly consistent with the expectations of participants in the financial markets when the agency's forecast was completed in early December, although those expectations now suggest somewhat lower interest rates over the next few years.

According to CBO's projections, the interest rate on 10-year Treasury notes will rise from 2.4 percent in the second half of 2014 to 3.9 percent in 2017 and then settle at 4.6 percent by the end of 2019. That rise will reflect continued improvement in economic conditions and the expected rise in short-term interest rates. However, CBO expects that those long-term rates will reach 4.6 percent somewhat later than the interest rate on three-month Treasury bills reaches 3.4 percent. The main reason for the difference in timing is that the long-term rates will probably be held down by the Federal Reserve's large portfolio of long-term assets. The Federal Reserve has indicated that it will begin to gradually reduce its holdings of long-term assets at some point after it starts raising the federal funds rate, depending on economic and financial conditions and the economic outlook; CBO projects that those holdings will start to decline in 2016, but that they will take many years to fall to historical levels.

Contributions to the Growth of Real GDP

CBO expects the growth of real GDP from 2015 through 2019 to be driven largely by consumer spending and investment, both business and residential. Government purchases are projected to have a small positive effect on GDP growth in 2016 and 2017. In contrast, net exports will restrain growth in 2015 and 2016, although they will contribute to growth thereafter, CBO projects.

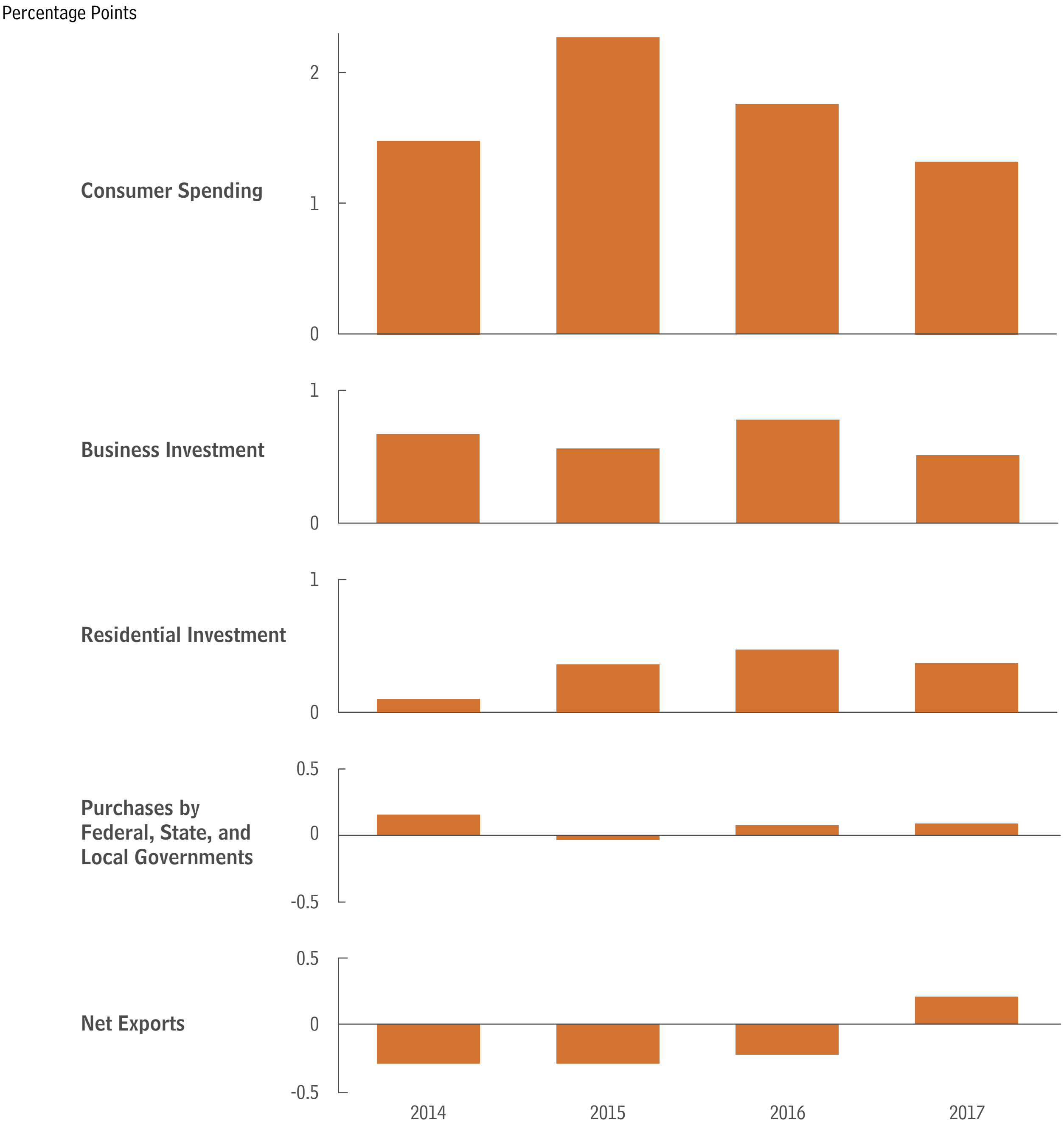
Consumer Spending. After growing by an estimated 2.2 percent from the fourth quarter of 2013 to the fourth quarter of 2014, real spending on consumer goods and services will grow by 3.3 percent in 2015, CBO expects. Because consumer spending accounts for about two-thirds of GDP, that projection means that consumer spending will contribute 2.3 percentage points to the projected growth of GDP this year (see Figure 2-3). CBO estimates that consumer spending will grow more slowly in later years and contribute an average of about 1½ percentage points to the growth of output from 2016 through 2019, which would be close to its average contribution over the past five years.

The same factors that spurred the growth of consumer spending in 2014—solid gains in real disposable (after-tax) personal income and household wealth—will continue to do so over the next few years, in CBO's assessment. The agency expects that real disposable personal income will again grow solidly in 2015, driven

Figure 2-3.

Projected Contributions to the Growth of Real GDP

Consumer spending and investment will drive the growth of real GDP over the next few years, CBO expects.



Source: Congressional Budget Office.

Notes: Data are annual. The values show the percentage-point contribution of the major components of GDP to the fourth-quarter-to-fourth-quarter growth rate of real GDP (output adjusted to remove the effects of inflation). Consumer spending is personal consumption expenditures. Business investment includes purchases of equipment, nonresidential structures, and intellectual property products and the change in inventories. Residential investment includes the construction of single-family and multifamily structures, manufactured homes, and dormitories; spending on home improvements; and brokers' commissions and other ownership-transfer costs. The measure of purchases by federal, state, and local governments is taken from the national income and product accounts. Net exports are exports minus imports. The values for 2014 do not incorporate data released by the Bureau of Economic Analysis since early December 2014.

GDP = gross domestic product.

primarily by growth in the compensation of employees (see Figure 2-4). Moreover, energy prices are expected to keep falling in the first part of this year, boosting households' purchasing power, just as they did in the second half of last year. Household wealth increased sharply in 2014, largely because of gains in stock prices, and it is projected to rise again this year—though more slowly—mostly because of rising house prices. In addition, significant improvements in consumer confidence last year are expected to continue to boost spending.

Continued improvements in consumers' creditworthiness and in the availability of credit will also support increases in consumer spending over the next few years, CBO projects. Delinquency rates on consumer loans and home mortgage loans continued to fall last year, and banks have become more willing to make consumer loans. The ratio of household debt to disposable personal income, which had fallen markedly from 2010 through 2012, declined much more slowly in 2013 and 2014, suggesting that households are becoming more willing to borrow, that financial institutions are becoming more willing to lend, or both.

Business Investment. CBO expects investment by businesses—which consists of fixed investment (investment in equipment, nonresidential structures, and intellectual property products) and investment in inventories—to be a key contributor to the growth of real GDP over the next few years. CBO anticipates that real business investment will increase by 4.3 percent between the fourth quarter of 2014 and the fourth quarter of 2015, by 5.9 percent the following year, and by smaller amounts in subsequent years. That projection means that real business investment will contribute 0.6 percentage points to the growth of real GDP in 2015, 0.8 percentage points in 2016, and somewhat less in later years (see Figure 2-3).

The components of fixed investment that have historically been the most sensitive to the business cycle—investment in equipment and nonmining structures—will contribute the most to the growth of investment in 2015, in CBO's estimation.[5] Growth in those components will be strong enough to offset a decline in investment in mining structures, which will result from lower oil prices. The decline in mining investment is projected to abate in 2016 as oil prices stabilize, further boosting the overall growth of fixed investment. Inventory investment will be somewhat smaller in 2015 than in 2014, CBO estimates, but have little impact on GDP growth in subsequent years.

Stronger projected growth in the demand for goods and services is a major reason for CBO's expectation of rising business investment. As the effects of very weak growth in demand during and immediately after the recession have faded, businesses have had a greater incentive to increase productive capacity and thus capital services (the flow of services available for production from the stock of capital; see Figure 2-4). As a result, business investment has expanded rapidly in recent years, growing at an average annual rate of 8 percent since 2009. Over the next few years, in response to increasing demand for their products, businesses will keep boosting investment at a pace faster than output growth, CBO projects.

Residential Investment. CBO expects rapid growth in real residential investment over the next few years, but the small size of the sector will limit its contribution to the growth of real GDP. Real residential investment is expected to grow by 11 percent this year on a fourth-quarter-to-fourth-quarter basis, and by more than 13 percent next year, before moderating in subsequent years. That projection implies a contribution to output growth of roughly one-half of one percentage point over each of the next few years (see Figure 2-3).

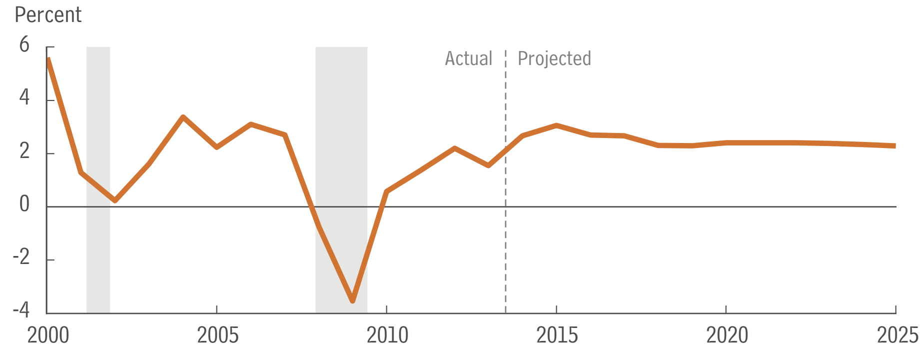
Housing starts—new, privately owned housing units on which construction begins in a given period—account for a large share of residential investment, and CBO expects them to post very strong growth, from an estimated 1.0 million units in 2014 to roughly 1.7 million units in 2019. The number of housing starts has been low in recent years because of weak household formation and a high vacancy rate (that is, the percentage of homes that are vacant). Household formation has been weaker since 2012 than one would expect, given the size of the increases in employment since then and the historical relationship between employment and household formation (see Figure 2-4). That weakness has probably resulted partly from the fact that lending standards for mortgages have remained fairly tight; household formation may also have been weak because households'

5. The term "business cycle" describes fluctuations in overall economic activity accompanied by fluctuations in the unemployment rate, interest rates, income, and other variables. Over the course of a business cycle, real activity rises to a peak and then falls until it reaches a trough; then it starts to rise again, beginning a new cycle. Business cycles are irregular, varying in frequency, magnitude, and duration.

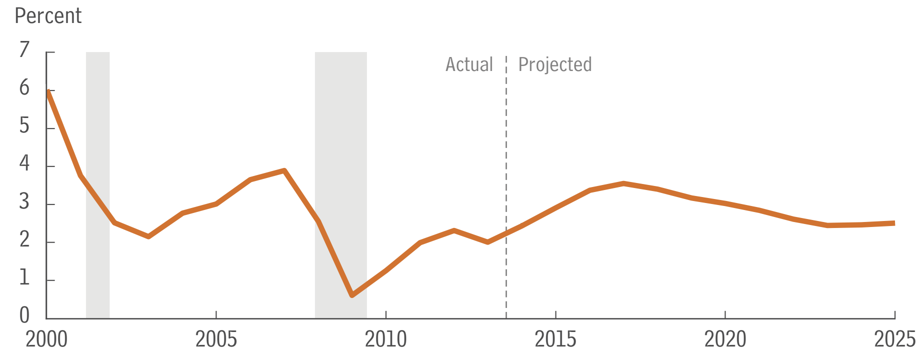
Figure 2-4.

Factors Underlying the Projected Contributions to the Growth of Real GDP

Solid **growth in the inflation-adjusted compensation of employees** is projected to support faster growth in consumer spending in the next two years.



The **growth of capital services** is projected to rise over the next few years because increases in the demand for goods and services will spur business investment.



Sources: Congressional Budget Office; Bureau of Economic Analysis; Bureau of the Census; Consensus Economics.

Notes: Data are annual. Actual data are plotted through 2013. Values for 2014 are CBO's estimates.

In the top panel, inflation-adjusted compensation of employees is total wages, salaries, and supplements divided by the price index for personal consumption expenditures. Percentage changes are measured from the average of one calendar year to the next.

In the bottom panel, capital services are a measure of the flow of services available for production from the real (inflation-adjusted) stock of capital (equipment, structures, intellectual property products, inventories, and land). Percentage changes are measured from the average of one calendar year to the next.

Continued

expectations for income growth have been slow to improve since the recession and because student loans have rendered some young adults unable or unwilling to obtain a mortgage. Better prospects for jobs and wages, as well as greater access to mortgage credit, will encourage more household formation and raise the demand for housing, in CBO's view, despite the negative effects of an expected rise in interest rates for mortgage loans. The greater demand for housing will help to reduce the vacancy rate, which will further encourage home building.

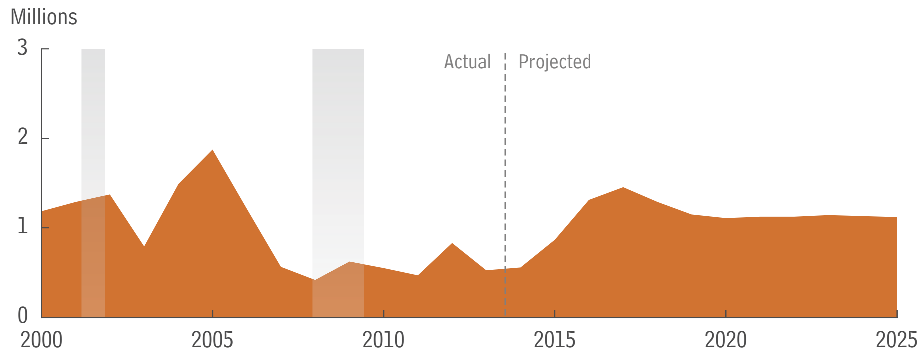
CBO anticipates that the stronger growth in demand for housing will put upward pressure on house prices. That upward pressure will be offset to some degree by the projected increase in the supply of housing units. On balance, CBO projects, house prices—as measured by the Federal Housing Finance Agency's (FHFA's) price index for home purchases—will increase by almost 3 percent in 2015 and by about 2½ percent per year, on average, over the 2016–2019 period. According to CBO's forecast, FHFA's index will surpass its prerecession peak (without being adjusted for overall inflation) in 2017.

Government Purchases. CBO projects that purchases of goods and services by governments at the federal, state, and local levels—which make up the portion of government spending directly included in GDP—will have little direct effect on the growth of output this year and contribute slightly in later years (see Figure 2-3 on page 34). In 2014, real government purchases increased by nearly 1 percent on a fourth-quarter-to-fourth-quarter basis, providing a mild positive contribution to real GDP growth. (During the previous four years, real government

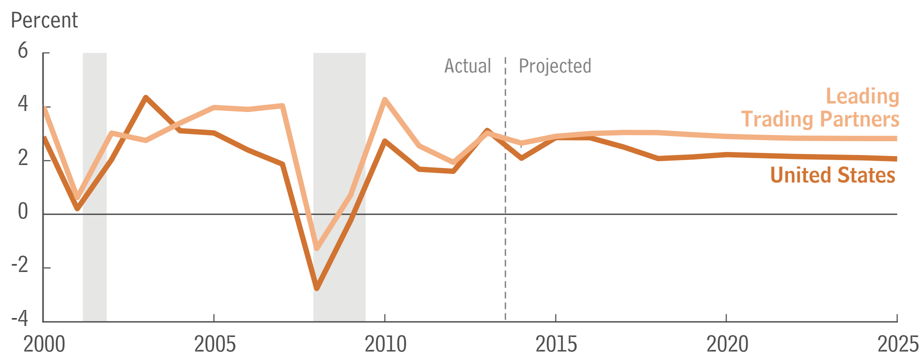
Figure 2-4. **Continued**

Factors Underlying the Projected Contributions to the Growth of Real GDP

A rise in **household formation** is projected to boost the demand for housing and spur residential investment for the next few years.



The rise in the **growth of real GDP in the United States relative to that among its leading trading partners** is projected to contribute to lower net exports this year.



Notes: In the top panel, household formation is the change in the number of households from one calendar year to the next.

In the bottom panel, the percentage change in real (inflation-adjusted) gross domestic product among the United States' leading trading partners is calculated using an average of the rates of growth of their real GDPs, weighted by their shares of U.S. exports. The trading partners included in the average are Australia, Brazil, Canada, China, Hong Kong, Japan, Mexico, Singapore, South Korea, Switzerland, Taiwan, the United Kingdom, and the countries of the euro zone. Percentage changes are measured from the fourth quarter of one calendar year to the fourth quarter of the next.

GDP = gross domestic product.

purchases had dampened real GDP growth.) This year, CBO expects an increase in real purchases by state and local governments to roughly offset a decline in real purchases by the federal government; in later years, growth in purchases by the former are expected to more than offset continued contractions in purchases by the latter.

CBO's projections of real purchases by state and local governments reflect the agency's expectation that those governments' finances will continue to improve. The recession and weak subsequent recovery, combined with a sharp drop in house prices between 2007 and 2011, significantly reduced those governments' tax revenues and strained their finances. In the past two years, however, the stronger economy and increases in house prices have improved state and local governments' finances, which has allowed them to purchase more. CBO expects real purchases by state and local governments to increase by about 1 percent per year from 2015 through 2019. In contrast, under current law, real purchases by the federal government—mostly stemming from discretionary appropriations—are projected to fall by 2 percent this year and by an annual average of 0.7 percent over the 2015–2019 period.

Net Exports. CBO expects that net exports (that is, exports minus imports) will impose a drag on GDP growth in 2015 and 2016, just as they did last year. In real terms, net exports are projected to be about $50 billion lower in the fourth quarter of 2015 than they were in the fourth quarter of 2014, dampening GDP growth by about 0.3 percentage points (see Figure 2-3 on page 34). Real net exports are projected to decline further in 2016, but by a smaller amount—about $40 billion. In each of the following three years, however, CBO projects that net exports will rise and add slightly to GDP growth.

CBO's projection of net exports is based partly on important differences in the expected pace of economic activity in the United States and among the nation's leading trading partners (see Figure 2-4 on page 36). CBO expects growth in the United States this year to improve relative to the growth of the leading trading partners; consequently, U.S. spending on imports will rise more than the trading partners' spending on U.S. exports will, reducing net exports.[6] For example, the economies of the euro zone are expected to grow unevenly and sluggishly in 2015 and 2016, and China's economy is projected to grow more modestly over the next few years than in previous years. Over time, though, CBO expects U.S. growth to slow slightly relative to growth among the nation's trading partners and particularly the countries in the euro zone; that will provide a small boost to net exports. Another factor affecting CBO's forecast of net exports is growing domestic energy production, which is expected to reduce demand for imported energy products.

CBO's projection of net exports is also based on the increase in the exchange value of the dollar last year and on the agency's forecast of a slight further increase in the exchange value this year. The increase last year was partly caused by a decline in long-term interest rates among leading U.S. trading partners, particularly in Europe and Asia, and by a deterioration in the outlook for foreign growth. Those developments increased the exchange value of the dollar by boosting the relative demand for dollar-denominated assets. This year, CBO expects the rise in economic growth in the United States relative to growth among the nation's trading partners to continue to contribute to rising interest rates in the United States relative to those abroad. That widening divergence in interest rates is projected to provide an additional boost to the relative demand for dollar-denominated assets and to further increase the exchange value of the dollar. The higher exchange value for the dollar will make imports for U.S. consumers cheaper and U.S. exports to foreign buyers more expensive, dampening net exports in the near term. As growth in foreign economies strengthens over time, however, CBO expects foreign central banks to tighten their monetary policies gradually, which will lower the exchange value of the dollar and contribute to stronger net exports later in the projection period.

6. CBO calculates the growth of leading U.S. trading partners using a weighted average of their growth rates. That measure uses shares of U.S. exports as weights. Similarly, CBO's measure of the exchange value of the dollar is an export-weighted average of the exchange rates between the dollar and the currencies of leading U.S. trading partners.

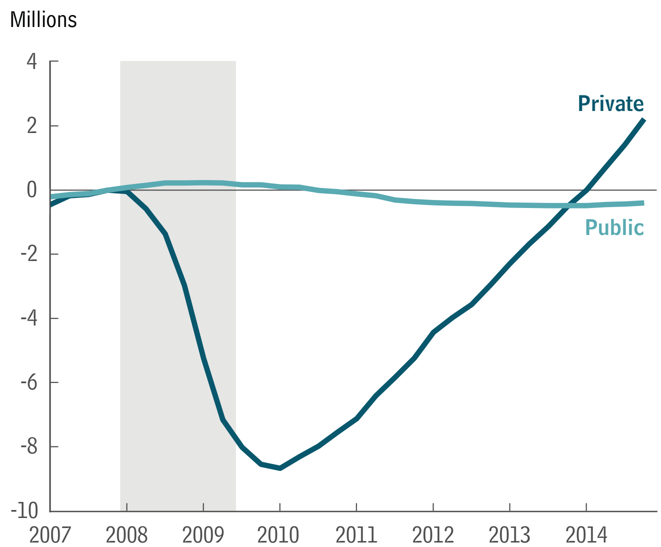
The Labor Market

Employment climbed briskly in 2014, marking more than four years of gains. An average of 234,000 nonfarm jobs were added per month in 2014, significantly more than the monthly average of about 185,000 jobs in the previous three years. Nearly all employment growth since the end of the recession in 2009 has occurred in the private sector, where employment in 2014 surpassed its prerecession peak; employment in the public sector remains well below its prerecession peak (see Figure 2-5).

Although conditions in the labor market improved notably in 2014, CBO estimates that a significant amount of slack remains. But CBO anticipates that the strengthening economy will lead to continued gains in employment, largely eliminating that slack by 2017.

Figure 2-5.

Changes in Private and Public Employment Since the End of 2007



Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: Private employment consists of all employees on the payrolls of nonfarm private industries. Public employment consists of all employees on government payrolls, excluding temporary and intermittent workers hired by the federal government for the decennial census.

Changes are measured from the beginning of the recession in the fourth quarter of 2007.

Data are quarterly and are plotted through the fourth quarter of 2014.

Current Slack in the Labor Market. Slack in the labor market includes the degree to which people who are not working would work if employment prospects were better, as well as the degree to which people who are employed would work longer hours if they could. Measuring slack is difficult, especially in light of the unusual developments that have taken place in the labor market since the recent recession. But in CBO's view, the key components of slack in the labor market are the following:

- The number of people working or actively looking for work is smaller than would be expected if the demand for workers was stronger. Specifically, the labor force participation rate—the percentage of people in the civilian noninstitutionalized population who are at least 16 years old and are either working or actively seeking work—is well below CBO's estimate of the *potential* labor force participation rate, which is the rate that would exist if not for the temporary effects of fluctuations in the overall demand for goods and services attributable to the business cycle.

- The unemployment rate is higher than CBO's estimate of the current natural rate of unemployment.

- The share of part-time workers who would prefer full-time work is unusually high.

Several indicators provide additional evidence that significant slack remains in the labor market. Most important is hourly labor compensation, which continues to grow more slowly than it did before the recession. Other indicators are the rate at which job seekers are hired and the rate at which workers are quitting their jobs, both of which remain lower than they were before the last recession.

If the unemployment rate had returned to its level in December 2007, and if the labor force participation rate had equaled its potential rate, there would have been more people employed in 2014—about 2¾ million more in the fourth quarter, according to CBO's estimates. The elevated unemployment rate and the depressed labor force participation rate account for that shortfall in roughly equal proportions. The equivalent shortfall in employment in the fourth quarter of 2013 was about 5¼ million people, largely reflecting the elevated unemployment rate, CBO estimates; at its peak in 2009, the shortfall was 8½ million people. Those estimates of shortfalls in employment use a measure that does not include the number of people who have left the labor force permanently in response to the recession and slow recovery. However, the measure includes unemployed workers who would have difficulty finding jobs even if demand for workers were higher. Different measures of shortfalls in employment might be appropriate for some purposes.

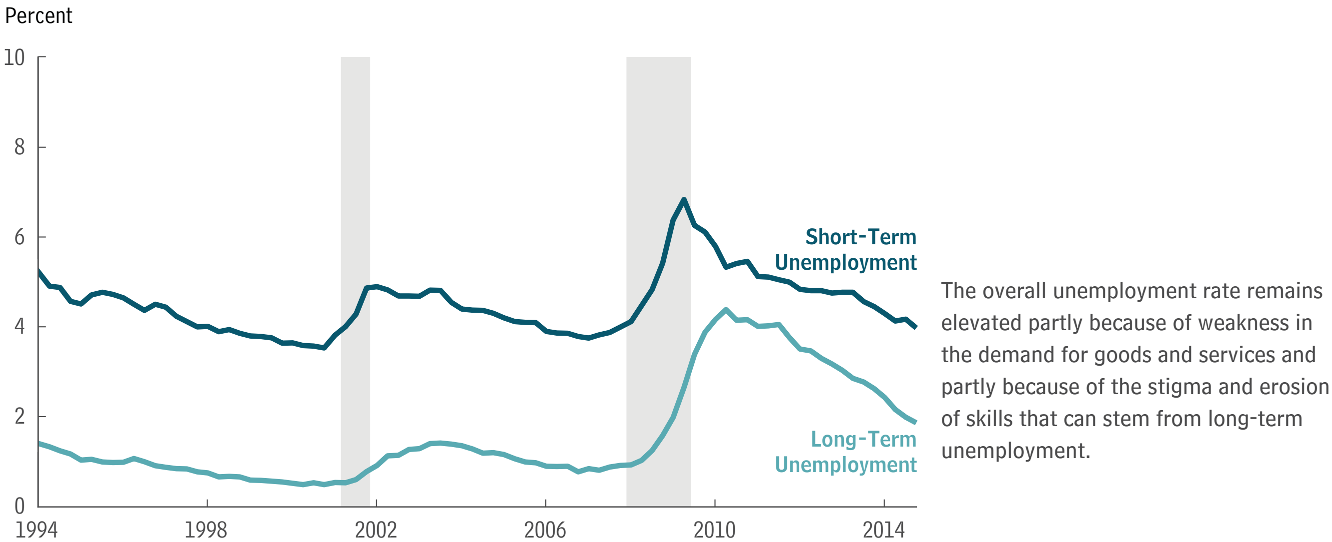
Labor Force Participation. The labor force participation rate fell from 65.9 percent in the fourth quarter of 2007, at the beginning of the recession, to 62.8 percent in the second quarter of 2014; it has since stabilized. About 1¾ percentage points of that roughly 3 percentage-point decline in participation, CBO estimates, stems from long-term trends (especially the aging of the population), but the rest of the decline is attributable to the weakness of the economy during the past several years. Specifically, about three-quarters of one percentage point represents the extent to which actual participation is lower than potential participation because of the recent cyclical weakness in employment prospects and wages; that gap is one component of slack in the labor market, and it will close over time as more people enter or reenter the labor force (as this chapter discusses below in "The Labor Market Outlook Through 2019" on page 42). And about one-half of one percentage point of the decline represents workers who became discouraged by the persistent weakness in the labor market and permanently dropped out of the labor force.[7]

Unemployment. The unemployment rate was 5.7 percent in the fourth quarter of 2014, roughly three-quarters of one percentage point above its level at the end of 2007. CBO estimates that roughly one-quarter of one percentage point of the difference between the rate in the fourth quarter and the rate before the recession is a temporary effect of cyclical weakness in the economy and thus is another component of slack in the labor market. (At its peak, in late 2009, the temporary effect of cyclical weakness on the unemployment rate was about 4¼ percentage points, CBO estimates.) CBO estimates that structural

7. Since publishing its most recent previous projections in *An Update to the Budget and Economic Outlook: 2014 to 2024* (August 2014), www.cbo.gov/publication/45653, CBO has revised downward its estimate of the degree to which the persistent weakness in the labor market led some workers to become discouraged and permanently drop out of the labor force. See "Comparison With CBO's August 2014 Projections" on page 52.

Figure 2-6.

Rates of Short- and Long-Term Unemployment



Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: The rate of short-term unemployment is the percentage of the labor force that has been out of work for 26 weeks or less. The rate of long-term unemployment is the percentage of the labor force that has been out of work for at least 27 consecutive weeks.

Data are quarterly and are plotted through the fourth quarter of 2014.

factors account for the remainder of the difference (and an equivalent increase in CBO's estimate of the natural rate of unemployment).[8] In particular, the stigma and erosion of skills that can stem from long-term unemployment (that is, unemployment that lasts for at least 27 consecutive weeks), which have remained higher than they were before the recent recession, are continuing to push up the unemployment rate.[9]

The difference between the unemployment rate in the fourth quarter and the unemployment rate before the recession can be explained entirely by an increase in long-term unemployment. Though the rate of short-term unemployment (the number of people unemployed for 26 weeks or less as a percentage of the labor force) in the fourth quarter of 2014 nearly matched the rate in the fourth quarter of 2007, the rate of long-term unemployment was still nearly 1 percentage point above the earlier rate of 0.9 percent (see Figure 2-6). The elevated rate of long-term unemployment in part reflects an increase in the natural rate of unemployment, but in CBO's view, that elevated rate also reflects slack in the labor market. CBO expects that many of the long-term unemployed who are not near retirement age will be employed again in the next few years. Indeed, much of the decline in the rate of long-term unemployment last year appears to have happened because people found work, not because they left the labor force.

Part-Time Employment. Another component of labor market slack is the number of people employed but not working as many hours as they would like. The incidence of part-time employment for economic reasons (that is, part-time employment among workers who would prefer full-time employment) remains significantly higher than it was before the recession (see Figure 2-7). The continued large share of part-time workers is one reason that the Bureau of Labor Statistics' U-6 measure of underused labor stood at 11.4 percent in the fourth quarter of 2014, down from a peak of 17.1 percent in the fourth quarter

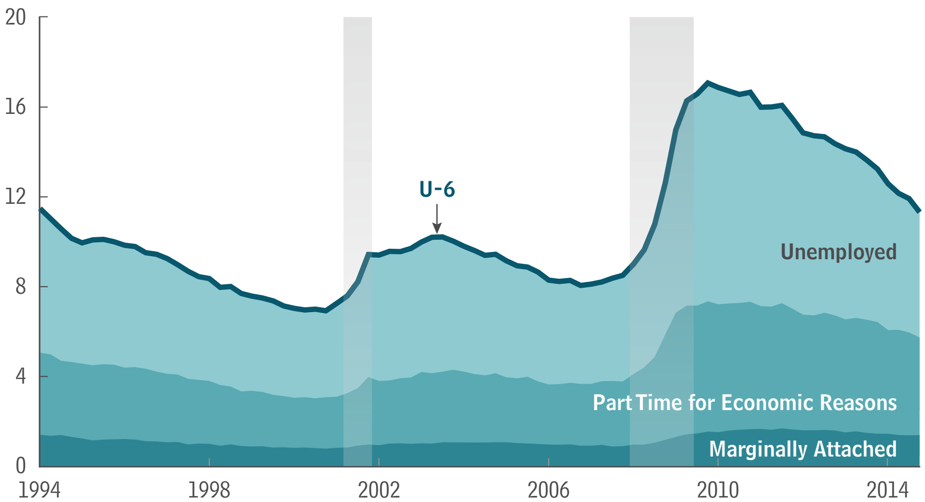
8. CBO has revised that estimate of the effect of the structural factors downward since publishing its most recent previous projections in August. See "Comparison With CBO's August 2014 Projections" on page 52.

9. Another structural factor that raised the unemployment rate until recently, in CBO's view, was a decrease in the efficiency with which employers filled vacancies. CBO estimates that that effect dissipated by late 2014.

Figure 2-7.

Underuse of Labor

Percentage of the Labor Force Plus Marginally Attached Workers



The **U-6 measure of the underuse of labor** has fallen since the end of the recession but remains quite high: The percentage of people who are unemployed, the percentage of people who are employed **part time for economic reasons**, and the percentage of people who are **marginally attached** to the labor force are all greater than they were before the recession began.

Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: Part-time employment for economic reasons refers to part-time employment among workers who would prefer full-time employment. People who are marginally attached to the labor force are those who are not currently looking for work but have looked for work in the past 12 months.

Data are quarterly and are plotted through the fourth quarter of 2014.

of 2009 but still nearly 3 percentage points above its level before the recession.[10]

Indicators of Labor Market Slack. Continued weak growth in hourly rates of labor compensation (that is, wages, salaries, and benefits) is an important signal that significant slack remains in the labor market. The reason is that when slack exists—that is, when labor resources are underused and many workers are unemployed or working fewer hours than they would like—firms can hire from a large pool of underemployed workers. Hence, the firms have a smaller incentive to increase compensation in order to attract workers.

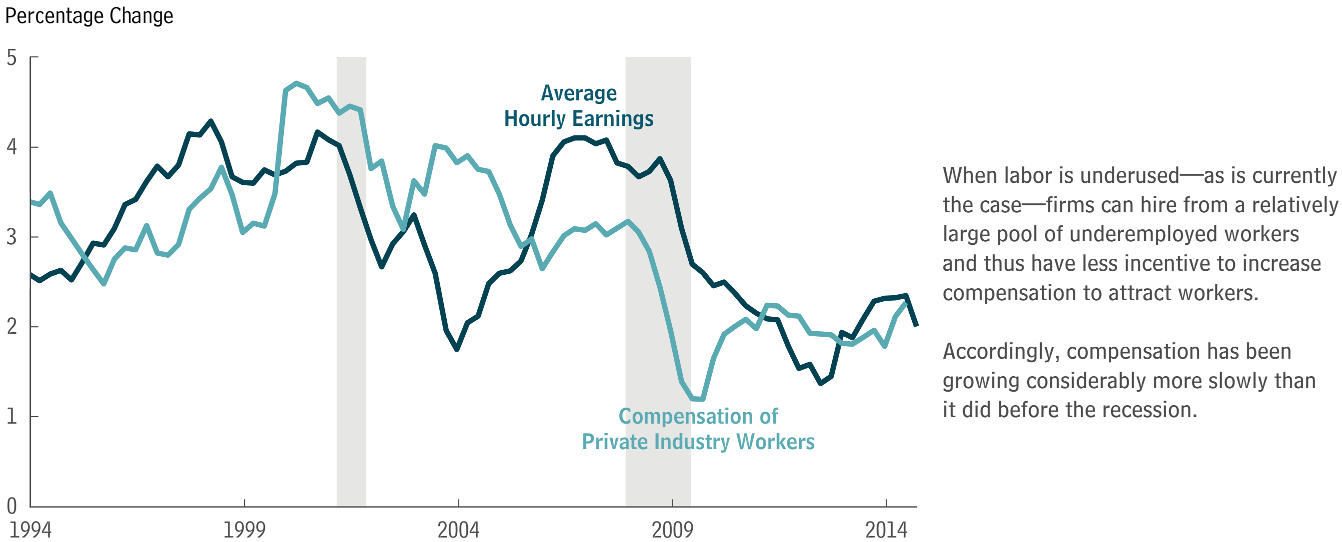
Labor compensation continues to grow considerably more slowly than it did before the recession, although it sped up a bit in 2014, according to some measures. Hourly rates of compensation, as measured by the employment cost index (ECI) for workers in private industry, grew by 2.0 percent in 2013; during the year ending in the third quarter of 2014, such compensation rose at an annual rate of 2.3 percent (see Figure 2-8). Similarly, the ECI for wages and salaries alone rose slightly faster last year than in the previous year—at an annual rate of 2.2 percent during the year ending in the third quarter of 2014, as opposed to 2.0 percent in 2013. Another measure—the average hourly earnings of production and nonsupervisory workers on private nonfarm payrolls, which measures only wages—grew a bit more slowly in 2014 than in 2013. However, all of those compensation measures were growing faster before the recession.

Two other indicators of slack in the labor market, the rate at which job seekers are hired and the rate at which workers are quitting their jobs (as a fraction of total employment), also have not fully recovered. Those rates have improved since reaching low points in the second quarter

10. The U-6 measure combines the number of unemployed people, the number of people who are employed part-time for economic reasons, and the number of people who are "marginally attached" to the labor force (that is, who are not currently looking for work but have looked for work in the past 12 months). It divides the total by the number of people in the labor force plus the number of marginally attached workers. The number of workers who are marginally attached to the labor force is also larger than it was before the recession—about 2.1 million people in the fourth quarter of 2014, up from about 1.4 million in the fourth quarter of 2007.

Figure 2-8.

Measures of Compensation Paid to Employees



Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: Average hourly earnings are earnings of production and nonsupervisory workers on private nonfarm payrolls. Compensation is measured by the employment cost index for workers in private industry.

Data are quarterly. Average hourly earnings are plotted through the fourth quarter of 2014; the employment cost index is plotted through the third quarter of 2014. Percentage changes are measured from the same quarter one year earlier.

of 2009, suggesting that employers are gaining confidence in the strength of the economy and that workers are more confident about finding new jobs after quitting. However, each rate has recovered only about two-thirds of the decline from its 2001–2007 average.

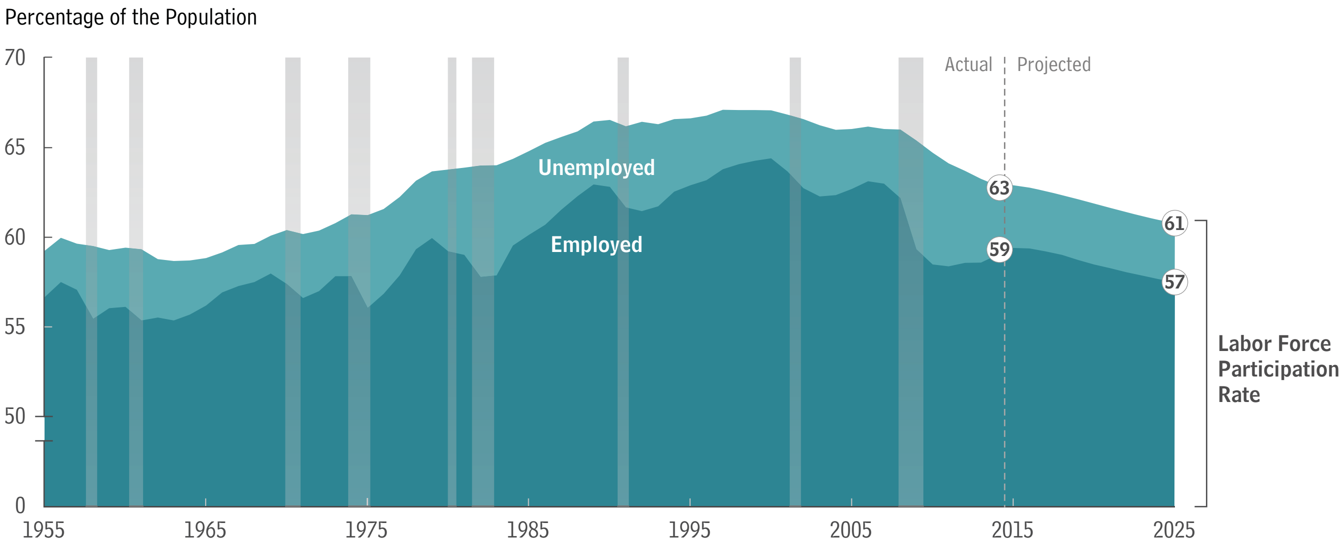
Difficulties in Measuring Slack in the Labor Market. Considerable difficulties arise in measuring slack in the labor market, especially under current circumstances. For example, in assessing potential labor force participation, CBO estimated how many people permanently dropped out of the labor force because of such factors as long-term unemployment. However, CBO may have underestimated or overestimated that number, and therefore potential labor force participation could be lower or higher, respectively, than the agency thinks. Similarly, CBO's estimate of the increase in the natural rate of unemployment since before the recession incorporates the agency's estimate of the decrease in the efficiency with which employers fill vacancies. That decrease in efficiency has dissipated over the past year, in CBO's judgment, as workers have acquired new skills, shifted to faster-growing industries and occupations, and relocated to take advantage of new opportunities. But if such adjustments in the labor market have occurred more slowly than CBO has estimated, the natural rate of unemployment would currently be higher than CBO has estimated. A higher natural rate would suggest more upward pressure on wages for any given unemployment rate.

The Labor Market Outlook Through 2019. The growth of output this year will increase the demand for labor, leading to solid employment gains and a further reduction in labor market slack, according to CBO's estimates. Those developments are expected to continue at a more moderate pace over the following two years. The unemployment rate is projected to fall to 5.5 percent in the fourth quarter of 2015 and to edge down to 5.3 percent by the fourth quarter of 2017 (see Table 2-1 on page 30). CBO expects the decline in the unemployment rate to be tempered by the fact that labor force participation, because of the stronger labor market, will decline less than would be expected on the basis of demographics and certain other factors. CBO also expects the diminished slack in the labor market to raise the growth of hourly labor compensation modestly.

Figure 2-9.

The Labor Force, Employment, and Unemployment

The percentage of the population that is employed is projected to fall over the next 10 years because of declining participation in the labor force, mainly by baby boomers as they age and move into retirement.



Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: The labor force consists of people who are employed and people who are unemployed but who are available for work and are actively seeking jobs. Unemployment as a percentage of the population is not the same as the official unemployment rate, which is expressed as a percentage of the labor force. The population is the civilian noninstitutionalized population age 16 or older.

Data are annual. Actual data are plotted through 2014.

CBO's labor market projections for 2018 and 2019 are largely based on a transition to the agency's projections for later years, when the relationship between the unemployment rate and the natural rate of unemployment is expected to match its historical average. Therefore, CBO projects slightly higher unemployment rates in 2018 and 2019—5.4 percent and 5.5 percent, respectively.

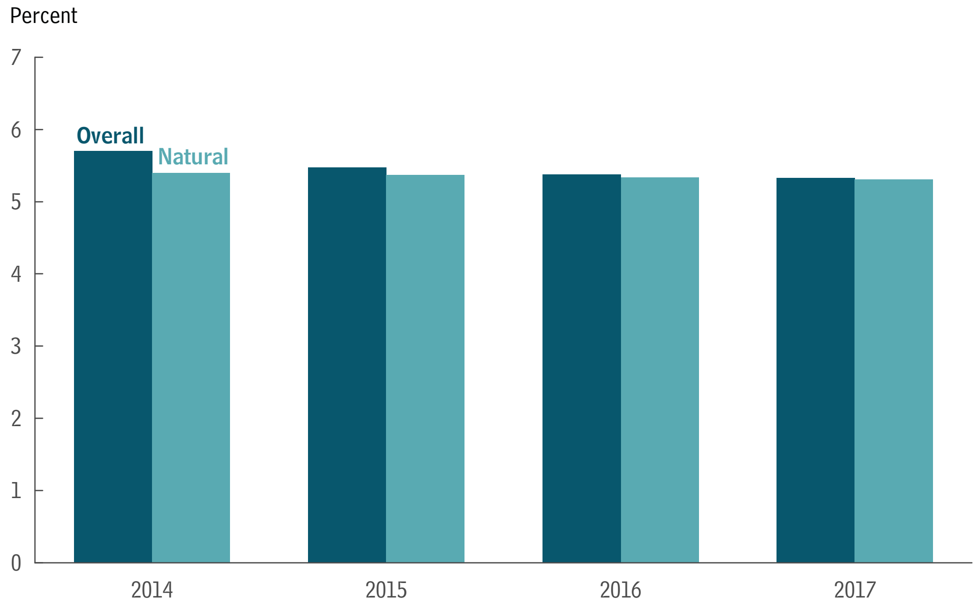
Employment. CBO expects nonfarm payroll employment to rise by an average of about 180,000 jobs per month in 2015. In 2016 and 2017, the average projected increase is about 130,000 per month, a number that is consistent with the expected moderation of output growth as output converges on its potential. That projection is also consistent with the expected improvement in productivity growth. Growth in employment and in total hours worked in the past two years was faster than what the modest growth in GDP during that period would have suggested, which meant that labor productivity grew unusually slowly. This year, CBO expects that labor productivity will grow at close to its average rate over the most recent business cycle, which means that output can grow more rapidly than it did last year even though employment is projected to grow a little more slowly than it did last year.

Despite the diminishing slack in the labor market, the number of people employed as a percentage of the population is projected to remain close to its current level—about 59 percent—through 2019 (see Figure 2-9). That percentage is well below the levels seen in the two decades before the recent recession, a difference that primarily reflects the long-term trends pushing down labor force participation, above all the aging of the baby boomers and their move into retirement.

Labor Force Participation. The rate of labor force participation has dropped noticeably in recent years, and CBO expects the rate to continue to decline—by about one-half of one percentage point (to 62.5 percent) by the end of 2017 and by an additional one-half of one percentage point (to 62 percent) by 2019. A number of factors will dampen participation. The most important is the ongoing movement of the baby-boom generation into retirement. Federal tax and spending policies—in particular, certain aspects of the ACA, and also the structure of

Figure 2-10.

Overall and Natural Rates of Unemployment



Stronger demand for labor will close the gap between the overall rate of unemployment and CBO's estimate of the natural rate.

CBO also expects the natural rate to fall, as the effects of stigma and erosion of skills among the long-term unemployed fade.

Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: The overall unemployment rate is a measure of the number of jobless people who are available for work and are actively seeking jobs, expressed as a percentage of the labor force. The natural rate is CBO's estimate of the rate arising from all sources except fluctuations in the overall demand for goods and services.

Data are fourth-quarter values. The value for the overall rate in 2014 is actual; values in other years are projected.

the tax code, whereby rising income pushes some people into higher tax brackets—will also tend to lower the participation rate in the next several years.[11]

But another factor is projected to offset some of those effects. Increasing demand for labor as the economy improves is expected to boost participation in the next few years: Some workers who left the labor force temporarily, or who stayed out of the labor force because of weak employment prospects, will enter the labor force, and other workers will choose to stay in the labor force rather than drop out. Those factors will push the labor force participation rate back toward its potential rate. Therefore, the projected decline in the labor force participation rate over the next few years is slower than what would result from demographic changes and the effects of fiscal policy alone.

The Unemployment Rate. For two reasons, CBO expects the unemployment rate to decline from an average of 6.2 percent in 2014 to 5.3 percent in 2017 (see Figure 2-10). First, stronger demand for labor will close the gap between the unemployment rate and the natural rate. Second, CBO expects the natural rate to fall as the effects of stigma and erosion of skills among the long-term unemployed fade.

However, the unemployment rate is projected to decline much less than it has in recent years, because CBO expects growth in employment and the drop in the labor force participation rate to be slower during the next few years, on balance, than they have been in the past few years.

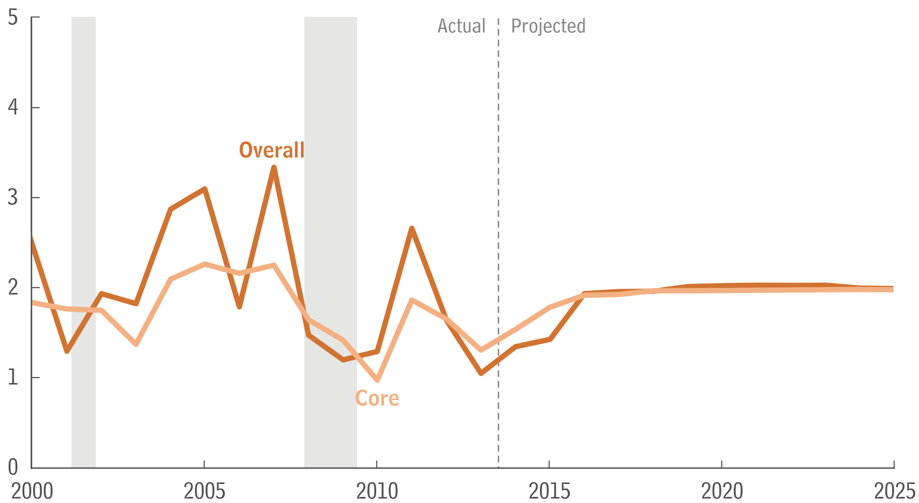
Labor Compensation. CBO projects stronger growth in hourly labor compensation over the next several years than in 2014. That pickup is consistent with the agency's projection of firms' stronger demand for workers. To some degree, firms can attract unemployed or underemployed workers without increasing compensation growth. However, as slack in the labor market diminishes

11. For more information about the ACA's effects on labor force participation, see Congressional Budget Office, *The Budget and Economic Outlook: 2014 to 2024* (February 2014), Appendix C, www.cbo.gov/publication/45010.

Figure 2-11.

Inflation

Percentage Change in Prices



CBO anticipates that prices will rise modestly over the next several years, reflecting the remaining slack in the economy and widely held expectations for low and stable inflation.

Sources: Congressional Budget Office; Bureau of Economic Analysis.

Notes: The overall inflation rate is based on the price index for personal consumption expenditures; the core rate excludes prices for food and energy.

Data are annual. Percentage changes are measured from the fourth quarter of one calendar year to the fourth quarter of the next. Actual data are plotted through 2013; the values for 2014 are CBO's estimates and do not incorporate data released by the Bureau of Economic Analysis since early December 2014.

and firms must increasingly compete for workers, CBO projects that growth in hourly compensation will pick up. That increase in compensation will boost labor force participation and the number of available workers, thereby moderating the overall increase in compensation growth. CBO expects the ECI for total compensation of workers in private industry to increase at an average annual rate of 3.6 percent from 2015 through 2019, compared with an average of about 2 percent during the past several years. The growth of other measures of hourly labor compensation, such as the average hourly earnings of production and nonsupervisory workers in private industries, is similarly expected to increase.

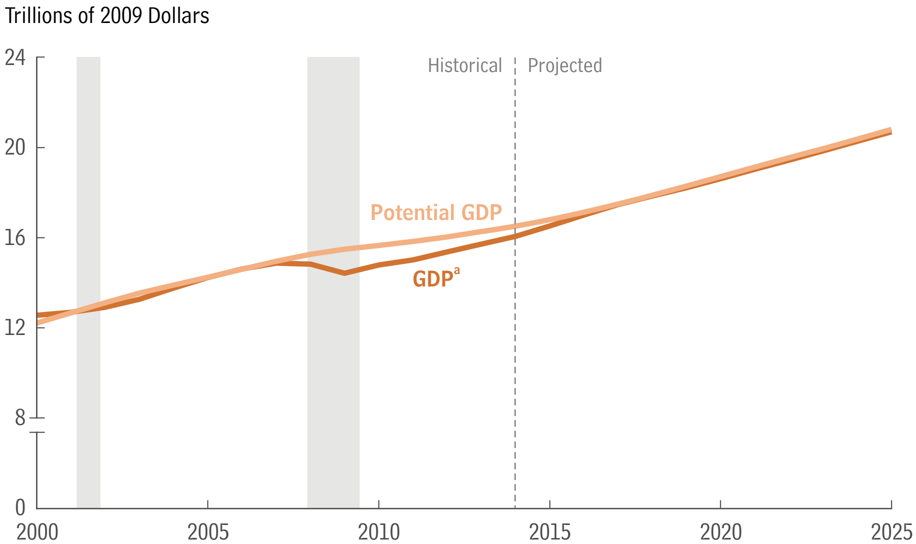
Inflation

CBO projects that the rate of inflation in 2015—as measured by the percentage change in the PCE price index from the fourth quarter of 2014 to the fourth quarter of 2015—will remain subdued (see Table 2-1 on page 30 and Figure 2-11). CBO expects less downward pressure on inflation this year and in the next few years because of the diminishing amount of slack in the economy. In 2015, however, CBO expects significant downward pressure on inflation to result from two recent developments: the increase in the exchange value of the dollar, which will reduce inflation by lowering import prices, and lower prices for crude oil, which will reduce energy prices (see Box 2-2 on page 31). In CBO's projections, inflation in the PCE price index will be 1.4 percent this year, very slightly above last year's estimated 1.3 percent. By contrast, CBO expects the *core* PCE price index—which excludes prices for food and energy—to rise at a faster 1.8 percent rate this year after an estimated 1.5 percent increase last year.

In 2016 and 2017, CBO projects the rate of overall PCE inflation to be close to the rate of core PCE inflation because of a partial rebound—consistent with prices in oil futures markets—in the price of crude oil. Given expectations for inflation and the anticipated reduction in slack, the projected rate of inflation for both measures rises to 1.9 percent in 2016 and stabilizes at 2.0 percent by the end of 2017. That rate is equal to the Federal Reserve's longer-term goal, reflecting CBO's judgment that consumers and businesses expect inflation to occur at about that rate and that the Federal Reserve will make changes in monetary policy to prevent inflation from exceeding or falling short of its goal for a prolonged period.

Figure 2-12.

GDP and Potential GDP



The gap between GDP and potential GDP—a measure of underused resources, or slack—will essentially be eliminated by the end of 2017, CBO expects.

Sources: Congressional Budget Office; Bureau of Economic Analysis.

Notes: Potential gross domestic product is CBO's estimate of the maximum sustainable output of the economy.

Data are annual. Actual data are plotted through 2013; projections are plotted through 2025 and are based on data available through early December 2014.

GDP = gross domestic product.

a. From 2020 to 2025, the projection for actual GDP falls short of that for potential GDP by one-half of one percent of potential GDP.

The consumer price index for all urban consumers (CPI-U) and its core version are expected to increase a little more rapidly than their PCE counterparts, because of the different methods used to calculate them and also because housing rents play a larger role in the consumer price indexes. CBO projects that the difference between inflation as measured by the CPI-U and inflation as measured by the PCE price index after this year will generally be about 0.4 percentage points per year, which is close to the average difference over the past several decades.

The Economic Outlook for 2020 Through 2025

CBO's economic projections for 2020 through 2025 are not based on forecasts of cyclical developments in the economy, as its projections for the next several years are. Rather, they are based on projections of underlying growth factors—such as the growth of the labor force, of hours worked, and of productivity—that exclude cyclical movements. Actual outcomes will no doubt deviate from what the underlying growth factors suggest, so CBO's economic projections are intended to reflect average outcomes. The projections take into account several factors: historical patterns for the nonfarm business sector and for the rest of the economy; projected changes in demographics; the response of investment to those and other long-term trends; CBO's estimates of the persistent effects of the 2007–2009 recession and of the slow economic recovery that followed it; and federal tax and spending policies under current law.

CBO projects that real GDP will be about one-half of one percent below real potential GDP, on average, during the 2020–2025 period (see Figure 2-12). That gap is based on CBO's estimate that output has been roughly that much lower than potential output, on average, over the period from 1961 to 2009, a period that included seven complete business cycles (measured from trough to trough). Indeed, over the course of each of the five complete business cycles that have occurred since 1975, output has been lower than potential output, on average: CBO estimates that over each of those cycles, the shortfall in output relative to potential output during and after that cycle's economic downturn has been larger and has lasted longer than the excess of output over potential output during that cycle's economic boom.[12]

In CBO's projections for the 2020–2025 period:

- The growth of real GDP averages 2.2 percent per year, as does the growth of real potential GDP.
- The unemployment rate edges down from 5.5 percent in 2020 to 5.4 percent in 2022 and subsequent years; during that period, it slightly exceeds CBO's estimate of the natural rate of unemployment, which is consistent with CBO's projection that output will fall short of potential output.
- Both inflation and core inflation, as measured by the PCE price index, average 2.0 percent a year. Inflation as measured by the CPI-U is somewhat higher.
- The interest rates on 3-month Treasury bills and 10-year Treasury notes are 3.4 percent and 4.6 percent, respectively.

Potential Output

The growth in real potential output that CBO projects for the 2020–2025 period (2.2 percent per year, on average) is substantially slower than CBO's estimate of the growth in real potential output during the business cycles, as measured from peak to peak, that occurred between 1982 and 2007 (3.1 percent per year, on average) but substantially faster than the growth in potential output during the current business cycle so far—that is, between 2008 and 2014 (1.4 percent per year, on average). Those differences reflect changes in the growth of potential hours worked, the growth of capital services, and the growth of potential productivity—primarily in the nonfarm business sector, which represents roughly three-quarters of total output. In addition, CBO's projection for potential output in the 2020–2025 period is lower than it would have been if the 2007–2009 recession had not occurred. According to CBO's estimates, the recession and the ensuing slow recovery have weakened the factors that determine potential output—labor supply, capital services, and productivity—for an extended period.

12. Further discussion will be provided in Congressional Budget Office, *Why CBO Projects Average Output Will Be Below Potential Output* (forthcoming).

Overall Output Growth. The main reason that potential output is projected to grow more slowly than it did in the earlier business cycles is that CBO expects growth in the potential labor force (the labor force adjusted for variations caused by the business cycle) to be much slower than it was earlier (see Table 2-2). Growth in the potential labor force will be held down by the ongoing retirement of the baby boomers; by a relatively stable labor force participation rate among working-age women, after sharp increases from the 1960s to the mid-1990s; and by federal tax and spending policies set in current law, which will reduce some people's incentives to work (as this chapter discusses below, in "The Labor Market" on page 50).

The main reason that CBO expects potential output to grow more quickly than it has over the past half-dozen years is that the agency expects the potential productivity of the labor force to grow more quickly. In CBO's projections, potential productivity grows at an annual rate of 1.6 percent from 2020 through 2025, which would be close to its average rate of growth during the business cycles between 1982 and 2007 and substantially higher than the 0.9 percent average rate that CBO estimates for 2008 through 2014. That projected increase, in turn, mostly reflects CBO's assessment of potential total factor productivity, or TFP—which is the average real output per unit of combined labor and capital services—in the nonfarm business sector. That measure has grown unusually slowly since the onset of the recession in 2007, but CBO estimates that it will accelerate during the next few years, returning to its average rate of growth during the years before the recession.

The Nonfarm Business Sector. In the nonfarm business sector, CBO projects that potential output will grow at an average rate of 2.6 percent per year over the 2020–2025 period. Like the projected growth rate of *overall* potential output, that growth rate would be lower than it was during the business cycles from 1982 through 2007 but higher than it has been since 2007.

Potential hours worked in the nonfarm business sector are projected to grow at an average annual rate of 0.6 percent from 2020 through 2025—more slowly than they did in earlier periods (particularly from 1982 through 2001) but more quickly than they did from 2008 through 2014. The reason that growth in hours in that sector is expected to be faster than it was during that most recent period, despite the projected slow growth of the

Table 2-2.

Key Inputs in CBO's Projections of Potential GDP

Percent, by Calendar Year

	Average Annual Growth							Projected Average Annual Growth		
	1950-1973	1974-1981	1982-1990	1991-2001	2002-2007	2008-2014	Total, 1950-2014	2015-2019	2020-2025	Total, 2015-2025
Overall Economy										
Potential GDP	4.0	3.3	3.2	3.2	2.8	1.4	3.3	2.1	2.2	2.1
Potential Labor Force	1.6	2.5	1.6	1.3	0.9	0.5	1.5	0.5	0.6	0.5
Potential Labor Force Productivity[a]	2.4	0.8	1.6	1.9	1.9	0.9	1.8	1.6	1.6	1.6
Nonfarm Business Sector										
Potential Output	4.1	3.7	3.3	3.6	3.2	1.6	3.5	2.5	2.6	2.5
Potential Hours Worked	1.4	2.4	1.6	1.2	0.7	0.2	1.3	0.5	0.6	0.6
Capital Services	3.9	4.1	4.0	4.3	3.0	2.1	3.7	3.1	2.8	2.9
Potential TFP	1.9	0.8	1.0	1.4	1.8	0.9	1.4	1.2	1.3	1.3
Potential TFP excluding adjustments	1.9	0.8	1.0	1.3	1.3	0.9	1.4	1.2	1.3	1.3
Adjustments to TFP (Percentage points)[b]	0	0	0	0.1	0.5	*	0.1	*	*	*
Contributions to the Growth of Potential Output (Percentage points)										
Potential hours worked	1.0	1.7	1.1	0.9	0.5	0.1	0.9	0.3	0.5	0.4
Capital input	1.2	1.2	1.2	1.3	0.9	0.6	1.1	0.9	0.8	0.9
Potential TFP	1.9	0.8	1.0	1.4	1.8	0.9	1.4	1.2	1.3	1.3
Total Contributions	4.0	3.6	3.3	3.6	3.1	1.6	3.5	2.5	2.6	2.5
Potential Labor Productivity[c]	2.7	1.3	1.7	2.3	2.5	1.5	2.2	2.0	1.9	2.0

Source: Congressional Budget Office.

Notes: Potential GDP is CBO's estimate of the maximum sustainable output of the economy.

GDP = gross domestic product; TFP = total factor productivity; * = between -0.05 percentage points and zero.

a. The ratio of potential GDP to the potential labor force.

b. The adjustments reflect CBO's estimate of the unusually rapid growth of TFP between 2001 and 2003 and changes in the average level of education and experience of the labor force.

c. The ratio of potential output to potential hours worked in the nonfarm business sector.

overall potential labor force, is that other sectors—including owner-occupied housing, nonprofit institutions serving households, and state and local governments—are expected to become a smaller share of the economy.[13]

Capital services in the nonfarm business sector are also projected to grow more slowly from 2020 through 2025 than they did during the business cycles from 1982 through 2007, primarily because of the slower growth of potential hours worked. But the projected growth of capital services from 2020 through 2025 is somewhat faster than such growth has been since 2007, reflecting projected increases in investment. The growth of capital

13. The output of the state and local government sector includes only the compensation of state and local employees and the depreciation of equipment, structures, and intellectual property products owned by state and local governments. Other purchases by state and local governments—such as new capital investments, goods that are not capital investments, and contracted services—are part of the output of other sectors of the economy, primarily the nonfarm business sector.

services has been restrained since 2007 because of weak investment, which itself was a response to the cyclical weakness of demand; in the long run, however, the growth of capital services depends mostly on the growth of hours worked and on the rate of increase in productivity.

CBO projects that potential TFP growth in the nonfarm business sector between 2020 and 2025 will equal its average between 2002 and 2007 (after the effects of a temporary surge in the early 2000s are excluded) of 1.3 percent. That is, CBO projects the growth rate of potential TFP to be essentially what recent history, before the recession, would have suggested. That approach is similar to the one that CBO uses to project trends in other factors that determine the growth of potential output. The projected growth rate is also close to the average observed during the business cycles from 1982 through 2007, a longer period that witnessed marked swings in the growth of TFP.[14] However, the projected rate is more rapid than the estimated average annual rate of growth of 0.9 percent from 2008 to 2014, as this chapter discusses below.

Lingering Effects of the Recession and Slow Recovery. Incorporated into the projection of overall potential output growth is CBO's expectation that each of the factors that determine potential output—potential labor hours, capital services, and potential TFP—will be lower through 2025 than it would have been if not for the recession and slow recovery. In most cases, it is difficult to quantify the effects of the recession and slow recovery on those factors. For example, there is significant uncertainty in estimating how much of the recent weakness in TFP can be traced to the effect of the recession and slow recovery on potential TFP, and how much reflects other developments in the economy. In addition, the effects of the recession and slow recovery on the labor force, capital services, and productivity are interrelated; for example, a smaller potential labor force implies a smaller need for firms to invest in capital services.

In CBO's assessment, the recession and weak recovery have led to a reduction in potential labor hours. Persistently weak demand for workers has led some people to leave the labor force permanently, and persistently high long-term unemployment has generated some stigma and erosion of skills for some workers, pushing the natural rate of unemployment above its prerecession level. CBO estimates that the lasting effects of the recession and slow recovery will, in 2025, boost the unemployment rate by about 0.2 percentage points and depress the labor force participation rate by about 0.3 percentage points.

CBO projects that, by 2025, the primary effect of the recession and the weak recovery on capital services will occur through the number of workers and TFP: Fewer workers require proportionately less capital, all else being equal, and lower TFP tends to reduce investment as well. The economic weakness has also affected capital services because of the plunge in investment during the recession, although CBO expects that effect to dissipate by 2025. In addition, the sharp increase in federal debt—which resulted from changes in fiscal policies that were made in response to the weak economy, as well as from the automatic stabilizers—is estimated to crowd out additional capital investment in the long term. CBO has not quantified the effect of each of those factors in its current projection.

Finally, CBO estimates that the recession and slow recovery contributed to the significant slowdown in the growth of potential TFP from 2008 to 2014 compared with the previous business cycles since 1982—and that slowdown will result in a lower level of potential TFP throughout the next decade even if growth in potential TFP picks up, as CBO expects it to. In CBO's judgment, the protracted weakness in demand for goods and services and the large amount of slack in the labor market lowered potential TFP growth by reducing the speed with which resources were reallocated to their most productive uses, slowing the rate at which workers gained new skills, and restraining businesses' spending on research and development. However, quantifying the role of the recession and weak recovery in the slowdown in potential TFP growth is difficult because factors unrelated to the weak economy may also have slowed such growth. For example, there appears to have been a slowdown in advances in information technology beginning in the few years prior to the

14. During that period, potential TFP grew at an average annual rate of 1.4 percent if the surge in the early 2000s is included and at a rate of 1.2 percent if it is excluded, CBO estimates.

recession.[15] (For more discussion, see “Comparison With CBO’s August 2014 Projections” on page 52.)

The Labor Market

CBO projects that the unemployment rate will edge down from 5.5 percent at the beginning of 2020 to 5.4 percent in 2025, and the agency’s estimate of the natural rate of unemployment falls from 5.3 percent to 5.2 percent over the same period. The labor force participation rate is expected to fall as well, from about 62 percent in 2020 to about 61 percent in 2025.

The decline in the estimated natural rate of unemployment over the 2020–2025 period reflects the diminishing effect of structural factors associated with the extraordinary increase in long-term unemployment—namely, the stigma of being unemployed for a long time and the erosion of skills that can occur. After contributing 0.5 percentage points to the natural rate in 2014, those factors are projected to contribute 0.3 percentage points at the beginning of 2020 and 0.2 percentage points in 2025.

The projected difference of roughly one-quarter of one percentage point between the unemployment rate and the natural rate during the 2020–2025 period is not based on a forecast of particular cyclical movements in the economy. Rather, it is based on CBO’s estimate that the unemployment rate has been roughly that much higher than the natural rate, on average, over the 50-year period ending in 2009.[16] The difference between the projections of the unemployment rate and the natural rate over the 2020–2025 period corresponds to the projected gap between output and potential output that was discussed above.

CBO’s projection of the labor force participation rate in 2025—approximately 61 percent—is about 1 percentage point lower than the rate that it projects for 2020 and 5¼ percentage points lower than that rate at the end of 2007. Most of the projected decline between 2007 and 2025 can be attributed to long-term trends, especially the aging of the population, CBO estimates. The remainder stems from the reduction in some people’s incentive to work resulting from the ACA and the structure of the tax code and from the permanent withdrawal of some workers from the labor force in response to the recession and slow recovery.

Inflation

In CBO’s projections, inflation as measured by the PCE price index and the core PCE price index averages 2.0 percent annually during the 2020–2025 period; that rate is consistent with the Federal Reserve’s longer-term goal. As measured by the CPI-U and the core CPI-U, projected inflation is higher during that period, at 2.4 percent and 2.3 percent, respectively. (Differences in the ways that the two price indexes are calculated make the CPI-U grow faster than the PCE price index, on average.)

Interest Rates

CBO projects that the interest rates on 3-month Treasury bills and 10-year Treasury notes will be 3.4 percent and 4.6 percent, respectively, from 2020 through 2025. CBO expects the federal funds rate to be 3.7 percent during that period.

After being adjusted for inflation as measured by the CPI-U, the projected real interest rate on 10-year Treasury notes equals 2.2 percent between 2020 and 2025. That would be well above the current real rate, but roughly three-quarters of a percentage point below the average real rate between 1990 and 2007, a period that CBO uses for comparison because it featured fairly stable expectations for inflation and no significant financial crises or severe economic downturns. According to CBO’s analysis, a number of factors will act to push down real interest rates on Treasury securities relative to their earlier average: slower growth of the labor force (which reduces the return on capital), slightly slower growth of productivity (which also reduces the return on capital), a greater share of total income going to high-income households (which tends to increase saving), and a higher risk premium on risky assets (which increases the relative demand for risk-free Treasury securities, boosting their prices and thereby lowering their interest rates). Other factors will act to raise real interest rates relative to their earlier average: a larger amount of federal debt as a percentage of GDP (which increases the relative supply of

15. See John Fernald, *Productivity and Potential Output Before, During, and After the Great Recession*, Working Paper 20248 (National Bureau of Economic Research, June 2014), www.nber.org/papers/w20248.

16. Specifically, that has been the average difference between the unemployment rate and CBO’s estimate of the natural rate between 1961 and 2009. The average difference was larger during more recent periods: about three-quarters of one percentage point between 1973 and 2009 and about 1 percentage point between 1973 and 2014.

Treasury securities), smaller net inflows of capital from other countries as a percentage of GDP (which reduces the supply of funds available for borrowing), a smaller number of workers in their prime saving years relative to the number of older people drawing down their savings (which tends to decrease saving and thus also reduces the supply of funds available for borrowing), and a higher share of income going to capital (which increases the return on capital assets with which Treasury securities compete). CBO expects that, on balance, those factors will result in real interest rates on Treasury securities that are lower than those between 1990 and 2007.[17]

Projections of Income

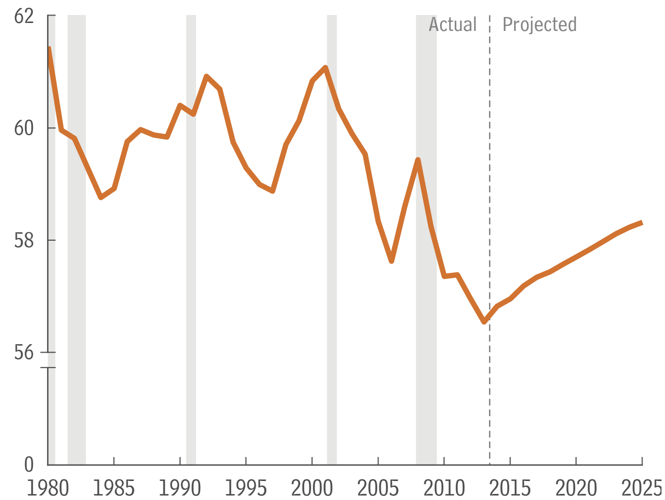
Economic activity and federal tax revenues depend not only on the amount of total income in the economy but also on how that income is divided among its constituent parts: labor income, domestic economic profits, proprietors' income, interest and dividend income, and other categories.[18] CBO projects various categories of income by estimating their shares of gross domestic income (GDI).[19] Of the categories of income, the most important components of the tax base are labor income, especially wage and salary payments, and domestic corporate profits.

In CBO's projections, labor income grows faster than the other components of GDI over the next decade, increasing its share from an estimated 56.8 percent in 2014 to 58.3 percent in 2025 (see Figure 2-13).[20] The projected increase in labor income's share of GDI stems primarily from an expected pickup in the growth of real hourly labor compensation, which will result from strengthening demand for labor. However, CBO expects some factors that have depressed labor income's share of GDI in recent years to continue during the coming decade, preventing that share from reaching its 1980–2007 average of nearly 60 percent. In particular, globalization has tended to move the production of labor-intensive goods and services to locations where labor costs

Figure 2-13.

Labor Income

Percentage of Gross Domestic Income



Sources: Congressional Budget Office; Bureau of Economic Analysis.

Notes: Labor income is defined as the sum of employees' compensation and CBO's estimate of the share of proprietors' income that is attributable to labor. Gross domestic income is all income earned in the production of gross domestic product. For further discussion of the labor share of income, see Congressional Budget Office, *How CBO Projects Income* (July 2013), www.cbo.gov/publication/44433.

Data are annual. Actual data are plotted through 2013; the value for 2014 is CBO's estimate and does not incorporate data released by the Bureau of Economic Analysis since early December 2014.

17. For a more detailed discussion of the factors affecting interest rates in the future, see Congressional Budget Office, *The 2014 Long-Term Budget Outlook* (July 2014), pp. 108–109, www.cbo.gov/publication/45471.

18. Domestic economic profits are corporations' domestic profits adjusted to remove distortions in depreciation allowances caused by tax rules and to exclude the effects of inflation on the value of inventories. Domestic economic profits exclude certain income of U.S.-based multinational corporations that is derived from foreign sources, most of which does not generate corporate income tax receipts in the United States.

19. In principle, GDI equals GDP, because each dollar of production yields a dollar of income; in practice, they differ because of difficulties in measuring both quantities. GDP was about 1 percent smaller than GDI in 2014, but CBO projects that GDP will grow slightly faster than GDI over the next decade, which will leave the gap between the two in 2025 equal to its long-run historical average.

20. CBO defines labor income as the sum of employees' compensation and a percentage of proprietors' income. That percentage is employees' compensation as a share of the difference between GDI and proprietors' income. For further discussion of labor income's share of GDI, see Congressional Budget Office, *How CBO Projects Income* (July 2013), www.cbo.gov/publication/44433.

are lower, and technological change appears to have made it easier for employers to substitute capital for labor.

In CBO's projections, domestic economic profits fall from 9.8 percent of GDI in 2014 to 7.8 percent in 2025. That decline occurs largely because of two factors: the pickup in the growth of labor compensation and a projected increase in corporate interest payments, the result of rising interest rates.

Some Uncertainties in the Economic Outlook

Significant uncertainty surrounds CBO's economic forecast—which the agency constructed to be in the middle of the distribution of possible outcomes, given the federal fiscal policies embodied in current law. But even if no significant changes are made to those policies, economic outcomes will undoubtedly differ from CBO's projections. Many developments—such as unforeseen changes in the housing market, the labor market, business confidence, and international conditions—could cause economic growth and other variables to differ substantially from what CBO has projected.[21]

The agency's current forecast of employment and output from 2015 through 2019 may be too pessimistic. For example, if firms responded to the expected increase in overall demand for goods and services with more robust hiring than CBO anticipates, the unemployment rate could fall more sharply than CBO projects. In addition, a greater-than-expected easing of borrowing constraints in mortgage markets could support stronger residential investment, accelerating the housing market's recovery and further boosting house prices. Households' increased wealth could then buttress consumer spending, raising GDP.

Alternatively, CBO's forecast for the next five years may be too optimistic. For instance, if investment by businesses rose less than CBO projects, production would also rise more slowly, and hiring would probably be weaker as well. That outcome could restrain consumer spending, which would reinforce the weakness in business investment. An unexpected worsening in international political or economic conditions could likewise weaken the U.S. economy by disrupting the international financial system, interfering with international trade, and reducing business and consumer confidence. In addition, because oil prices are set in international markets, disruptions to foreign oil production could affect U.S. energy prices.

A number of factors that will determine the economy's output later in the coming decade are also uncertain. For example, the economy could grow considerably faster than CBO forecasts if the labor force grew more quickly than expected (say, because older workers chose to stay in the labor force longer than expected), business investment was stronger, or productivity grew more rapidly. Similarly, lower-than-expected growth would occur if the stigma and erosion of skills that stem from elevated long-term unemployment dissipate more slowly than CBO projects, because then growth in the number of hours worked would be smaller (if all other factors were held equal), which would in turn lead to less business investment.

Comparison With CBO's August 2014 Projections

CBO's current economic projections differ somewhat from the projections that it issued in August 2014 (see Table 2-3). For the period from 2014 through 2018—the first period examined in that report—real GDP is now expected to grow by 2.5 percent annually, on average, which is about 0.2 percentage points less than CBO projected at the time. Because projected growth from 2019 through 2024 is almost unchanged, on average, the change in the earlier period means that real GDP is now projected to be roughly 1 percent lower in 2024 than the agency projected in August. The projected unemployment rate is also slightly lower in CBO's current forecast than it was in its August forecast, as are interest rates after 2018. CBO's projection of inflation in 2015 is currently lower than it was in August, but its projection of inflation in later years is roughly unchanged.

Output

Although real GDP grew faster than expected in 2014 and was about one-half of one percent higher at the end

21. The inherent uncertainty underlying economic forecasts will be discussed in Congressional Budget Office, *CBO's Economic Forecasting Record: 2015 Update* (forthcoming). CBO regularly evaluates the quality of its economic forecasts by comparing them with the economy's actual performance and with forecasts by the Administration and the *Blue Chip* consensus. Such comparisons indicate the extent to which imperfect information and analysis—factors that affect all forecasters—might have caused CBO to misread patterns and turning points in the economy.

Table 2-3.

Comparison of CBO's Current and Previous Economic Projections for Calendar Years 2014 to 2024

	Estimated, 2014	Forecast 2015	Forecast 2016	Forecast 2017	Projected Annual Average 2018–2024	Projected Annual Average 2014–2024
	Percentage Change From Fourth Quarter to Fourth Quarter					
Real (Inflation-adjusted) GDP						
January 2015	2.1	2.9	2.9	2.5	2.1	2.3
August 2014	1.5	3.4	3.4	2.7	2.2	2.4
Nominal GDP						
January 2015	4.0	4.2	4.6	4.5	4.2	4.3
August 2014	3.2	5.2	5.3	4.7	4.2	4.3
PCE Price Index						
January 2015	1.3	1.4	1.9	2.0	2.0	1.9
August 2014	1.9	1.7	1.8	1.9	2.0	1.9
Core PCE Price Index[a]						
January 2015	1.5	1.8	1.9	1.9	2.0	1.9
August 2014	1.6	1.9	1.9	1.9	2.0	1.9
Consumer Price Index[b]						
January 2015	1.2 [c]	1.5	2.3	2.3	2.4	2.2
August 2014	2.5	1.9	2.0	2.2	2.4	2.3
Core Consumer Price Index[a]						
January 2015	1.7 [c]	2.1	2.2	2.3	2.3	2.2
August 2014	1.9	2.2	2.2	2.3	2.3	2.2
GDP Price Index						
January 2015	1.8	1.3	1.7	1.9	2.0	1.9
August 2014	1.8	1.7	1.8	1.9	2.0	1.9
Employment Cost Index[d]						
January 2015	2.3	2.7	3.2	3.6	3.5	3.3
August 2014	1.9	3.0	3.5	3.7	3.4	3.3
Real Potential GDP						
January 2015	1.6	1.8	2.1	2.2	2.2	2.1
August 2014	1.7	1.9	2.1	2.2	2.2	2.1
	Calendar Year Average					
Unemployment Rate (Percent)						
January 2015	6.2 [c]	5.5	5.4	5.3	5.4	5.5
August 2014	6.2	5.9	5.7	5.7	5.6	5.7
Interest Rates (Percent)						
Three-month Treasury bills						
January 2015	* [c]	0.2	1.2	2.6	3.4	2.5
August 2014	0.1	0.3	1.1	2.1	3.4	2.5
Ten-year Treasury notes						
January 2015	2.5 [c]	2.8	3.4	3.9	4.5	4.0
August 2014	2.8	3.3	3.8	4.2	4.7	4.3
Tax Bases (Percentage of GDP)						
Wages and salaries						
January 2015	42.7	42.6	42.6	42.7	42.9	42.8
August 2014	42.8	42.7	42.5	42.6	43.0	42.9
Domestic economic profits						
January 2015	9.9	10.0	9.7	9.4	8.2	8.7
August 2014	9.2	9.3	9.4	9.3	7.9	8.3

Sources: Congressional Budget Office; Bureau of Labor Statistics; Federal Reserve.

Notes: Estimated values for 2014 do not reflect the values for GDP and related series released by the Bureau of Economic Analysis since early December 2014.

GDP = gross domestic product; PCE = personal consumption expenditures; * = between zero and 0.05 percent.

a. Excludes prices for food and energy.

b. The consumer price index for all urban consumers.

c. Actual value for 2014.

d. The employment cost index for wages and salaries of workers in private industries.

of the year than CBO anticipated in August, CBO has revised downward its projection of real GDP after 2015. Specifically, the agency projected in August that real GDP would increase at an average annual pace of 2.7 percent in 2014 through 2018; it now projects an average 2.5 percent rate. The primary reason for that change is that the agency has reduced its estimate of potential output.

The revision to potential output mainly results from CBO's reassessment of the growth in potential TFP in the nonfarm business sector since 2007. In CBO's previous projection, that measure of productivity grew by 1.2 percent per year, on average, from 2007 through 2014—one-tenth of a percentage point below the pace that CBO estimated for the 2002–2007 trend (excluding the effects of a temporary surge in the early 2000s) because of a small estimated effect of the recession. However, CBO now estimates that potential TFP slowed more significantly after 2007, growing by only 0.9 percent per year from 2008 to 2014. That revision to CBO's estimate of potential TFP growth reduces the estimated growth of potential GDP between 2007 and 2014, and it lowers CBO's estimate of the level of potential GDP in the fourth quarter of 2014 by about 1 percent.

What prompted that change? In previous periods of cyclical weakness, actual TFP has generally been lower than potential TFP, and CBO's August projection followed that pattern. But the growth of actual TFP in the past few years has persistently been lower than CBO anticipated, so the gap between actual TFP and CBO's previous estimate of potential TFP was widening even as other economic measures, such as the gap between the unemployment rate and the natural rate of unemployment, were improving.

Consequently, CBO now interprets more of the persistent weakness in *actual* TFP in the nonfarm business sector as reflecting weakness in *potential* TFP for the sector—concluding that potential TFP grew more slowly from 2008 to 2014 than the agency had previously estimated.[22] That slowdown may have resulted from larger-than-anticipated effects of the factors that CBO has repeatedly attributed to the economy's prolonged weakness: delayed reallocation of resources to their most productive uses, slower adoption of new skills and technologies, and curtailed spending on research and development. The slowdown may also reflect factors unrelated to the recession and weak recovery—such as a reduction in the pace of innovation in industries that produce and use information technology, which may have begun before the recession.[23]

Because the growth of potential TFP in the nonfarm business sector has been revised downward for the past six years and is nearly unrevised for the next decade, the estimated *level* of TFP in that sector is lower throughout the coming decade than it was in CBO's August projections—and therefore the estimated level of potential nonfarm business sector output is lower as well. As a result, CBO has revised its projection of potential output in 2024 (the last year of the agency's August projection) downward by 1 percent, a revision similar to the one that the agency made for 2014.[24]

22. In the current projection, CBO uses one trend in TFP for the 2001–2007 business cycle and another for the following years through 2014. (In both cases, CBO estimated trends after accounting for business cycle effects.) The agency's current approach yields a gap between actual TFP and estimated potential TFP that is roughly constant in recent years. CBO views that gap as resulting largely from ongoing cyclical weakness in the economy.

23. See John Fernald, *Productivity and Potential Output Before, During, and After the Great Recession*, Working Paper 20248 (National Bureau of Economic Research, June 2014), www.nber.org/papers/w20248.

24. Since 2007, CBO has lowered its projection of potential output in 2017—the end of the projection period for the estimates made in 2007—by about 9 percent. (That comparison excludes the effects of changes that the Bureau of Economic Analysis made to the definition of GDP during its comprehensive revision of the national income and product accounts in 2013.) Calculating the degree to which different factors have contributed to that revision is very difficult and subject to considerable uncertainty. Nonetheless, CBO estimates that reassessments of economic trends that had started before the recession began account for about one-half of the revision. For example, CBO has concluded that rates of growth in potential labor hours in the 2000s were generally lower than they were in the 1990s and lower than the agency had estimated in its 2007 projection. The remainder of the revision to potential output is attributable to a number of factors that have each had a smaller effect. Those factors include the recession and weak recovery, revisions of historical data, changes in CBO's methods for estimating potential output, revisions to estimated net flows of immigration based on analysis of recently released data, and the effect of higher federal debt in crowding out capital investment in the long term. For further discussion, see Congressional Budget Office, *Revisions to CBO's Projection of Potential Output Since 2007* (February 2014), pp. 8–11, www.cbo.gov/publication/45150.

CBO has also revised downward its projection of average real GDP growth from 2014 through 2018—a revision that reflects primarily the downward revision to CBO's estimate of potential GDP but also some recent economic developments, including the appreciation in the exchange value of the dollar. For the end of 2014, real GDP is revised upward by one-half of one percent, relative to CBO's August projections. Coupling that upward revision with CBO's 1 percent downward revision to potential output, CBO estimates that the gap between actual and potential GDP at the end of 2014—currently estimated to be 2¼ percent—is 1½ percentage points narrower than the agency projected in August. A narrower output gap suggests that there is less room for a strengthening economy to keep output growth above the growth rate of potential output without inducing a tightening of monetary policy to keep inflation from rising above the Federal Reserve's longer-term goal. As a result, CBO now projects that output growth over the next few years will be modestly slower than in its previous projection (and that short-term interest rates will rise more rapidly).

The Labor Market

During the second half of 2014, employment rose (and the unemployment rate fell) more than CBO anticipated, which led the agency to reduce its projection of the unemployment rate from 5.9 percent to 5.5 percent in 2015 and by smaller amounts in subsequent years. In addition, CBO now expects the growth of nonfarm payroll employment to be about 50,000 jobs (per month, on average) greater this year, and about 30,000 jobs greater next year, than the agency projected in August. Recent evidence suggests better employment prospects for those currently outside the labor force than CBO previously anticipated. Moreover, the stronger labor market in CBO's current forecast suggests greater incentives for people to enter or remain in the labor force than in CBO's previous forecast. As a result, the expected rate of labor force participation has been revised upward from 62.7 percent to 62.9 percent in 2015 and from 62.5 percent to 62.8 percent in 2016.

CBO also revised downward its projection of the natural rate of unemployment over the next decade—by about one-quarter of a percentage point each year over the next few years and by about one-tenth of a percentage point in later years—for two reasons. First, recent evidence about employment and wages suggests that reductions in the efficiency with which employers fill vacancies have been causing a smaller disruption to the labor market than CBO previously estimated; thus, that effect is estimated to have dissipated by the end of 2014, more quickly than CBO previously thought. Second, evidence about the propensity of the long-term unemployed to find jobs suggests that they experience somewhat less stigma and erosion of skills than CBO previously estimated.[25] In particular, although the long-term unemployed tend to have considerably worse labor market outcomes than the short-term unemployed have, the difference now appears to be a little smaller than CBO previously estimated.

Further, CBO revised upward its projection of the potential labor force participation rate over the next decade—by 0.1 percentage point each year, on average. CBO estimates that unusual aspects of the slow recovery of the labor market that have led workers to become discouraged and permanently drop out of the labor force are having a slightly smaller effect than the agency projected in August. CBO now expects that fewer of the long-term unemployed will leave the labor force permanently, in light of the evidence that their labor market outcomes seem to differ less from those of the short-term unemployed than the agency previously estimated. In addition, evidence since 2013 shows a surprising uptick in the number of people moving directly from outside the labor force into employment, which suggests better employment prospects for those outside the labor force than CBO anticipated.

For the period from 2020 through 2025, CBO revised its projections of the actual unemployment rate and the actual labor force participation rate to be consistent with its revisions to the natural rate of unemployment and the potential participation rate. The agency has done so because it projects (just as it did in August) that the unemployment rate and the participation rate will return to their historical relationships with the natural rate of unemployment and the potential participation rate.

Interest Rates

CBO currently projects generally higher short-term interest rates and lower long-term interest rates during the

25. For examples, see Rob Dent and others, *How Attached to the Labor Market Are the Long-Term Unemployed?* (Federal Reserve Bank of New York, November 2014), http://tinyurl.com/kt772t8; and Rob Valletta, *Long-Term Unemployment: What Do We Know?* Economic Letter 2013-03 (Federal Reserve Bank of San Francisco, February 2013), http://tinyurl.com/mxqty5j.

2015–2019 period than it projected in August. Short-term rates are projected to be higher, on average, because CBO now estimates that there is less slack in the economy than the agency previously estimated, and therefore expects that the Federal Reserve will provide slightly less support for growth through its conduct of monetary policy over the next few years. The lower projection for long-term interest rates reflects CBO's estimate that factors that have led to an unexpected decline in long-term rates (as the next paragraph explains) will persist over the next decade.

CBO's projections of short- and long-term interest rates between 2020 and 2025 are 0.1 percentage point lower than they were in August. Over the past six months, the outlook for growth among leading U.S. trading partners has unexpectedly deteriorated, which implies poorer investment opportunities in those countries and lower rates of return on assets in those countries. In addition, CBO anticipates that foreign central banks will respond to slower-than-expected growth by maintaining slightly looser monetary policy than CBO expected, which also lowers rates of return abroad. As a result of those factors, U.S. Treasury securities have become relatively more attractive to investors, a development that has put downward pressure on U.S. interest rates.

Comparison With Other Economic Projections

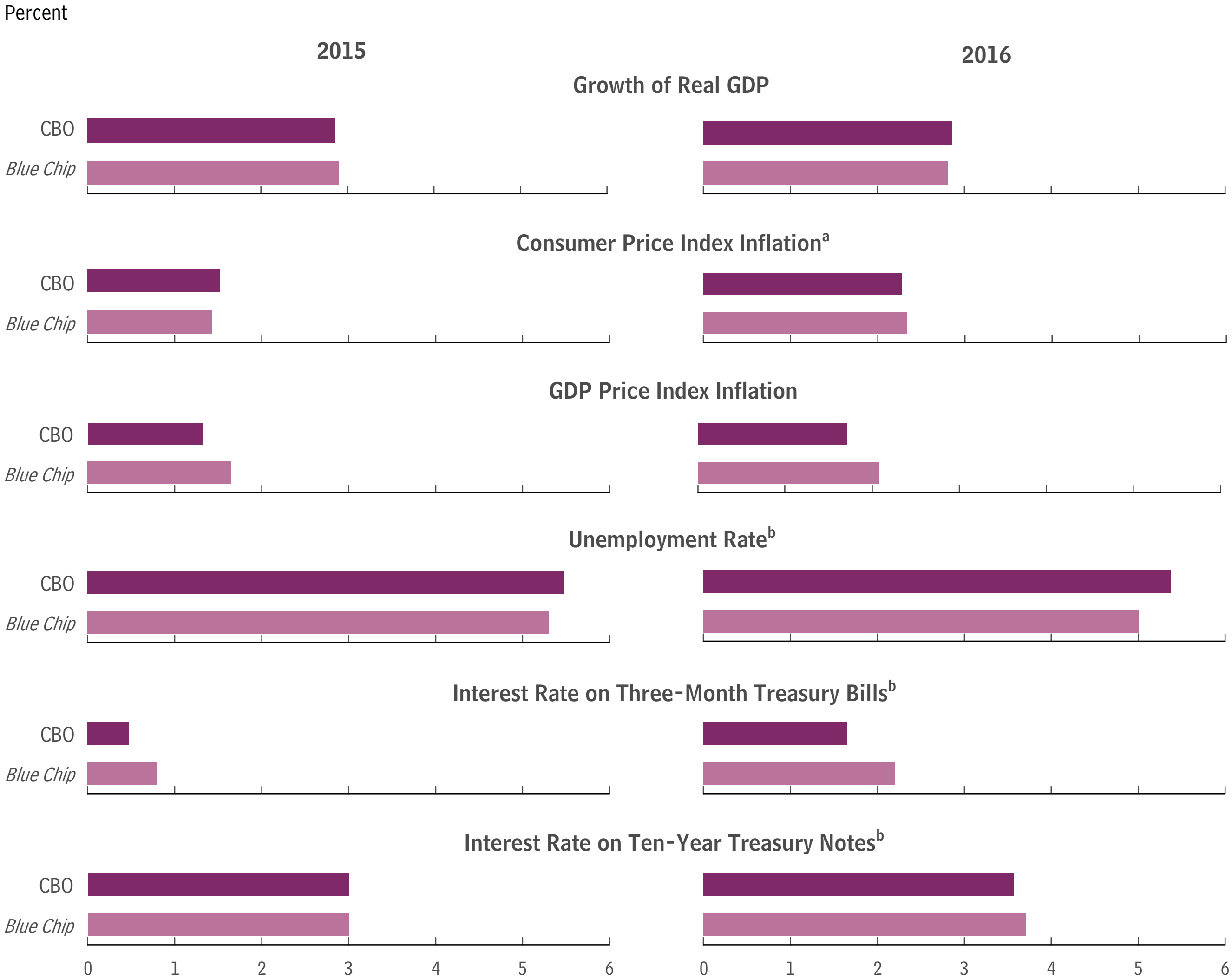
CBO's projections of the growth of real GDP, the unemployment rate, inflation, and interest rates in 2015 and 2016 are generally very similar to the projections of the *Blue Chip* consensus published in January 2015 (see Figure 2-14). CBO's forecast of the growth of real GDP matches that of the *Blue Chip* consensus for this year and is 0.1 percentage point faster for next year. CBO's forecast of inflation, as measured by the CPI-U, is 0.1 percentage point higher than the *Blue Chip* consensus this year but does not differ from it next year. CBO's projection for the unemployment rate is close to that of the *Blue Chip* consensus this year but is modestly higher next year. Finally, relative to the *Blue Chip* consensus for 2015 and 2016, CBO's forecast for short-term interest rates is somewhat lower, while the forecast for long-term interest rates is similar.

Similarly, CBO's projections differ only slightly from the forecasts made by the Federal Reserve that were presented at the December 2014 meeting of the Federal Open Market Committee (see Figure 2-15). The Federal Reserve reports two sets of forecasts: a range (which reflects the highest and lowest forecasts of the members of the Board of Governors of the Federal Reserve System and of the presidents of the Federal Reserve Banks) and a central tendency (which excludes the range's three highest and three lowest projections). CBO's projections of the growth of real GDP and inflation in 2015 and beyond are within the Federal Reserve's central tendencies. CBO's projections of the unemployment rate in 2015 and beyond fall within the Federal Reserve's ranges but are at the high end of the central tendencies or slightly above them.

CBO's projections probably differ from those of the other forecasters at least partly because of varying assumptions about the government's future tax and spending policies. For example, CBO's projections, which are based on current law, incorporate the effects of the recent retroactive extension through 2014 of certain provisions that reduce the tax liabilities of individuals and firms, but also reflect an assumption that those cuts will not be subsequently extended. Other forecasters might assume extensions of those tax cuts beyond 2014. Also, CBO's projections might differ from those of the other forecasters because of differences in the economic news available when the forecasts were completed and differences in the economic and statistical models used.

Figure 2-14.

Comparison of Economic Projections by CBO and the *Blue Chip* Consensus



Sources: Congressional Budget Office; Aspen Publishers, *Blue Chip Economic Indicators* (January 10, 2015).

Notes: The *Blue Chip* consensus is the average of about 50 forecasts by private-sector economists.

Real gross domestic product is the output of the economy adjusted to remove the effects of inflation.

Growth of real GDP and inflation rates are measured from the fourth quarter of one calendar year to the fourth quarter of the next year.

The unemployment rate is a measure of the number of jobless people who are available for work and are actively seeking jobs, expressed as a percentage of the labor force.

GDP = gross domestic product.

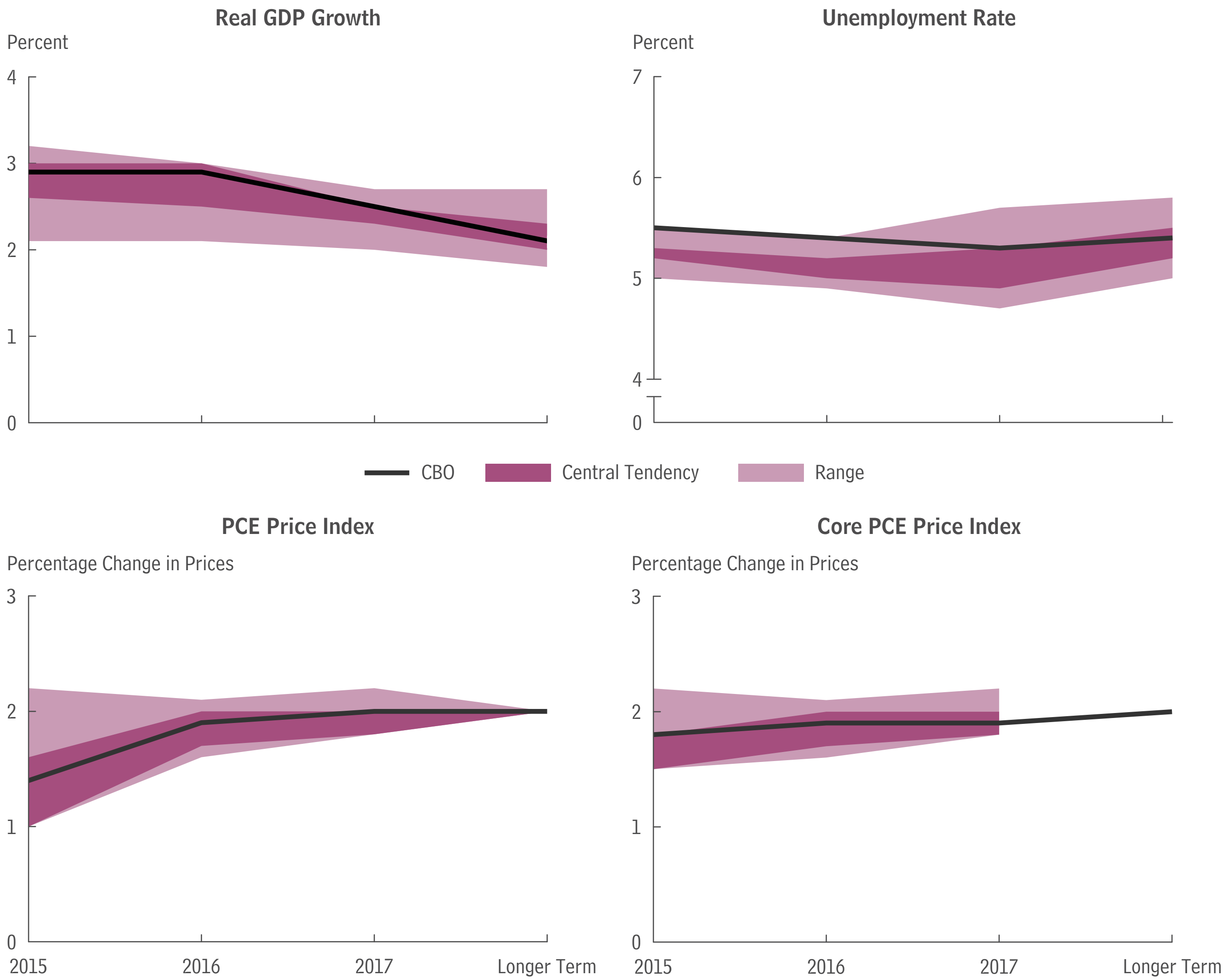
a. The consumer price index for all urban consumers.

b. Rate in the fourth quarter.

Figure 2-15.

Comparison of Economic Projections by CBO and the Federal Reserve

CBO's projections of the growth of real GDP and of inflation are within the Federal Reserve's central tendencies, and CBO's projections of the unemployment rate are at the high end of or slightly above the central tendencies.



Sources: Congressional Budget Office; Board of Governors of the Federal Reserve System, "Economic Projections of Federal Reserve Board Members and Federal Reserve Bank Presidents, December 2014" (December 17, 2014).

Notes: The range of estimates from the Federal Reserve reflects the projections of each member of the Board of Governors and the president of each Federal Reserve Bank. The central tendency is that range without the three highest and three lowest projections.

For CBO, longer-term projections are values for 2025. For the Federal Reserve, longer-term projections are described as the value at which each variable would settle under appropriate monetary policy and in the absence of further shocks to the economy.

Real gross domestic product is the output of the economy adjusted to remove the effects of inflation.

The unemployment rate is a measure of the number of jobless people who are available for work and are actively seeking jobs, expressed as a percentage of the labor force.

The core PCE price index excludes prices for food and energy.

Data are annual.

GDP = gross domestic product; PCE = personal consumption expenditures.

CHAPTER

3

The Spending Outlook

Under the provisions of current law, federal outlays in 2015 will total $3.7 trillion, the Congressional Budget Office estimates, roughly $150 billion (or 4.3 percent) more than the amount spent in 2014. They are projected to grow faster over the coming decade—at an average annual rate of more than 5 percent—and reach $6.1 trillion in 2025.

All of the projected growth for 2015 is attributable to mandatory spending, which makes up about 60 percent of the federal budget and is projected to rise by nearly $160 billion, from $2.1 trillion last year to $2.3 trillion this year (see Table 3-1). In contrast, discretionary spending and the government's net interest payments are expected to change very little. Discretionary spending, which totaled $1.2 trillion in 2014, is projected to edge down by $4 billion in 2015. Net outlays for interest are expected to dip by $3 billion this year to $227 billion. (See Box 3-1 for descriptions of the three major types of federal spending.)

All told, federal outlays in 2015 will equal 20.3 percent of gross domestic product (GDP), CBO estimates, which is the same as last year's percentage and only slightly higher than the 20.1 percent that such spending has averaged over the past 50 years. But the mix of that spending has changed noticeably over time. Mandatory spending (net of the offsetting receipts credited against such spending) is expected to equal 12.5 percent of GDP in 2015, whereas over the 1965–2014 period, it averaged 9.3 percent. Meanwhile, the other major components of federal spending have declined relative to GDP: Discretionary spending is anticipated to equal 6.5 percent of GDP this year, down from its 8.8 percent average over the past 50 years, and net outlays for interest are expected to be 1.3 percent of GDP, down from the 50-year average of 2.0 percent (see Figure 3-1 on page 62).

In CBO's baseline projections, outlays rise over the coming decade, reaching 22.3 percent of GDP in 2025, an increase of 2.0 percentage points. Mandatory spending is projected to contribute 1.7 percentage points to that increase—a combination of rapid growth in spending for Social Security and the major health care programs and a drop, relative to GDP, in outlays for other mandatory programs. As interest rates return to more typical levels and debt continues to mount, net outlays for interest are also projected to increase significantly, contributing another 1.7 percentage points to the growth in outlays. However, discretionary spending, measured as a percentage of GDP, falls by 1.4 percentage points in CBO's baseline projections.

Specifically, CBO's baseline for federal spending includes the following projections:

- Outlays for the largest federal program, Social Security, are expected to rise from 4.9 percent of GDP in 2015 to 5.7 percent in 2025.

- Federal outlays for major health care programs—including Medicare, Medicaid, subsidies for health insurance purchased through exchanges and related spending, and the Children's Health Insurance Program (CHIP)—are projected to increase more rapidly than outlays for Social Security, growing from 5.1 percent of GDP (net of premium payments and other offsetting receipts for Medicare) in 2015 to 6.2 percent in 2025.

- Outlays for all other mandatory programs (net of other offsetting receipts) are expected to decline from 2.5 percent of GDP in 2015 to 2.3 percent in 2025.

- Discretionary spending relative to the size of the economy is projected to fall by more than 20 percent over the next 10 years, from 6.5 percent of GDP in 2015 to 5.1 percent in 2025.

- Net interest payments are projected to more than double, rising from 1.3 percent of GDP in 2015 to 3.0 percent in 2025.

Table 3-1.

Outlays Projected in CBO's Baseline

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
							In Billions of Dollars							
Mandatory														
Social Security	845	883	921	971	1,032	1,096	1,165	1,237	1,313	1,392	1,476	1,564	5,185	12,167
Medicare	600	622	668	681	699	772	826	886	986	1,021	1,052	1,175	3,645	8,765
Medicaid	301	335	360	384	405	428	452	477	503	530	558	588	2,029	4,686
Other spending	626	690	741	764	770	783	797	824	863	864	866	910	3,855	8,184
Offsetting receipts	-276	-275	-216	-237	-253	-263	-273	-288	-303	-321	-336	-346	-1,241	-2,835
Subtotal	2,096	2,255	2,475	2,563	2,653	2,816	2,968	3,137	3,363	3,486	3,616	3,891	13,474	30,967
Discretionary														
Defense	596	583	587	592	599	616	631	646	666	677	689	711	3,025	6,413
Nondefense	583	592	589	590	594	605	617	630	644	658	672	689	2,995	6,288
Subtotal	1,179	1,175	1,176	1,182	1,193	1,221	1,248	1,276	1,310	1,336	1,361	1,400	6,019	12,701
Net interest	229	227	276	332	410	480	548	606	664	722	777	827	2,046	5,643
Total Outlays	**3,504**	**3,656**	**3,926**	**4,076**	**4,255**	**4,517**	**4,765**	**5,018**	**5,337**	**5,544**	**5,754**	**6,117**	**21,540**	**49,310**
On-budget	2,798	2,914	3,143	3,244	3,366	3,570	3,752	3,938	4,185	4,314	4,441	4,715	17,075	38,667
Off-budget[a]	706	742	784	832	889	948	1,012	1,080	1,152	1,230	1,313	1,402	4,465	10,643
Memorandum:														
Gross Domestic Product	17,251	18,016	18,832	19,701	20,558	21,404	22,315	23,271	24,261	25,287	26,352	27,456	102,810	229,438
							As a Percentage of Gross Domestic Product							
Mandatory														
Social Security	4.9	4.9	4.9	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.0	5.3
Medicare	3.5	3.5	3.5	3.5	3.4	3.6	3.7	3.8	4.1	4.0	4.0	4.3	3.5	3.8
Medicaid	1.7	1.9	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0
Other spending	3.6	3.8	3.9	3.9	3.7	3.7	3.6	3.5	3.6	3.4	3.3	3.3	3.8	3.6
Offsetting receipts	-1.6	-1.5	-1.1	-1.2	-1.2	-1.2	-1.2	-1.2	-1.2	-1.3	-1.3	-1.3	-1.2	-1.2
Subtotal	12.2	12.5	13.1	13.0	12.9	13.2	13.3	13.5	13.9	13.8	13.7	14.2	13.1	13.5
Discretionary														
Defense	3.5	3.2	3.1	3.0	2.9	2.9	2.8	2.8	2.7	2.7	2.6	2.6	2.9	2.8
Nondefense	3.4	3.3	3.1	3.0	2.9	2.8	2.8	2.7	2.7	2.6	2.6	2.5	2.9	2.7
Subtotal	6.8	6.5	6.2	6.0	5.8	5.7	5.6	5.5	5.4	5.3	5.2	5.1	5.9	5.5
Net interest	1.3	1.3	1.5	1.7	2.0	2.2	2.5	2.6	2.7	2.9	3.0	3.0	2.0	2.5
Total Outlays	**20.3**	**20.3**	**20.8**	**20.7**	**20.7**	**21.1**	**21.4**	**21.6**	**22.0**	**21.9**	**21.8**	**22.3**	**21.0**	**21.5**
On-budget	16.2	16.2	16.7	16.5	16.4	16.7	16.8	16.9	17.2	17.1	16.9	17.2	16.6	16.9
Off-budget[a]	4.1	4.1	4.2	4.2	4.3	4.4	4.5	4.6	4.8	4.9	5.0	5.1	4.3	4.6

Source: Congressional Budget Office.

a. Off-budget outlays stem from transactions related to the Social Security trust funds and the net cash flow of the Postal Service.

Box 3-1.

Categories of Federal Spending

On the basis of its treatment in the budget process, federal spending can be divided into three broad categories: mandatory spending, discretionary spending, and net interest.

Mandatory spending consists primarily of spending for benefit programs, such as Social Security, Medicare, and Medicaid. The Congress generally determines funding for those programs by setting rules for eligibility, benefit formulas, and other parameters rather than by appropriating specific amounts each year. In making baseline projections, the Congressional Budget Office generally assumes that the existing laws and policies governing those programs will remain unchanged. Mandatory spending also includes offsetting receipts—fees and other charges that are recorded as negative budget authority and outlays. Offsetting receipts differ from revenues in that revenues are collected in the exercise of the government's sovereign powers (income taxes, for example), whereas offsetting receipts are generally collected from other government accounts or from members of the public for businesslike transactions (premiums for Medicare or rental payments and royalties for the drilling of oil or gas on public lands, for example).

Discretionary spending is controlled by annual appropriation acts in which policymakers stipulate how much money will be provided for certain government programs in specific years. Appropriations fund a broad array of items and activities, including defense, law enforcement, transportation, the national park system, disaster relief, and foreign aid. Some of the fees and charges triggered by appropriation acts are classified as offsetting collections and are credited against discretionary spending for the particular accounts affected.

CBO's baseline depicts the path of spending for individual discretionary accounts as directed by the provisions of the Balanced Budget and Emergency Deficit Control Act of 1985. That act stated that current appropriations should be assumed to grow with inflation in the future.[1] However, the Budget Control Act of 2011 (Public Law 112-25) imposed caps on discretionary appropriations through 2021 (and subsequent legislation modified those limits), so the baseline also incorporates the assumption that discretionary funding will not exceed the current caps.

The caps can, however, be adjusted upward for appropriations for certain activities, including war-related activities known as overseas contingency operations, certain disaster assistance efforts, specified program integrity initiatives, or designated emergencies. In CBO's baseline, the most recent appropriations for those categories, with increases for inflation, are used to project future adjustments to the caps.

In addition to outlays from appropriations subject to caps, the baseline also includes discretionary spending for highway and airport infrastructure programs and public transit programs, all of which receive mandatory budget authority from authorizing legislation. Each year, however, appropriation acts control spending for those programs by limiting how much of the budget authority the Department of Transportation can obligate. For that reason, those obligation limitations are often treated as a measure of discretionary resources, and the resulting outlays are considered discretionary spending.

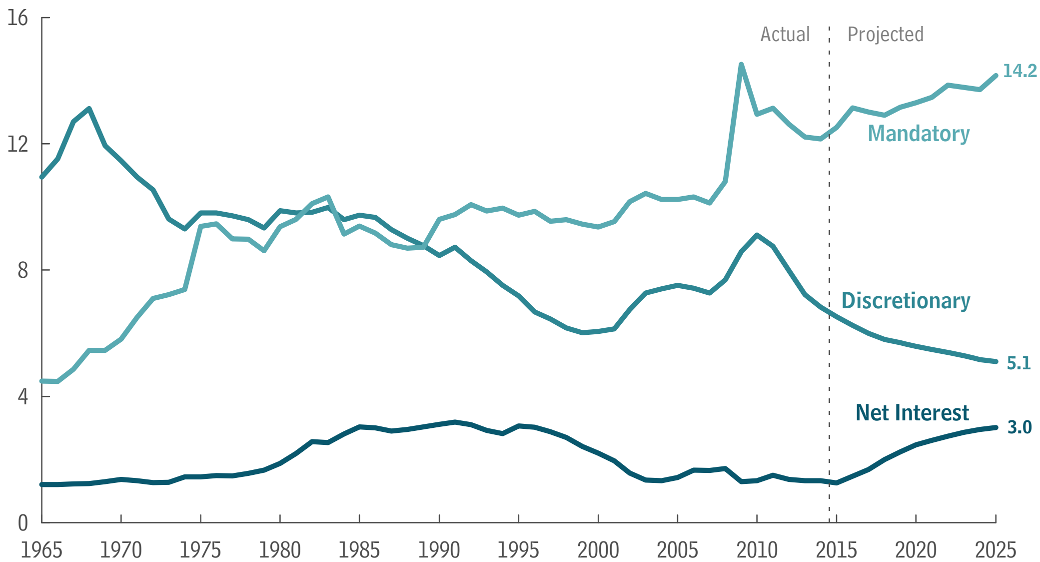
Net interest includes interest paid on Treasury securities and other interest that the government pays (for example, that paid on late refunds issued by the Internal Revenue Service) minus the interest that it collects from various sources (for example, from states that pay the federal unemployment trust fund interest on advances they received when the balances of their state unemployment accounts were insufficient to pay benefits in a timely fashion). Net interest is determined by the size and composition of the government's debt and by market interest rates.

1. In CBO's baseline, discretionary funding related to federal personnel is inflated using the employment cost index for wages and salaries; other discretionary funding is adjusted using the gross domestic product price index.

Figure 3-1.

Outlays, by Type of Spending

Percentage of Gross Domestic Product



Under current law, rising spending for Social Security and the major health care programs will boost mandatory outlays.

Total discretionary spending is projected to fall relative to GDP as funding grows modestly in nominal terms.

At the same time, higher interest rates and growing debt will push up net interest payments.

Source: Congressional Budget Office.

In developing its baseline projections, CBO generally assumes, in accordance with the rules established by the Balanced Budget and Emergency Deficit Control Act of 1985, that the provisions of current law governing federal taxes and spending will remain unchanged. Therefore, when projecting spending for mandatory programs, CBO assumes that existing laws will not be altered and that future outlays will depend on changes in caseloads, benefit costs, economic variables, and other factors. When projecting spending for discretionary programs, CBO assumes that most discretionary appropriations provided between 2016 and 2021 will be constrained by the statutory caps and other provisions of the Budget Control Act of 2011 (Public Law 112-25) and that thereafter appropriations in a given year will equal those in the prior year with an adjustment for inflation.[1]

Mandatory Spending

Mandatory—or direct—spending includes spending for benefit programs and certain other payments to people, businesses, nonprofit institutions, and state and local governments. It is generally governed by statutory criteria and is not normally constrained by the annual appropriation process.[2] Certain types of payments that federal agencies receive from the public and from other government agencies are classified as offsetting receipts and reduce gross mandatory spending.

Total mandatory spending amounted to 12.2 percent of GDP in 2014. That figure is lower than the 13.1 percent such spending averaged over the previous five years but higher than the 10.3 percent of GDP it averaged in the five years before the most recent recession. Over the next 10 years, however, the aging of the population, the expansion of health insurance subsidies, and the rising per-beneficiary cost of health care will boost spending for

1. Appropriations for certain activities—overseas contingency operations, activities designated as emergency requirements, disaster relief, and initiatives designed to enhance program integrity by reducing overpayments in certain benefit programs—are not constrained by the caps and are assumed to grow with inflation from the amounts provided in 2015. (Overseas contingency operations refer to military operations and related activities in Afghanistan and elsewhere.)

2. Each year, some mandatory programs are modified by provisions contained in annual appropriation acts. Such changes may decrease or increase spending for the affected programs for either a single year or multiple years. Provisions of the Deficit Control Act and the Balanced Budget Act of 1997 govern how CBO projects spending for mandatory programs whose authorizations are scheduled to expire under current law, some of which are assumed to continue.

federal programs that serve the elderly and subsidize health care. As a result, mandatory spending will be higher as a share of GDP throughout the coming decade than it was in 2014, CBO projects.

Mandatory spending will jump by nearly 8 percent in 2015, to $2.3 trillion (or 12.5 percent of GDP), CBO estimates, if no additional laws are enacted that affect such spending this year. The major contributors to that growth include outlays for Medicaid, subsidies for health insurance purchased through exchanges, and the government's transactions with Fannie Mae and Freddie Mac. Some of that growth in spending will be offset by receipts from auctions of portions of the electromagnetic spectrum, which are expected to bring in more than $40 billion to the federal government this year. Over the next 10 years, mandatory spending is projected to rise at an average rate of close to 6 percent per year, reaching $3.9 trillion, or 14.2 percent of GDP, in 2025 (see Table 3-2). By comparison, mandatory spending has averaged 11.9 percent of GDP over the past 10 years and 9.3 percent over the past 50 years.

At $1.8 trillion in 2015, federal outlays for Social Security combined with those for Medicare, Medicaid, and other major health care programs will make up roughly half of all federal outlays and 80 percent of mandatory spending (net of offsetting receipts). Under current law, CBO projects, spending for those programs will increase at an average annual rate of 6 percent over the 2015–2025 period and will total $3.3 trillion in 2025. By that year, spending for Social Security and the major health care programs will have risen from 10.0 percent of GDP in 2015 to 11.9 percent of GDP. In contrast, other mandatory spending relative to GDP is projected to decline slightly.

After Social Security and the major health care programs, the next largest set of mandatory programs consists of several that are designed to provide income security. Those programs—including certain refundable tax credits, the Supplemental Nutrition Assistance Program (SNAP), Supplemental Security Income (SSI), and unemployment compensation—will account for $307 billion, or 1.7 percent of GDP, in 2015, by CBO's estimate.[3] Those programs, in total, are projected to grow by an average of only 1.5 percent per year; declining outlays for refundable tax credits and for SNAP contribute to that slow rate of growth. As a result, by 2025 outlays for mandatory income security programs are projected to shrink to 1.3 percent of GDP.

Other mandatory spending programs include retirement benefits for federal civilian and military employees, certain benefits for veterans, student loans, and support for agriculture. Under current law, CBO projects, outlays for all of those other programs will grow at an average annual rate of 2.5 percent from 2015 through 2025, causing such spending to slide from 1.8 percent of GDP in 2015 to 1.5 percent of GDP in 2025. (Civilian and military retirement benefits account for roughly half of those amounts.)

CBO estimates that offsetting receipts (other than those for Medicare) will reduce mandatory outlays by 1.0 percent of GDP in 2015 and by an average of about 0.5 percent of GDP in ensuing years. Receipts from auctioning a portion of the electromagnetic spectrum have substantially boosted that total this year but are expected to have much smaller effects, on average, in later years. In addition, because of the way CBO treats the activities of Fannie Mae and Freddie Mac in its baseline projections, offsetting receipts from those entities are not reflected beyond the current year.

Social Security

Social Security, which is the largest federal spending program, provides cash benefits to the elderly, to people with disabilities, and to their dependents and survivors. Social Security comprises two main parts: Old-Age and Survivors Insurance (OASI) and Disability Insurance (DI). Social Security outlays grew by about 5 percent in 2014 because of increases in caseloads and average benefits.

CBO estimates that, under current law, outlays for Social Security will total $883 billion, or 4.9 percent of GDP, in 2015 and will climb steadily (by an average of about 6 percent per year) over the next decade as the nation's elderly population grows and as average benefits rise. By 2025, CBO estimates, Social Security outlays will total $1.6 trillion, or 5.7 percent of GDP, if current laws remain unchanged (see Figure 3-2 on page 66).

3. Tax credits reduce a taxpayer's overall income tax liability; if a refundable credit exceeds a taxpayer's other income tax liabilities, all or a portion of the excess (depending on the particular credit) is refunded to the taxpayer, and that payment is recorded as an outlay in the budget.

Table 3-2.

Mandatory Outlays Projected in CBO's Baseline

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Social Security														
Old-Age and Survivors Insurance	703	738	772	817	873	931	994	1,058	1,124	1,195	1,269	1,347	4,387	10,379
Disability Insurance	142	145	149	154	159	165	171	180	189	198	208	216	798	1,788
Subtotal	845	883	921	971	1,032	1,096	1,165	1,237	1,313	1,392	1,476	1,564	5,185	12,167
Major Health Care Programs														
Medicare[a]	600	622	668	681	699	772	826	886	986	1,021	1,052	1,175	3,645	8,765
Medicaid	301	335	360	384	405	428	452	477	503	530	558	588	2,029	4,686
Exchange subsidies and related spending[b]	15	45	71	93	101	106	110	116	122	125	128	131	482	1,104
Children's Health Insurance Program	9	10	11	6	6	6	6	6	6	6	6	6	34	62
Subtotal[a]	926	1,012	1,111	1,163	1,210	1,312	1,394	1,485	1,617	1,682	1,744	1,900	6,190	14,617
Income Security Programs														
Earned income, child, and other tax credits[c]	86	87	89	90	91	75	76	77	78	79	80	82	420	816
Supplemental Nutrition Assistance Program	76	78	78	76	75	74	74	74	73	74	74	75	378	747
Supplemental Security Income	54	55	60	57	54	61	63	64	71	68	65	72	295	636
Unemployment compensation	44	35	36	37	39	42	46	49	51	54	57	60	200	472
Family support and foster care[d]	31	31	32	32	32	33	33	33	34	34	34	35	162	331
Child nutrition	20	21	22	23	24	25	26	27	28	29	31	32	120	268
Subtotal	311	307	317	316	316	310	316	324	336	338	341	355	1,575	3,269
Federal Civilian and Military Retirement														
Civilian[e]	100	97	99	102	105	108	112	116	120	124	128	132	526	1,145
Military	55	57	62	59	56	62	64	66	73	70	67	74	303	653
Other	8	7	6	6	7	7	8	9	9	9	9	9	34	79
Subtotal	164	160	167	167	168	178	184	191	202	203	204	215	863	1,878
Veterans' Programs[f]														
Income security	71	74	82	79	74	83	84	85	93	87	81	91	402	840
Other	16	25	20	16	16	18	18	19	21	21	21	23	88	195
Subtotal	87	99	102	95	91	100	103	105	114	109	103	114	490	1,035
Other Programs														
Agriculture	19	11	16	19	17	16	15	15	15	15	15	15	83	159
MERHCF	9	10	10	10	11	11	12	13	14	15	16	17	55	128
Deposit insurance	-14	-10	-10	-10	-9	-14	-16	-10	-12	-13	-14	-15	-59	-124
Fannie Mae and Freddie Mac[g]	0	0	3	3	3	2	1	1	2	2	2	2	13	21
Higher education	-12	-3	-7	-4	-1	0	2	2	1	1	1	1	-10	-4
Other	38	61	62	69	68	68	64	64	64	64	65	69	329	655
Subtotal	40	69	73	87	89	83	78	84	84	84	84	89	411	835

Continued

Old-Age and Survivors Insurance. OASI, the larger of Social Security's two components, pays full benefits to workers who start collecting them at a specified full retirement age that depends on a worker's year of birth. (Full retirement age is defined as age 66 for those born before 1955 and increases incrementally for those born in 1955 and later years, reaching age 67 for those born in 1960 or later.) Workers can, however, choose to start collecting reduced benefits as early as age 62. The program also makes payments to eligible spouses and children of deceased workers. OASI spending totaled $703 billion in 2014, accounting for more than 80 percent of Social Security's outlays.

Table 3-2. **Continued**

Mandatory Outlays Projected in CBO's Baseline

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2016-2020	2016-2025
Offsetting Receipts														
Medicare[h]	-95	-99	-106	-113	-121	-130	-139	-149	-163	-178	-189	-199	-609	-1,487
Federal share of federal employees' retirement														
Social Security	-16	-16	-17	-17	-18	-18	-19	-20	-20	-21	-22	-23	-89	-195
Military retirement	-21	-20	-19	-20	-20	-21	-22	-23	-23	-24	-25	-26	-102	-223
Civil service retirement and other	-29	-32	-32	-34	-35	-36	-37	-38	-39	-40	-41	-42	-174	-373
Subtotal	-65	-68	-68	-71	-73	-75	-78	-80	-83	-85	-88	-90	-365	-791
Receipts related to natural resources	-14	-13	-13	-13	-17	-16	-17	-18	-17	-18	-19	-19	-75	-165
MERHCF	-8	-7	-7	-8	-8	-9	-9	-10	-10	-11	-11	-12	-41	-94
Fannie Mae and Freddie Mac[g]	-74	-26	0	0	0	0	0	0	0	0	0	0	0	0
Other	-20	-62	-22	-32	-34	-32	-31	-32	-30	-30	-29	-26	-151	-298
Subtotal	-276	-275	-216	-237	-253	-263	-273	-288	-303	-321	-336	-346	-1,241	-2,835
Total Mandatory Outlays	2,096	2,255	2,475	2,563	2,653	2,816	2,968	3,137	3,363	3,486	3,616	3,891	13,474	30,967
Memorandum:														
Mandatory Spending Excluding the Effects of Offsetting Receipts	2,373	2,530	2,691	2,799	2,905	3,079	3,241	3,425	3,666	3,808	3,952	4,237	14,715	33,802
Spending for Medicare Net of Offsetting Receipts	505	523	562	568	577	641	687	737	823	843	863	976	3,036	7,278
Spending for Major Health Care Programs Net of Offsetting Receipts[i]	831	913	1,005	1,051	1,089	1,182	1,255	1,336	1,454	1,504	1,555	1,701	5,581	13,130

Source: Congressional Budget Office.

Notes: Data on spending for benefit programs in this table generally exclude administrative costs, which are discretionary.

MERHCF = Department of Defense Medicare-Eligible Retiree Health Care Fund (including TRICARE for Life).

a. Gross spending, excluding the effects of Medicare premiums and other offsetting receipts. (Net Medicare spending is included in the memorandum section of the table.)

b. Subsidies for health insurance purchased through exchanges established under the Affordable Care Act.

c. Includes outlays for the American Opportunity Tax Credit and other credits.

d. Includes the Temporary Assistance for Needy Families program, the Child Support Enforcement program, the Child Care Entitlement program, and other programs that benefit children.

e. Includes Civil Service, Foreign Service, Coast Guard, and other, smaller retirement programs as well as annuitants' health care benefits.

f. Income security programs include veterans' compensation, pensions, and life insurance programs. Other benefits are primarily education subsidies. Most of the costs of veterans' health care are classified as discretionary spending and thus are not shown in this table.

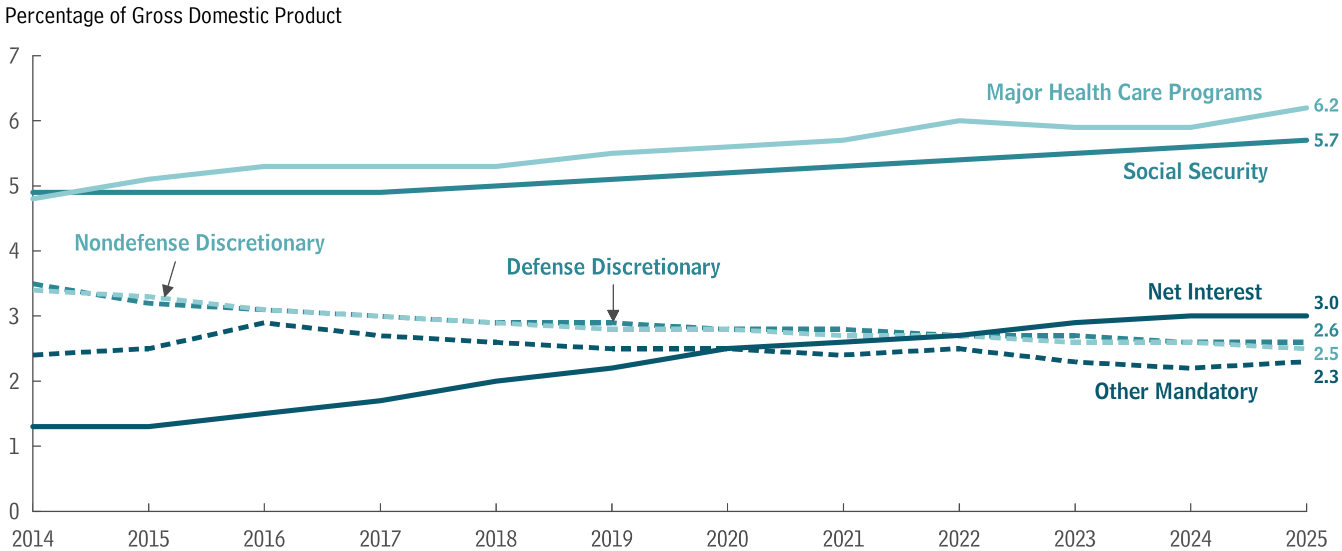
g. The cash payments from Fannie Mae and Freddie Mac to the Treasury are recorded as offsetting receipts in 2014 and 2015. Beginning in 2016, CBO's estimates reflect the net lifetime costs—that is, the subsidy costs adjusted for market risk—of the guarantees that those entities will issue and of the loans that they will hold, counted as federal outlays in the year of issuance.

h. Includes premium payments, recoveries of overpayments made to providers, and amounts paid by states from savings on Medicaid's prescription drug costs.

i. Consists of outlays for Medicare (net of offsetting receipts), Medicaid, the Children's Health Insurance Program, and subsidies for health insurance purchased through exchanges and related spending.

Figure 3-2.

Projected Outlays in Major Budget Categories



Source: Congressional Budget Office.

Note: Major health care programs consist of Medicare, Medicaid, the Children's Health Insurance Program, and subsidies for health insurance purchased through exchanges and related spending. (Medicare spending is net of offsetting receipts.) Other mandatory spending is all mandatory spending other than that for major health care programs and Social Security.

About 47 million people received OASI benefits in 2014. Over the 2015–2025 period, as more baby boomers (people born between 1946 and 1964) become eligible to receive benefits under the program, the number of people collecting those benefits will increase by an average of about 3 percent per year, CBO estimates. By 2025, nearly 65 million people will be receiving OASI benefits—37 percent more than the number of recipients in 2014 and 59 percent more than the number in 2007, the last year before the first baby boomers became eligible for benefits under the program.

Average benefits will also rise in the future because beneficiaries generally receive annual cost-of-living adjustments (COLAs) and because initial benefits are based on people's lifetime earnings, which tend to increase over time. OASI beneficiaries received a COLA of 1.7 percent in January 2015; CBO anticipates that beneficiaries will receive a COLA of 0.9 percent in 2016 and that COLAs will average 2.4 percent annually from 2017 through 2025. (Each year's COLA is determined by the annual increase in the consumer price index for urban wage earners.) All told, the average benefit will rise by about 3 percent per year over the 2015–2025 period, according to CBO's estimates. The increasing average benefit, in combination with the growing number of beneficiaries, is projected to boost outlays for OASI by an average of about 6 percent per year over that period.

Disability Insurance. Social Security's disability benefits are paid to workers who suffer debilitating health conditions before they reach OASI's full retirement age. Payments are also made to the eligible spouses and children of those recipients. In 2014, federal spending for DI totaled $142 billion.

The number of people receiving those benefits rose by about 0.5 percent in 2014, to 11 million—a much slower rate of growth than the program had experienced during the previous several years. The growth in the DI caseload is expected to remain modest as the economy continues to improve, leading fewer people to seek disability benefits, and as more Americans reach the age at which they qualify for benefits under OASI. Like OASI beneficiaries, those receiving benefits under DI received a COLA of 1.7 percent for 2015. Including COLAs that will be paid in future years, average DI benefits under current law will grow by about 3 percent per year, on average, from 2015 through 2025, and the program's outlays will rise by an average of about 4 percent annually during those years, CBO estimates.

CBO projects that the balance of the DI trust fund will be exhausted during fiscal year 2017. After that time, additional revenues will continue to be credited to the DI trust fund, but, in CBO's estimation, the amounts will be insufficient to pay all of the benefits due. However, in keeping with the rules in section 257 of the Deficit Control Act, CBO's baseline incorporates the assumption that full benefits will continue to be paid after the balance of the trust fund has been exhausted, although there will be no legal authority to make such payments in the absence of legislative action.

Medicare, Medicaid, and Other Major Health Care Programs

At $926 billion in 2014, gross federal outlays for Medicare, Medicaid, and other major programs related to health care accounted for 39 percent of gross mandatory spending and equaled 5.4 percent of GDP. (Those amounts do not reflect the income received by the government from premiums paid by Medicare beneficiaries or from other offsetting receipts.) Under current law, CBO estimates, gross federal outlays for those programs will jump to $1.0 trillion, or 5.6 percent of GDP, in 2015. In CBO's baseline projections, that spending grows robustly—at an average rate of nearly 7 percent per year—and thus nearly doubles between 2015 and 2025, reaching $1.9 trillion, or 6.8 percent of GDP, by the end of that period.

Medicare. Medicare provides subsidized medical insurance to the elderly and to some people with disabilities. The program has three principal components: Part A (Hospital Insurance), Part B (Medical Insurance, which covers doctors' services, outpatient care, home health services, and other medical services), and Part D (which covers outpatient prescription drugs).[4] People generally become eligible for Medicare at age 65 or two years after they qualify for Social Security disability benefits.

Gross spending for Medicare will total $622 billion in 2015, CBO estimates, or 3.5 percent of GDP, the same share as in 2014. By 2025, the program's spending will reach nearly $1.2 trillion, or 4.3 percent of GDP, if current laws remain in place. Medicare also collects substantial offsetting receipts—mostly in the form of premiums paid by beneficiaries—which, in CBO's baseline projections, rise from $99 billion in 2015 to $199 billion in 2025. (See "Offsetting Receipts" on page 74.) Under current law, spending for Medicare net of those offsetting receipts will be 2.9 percent of GDP in 2015 and 3.6 percent in 2025, CBO estimates.

Spending for Medicare (not including offsetting receipts) is expected to grow by an average of nearly 7 percent per year over the next 10 years under current law. About 60 percent of that growth results from higher costs per beneficiary; the rest stems from an increasing number of beneficiaries. CBO projects that Medicare caseloads will expand at an average rate of 3 percent per year as growing numbers of baby boomers turn 65 and become eligible for benefits. In 2014, Medicare had about 54 million beneficiaries; that number is expected to climb to 73 million in 2025.

CBO projects that, under current law, nominal spending per beneficiary will grow at an average rate of 4 percent per year over the coming decade—much more slowly than it has grown historically. After adjusting for inflation (as measured by the price index for personal consumption expenditures), Medicare spending per beneficiary is expected to increase at an average annual rate of 1.2 percent between 2015 and 2025, whereas it averaged real annual growth of 4 percent between 1985 and 2007 (excluding the jump in spending that occurred in 2006 with the implementation of Part D).

The comparatively slow growth in per-beneficiary spending that CBO projects for the next decade results from a combination of factors. One of those factors is the anticipated influx of new beneficiaries, which will bring down the average age of Medicare beneficiaries and therefore, holding all else equal, reduce average health care costs per beneficiary because younger beneficiaries tend to use fewer health care services.

A second factor is the slowdown in the growth of Medicare spending across all types of services, beneficiaries, and major geographic regions in recent years. Although the reasons for that slower growth are not yet

4. Medicare Part C (known as Medicare Advantage) specifies the rules under which private health care plans can assume responsibility for, and be compensated for, providing benefits covered under Parts A, B, and D.

entirely clear, CBO projects that the slowdown will persist for some years to come.[5] For example, since March 2010, CBO has reduced its projection of Medicare outlays in 2020 (the last year included in the March 2010 projection) by $122 billion, or about 14 percent, based on subsequent analysis by its staff and other analysts of data on Medicare spending. (CBO has also made revisions to its projections for Medicare spending in response to legislative action and revisions to the economic outlook.)

A third factor that contributes to the slow projected growth in Medicare spending per beneficiary over the next decade is the constraints on service payment rates that are built into current law:

- Payment rates for physicians' services are set according to the sustainable growth rate mechanism (SGR).[6] Under current law, payment rates for those services will be reduced by 21 percent in April 2015 and raised or lowered by small amounts in subsequent years, so CBO incorporates those changes into its projections. If, however, future legislation overrides the scheduled reductions (as has happened in every year since 2003), spending for Medicare will be greater than the amount that is projected in CBO's baseline. For example, if payment rates for physicians' services remained at the current level from April 2015 through 2025, CBO estimates that net Medicare outlays through 2025 would be $137 billion (or roughly 2 percent) higher than in its baseline projections. If those payment rates were increased over time, the effect on Medicare outlays would be even greater.

- Payments to other types of providers are limited by provisions of the Affordable Care Act (ACA) that hold annual increases in payment rates for Medicare services (apart from those provided by physicians) to about 1 percentage point less than inflation. Under CBO's economic projections, those payment rates are expected to increase by about 1 percent per year on average.

- Payments to Medicare providers will also be affected—especially later in the coming decade—by a provision originally enacted in the Budget Control Act of 2011 and extended by subsequent laws that reduces payment rates for most Medicare services by 2.0 percent through March 2023 and then by varying amounts over the next year and a half: by 2.9 percent through September 2023, then by 1.1 percent through March 2024, and then by 4.0 percent through September 2024.

Despite the relatively slow growth in per-beneficiary Medicare spending projected over the next 10 years, net federal spending per beneficiary for Parts A and B is projected to grow by 38 percent. Net federal spending per beneficiary for Part D, which accounts for a small share of total Medicare spending, is projected to grow much more—by 77 percent—largely because of rising drug costs combined with provisions in the ACA that expand the extent of coverage for some prescription drugs.

Medicaid. Medicaid is a joint federal and state program that funds medical care for certain low-income, elderly, and disabled people. The federal government shares costs for approved services, as well as administrative costs, with states; the federal share varies from state to state but averaged about 57 percent in most years prior to 2014. (During some economic downturns, the federal government's share has temporarily increased.)

Beginning in January 2014, the ACA gave states the option of expanding eligibility for their Medicaid programs to people with income at or below 138 percent of the federal poverty guidelines. In 2014, 27 states and the District of Columbia expanded their programs. The federal government pays a greater share of the costs incurred by enrollees who were made eligible for Medicaid in those states than it does for traditional enrollees: The federal share for those newly eligible enrollees is 100 percent from 2014 through 2016 and declines thereafter, falling

5. See Michael Levine and Melinda Buntin, *Why Has Growth in Spending for Medicare Fee-for-Service Slowed?* Working Paper 2013-06 (Congressional Budget Office, August 2013), www.cbo.gov/publication/44513. That analysis reviews the observed slowdown in growth in Medicare spending between the 2000–2005 and 2007–2010 periods. It suggests that demand for health care by Medicare beneficiaries was not measurably diminished by the financial turmoil and recession and that, instead, much of the slowdown in spending growth was caused by other factors affecting beneficiaries' demand for care and by changes in providers' behavior.

6. The SGR was enacted as part of the Balanced Budget Act of 1997 as a method for controlling spending by Medicare on physicians' services.

to 90 percent in 2020.[7] (See Appendix B for more information on the insurance coverage provisions of the ACA.)

Federal outlays for Medicaid totaled $301 billion in 2014, 14 percent more than 2013 spending for the program. CBO estimates that slightly more than half of that increase resulted from enrollment of people who were newly eligible because of the ACA and from the greater share of costs paid by the federal government for those new enrollees. Provisions of the ACA also led to increased enrollment of individuals who were previously eligible for Medicaid. CBO cannot, however, precisely determine the total share of growth between 2013 and 2014 resulting from the ACA because there is no way to know whether new enrollees who would have been eligible in the absence of the ACA would have signed up had it not been enacted.

CBO projects that, under current law, federal spending for Medicaid will jump by an additional 11 percent this year as more people in states that have already expanded Medicaid eligibility enroll in the program and as more states expand eligibility. The number of people enrolled in Medicaid on an average monthly basis is expected to rise from 63 million in 2014 to 66 million in 2015. CBO anticipates that, by 2020, 80 percent of the people who meet the new eligibility criteria will live in states that have extended Medicaid coverage and that enrollment in Medicaid will be 75 million.

From 2016 to 2025, growth in federal spending for Medicaid is projected to increase at about the same rate of growth that such spending averaged over the past 10 years—about 6 percent annually. By 2025, about 78 million people will be enrolled in Medicaid on an average monthly basis, CBO projects. In that year, federal outlays for Medicaid are, under current law, projected to total $588 billion, or about 2.1 percent of GDP, up from 1.9 percent of GDP in 2015.

Exchange Subsidies and Related Spending. Individuals and families can now purchase private health insurance coverage through marketplaces known as exchanges that are operated by the federal government, by state governments, or through a partnership between federal and state governments. (See Appendix B for more information on the insurance coverage provisions of the ACA.) Subsidies of purchases made through those exchanges fall into two categories: subsidies to cover a portion of participants' health insurance premiums, and subsidies to reduce their cost-sharing amounts (out-of-pocket payments required under insurance policies). Related spending consists of grants to states for establishing health insurance exchanges and outlays for risk adjustment and reinsurance.[8] Outlays for those exchange subsidies and related spending are expected to rise from $15 billion last year to $45 billion in 2015, to $71 billion in 2016, and to $131 billion by 2025.

Exchange subsidies make up the largest portion of that spending: Outlays are projected to total $28 billion in 2015 (up from $13 billion in 2014) and to reach $112 billion by 2025. (A portion of the subsidies for health insurance premiums will be provided in the form of reductions in recipients' tax payments.)[9] In 2014, CBO estimates, an average of 5 million people per month received subsidies through the exchanges. CBO and the staff of the Joint Committee on Taxation project that about 9 million people will receive such subsidies in 2015 and that the number will grow to roughly 16 million in 2016 and to between 17 million and 19 million in each year from 2017 to 2025. (Other people who will not be eligible for subsidies are also expected to purchase health insurance coverage through the exchanges.)

7. Taking into account the enhanced federal matching rates for populations made eligible under the ACA, the average federal share of spending for Medicaid is expected to be between 60 percent and 62 percent in 2015 and later years.

8. CBO previously anticipated that the transactions of the risk corridor program created by the ACA, which reduces risk for health insurers by partially offsetting high losses and sharing large profits, would be recorded in the budget as mandatory spending and revenues. However, the Administration plans to record the program's outflows as discretionary spending and inflows as offsetting collections to such spending, and CBO will follow that treatment. That difference in classification reduces both mandatory spending and revenues in CBO's baseline by the same amounts. In addition, because CBO expects that the additional discretionary spending and offsetting collections will be of equal amounts in each year, the reclassification will have no net impact on discretionary spending. Consequently, it has no net effect on CBO and the Joint Committee on Taxation's estimates of the effects of the ACA's insurance coverage provisions.

9. The subsidies for health insurance premiums are structured as refundable tax credits; the portions of such credits that exceed taxpayers' other income tax liabilities are refunded to the taxpayer and classified as outlays, whereas the portions that reduce tax payments appear in the budget as reductions in revenues.

CBO estimates that outlays for grants to states for exchange operations will be about $1 billion in 2015. Because funds for new grants needed to be obligated by the end of 2014, spending of such grants is winding down. In CBO's baseline, outlays associated with grants for operating state exchanges decline to zero by 2018.

In accordance with the ACA, new programs requiring the federal government to make payments to health insurance plans for risk adjustment (amounts paid to plans that attract less healthy enrollees) and for reinsurance (amounts paid to plans that enroll individuals who end up with high costs) became effective in 2014. The two programs are intended to spread more widely—either to other insurance plans or to the federal government—some of the risk that health insurers face when selling health insurance through the new exchanges or in other individual or small group markets. Outlays for the two programs are expected to begin in 2015 and to total $16 billion in that year; over the 2016–2025 period, CBO projects, outlays for those programs will total $181 billion. Those payments will be offset by associated revenues. Under current law, the reinsurance program is authorized only for insurance issued through 2016 (although spending associated with the programs is expected to continue for an additional year), but the risk-adjustment program is permanent.

Children's Health Insurance Program. The Children's Health Insurance Program provides health insurance coverage to children in families whose income, although modest, is too high for them to qualify for Medicaid. The program is jointly financed by the federal government and the states and is administered by the states within broad federal guidelines. Total federal spending for CHIP was approximately $9 billion in 2014 and is expected to rise to $10 billion in 2015—the last year for which funding is provided in law. Funding for CHIP in 2015 consists of two semiannual allotments of $2.85 billion—much smaller amounts than were allotted in the four preceding years—and $15.4 billion in onetime funding for the program, which will supplement the first allotment.

Following the rules governing baseline projections, CBO assumes in its baseline that funding for CHIP after 2015 is set at about $6 billion a year (that is, at the annualized rate of the second of the semiannual allotments for 2015).[10] Nevertheless, annual spending for CHIP is projected to reach $11 billion in 2016 because some of the funds allocated to states in previous years will be spent in that year; outlays are projected to fall to about $6 billion in 2017 and remain there in subsequent years. Nearly 6 million people will be enrolled in CHIP on an average monthly basis in 2015, CBO estimates. Enrollment drops later in the decade in CBO's baseline projections, mostly because funding is assumed to decline after 2015.

Income-Security Programs

The federal government makes various payments to people and government entities in order to assist the poor, the unemployed, and others in need. Federal spending for the refundable portions of the earned income tax credit (EITC), the child tax credit, certain other tax credits, SNAP, SSI, unemployment compensation, family support, foster care, and other services increased rapidly during the most recent recession, peaking in 2010 at $437 billion, or 3.0 percent of GDP. By 2014, such spending had dropped to $311 billion, or 1.8 percent of GDP. Under current law, spending on mandatory income-security programs is projected to decline slightly in 2015 and then to grow modestly. By 2025, outlays for those programs are anticipated to be $355 billion, or 1.3 percent of GDP.

Earned Income, Child, and Other Tax Credits. Refundable tax credits reduce a filer's overall income tax liability; if the credit exceeds the rest of the filer's income tax liability, the government pays all or some portion of that excess to the taxpayer. Those payments—including the ones made for the refundable portions of the EITC, the child tax credit, and the American Opportunity Tax Credit (AOTC)—are categorized as outlays. The EITC is a fully refundable credit available primarily to people with earnings and income that fall below established maximums. The child tax credit is a partially refundable credit (limited to 15 percent of earnings over a predetermined threshold) available to qualifying families with dependent children. The AOTC allows certain individuals (including those who owe no taxes) to claim a credit for college expenses. Outlays for those credits totaled $86 billion in 2014.

Such outlays are projected to reach $91 billion in 2018 before dropping to $75 billion in 2019, following the expiration, under current law, of the AOTC and of the temporary expansions in the child tax credit and EITC

10. Although CBO's projections assume that $6 billion in funding will be provided for 2016 and subsequent years, if lawmakers provide no such funding, state programs will terminate in 2016.

that were first enacted in 2009 and most recently extended in January 2013. Under current law, by 2025 outlays for refundable tax credits will total $82 billion, CBO projects. Those tax credits also affect the budget, to a lesser extent, by reducing tax revenues. However, the portion of the refundable tax credit that reduces revenues is not reported separately in the federal budget.

Supplemental Nutrition Assistance Program. Outlays for SNAP fell by 8 percent in 2014 to $76 billion after having risen each year since 2008, when the most recent recession began. CBO estimates that the program's spending will rise modestly this year, to $78 billion, and that 46 million people will receive those benefits. CBO expects that the number of people collecting SNAP benefits, which increased dramatically in the wake of the most recent recession, will gradually decline over the coming years. Average per-person benefits, however, will increase each year because of adjustments for inflation in prices for food. Based on the assumption that the program will be extended after it expires at the end of fiscal year 2018 (as provided in the rules governing baseline projections), CBO projects that by 2025, 33 million people will be enrolled in SNAP and the program's outlays will total $75 billion.

Supplemental Security Income. SSI provides cash benefits to people with low incomes who are elderly or disabled. Outlays for SSI rose by about 2 percent in 2014 to $54 billion. According to CBO's estimates, spending for that program will increase at an average annual rate of close to 3 percent over the coming decade. In CBO's projections, the number of beneficiaries for SSI edges up at an average annual rate of less than half a percent; most of the anticipated growth in spending for that program through 2025 stems from COLA increases. Under current law, spending for SSI benefits will be $72 billion in 2025, CBO estimates.

Unemployment Compensation. In 2014, outlays for unemployment compensation were $44 billion, about two-thirds of the amount spent in 2013. Such spending peaked at $159 billion in 2010, in part because of the exceptionally high unemployment rate and in part because of legislation that significantly expanded benefits for individuals who had been unemployed for long periods. The improving economy and the expiration of those temporary provisions at the end of December 2013 have reduced outlays considerably. If there are no changes to current law, outlays will drop again in 2015, CBO estimates, to $35 billion, close to the amount spent in 2007.

Over the next 10 years, outlays for unemployment compensation are projected to rise gradually, pushed up by growth in the labor force and wages (which serve as the basis for benefits). By 2025, CBO projects, outlays for the program will, under current law, amount to $60 billion, or 0.2 percent of GDP.

Family Support and Foster Care. Spending for family support programs—grants to states that help fund welfare programs, foster care, child support enforcement, and the Child Care Entitlement—is expected to remain close to last year's level, about $31 billion, in 2015. Spending for those programs is projected to rise only gradually through 2025, at an average annual rate of 1 percent.

Funding for two major components of family support is capped: The regular Temporary Assistance to Needy Families (TANF) program is limited to roughly $17 billion annually (although some additional funding is available if states' unemployment rates or SNAP caseloads exceed certain thresholds), and funding for the Child Care Entitlement is capped at just under $3 billion per year. Under current law, the regular TANF program and the Child Care Entitlement are funded only through the end of this fiscal year, but CBO's baseline reflects the assumption (as specified in the Deficit Control Act) that such funding will continue throughout the projection period.

Outlays for federal grants to states for foster care and adoption assistance and for child support enforcement are expected to remain near the 2014 amounts—about $7 billion and $4 billion, respectively—in 2015. CBO estimates that, under current law, spending for the two programs will increase modestly over the coming decade and amount to $9 billion and $5 billion, respectively, in 2025.

Child Nutrition. CBO projects that federal spending for child nutrition—which provides cash and commodities for meals and snacks in schools, day care settings, and summer programs—will rise by 5 percent in 2015, to $21 billion. Much of that increase stems from higher per-meal reimbursement rates, which are adjusted automatically each school year to account for inflation. CBO anticipates that growth in the number of meals provided and in reimbursement rates will lead to spending increases averaging 4 percent per year from 2016 through 2025, for a total of $32 billion in 2025.[11]

Civilian and Military Retirement

Retirement and survivors' benefits for federal civilian employees (along with benefits provided through several smaller retirement programs for employees of various government agencies and for retired railroad workers) amounted to $108 billion in 2014. Under current law, such outlays will grow by about 3 percent annually over the next 10 years, CBO projects, reaching $141 billion in 2025.

Growth in federal civil service retirement benefits is attributable primarily to cost-of-living adjustments for retirees and to increases in federal salaries, which boost benefits for people entering retirement. (CBO's projections reflect the assumption that federal salaries will rise in accordance with the employment cost index for wages and salaries of workers in private industry.) One factor that is restraining growth in spending for retirement benefits is the ongoing, gradual replacement of the Civil Service Retirement System (CSRS) with the Federal Employees Retirement System (FERS). FERS covers employees hired after 1983 and provides a smaller benefit than that provided by CSRS. FERS recipients are, however, eligible for Social Security benefits on the basis of their federal employment, whereas CSRS employees are not. In addition, under FERS, employees' contributions to the federal Thrift Savings Plan are matched in part by their employing agencies (but those matching funds are categorized as discretionary—not mandatory—costs because they come out of annual appropriations to the agencies).

The federal government also provides annuities to personnel who retire from the military and their survivors. Outlays for those annuities totaled $55 billion in 2014. Most of the annual growth in those outlays results from COLAs and increases in military basic pay. Outlays for military retirement annuities are projected to grow over the next 10 years by an average of about 3 percent per year, rising to $74 billion in 2025.

11. Spending for child nutrition includes roughly $1 billion in outlays each year related to the Funds for Strengthening Markets program (also known as Section 32), which, among other things, provides funds to purchase commodities that are distributed to schools as part of child nutrition programs.

Veterans' Benefits

Mandatory spending for veterans' benefits includes disability compensation, readjustment benefits, pensions, insurance, housing assistance, and burial benefits. Outlays for those benefits totaled $87 billion in 2014, of which roughly 75 percent represented disability compensation. That amount does not include most federal spending for veterans' health care, which is funded by discretionary appropriations.

Spending for mandatory veterans' benefits is projected to rise by 14 percent, to $99 billion, in 2015. The growth projected for 2015 largely reflects new mandatory spending for medical services and facilities resulting from the Veterans Access, Choice, and Accountability Act of 2014 (P.L. 113-146). That law provided onetime funding of $5 billion to expand health care hiring and infrastructure of the Department of Veterans Affairs and $10 billion to temporarily cover the costs of contracted medical care for veterans. (That funding was an exception to the usual approach of funding veterans' health care through discretionary appropriations.) Other growth, though less substantial, stems from an expected increase in the average benefit for veterans' disability compensation.

CBO expects that, under current law, moderate growth in mandatory spending for veterans' benefits (averaging about 1.4 percent a year between 2015 and 2025) will cause outlays to rise to $114 billion in 2025.

Other Mandatory Spending

Other mandatory spending includes outlays for agricultural support, some smaller health care programs, net outlays for deposit insurance, subsidy costs for student loans, and other payments. Outlays in some of those categories fluctuate markedly from year to year and may be either positive or negative.

Agricultural Support. Mandatory spending for agricultural programs totaled $19 billion in 2014. The relatively high spending last year included significant payments for livestock disaster assistance for drought-related losses since 2012 and crop insurance payments for crop losses in 2013. Spending for agricultural support is projected to average $15 billion per year between 2015 and 2025 based on the assumption (specified in the Deficit Control Act) that the current programs that are scheduled to expire during that period will be extended.

Deposit Insurance. Net outlays for deposit insurance were negative last year: The program's collections (premiums paid by financial institutions) exceeded its disbursements (the cost of resolving failed institutions) by $14 billion. Premium payments will continue to exceed amounts spent on failed institutions, CBO projects, and net outlays for deposit insurance will range from –$9 billion to –$16 billion annually over the coming decade.

Medicare-Eligible Retiree Health Care Fund. The Department of Defense's Medicare-Eligible Retiree Health Care Fund (MERHCF) provides health care benefits, mainly through the TRICARE for Life program, to retirees of the uniformed services (and to their dependents and surviving spouses) who are eligible for Medicare. Outlays for those benefits totaled $9 billion in 2014. Over the coming decade, spending from the MERHCF is projected to rise at an average annual rate of roughly 6 percent, reaching $17 billion in 2025.

Fannie Mae and Freddie Mac. In September 2008, the government placed Fannie Mae and Freddie Mac, two institutions that facilitate the flow of funding for home loans nationwide, into conservatorship.[12] Because the Administration considers Fannie Mae and Freddie Mac to be nongovernmental entities for federal budgeting purposes, it recorded the Treasury's payments to those entities as outlays in the budget and reports payments by those entities to the Treasury, such as those made in 2014 and expected in 2015, as offsetting receipts. (For further details, see page 75.)

In contrast to the Administration, CBO projects the budgetary impact of the two entities' operations in future years as if they were being conducted by a federal agency because of the degree of management and financial control that the government exercises over them.[13] Therefore, CBO estimates the net lifetime costs—that is, the subsidy costs adjusted for market risk—of the guarantees that those entities will issue and of the loans that they will hold and shows those costs as federal outlays in the year of issuance. CBO estimates that those outlays will amount to $21 billion from 2016 through 2025.

Higher Education. Mandatory outlays for higher education fall into three categories: the net costs (on a present-value basis) of student loans originated in a given year, which are frequently estimated to be negative; a portion of the costs of Pell grants provided in that year; and spending for some smaller programs.[14] In 2014, total mandatory outlays for higher education were –$12 billion. That amount included the following: the budgetary effects of student loans originated last year, which amounted to –$22 billion (on a present-value basis); a slight increase in the estimated cost of direct and guaranteed loans originated in previous years, which amounted to $1 billion (also on a present-value basis); and mandatory spending for Pell grants, which totaled $8 billion.[15]

In 2015, the net costs for new student loans will be –$15 billion, mandatory spending for the Federal Pell Grant Program will be $11 billion, and other spending will be $0.4 billion, resulting in net mandatory outlays for higher education of –$3 billion, CBO estimates. In later years, projected mandatory outlays for higher

12. Conservatorship is the legal process in which an entity, in this case the federal government, is appointed to establish control and oversight of a company to put it in a sound and solvent condition.

13. See Congressional Budget Office, *CBO's Budgetary Treatment of Fannie Mae and Freddie Mac* (January 2010), www.cbo.gov/publication/41887.

14. CBO calculates subsidy costs for student loans following the procedures specified in the Federal Credit Reform Act of 1990 (FCRA). Under FCRA accounting, the discounted present value of expected income from federal student loans made during the 2015–2025 period is projected to exceed the discounted present value of the government's costs. (Present value is a single number that expresses a flow of current and future income or payments in terms of an equivalent lump sum received or paid today; the present value depends on the rate of interest—known as the discount rate—that is used to translate future cash flows into current dollars.) Credit programs that produce net income rather than net outlays are said to have negative subsidy rates, which result in negative outlays. The original subsidy calculation for a set of loans or loan guarantees may be increased or decreased in subsequent years by a credit subsidy reestimate based on an updated assessment of the present value of the cash flows associated with the outstanding loans or loan guarantees.

FCRA accounting does not, however, consider all costs borne by the government. In particular, it omits market risk—the risk taxpayers face because federal receipts from payments on student loans tend to be low when economic and financial conditions are poor and resources are therefore more valuable. Fair-value accounting methods account for such risk, so the program's savings are less (or its costs are greater) under fair-value accounting than they are under FCRA accounting.

15. Under current law, the Pell grant program also receives funding from discretionary appropriations. For 2014, those appropriations totaled $23 billion.

education trend from modestly negative to slightly positive. That switch occurs primarily because rising interest rates will, in CBO's estimation, increase the subsidy cost of student loans (making it less negative) to the point that the negative outlays for new student loans will no longer fully offset the cost of mandatory spending for Pell grants and other higher education programs under current law. (Those projected outlays do not include any potential revision to the estimated subsidy costs of loans or guarantees made before 2015.)

Additional Mandatory Spending. Other mandatory spending includes outlays for a number of different programs; some of those outlays are associated with significant offsetting receipts or revenues collected by the federal government. For example, $138 billion in mandatory outlays over the 2016–2025 period is related to the administration of justice, including some activities of the Department of Homeland Security. Most of that spending is offset by revenues and by fees, penalties, fines, and forfeited assets that are credited in the budget as offsetting receipts. An additional $115 billion in outlays over the 2016–2025 period stems from the Universal Service Fund and is offset in the federal budget by revenues of similar amounts. Other mandatory spending over the 2016–2025 period includes the following outlays:

- $59 billion for conservation activities on private lands;
- $57 billion for grants to states for social services, such as vocational rehabilitation;
- $40 billion in subsidy payments to state and local governments related to the Build America Bonds program for infrastructure improvements; and
- $32 billion in payments to states and territories, primarily from funds generated from mineral production on federal land.

Offsetting Receipts

Offsetting receipts are funds collected by federal agencies from other government accounts or from the public in businesslike or market-oriented transactions that are recorded as negative outlays (that is, as credits against direct spending). Such receipts include beneficiaries' premiums for Medicare, intragovernmental payments made by federal agencies for their employees' retirement benefits, royalties and other charges for the production of oil and natural gas on federal lands, proceeds from sales of timber harvested and minerals extracted from federal lands, payments by Fannie Mae and Freddie Mac, and various fees paid by users of public property and services.

In 2014, offsetting receipts totaled $276 billion. The total for this year will be nearly unchanged at $275 billion, CBO estimates. That amount reflects a decrease in receipts from Fannie Mae and Freddie Mac, which is mostly offset by an increase in proceeds from the Federal Communications Commission's auctions of licenses to use a portion of the electromagnetic spectrum. Over the coming decade, offsetting receipts are projected to increase by just over 2 percent per year, on average, rising to $346 billion by 2025 (see Table 3-2 on page 64).

Medicare. Offsetting receipts for Medicare are composed primarily of premiums paid by Medicare beneficiaries, but they also include recoveries of overpayments made to providers and payments made by states to cover a portion of the prescription drug costs for low-income beneficiaries. In 2014, those receipts totaled $95 billion, constituting one-third of all offsetting receipts and covering about 16 percent of gross Medicare spending. Over the coming years, those receipts are projected to rise at about the same rate as spending for Medicare, totaling $199 billion in 2025.

Federal Retirement. In 2014, $65 billion in offsetting receipts consisted of intragovernmental transfers from federal agencies to the federal funds from which employees' retirement benefits are paid (mostly trust funds for Social Security and for military and civilian retirement). Those payments from agencies' operating accounts to the funds have no net effect on federal outlays. Such payments will grow by nearly 3 percent per year, on average, CBO estimates, reaching $90 billion in 2025.

Natural Resources. Receipts stemming from the extraction of natural resources—particularly oil, natural gas, and minerals—from federally owned lands totaled $14 billion in 2014. By 2025, CBO estimates, those receipts will be $19 billion. The royalty payments included in that category fluctuate depending on the price of the commodity extracted.

Medicare-Eligible Retiree Health Care Fund. Intragovernmental transfers are also made to the Department of Defense's MERHCF (discussed above). Contributions to the fund are made on an accrual basis: Each year, the services contribute an amount sufficient to cover the increase in the estimated future costs of retirement benefits for their currently active service members. Such payments totaled $8 billion in 2014 and, because of rising health care costs, are projected to grow to $12 billion by 2025.

Fannie Mae and Freddie Mac. In the first few years after they were placed into conservatorship, the Treasury made payments to Fannie Mae and Freddie Mac; however, over the past couple of years, those entities have been making payments to the government. The Administration has recorded the payments by the government as outlays and the payments to the government from those two entities as offsetting receipts. To match the reporting for the current year in the *Monthly Treasury Statements*, CBO adopts the Administration's presentation for 2015, but for later years, because of the extent of government control over the two entities, CBO considers them to be part of the government and their transactions with the Treasury to be intragovernmental.

In 2014, the Treasury made no payments to those entities and received payments from them totaling $74 billion. CBO estimates that net payments from those entities to the Treasury will amount to $26 billion in 2015. That drop occurs partly because in fiscal year 2014 Freddie Mac's payments to the Treasury were boosted by a nearly $24 billion payment following a onetime revaluation of certain tax assets. In addition, financial institutions are expected to make fewer settlement payments to Fannie Mae and Freddie Mac in 2015 for allegations of fraud in connection with residential mortgages and certain other securities.

Legislation Assumed in the Baseline for Expiring Programs

In keeping with the rules established by the Deficit Control Act, CBO's baseline projections incorporate the assumption that some mandatory programs will be extended when their authorization expires, although the assumptions apply differently to programs created before and after the Balanced Budget Act of 1997. All direct spending programs that predate that act and have current-year outlays greater than $50 million are assumed to continue in CBO's baseline projections. For programs established after 1997, continuation is assessed program by program in consultation with the House and Senate Budget Committees.

CBO's baseline projections therefore incorporate the assumption that the following programs, whose authorization expires within the current projection period, will continue: SNAP, TANF, CHIP, rehabilitation services, the Child Care Entitlement, trade adjustment assistance for workers, child nutrition, promoting safe and stable families, most farm subsidies, certain transportation programs, and some recreation fees. In addition, the Deficit Control Act directs CBO to assume that a cost-of-living adjustment for veterans' compensation will be granted each year. In CBO's projections, the assumption that expiring programs will continue accounts for less than $1 billion in mandatory outlays for 2015 and about $940 billion between 2016 and 2025, mostly for SNAP and TANF (see Table 3-3).

Discretionary Spending

Roughly one-third of federal outlays stem from budget authority provided in annual appropriation acts.[16] That funding—referred to as discretionary—translates into outlays when the money is spent. Although some appropriations (for example, those designated for employees' salaries) are spent quickly, others (such as those intended for major construction projects) are disbursed over several years. In any given year, discretionary outlays include spending from new budget authority and from budget authority provided in previous appropriations.

Several transportation programs have an unusual budgetary treatment: Their budget authority is provided in authorizing legislation, rather than in appropriation acts, but their spending is constrained by *obligation limitations* imposed by appropriation bills. Consequently, their budget authority is considered mandatory, but their outlays are discretionary. (The largest of those programs is the Federal-Aid Highway Program, which is funded from the

16. Budget authority is the authority provided by law to incur financial obligations that will result in immediate or future outlays of federal funds. Budget authority may be provided in an appropriation act or an authorization act and may take the form of a direct appropriation of funds from the Treasury, borrowing authority, contract authority, entitlement authority, or authority to obligate and expend offsetting collections or receipts. Offsetting collections and receipts are shown as negative budget authority and outlays.

Table 3-3.

Costs for Mandatory Programs That Continue Beyond Their Current Expiration Date in CBO's Baseline

Billions of Dollars

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Supplemental Nutrition Assistance Program													
Budget authority	0	0	0	0	74	74	74	73	74	74	75	148	518
Outlays	0	0	0	0	72	74	74	73	74	74	75	146	515
Temporary Assistance for Needy Families													
Budget authority	0	17	17	17	17	17	17	17	17	17	17	86	173
Outlays	0	13	16	17	17	17	17	17	17	17	17	81	167
Commodity Credit Corporation[a]													
Budget authority	0	0	0	0	2	3	8	8	9	9	10	5	50
Outlays	0	0	0	0	1	2	8	8	9	9	10	2	45
Children's Health Insurance Program													
Budget authority	0	6	6	6	6	6	6	6	6	6	6	29	57
Outlays	0	5	6	6	6	6	6	6	6	6	6	28	57
Veterans' Compensation COLAs													
Budget authority	0	2	4	5	7	8	10	13	13	14	15	26	92
Outlays	0	2	4	5	7	8	10	13	13	14	15	26	91
Rehabilitation Services													
Budget authority	0	0	0	0	0	0	0	0	4	4	4	0	12
Outlays	0	0	0	0	0	0	0	0	2	4	4	0	10
Child Care Entitlements to States													
Budget authority	0	3	3	3	3	3	3	3	3	3	3	15	29
Outlays	0	2	3	3	3	3	3	3	3	3	3	14	28
Trade Adjustment Assistance for Workers[b]													
Budget authority	0	1	1	1	1	1	1	1	1	1	1	4	9
Outlays	0	*	1	1	1	1	1	1	1	1	1	4	9
Child Nutrition[c]													
Budget authority	0	1	1	1	1	1	1	1	1	1	1	4	9
Outlays	0	1	1	1	1	1	1	1	1	1	1	4	9

Continued

Highway Trust Fund.) As a result, total discretionary outlays in the budget are greater than total discretionary budget authority. In some cases, the amounts of those obligation limitations are added to discretionary budget authority to produce a measure of the total *funding* provided for discretionary programs.

In CBO's baseline projections, most appropriations for the 2015–2021 period are assumed to be constrained by the caps set by the Budget Control Act of 2011 and modified in subsequent legislation, including the automatic reductions required by that act. For the period from 2022

Table 3-3. **Continued**

Costs for Mandatory Programs That Continue Beyond Their Current Expiration Date in CBO's Baseline

Billions of Dollars

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Promoting Safe and Stable Families													
Budget authority	0	0	*	*	*	*	*	*	*	*	*	1	3
Outlays	0	0	*	*	*	*	*	*	*	*	*	1	3
Ground Transportation Programs Not Subject to Annual Obligation Limitations													
Budget authority	*	1	1	1	1	1	1	1	1	1	1	3	6
Outlays	*	*	*	1	1	1	1	1	1	1	1	2	6
Ground Transportation Programs Controlled by Obligation Limitations[d]													
Budget authority	17	50	50	50	50	50	50	50	50	50	50	251	501
Outlays	0	0	0	0	0	0	0	0	0	0	0	0	0
Air Transportation Programs Controlled by Obligation Limitations[d]													
Budget authority	0	3	3	3	3	3	3	3	3	3	3	16	32
Outlays	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Resources													
Budget authority	0	0	0	0	0	0	0	0	0	0	0	0	0
Outlays	0	*	*	*	*	*	*	*	*	*	*	*	*
Total													
Budget authority	**17**	**83**	**85**	**87**	**165**	**167**	**174**	**177**	**182**	**183**	**186**	**588**	**1,491**
Outlays	*****	**24**	**30**	**33**	**108**	**113**	**120**	**123**	**126**	**129**	**133**	**307**	**939**

Source: Congressional Budget Office.

Note: COLAs = cost-of-living adjustments; * = between -$500 million and $500 million.

a. Agricultural commodity price and income supports and conservation programs under the Agricultural Act of 2014 generally expire after 2018. Although permanent price support authority under the Agricultural Adjustment Act of 1938 and the Agricultural Act of 1949 would then become effective, CBO continues to adhere to the rule in section 257(b)(2)(ii) of the Deficit Control Act that indicates that the baseline should assume that the Agricultural Act's provisions remain in effect.

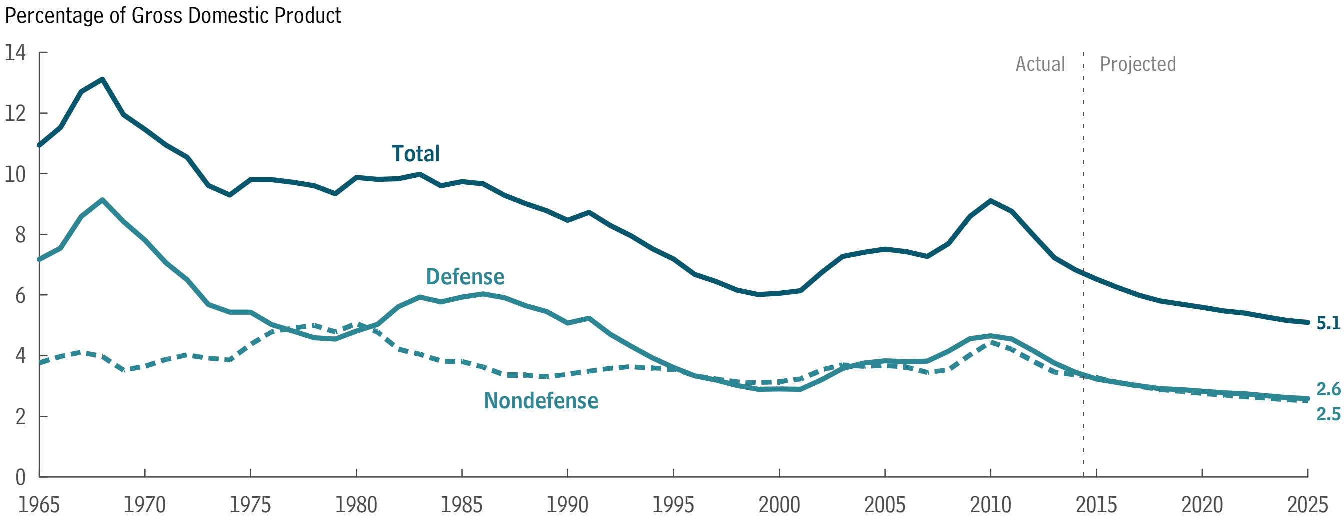
b. Does not include the cost of extending Reemployment Trade Adjustment Assistance, which, if extended through 2025, would increase mandatory outlays by $0.4 billion, CBO estimates.

c. Includes the Summer Food Service program and states' administrative expenses.

d. Authorizing legislation for those programs provides contract authority, which is counted as mandatory budget authority. However, because the programs' spending is subject to obligation limitations specified in annual appropriation acts, outlays are considered discretionary.

Figure 3-3.

Discretionary Outlays, by Category



Source: Congressional Budget Office.

through 2025, CBO assumes that those appropriations will grow at the rate of inflation from the amounts estimated for 2021.[17]

Funding for certain purposes is not constrained by the caps: Military and diplomatic operations in Afghanistan and elsewhere that have been designated as overseas contingency operations (OCO), responses to events designated as emergencies, disaster relief, and initiatives designed to enhance program integrity by reducing overpayments in some benefit programs are all exempt activities. CBO developed projections for such funding by assuming that it would grow at the rate of inflation from the amounts appropriated for 2015.

Under those assumptions, discretionary outlays in CBO's baseline grow by an average of less than 2 percent a year from 2015 through 2025. Because that pace is less than the projected growth rate of nominal GDP, discretionary outlays in CBO's baseline projections fall from 6.5 percent of GDP in 2015 to 5.1 percent of GDP in 2025, a smaller share than in any year since before 1962 (the first year for which comparable data are available).

Trends in Discretionary Outlays

Since the 1960s, the share of federal spending that is governed by the annual appropriation process has dropped by about half—from 67 percent of total spending in 1962 to 34 percent in 2014. Discretionary outlays averaged 12 percent of GDP over the 1962–1969 period, fell to about 10 percent during much of the 1970s and 1980s, and gradually declined to 6.0 percent in 1999 (see Figure 3-3). They then began to increase relative to the size of the economy, reaching 7.7 percent of GDP in 2008. That rise occurred in part because of actions taken in response to the terrorist attacks of September 11, 2001, and the subsequent military operations in Afghanistan and Iraq. (Funding for those operations from 2001 to 2015 is examined in Box 3-2.)

By 2010, discretionary outlays reached a recent peak of 9.1 percent of GDP, largely because of $281 billion in discretionary funding provided by the American Recovery and Reinvestment Act of 2009 (ARRA; P.L. 111-5). Since then, discretionary outlays have again declined as a share of GDP, falling to 6.8 percent in 2014, mostly because of the constraints put in place by the Budget Control Act and because of declines in spending for OCO and for activities funded by ARRA.

17. CBO develops projections of discretionary spending by first inflating the appropriations provided for specific activities in 2015 and then reducing total projected defense and nondefense funding by the amounts necessary to bring them in line with the caps. In CBO's baseline, discretionary funding related to federal personnel is inflated using the employment cost index for wages and salaries; other discretionary funding is adjusted using the gross domestic product price index.

During the 1990s, declines in discretionary outlays relative to the size of the economy largely reflected reductions in defense spending, which reached a low of 2.9 percent of GDP from 1999 through 2001. In part boosted by funding for operations in Afghanistan and Iraq, outlays for defense began to rise in 2002, reaching 4.7 percent of GDP in 2010 when funding for defense-related activities peaked. Since then, defense spending has fallen again relative to GDP, to 3.5 percent in 2014, owing mostly to a reduction in funding for OCO. As a whole, between 2010 and 2014, funding for defense declined by 15 percent in nominal terms, or nearly 21 percent in constant 2010 dollars. That change was heavily influenced by reductions in funding for OCO. Excluding those amounts, funding for defense fell by roughly 6 percent in nominal terms, or 12 percent in real terms, over that period.

Nondefense discretionary programs encompass such activities as transportation, education grants, housing assistance, health-related research, veterans' health care, most homeland security activities, the federal justice system, foreign aid, and environmental protection. Historically, nondefense discretionary outlays represented a fairly stable share of GDP, averaging 3.8 percent over the 1962–2008 period and rarely exceeding 5.0 percent or falling below 3.2 percent. Funding from ARRA, enacted in 2009, helped push that share to a recent high of 4.5 percent in 2010, but by 2012 agencies had spent roughly 85 percent of that funding, and nondefense discretionary outlays fell back to the historical average of 3.8 percent of GDP. Between 2010 and 2014, funding for nondefense discretionary programs declined by 4.4 percent in nominal terms, or 10.7 percent in constant 2010 dollars. Outlays for those programs have followed the downward trend in funding and have fallen notably relative to GDP, reaching 3.4 percent in 2014.

Discretionary Appropriations and Outlays in 2015

The Consolidated and Further Continuing Appropriations Act, 2015 (P.L. 113-235) provided discretionary budget authority totaling $1,120 billion.[18] (That amount includes, on an annualized basis, appropriations for the Department of Homeland Security that are available only through February 27, 2015.) In total, discretionary budget authority for fiscal year 2015 is roughly 1 percent less than the $1,133 billion for fiscal year 2014 (see Table 3-4 on page 82).

The caps on budget authority for 2015 had been set at $521.3 billion for defense programs and at $492.4 billion for nondefense programs, for a total of $1,013.6 billion. Those limits are adjusted, however, when appropriations are provided for certain purposes. Budget authority designated as an emergency requirement or provided for OCO leads to an increase in the caps, as does budget authority provided for some types of disaster relief or for certain program integrity initiatives.[19] To date, such adjustments to the caps on discretionary budget authority for 2015 have totaled $86 billion; most of that amount, $74 billion, resulted from funding for OCO. Those adjustments raise the caps to a total of $1,100 billion.

The amount of discretionary budget authority in CBO's baseline, however, is about $20 billion more than the adjusted caps, mostly because changes to mandatory programs included in P.L. 113-235 resulted in reductions to budget authority for such programs in 2015 that were credited against discretionary funding levels when the legislation was enacted. In CBO's baseline, those reductions are reflected in the relevant mandatory accounts, and the full amount of discretionary budget authority is shown in the discretionary accounts.

Assuming that funding for the Department of Homeland Security remains at the annualized levels specified in P.L. 113-235 and that no additional appropriations are made, CBO estimates that discretionary outlays will edge down in 2015 to $1,175 billion, slightly below the $1,179 billion of such outlays in 2014 and equal to 6.5 percent of GDP. That sum represents the lowest amount of discretionary outlays since 2008. Since their recent peak in 2010, discretionary outlays have declined by 13 percent in nominal terms and 18 percent in real terms (adjusted for inflation using the price index for personal consumption expenditures).

Defense Discretionary Funding and Outlays. Budget authority provided for defense discretionary programs in 2015 totals $586 billion—3.3 percent less than the 2014 amount of $606 billion. (Almost all defense spending is

18. Obligation limitations for transportation programs in 2015 total an additional $53 billion, which is the same amount legislated for 2014.

19. Such initiatives identify and reduce improper payments for benefit programs such as DI, SSI, Medicare, Medicaid, and CHIP.

Box 3-2.

Funding for Operations in Afghanistan and Iraq and Related Activities

Since September 2001, lawmakers have provided $1.6 trillion in budget authority for operations in Afghanistan and Iraq and related activities (see the table). That amount includes funding for military and diplomatic operations in Afghanistan, Iraq, and elsewhere related to the fight against terrorism; for some defense activities that are designated as related to those overseas operations; for some veterans' benefits and services; and for related activities of the Department of Justice. Appropriations specifically designated for those purposes averaged about $85 billion a year from 2001 through 2007 and peaked at $187 billion in 2008. Funding declined to an average of $150 billion over the 2009–2012 period and to an average of $93 billion in 2013 and 2014. Lawmakers have appropriated $74 billion for such activities in 2015.

Funding to date for military operations and other defense activities has totaled almost $1.5 trillion, most of which has gone to the Department of Defense (DoD), including about $910 billion for operation and maintenance costs, $310 billion for procurement, and $200 billion for military personnel costs. Lawmakers have also provided $91 billion to train and equip indigenous security forces in Afghanistan and Iraq.[1] In addition, $90 billion has been provided for diplomatic operations and aid to Afghanistan, Iraq, and other countries that are assisting the United States in its fight against terrorism.

1. That $91 billion includes $5 billion provided for Iraqi security forces in 2004 in an appropriation for the State Department's Iraq Relief and Reconstruction Fund.

The majority of those funds have gone to the Economic Support Fund ($24 billion), to diplomatic and consular programs ($20 billion), and to the Iraq Relief and Reconstruction Fund ($16 billion).

DoD reports that in fiscal year 2014, obligations for operations in Afghanistan and Iraq and related activities averaged $5 billion per month. That monthly average is about $1.8 billion less than the amount reported for 2013. Operation Enduring Freedom (in and around Afghanistan) accounted for almost all of those obligations in 2014.

Because most appropriations for operations in Afghanistan and Iraq and related activities appear in the same budget accounts as appropriations for DoD's other functions, it is impossible to determine precisely how much has been spent on those activities alone. The Congressional Budget Office estimates that the $1.5 trillion appropriated between 2001 and 2015 for military operations and other defense activities in Afghanistan and Iraq and for indigenous security forces in those two countries has resulted in outlays of about $1.4 trillion through 2014; about $95 billion of that was spent in 2014. Of the $90 billion appropriated for international affairs activities related to the war efforts over the 2001–2015 period, about $68 billion was spent by the end of 2014, CBO estimates, with $8 billion of that spending occurring in 2014. In total, outlays for all activities related to the operations in Afghanistan and Iraq amounted to about $103 billion last year. On the basis of sums appropriated for 2015, CBO estimates that outlays will total about $80 billion this year.

Continued

categorized as discretionary.) The decline in funding is attributable to a $21 billion reduction in defense appropriations for OCO, which total $64 billion in 2015; excluding the amounts for OCO, funding for defense programs in 2015 is $1 billion (or 0.2 percent) higher than last year. The latest drop in OCO-related appropriations continues a marked decline in such funding, which has fallen by 60 percent (in nominal terms) since 2011. As a whole, reductions in defense appropriations over the past several years have caused outlays to fall to an estimated $583 billion in 2015—2.2 percent less than the 2014 amount. CBO projects that, as a share of GDP, defense outlays will decline from 3.5 percent in 2014 to 3.2 percent in 2015, the lowest level since 2002.

Three major categories of Department of Defense funding account for most of the defense appropriation for 2015 (as they have in preceding years): operation and maintenance ($246 billion), military personnel ($140 billion), and procurement ($101 billion). Appropriations

Box 3-2. **Continued**

Funding for Operations in Afghanistan and Iraq and Related Activities

Estimated Budget Authority Provided for U.S. Operations in Afghanistan and Iraq and Related Activities for Fiscal Years 2001 to 2015

Billions of Dollars

	2001-2007	2008	2009	2010	2011	2012	2013[a]	2014	2015	Total, 2001-2015
Military Operations and Other Defense Activities[b]										
Iraq[c]	369	133	90	59	42	10	3	1	4	710
Afghanistan	80	29	38	87	98	89	65	74	51	611
Other[d]	81	13	13	5	6	6	10	6	4	143
Subtotal	530	175	140	151	146	104	78	81	59	1,465
Indigenous Security Forces[e]										
Iraq	19	3	1	1	2	0	0	0	2	27
Afghanistan	11	3	6	9	12	11	4	5	3	64
Subtotal	30	6	7	10	13	11	4	5	5	91
Diplomatic Operations and Foreign Aid[f]										
Iraq	25	3	2	2	0	4	4	2	1	43
Afghanistan	5	1	5	2	0	5	5	1	3	27
Other	7	*	1	*	0	2	2	3	5	20
Subtotal	37	5	7	4	0	11	11	7	9	90
Other Services and Activities[g]										
Iraq	1	1	*	0	0	0	0	0	0	2
Afghanistan	*	*	*	0	0	0	0	0	0	*
Other	*	*	*	0	0	0	0	0	0	1
Subtotal	1	2	*	0	0	0	0	0	0	3
Total	**598**	**187**	**154**	**165**	**159**	**127**	**93**	**92**	**74**	**1,649**

Source: Congressional Budget Office.

Note: * = between zero and $500 million.

a. Amounts for 2013 are net of reductions implemented in response to the Administration's sequestration order of March 1, 2013.

b. CBO estimated the funding provided for operations in Afghanistan and Iraq using information in budget justification materials from the Department of Defense and in the department's monthly reports on its obligations. Some allocations for prior years have been adjusted to reflect more recent information.

c. Includes funding for military operations against the Islamic State in Iraq and Syria.

d. Includes Operation Noble Eagle (homeland security missions, such as combat air patrols, in the United States), additional personnel and restructuring efforts for Army and Marine Corps units, classified activities not funded by appropriations for the Iraq Freedom Fund, the European Reassurance Initiative, and improvements to military readiness. (From 2005 through 2015, funding for Operation Noble Eagle has been intermingled with regular appropriations for the Department of Defense; that funding is not included in this table.)

e. Funding for indigenous security forces is used to train and equip military and police units in Afghanistan and Iraq. That funding was appropriated in accounts for diplomatic operations and foreign aid (budget function 150) in 2004 and in accounts for defense (budget function 050) starting in 2005.

f. In 2010 and 2011, most funding for diplomatic operations in, and foreign aid to, countries helping the United States fight terrorism was provided in regular appropriations and cannot be isolated.

g. Includes funding for some veterans' benefits and services and for certain activities of the Department of Justice. Excludes about $34 billion in spending by the Department of Veterans Affairs for the incremental costs of medical care, disability compensation, and survivors' benefits for veterans of operations in Afghanistan and Iraq and of the war on terrorism. That amount is based on CBO's estimates of spending from regular appropriations for the Department of Veterans Affairs and was not explicitly appropriated for war-related expenses.

Table 3-4.

Changes in Discretionary Budget Authority From 2014 to 2015

Billions of Dollars

	Actual, 2014	Estimated, 2015	Percentage Change
Defense			
Funding constrained by caps	520	521	0.2
Overseas contingency operations	85	64	-24.5
Other cap adjustments	*	*	-50.2
Subtotal	606	586	-3.3
Nondefense			
Funding constrained by caps	514	513	-0.2
Overseas contingency operations	7	9	42.0
Other cap adjustments	7	12	90.7
Subtotal	527	534	1.5
Total Discretionary Budget Authority			
Funding constrained by caps	1,034	1,034	**
Overseas contingency operations	92	74	-19.8
Other cap adjustments	7	13	86.1
Total	1,133	1,120	-1.1

Source: Congressional Budget Office.

Notes: Excludes budgetary resources provided by obligation limitations for certain ground and air transportation programs.

Budget authority designated as an emergency requirement or provided for overseas contingency operations leads to an increase in the caps, as does budget authority provided for some types of disaster relief or for certain program integrity initiatives.

n.a. = not applicable; * = between zero and $500 million; ** = between -0.05 percent and zero.

for research and development ($64 billion) account for an additional 11 percent of total funding for defense. The rest of the appropriation, about 6 percent, comprises funding for military construction, family housing, and other Department of Defense programs ($9 billion); funding for atomic energy activities, primarily within the Department of Energy ($18 billion); and funding for various defense-related programs in other departments and agencies ($8 billion).

Nondefense Discretionary Funding and Outlays. To date, funding for nondefense programs in 2015 totals $588 billion. That amount represents $534 billion in appropriations (including, on an annualized basis, the appropriations for the Department of Homeland Security that are available for only part of the year) and $53 billion in obligation limitations for several ground and air transportation programs. The 2015 amount is $8 billion more than the funding provided in 2014, in part because of $5 billion in emergency funding appropriated in response to the Ebola outbreak in West Africa. CBO anticipates that nondefense discretionary outlays will rise from $583 billion in 2014 to $592 billion in 2015—an increase of 1.5 percent; however, as a share of GDP, discretionary outlays will fall from 3.4 percent in 2014 to 3.3 percent in 2015 because the economy is projected to grow faster than those outlays.

Seven broad budget categories (referred to as budget functions) account for about 80 percent of the $588 billion in resources provided in 2015 for nondefense discretionary activities (see Table 3-5). Activities related to education, training, employment, and social services received $92 billion, claiming 16 percent of total nondefense discretionary funding.[20] Transportation programs received $85 billion (including appropriations and obligation limitations), or 14 percent of the total. Income-security programs and veterans' benefits and services each received $65 billion, or 11 percent of total

20. Spending for student loans and for several other federal programs in the category of education, training, employment, and social services is not included in that total because funding for those programs is considered mandatory.

Table 3-5.

Changes in Nondefense Discretionary Funding From 2014 to 2015

Billions of Dollars

Budget Function	Actual, 2014	Estimated, 2015	Change
Education, Training, Employment, and Social Services	92	92	*
Transportation[a]	85	85	*
Income Security	65	65	*
Veterans' Benefits and Services	64	65	2
Health	56	59	3
Administration of Justice	52	51	-1
International Affairs	50	54	3
Natural Resources and Environment	34	34	*
General Science, Space, and Technology	29	30	*
Community and Regional Development	17	17	*
General Government	19	16	-2
Medicare	6	7	*
Agriculture	6	6	*
Social Security	6	6	*
Energy	5	5	*
Commerce and Housing Credit	-6	-4	3
Total	**580**	**588**	**8**

Source: Congressional Budget Office.

Note: * = between -$500 million and $500 million.

a. Includes budgetary resources provided by obligation limitations for certain ground and air transportation programs.

nondefense funding. Health programs account for $59 billion, or 10 percent of such funding, while the shares of total funding allocated for international affairs ($54 billion) and administration of justice ($51 billion), are each about 9 percent.[21]

Projections for 2016 Through 2025

For 2016, the caps on discretionary appropriations are set at $523 billion for defense and $493 billion for nondefense activities, for a total of $1,016 billion—$2 billion more than the 2015 caps (prior to adjustments for appropriations for OCO and other activities not constrained by the caps). In CBO's baseline, the amounts projected for activities that result in cap adjustments in 2016 total $88 billion (equal to the 2015 amounts adjusted for inflation)—bringing total 2016 appropriations projected in the baseline to $1,104 billion, the lowest amount of discretionary appropriations since 2007. That amount is 1.5 percent less than the 2015 appropriations, mostly because the budget authority enacted for 2015 includes about $20 billion that was offset by reductions in mandatory programs; similar actions are not assumed in the baseline for subsequent years.

CBO estimates that achieving compliance with the 2016 cap on nondefense appropriations without using any offsets from changes to mandatory programs would require a 3.8 percent reduction in budget authority relative to 2015 appropriations. With such a reduction, nondefense outlays would fall, CBO estimates, but only by 0.5 percent because residual outlays of earlier onetime appropriations—including funds provided under ARRA for high-speed rail projects and appropriations enacted in response to Hurricane Sandy—would help offset the reduction in spending attributable to the drop in 2016 appropriations. Funding equal to the 2016 cap on defense appropriations would generate increases in defense-related appropriations and outlays in 2016 of an estimated 0.5 percent and 0.7 percent, respectively. In total, discretionary outlays are projected to total $1,176 billion in 2016—0.1 percent more than spending in 2015—and to equal 6.2 percent of GDP.

21. Some significant income-security programs, such as SNAP, unemployment compensation, and TANF, are not reflected in that total because they are included in mandatory spending.

From 2017 through 2021, caps on discretionary appropriations and the corresponding projected amounts of discretionary funding in CBO's baseline grow at an average annual rate of 2.4 percent; after 2021, when there are no caps, appropriations are projected (based on the methods described above) to grow by about 2.5 percent annually. Discretionary outlays are also projected to grow over those years, although at rates of less than 1 percent annually through 2018, largely reflecting the tapering of expenditures of earlier funding provided for OCO and in response to Hurricane Sandy. Starting in 2019, discretionary outlays in CBO's baseline grow at an average rate of 2.3 percent per year, following the projected growth in funding. Because that pace is well below the expected growth of nominal GDP, discretionary outlays are projected to fall steadily relative to the size of the economy, from 6.5 percent of GDP in 2015 to 5.1 percent in 2025.

Alternative Paths for Discretionary Spending

Total funding for discretionary activities in 2015 will amount to about $1,173 billion on an annualized basis, CBO estimates—$1,120 billion in budget authority and $53 billion in transportation-related obligation limitations. In CBO's baseline projections, discretionary funding is projected for subsequent years on the basis of the amounts and procedures prescribed in the Budget Control Act and related laws. However, if the policies governing discretionary appropriations changed, funding could differ greatly from the baseline projections. To illustrate such potential differences, CBO has estimated the budgetary consequences of several alternative paths for discretionary funding (see Table 3-6).

The first alternative path addresses spending for war-related activities that are designated as overseas contingency operations. The outlays projected in the baseline stem from budget authority provided for those purposes in 2014 and prior years, from the $74 billion in budget authority provided for 2015, and from the $822 billion that is assumed to be appropriated over the 2016–2025 period (under the assumption that annual funding is set at $74 billion plus adjustments for anticipated inflation, in accordance with the rules governing baseline projections).[22]

In coming years, the funding required for overseas contingency operations—in Afghanistan or other countries—might be smaller than the amounts projected in the baseline if the number of deployed troops and the pace of operations diminished over time. For that reason, CBO has formulated a budget scenario that encompasses a reduction in the deployment of U.S. forces abroad for military actions and a concomitant reduction in diplomatic operations and foreign aid. Many other scenarios—some costing more and some less—are also possible.

In 2014, the number of U.S. active-duty, reserve, and National Guard personnel deployed for war-related activities averaged about 110,000, CBO estimates. In this alternative scenario, the average number of military personnel deployed for war-related purposes would decline over the next two years from roughly 90,000 in 2015 to 50,000 in 2016 and to 30,000 in 2017 and thereafter. (Those levels could represent various allocations of forces among Afghanistan and other regions.) Under that scenario, and assuming that the extraordinary funding for diplomatic operations and foreign aid declines at a similar rate, total discretionary outlays over the 2016–2025 period would be $454 billion less than the amount in the baseline.[23]

For the second policy alternative, CBO assumed that discretionary funding would grow at the rate of inflation after 2015. If that occurred, discretionary outlays would surpass CBO's baseline projections by $480 billion over the 2016–2025 period. In that scenario, discretionary outlays would increase by an average of 2.3 percent a year over the next decade.

The third scenario reflects the assumption that most discretionary budget authority and obligation limitations will be frozen at the 2015 level for the entire projection

22. Funding for overseas contingency operations in 2015 includes $64 billion for military operations and for indigenous security forces in Afghanistan and Iraq and $9 billion for diplomatic operations and foreign aid.

23. The reduction in budget authority under this alternative is similar to the reductions arising from some proposals to cap discretionary appropriations for overseas contingency operations. Such caps could result in reductions in CBO's baseline projections of discretionary spending. However, those reductions might simply reflect policy decisions that have already been made or would be made in the absence of caps. Moreover, if future policymakers believed that national security required appropriations above the capped levels, they would almost certainly provide emergency appropriations that would not, under current law, be counted against the caps.

period.[24] In that case, total discretionary outlays for the 10-year period would be $929 billion lower than those projected in the baseline, and total discretionary spending would fall to 4.3 percent of GDP by 2025.

For the final alternative scenario, CBO projected what would occur if lawmakers canceled the automatic reductions in the discretionary caps required by the Budget Control Act. Those automatic procedures will reduce discretionary spending over the 2016–2021 period (and mandatory spending through 2024). If, instead, lawmakers chose to set total discretionary funding equal to the caps originally specified under the Budget Control Act and prevent further automatic cuts to discretionary funding each year, outlays would be $845 billion (or about 7 percent) higher over the 2016–2025 period than the amount projected in CBO's baseline.

Net Interest

In 2014, net outlays for interest were $229 billion, about $8 billion more than the amount spent in 2013. As a percentage of GDP, net interest was 1.3 percent in 2014 and is expected to remain at that level in 2015.

Net interest outlays are dominated by the interest paid to holders of the debt that the Department of the Treasury issues to the public. The Treasury also pays interest on debt issued to trust funds and other government accounts, but such payments are intragovernmental transactions that have no effect on the budget deficit. Other federal accounts also pay and receive interest for various reasons.[25]

The federal government's interest payments depend primarily on market interest rates and the amount of debt held by the public; however, other factors, such as the rate of inflation and the maturity structure of outstanding securities, also affect interest costs. (For example, longer-term securities generally pay higher interest than do shorter-term securities.) Interest rates are determined by a combination of market forces and the policies of the Federal Reserve System. Debt held by the public is determined mostly by cumulative budget deficits, which depend on policy choices about noninterest spending and revenues as well as on economic conditions and other factors. At the end of 2014, debt held by the public reached $12.8 trillion, and in CBO's baseline it is projected to total $21.6 trillion in 2025. (For detailed projections of debt held by the public, see Table 1-3 on page 19.)

Although debt held by the public surged in the past few years to its highest levels relative to GDP since the early 1950s, the government's interest costs have remained low relative to GDP because interest rates on Treasury securities have been remarkably low. Average rates on 3-month Treasury bills plummeted from nearly 5 percent in 2007 to 0.1 percent in 2010; those rates fell further to 0.04 percent in 2014. Similarly, average rates on 10-year Treasury notes dropped from nearly 5 percent in 2007 to a low of 1.9 percent in 2012; those rates, however, increased in 2014 to 2.7 percent. As a result of such low rates, even though debt held by the public more than doubled from the end of 2007 to the end of 2014, outlays for net interest fell from 1.7 percent of GDP to 1.3 percent over that period. By comparison, such outlays averaged about 3 percent of GDP in the 1980s and 1990s.

Baseline Projections of Net Interest

Under CBO's baseline assumptions, net interest costs are projected to nearly quadruple from $227 billion in 2015 to $827 billion in 2025. One reason for that increase is that debt held by the public is projected to rise by nearly 70 percent (in nominal terms) over the next 10 years (see Figure 3-4 on page 88).[26] More significantly, CBO estimates, the interest rate paid on 3-month Treasury bills will rise from 0.1 percent in 2015 to 3.4 percent in 2018 and subsequent years, and the rate on 10-year Treasury notes will increase from 2.6 percent in 2015 to 4.6 percent in 2020 and subsequent years. As a result, under current law, net interest outlays are projected to reach 3.0 percent of GDP in 2025.

Net interest costs consist of gross interest (the amounts paid on all of the Treasury's debt issuances) minus interest received by trust funds (which are intragovernmental

24. Some items, such as offsetting collections and payments made by the Treasury on behalf of the Department of Defense's TRICARE for Life program, would not be held constant.

25. See Congressional Budget Office, *Federal Debt and Interest Costs* (December 2010), www.cbo.gov/publication/21960.

26. Debt held by the public does not include securities issued by the Treasury to federal trust funds and other government accounts. Those securities are included as part of the measure of gross debt. (For further details, see Chapter 1.)

Table 3-6.

CBO's Projections of Discretionary Spending Under Selected Policy Alternatives

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
CBO's January 2015 Baseline (Spending caps in effect through 2021)														
Budget Authority														
Defense	606	586	589	603	617	632	647	663	679	696	713	730	3,087	6,568
Nondefense	527	534	515	526	539	553	567	580	594	609	624	640	2,701	5,748
Total	1,133	1,120	1,104	1,129	1,156	1,185	1,214	1,243	1,273	1,305	1,337	1,370	5,788	12,316
Outlays														
Defense	596	583	587	592	599	616	631	646	666	677	689	711	3,025	6,413
Nondefense	583	592	589	590	594	605	617	630	644	658	672	689	2,995	6,288
Total	1,179	1,175	1,176	1,182	1,193	1,221	1,248	1,276	1,310	1,336	1,361	1,400	6,019	12,701
Reduce the Number of Troops Deployed for Overseas Contingency Operations to 30,000 by 2017[a]														
Budget Authority														
Defense	606	586	565	564	573	585	599	614	629	645	661	677	2,887	6,113
Nondefense	527	534	513	521	532	546	560	572	587	601	616	632	2,672	5,681
Total	1,133	1,120	1,079	1,085	1,105	1,131	1,159	1,186	1,216	1,246	1,277	1,309	5,559	11,794
Outlays														
Defense	596	583	576	566	564	575	586	599	618	629	639	660	2,867	6,011
Nondefense	583	592	589	588	590	600	612	624	637	651	665	681	2,978	6,236
Total	1,179	1,175	1,164	1,154	1,154	1,175	1,198	1,223	1,255	1,280	1,304	1,341	5,845	12,247
Increase Discretionary Appropriations at the Rate of Inflation After 2015[b]														
Budget Authority														
Defense	606	586	598	612	628	645	662	679	697	715	733	752	3,144	6,720
Nondefense	527	534	543	553	569	585	603	620	638	656	673	691	2,853	6,132
Total	1,133	1,120	1,141	1,165	1,197	1,230	1,265	1,299	1,335	1,371	1,406	1,443	5,997	12,852
Outlays														
Defense	596	583	593	600	608	628	644	661	683	695	708	732	3,072	6,551
Nondefense	583	592	604	612	620	634	651	667	684	702	719	737	3,121	6,630
Total	1,179	1,175	1,196	1,212	1,229	1,262	1,295	1,328	1,367	1,398	1,427	1,469	6,193	13,181

Continued

payments) and from other sources. In 2015, for example, estimated net outlays for interest ($227 billion) consist of $405 billion in gross interest, minus $139 billion received by the trust funds and $39 billion in other net interest receipts.

Gross Interest

In 2014, interest paid by the Treasury on all of its debt issuances totaled $431 billion (see Table 3-7 on page 89). More than one-third of that total, $158 billion, represents payments to other entities (such as trust funds) within the federal government; the remainder is paid to owners of Treasury debt issued to the public. In CBO's baseline, gross interest payments from 2016 through 2025 total $8.0 trillion. About 70 percent of that amount reflects interest paid on debt held by the public.

Interest Received by Trust Funds

The Treasury has issued more than $5.0 trillion in securities to federal trust funds and other government accounts. Trust funds are the dominant holders of such securities, owning more than 90 percent of them. The interest paid on those securities has no net effect on federal spending because it is credited to accounts elsewhere in the budget.

Table 3-6. **Continued**

CBO's Projections of Discretionary Spending Under Selected Policy Alternatives

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Freeze Most Discretionary Appropriations at the 2015 Amount[c]														
Budget Authority														
Defense	606	586	587	589	590	592	594	596	598	600	603	605	2,952	5,955
Nondefense	527	534	534	531	532	533	536	537	539	540	540	540	2,666	5,362
Total	1,133	1,120	1,121	1,120	1,122	1,126	1,130	1,133	1,137	1,140	1,142	1,145	5,618	11,316
Outlays														
Defense	596	583	585	582	578	583	585	587	593	591	589	595	2,914	5,869
Nondefense	583	592	598	596	589	588	589	589	589	589	588	588	2,960	5,903
Total	1,179	1,175	1,183	1,177	1,168	1,171	1,174	1,176	1,182	1,180	1,177	1,183	5,874	11,772
Prevent the Automatic Spending Reductions Specified in the Budget Control Act[d]														
Budget Authority														
Defense	606	586	643	657	671	686	701	717	734	752	771	790	3,357	7,121
Nondefense	527	534	552	564	576	590	602	615	630	646	662	678	2,884	6,114
Total	1,133	1,120	1,195	1,220	1,247	1,275	1,303	1,331	1,364	1,398	1,433	1,468	6,241	13,235
Outlays														
Defense	596	583	621	637	649	668	684	699	720	733	745	769	3,259	6,925
Nondefense	583	592	608	621	628	640	653	665	679	694	709	726	3,150	6,621
Total	1,179	1,175	1,230	1,258	1,277	1,308	1,337	1,364	1,399	1,426	1,454	1,495	6,409	13,546

Source: Congressional Budget Office.

Note: Nondefense discretionary outlays are usually higher than budget authority because of spending from the Highway Trust Fund and the Airport and Airway Trust Fund that is subject to obligation limitations set in appropriation acts. The budget authority for such programs is provided in authorizing legislation and is not considered discretionary.

a. For this alternative, CBO does not extrapolate the $74 billion in budget authority for military operations, diplomatic activities, and aid to Afghanistan and other countries provided for 2015. Rather, the alternative incorporates the assumption that, as the number of troops falls to about 30,000 by 2017, funding for overseas contingency operations declines as well, to $50 billion in 2016, $32 billion in 2017, and then an average of about $27 billion a year from 2018 on, for a total of $300 billion over the 2016–2025 period.

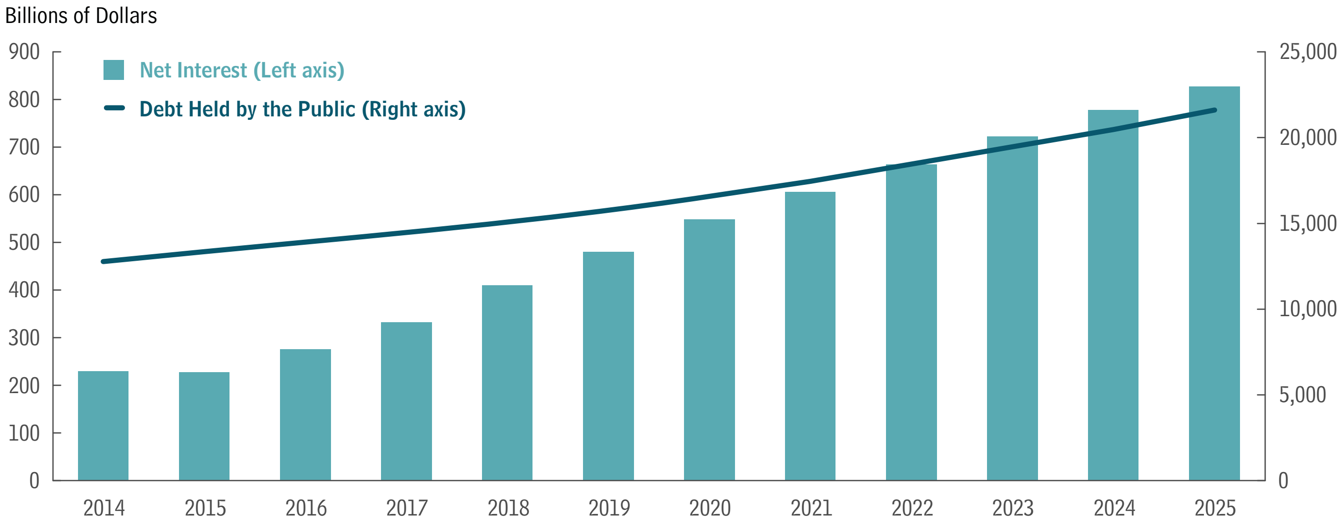
b. These estimates reflect the assumption that appropriations will not be constrained by caps and will instead grow at the rate of inflation from their 2015 level. Discretionary funding related to federal personnel is inflated using the employment cost index for wages and salaries; other discretionary funding is adjusted using the gross domestic product price index.

c. This option reflects the assumption that appropriations other than those for overseas contingency operations would generally be frozen at the 2015 level through 2025. Some items, such as offsetting collections and payments made by the Treasury on behalf of the Department of Defense's TRICARE for Life program, would not be held constant.

d. The Budget Control Act of 2011 specified that if lawmakers did not enact legislation originating from the Joint Select Committee on Deficit Reduction that would reduce projected deficits by at least $1.2 trillion, automatic procedures would go into effect to reduce both discretionary and mandatory spending during the 2013–2021 period. Those procedures are now in effect and take the form of equal cuts (in dollar terms) in funding for defense and nondefense programs. For the 2016–2021 period, the automatic procedures lower the caps on discretionary budget authority specified in the Budget Control Act (caps for 2014 and 2015 were revised by the Bipartisan Budget Act of 2013); for the 2022–2025 period, CBO has extrapolated the reductions estimated for 2021.

Figure 3-4.

Projected Debt Held by the Public and Net Interest



Source: Congressional Budget Office.

In 2015, trust funds will be credited with $139 billion of such intragovernmental interest, CBO estimates, mostly for the Social Security, Military Retirement, and Civil Service Retirement and Disability trust funds. Over the 2016–2025 period, the intragovernmental interest received by trust funds is projected to total $1.7 trillion.

Other Interest

CBO anticipates that the government will record net payments of $39 billion in other interest in 2015, representing the net result of many transactions, including both interest collections and interest payments.

The largest interest collections come from the government's credit financing accounts, which have been established to record the cash transactions related to federal direct loan and loan guarantee programs. For those programs, net subsidy costs are recorded in the budget, but the cash flows that move through the credit financing accounts are not. Credit financing accounts pay interest to and receive interest from Treasury accounts that appear in the budget, but, on net, they pay more interest to the Treasury than they receive from it. CBO estimates that net receipts from the credit financing accounts will total $31 billion in 2015 and steadily increase to $62 billion in 2025. Interest payments associated with the direct student loan program dominate those totals.

Table 3-7.

Federal Interest Outlays Projected in CBO's Baseline

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Interest on Treasury Debt Securities (Gross interest)[a]	431	405	472	541	631	713	790	857	919	981	1,040	1,092	3,148	8,036
Interest Received by Trust Funds														
Social Security	-100	-97	-92	-91	-92	-94	-94	-95	-94	-91	-87	-81	-464	-912
Other[b]	-58	-42	-60	-67	-74	-79	-83	-86	-87	-88	-91	-95	-364	-811
Subtotal	-158	-139	-152	-159	-166	-173	-178	-181	-180	-179	-179	-176	-828	-1,723
Other Interest[c]	-39	-39	-44	-50	-54	-58	-63	-69	-74	-78	-83	-88	-270	-662
NRRIT Investment Income (Non-Treasury holdings)[d]	-4	*	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-4	-9
Net Interest Outlays	**229**	**227**	**276**	**332**	**410**	**480**	**548**	**606**	**664**	**722**	**777**	**827**	**2,046**	**5,643**

Source: Congressional Budget Office.

Note: NRRIT = National Railroad Retirement Investment Trust; * = between -$500 million and zero.

a. Excludes interest costs on debt issued by agencies other than the Treasury (primarily the Tennessee Valley Authority).

b. Mainly the Civil Service Retirement, Military Retirement, Medicare, and Unemployment Insurance Trust Funds.

c. Primarily interest on loans to the public.

d. Earnings on investments by the NRRIT, an entity created to manage and invest assets of the Railroad Retirement program.

CHAPTER

4

The Revenue Outlook

The Congressional Budget Office projects that revenues will edge up from 17.5 percent of gross domestic product (GDP) in fiscal year 2014 to 17.7 percent in 2015, slightly above the 50-year average of 17.4 percent (see Figure 4-1). In 2016, CBO projects, if current laws generally do not change, federal revenues will rise significantly—to 18.4 percent of GDP—because of the expiration of certain provisions of law that reduce tax liabilities. After that, revenues as a share of GDP are projected to fall slightly and then remain relatively stable, near 18 percent of GDP, through 2025.

In 2015, federal revenues will total about $3.2 trillion, CBO estimates—$168 billion, or 5.6 percent, more than the amount collected in 2014. That increase, at a faster pace than GDP, stems largely from an anticipated rise in individual income tax receipts—up from 8.1 percent of GDP in 2014 to 8.3 percent this year, in part because of an increase in average tax rates (total taxes as a percentage of total income). As the economy grows, people's incomes rise faster than tax brackets increase because tax brackets are indexed only to inflation; that phenomenon is known as real bracket creep. In addition, CBO expects an increase in distributions from tax-deferred retirement accounts whose balances have been boosted in the past few years by strong stock market gains.

CBO projects that revenues will rise more rapidly in 2016, by 8.5 percent. Most of that increase results from the expiration, at the end of calendar year 2014, of several provisions that reduced the income tax liabilities of corporations and individuals—including one provision that allowed businesses to immediately deduct significant portions of their investments in equipment. Those provisions have been extended routinely in the past for limited periods, but CBO's baseline follows current law. Under current law, the expiration of those provisions will boost corporate and individual income tax payments somewhat in fiscal year 2015 but much more in 2016 and later years because payments in 2015 will still reflect much of the effects of those provisions before expiration.

In CBO's baseline projections, revenues remain between 18.0 percent and 18.3 percent of GDP from 2017 through 2025, largely because of offsetting movements in three sources of revenue:

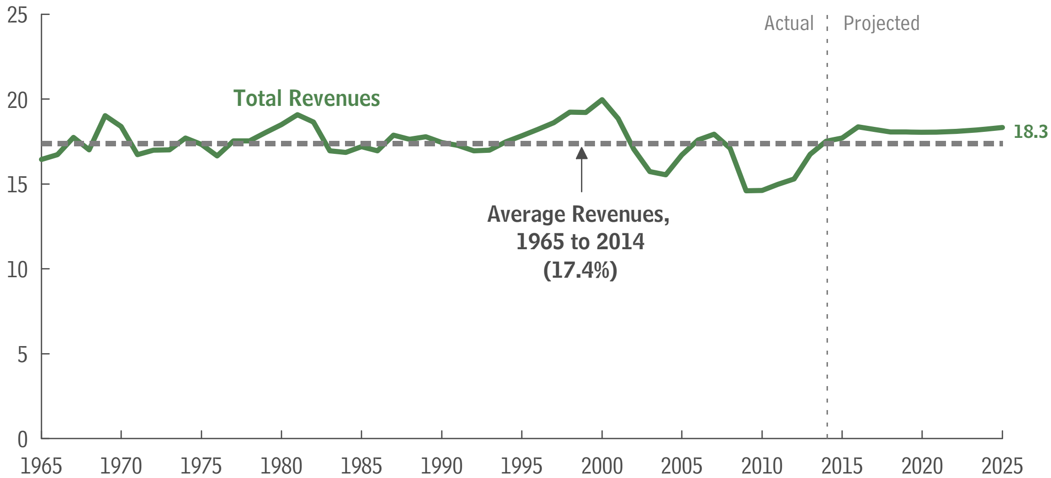
- Individual income tax receipts, which are projected to increase relative to GDP, mostly as a result of rising average tax rates from real bracket creep;
- Corporate income tax receipts, which are projected to decline relative to GDP, largely because of an expected drop in domestic economic profits relative to the size of the economy, the result of growing labor costs and rising interest payments on businesses' debt; and
- Remittances to the U.S. Treasury from the Federal Reserve System, which have been very large since 2010 because of substantial changes in the size and composition of the central bank's portfolio but which are projected to decline to more typical amounts relative to GDP.

CBO's projections of revenues for the 2015–2024 period are slightly below those it published in August 2014. At that time, CBO published revenue projections for the period from 2014 to 2024; the projections in this report cover the 2015–2025 period. For the overlapping years—2015 through 2024—the current projections are below the previous ones by $415 billion (or 1.0 percent), and they are lower in every year except 2016. Those revisions reflect the downward revision to CBO's forecast of GDP growth, the recent one-year extension of expired tax provisions, and other factors. (For more information on changes since August to the revenue projections, see Appendix A.)

Figure 4-1.

Total Revenues

Percentage of Gross Domestic Product



Under current law, revenues will rise as a share of GDP in 2016 because of several expired tax provisions but then level off.

Source: Congressional Budget Office.

The tax rules that form the basis of CBO's projections include an array of exclusions, deductions, preferential rates, and credits that reduce revenues for any given level of tax rates, in both the individual and corporate income tax systems. Some of those provisions are called tax expenditures because, like government spending programs, they provide financial assistance to particular activities, entities, or groups of people. The tax expenditures with the largest effects on revenues are the following:

- The exclusion from workers' taxable income of employers' contributions for health care, health insurance premiums, and long-term-care insurance premiums;
- The exclusion of contributions to and earnings of pension funds (minus pension benefits that are included in taxable income);
- Preferential tax rates on dividends and long-term capital gains; and
- The deductions for state and local taxes (on nonbusiness income, sales, real estate, and personal property).

On the basis of estimates prepared by the staff of the Joint Committee on Taxation (JCT), CBO expects that under current law, those and other tax expenditures will total almost $1.5 trillion in 2015—an amount equal to 8.1 percent of GDP, or equivalent to nearly half of the revenues projected for the year.[1] Most of that amount arises from the 11 largest tax expenditures, which CBO estimates will total 5.9 percent of GDP in 2015 and 6.6 percent of GDP from 2016 to 2025.

The Evolving Composition of Revenues

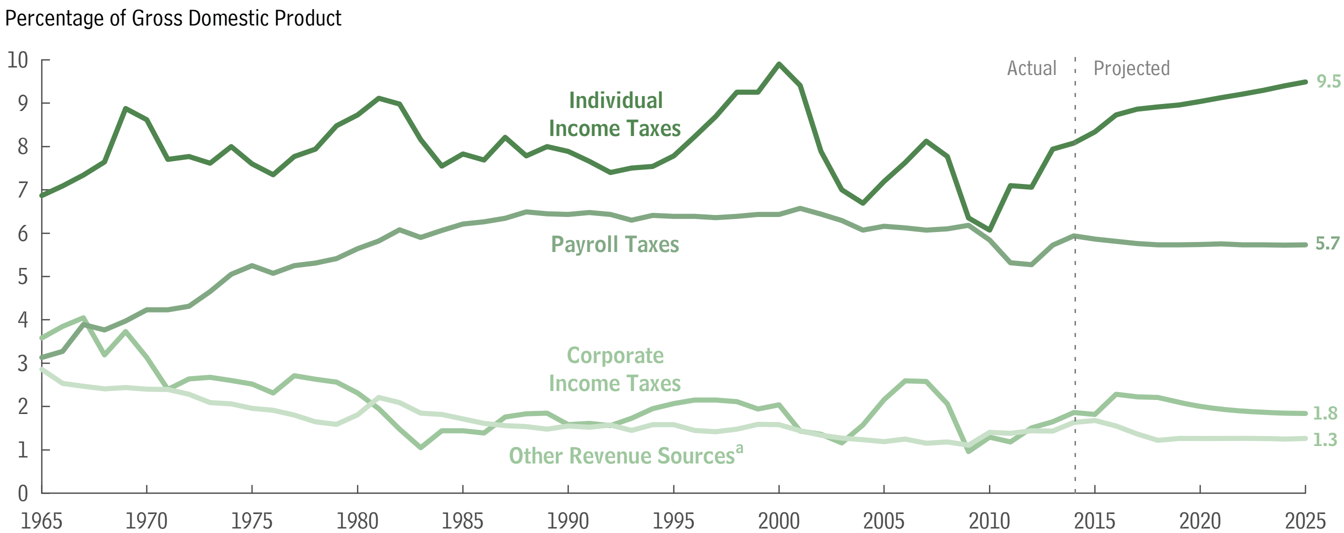
Federal revenues come from various sources: individual income taxes; payroll taxes, which are dedicated to certain social insurance programs; corporate income taxes; excise taxes; earnings of the Federal Reserve System, which are remitted to the Treasury; customs duties; estate and gift taxes; and miscellaneous fees and fines. Individual income taxes constitute the largest source of federal revenues, having contributed, on average, about 45 percent of total revenues (equal to 7.9 percent of GDP) over the past 50 years. Payroll taxes—mainly for Social Security and Medicare Part A (the Hospital Insurance program)—are the second-largest source of revenues, averaging about one-third of total revenues (equal to 5.7 percent of GDP) over the same period. Corporate income taxes contributed 12 percent of revenues (or 2.1 percent of GDP) over

1. See Joint Committee on Taxation, *Estimates of Federal Tax Expenditures for Fiscal Years 2014–2018,* JCX-97-14 (August 2014), http://go.usa.gov/zDb5. CBO used its economic forecast to extrapolate the estimates beyond 2018 and included projected effects on payroll taxes.

Figure 4-2.

Revenues, by Major Source

Over the next decade, individual income taxes will grow at a faster rate than other taxes primarily because of "real bracket creep," which occurs when income grows faster than inflation and more income is pushed into higher tax brackets.



Source: Congressional Budget Office.

a. Excise taxes, remittances from the Federal Reserve to the Treasury, customs duties, estate and gift taxes, and miscellaneous fees and fines.

the past 50 years, and all other sources combined contributed about 10 percent of revenues (or 1.7 percent of GDP).

Although that broad picture has remained roughly the same over the past several decades, the details have varied:

- Receipts from individual income taxes have fluctuated more than the other major types of revenues, ranging from 41 percent to 50 percent of total revenues (and from 6.1 percent to 9.9 percent of GDP) between 1965 and 2014, but showing no clear trend over that period (see Figure 4-2).

- Receipts from payroll taxes rose as a share of revenues from the mid-1960s through the 1980s—largely because of an expansion of payroll taxes to finance the new Medicare program and because of legislated increases in payroll tax rates for Social Security and in the amount of income to which those taxes applied. Those receipts reached about 37 percent of total revenues (and about 6.5 percent of GDP) by the late 1980s. Since 2001, payroll tax receipts have fallen slightly relative to GDP, accounting for 6.0 percent of the economy, on average; over the period from 2001 to 2014. Those receipts were unusually low in 2011 and 2012 because of a two-year cut in the employees' share of the Social Security payroll tax.

- Revenues from corporate income taxes declined as a share of total revenues and GDP from the 1960s to the mid-1980s, mainly because of declining profits relative to the size of the economy. Those revenues have fluctuated widely since then, with no particular trend.

- Revenues from the remaining sources together have slowly fallen relative to total revenues and GDP, largely because of declining receipts from excise taxes. However, that downward trend has reversed in the past several years because of the increase in remittances from the Federal Reserve System.

Under current law, CBO projects, individual income taxes will generate a growing share of revenues over the next decade. By 2020, they will account for more than half of total revenues, and by 2025, they will reach 9.5 percent of GDP, well above the historical average. Receipts from payroll taxes are projected to decline slightly relative to GDP, from 5.9 percent in 2014 to

5.7 percent for the period from 2018 to 2025. Corporate income taxes are expected to make roughly the same contribution that they have made on average for the past 50 years, supplying just over 10 percent of total revenues and averaging about 2 percent of GDP. Taken together, the remaining sources of revenue are expected to diminish somewhat relative to total revenues and GDP, largely because of a decline in Federal Reserve remittances to more typical amounts; those sources are projected to average a bit more than 1 percent of GDP from 2018 through 2025.

Individual Income Taxes

If current laws do not change, individual income taxes are expected to rise markedly relative to GDP over the next 10 years, the result of structural features of the tax system (such as real bracket creep), recent changes in tax provisions, and other factors. CBO projects that individual income tax receipts will increase from 8.1 percent of GDP in 2014 to 8.7 percent in 2016; they will then rise by about 0.1 percentage point of GDP per year, on average, through 2025 (see Table 4-1).

Significant Growth in Receipts Relative to GDP From 2014 to 2016

After declining by 23 percent between 2007 and 2010, receipts from individual income taxes have risen in each of the past four years. That trend continues in CBO's projection, with such receipts increasing by 8 percent in 2015 and by 9 percent in 2016. In 2016 they are projected to total more than $1.6 trillion; at 8.7 percent of GDP, they will equal the highest percentage since 2001 and be well above the 50-year average of 7.9 percent of GDP.

Part of the projected increase in individual income tax receipts in 2015 and 2016 results from projected growth in taxable personal income, as measured in the national income and product accounts (NIPAs) produced by the Bureau of Economic Analysis. That measure includes wages, salaries, dividends, interest, rental income, and proprietors' income; its expected growth in 2015 and 2016 of 4 percent to 4½ percent corresponds roughly to expected growth in nominal GDP. However, projected receipts from individual income taxes rise faster than projected taxable personal income—boosting receipts relative to GDP by 0.6 percentage points from 2014 to 2016—because of real bracket creep, recent changes in tax provisions, and other factors.

Real Bracket Creep. The most significant factor pushing up taxes relative to income is real bracket creep. That phenomenon occurs because the income tax brackets and exemptions under both the regular income tax and the alternative minimum tax (AMT) are indexed only to inflation.[2] If incomes grow faster than inflation, as generally occurs when the economy is growing, more income is pushed into higher tax brackets. In CBO's estimates, real bracket creep raises revenues relative to GDP by 0.2 percentage points between 2014 and 2016.

Recent Changes in Tax Provisions. The Tax Increase Prevention Act of 2014 (Division A of Public Law 113-295), which was enacted in December 2014, retroactively extended many tax provisions that reduced tax liabilities and had been extended routinely in previous years. However, those provisions were extended only through December 2014. Their expiration generates a marked increase in tax revenues next year in CBO's current-law projections. The largest effect will come from the expiration of rules allowing certain businesses to immediately deduct a portion of their equipment investments. That expiration will increase receipts from both the corporate income tax and the individual income tax, because the rules apply both to C corporations, whose income is subject to the corporate tax, and to S corporations and noncorporate businesses, whose income is subject to the individual tax. Other significant expiring tax provisions included the option to deduct state and local sales taxes rather than income taxes and the ability to exclude forgiven mortgage debt from taxable income. If the expired provisions are not extended again, those expirations will increase individual income tax liabilities starting in calendar year 2015, thus affecting income tax payments starting in fiscal year 2016, by CBO's estimates.[3]

2. The AMT is a parallel income tax system with fewer exemptions, deductions, and rates than the regular income tax. Households must calculate the amount that they owe under both the alternative minimum tax and the regular income tax, and then pay the larger of the two amounts.

3. CBO estimates that the effect of higher tax liabilities on tax payments in fiscal year 2015 will be offset by refunds that will be owed to taxpayers as a result of the retroactive nature of the recent extension. Some individual taxpayers probably increased their estimated payments in 2014 because of the previous expiration of the provisions at the end of 2013; because of the retroactive extension, those taxpayers will receive refunds (or make smaller payments than otherwise) when they file their tax returns in 2015. Such refunds will probably be more significant for corporations, which are required to adjust their estimated payments more than individual taxpayers are in response to changes in expected tax liabilities.

Table 4-1.

Revenues Projected in CBO's Baseline

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
							In Billions of Dollars							
Individual Income Taxes	1,395	1,503	1,644	1,746	1,832	1,919	2,017	2,124	2,235	2,352	2,477	2,606	9,158	20,952
Payroll Taxes	1,024	1,056	1,095	1,136	1,179	1,227	1,281	1,337	1,391	1,449	1,508	1,573	5,917	13,175
Corporate Income Taxes	321	328	429	437	453	450	447	450	459	472	488	506	2,216	4,591
Other														
Excise taxes	93	96	98	102	105	107	108	111	113	115	117	119	520	1,094
Federal Reserve remittances	99	102	76	40	17	27	31	34	37	42	47	52	191	404
Customs duties	34	36	39	41	43	45	48	50	53	56	59	63	216	497
Estate and gift taxes	19	20	21	22	22	23	24	25	26	27	27	28	113	246
Miscellaneous fees and fines	36	48	57	63	63	67	69	73	76	78	81	82	320	710
Subtotal	282	302	292	269	251	269	280	293	305	318	330	345	1,361	2,952
Total	**3,021**	**3,189**	**3,460**	**3,588**	**3,715**	**3,865**	**4,025**	**4,204**	**4,389**	**4,591**	**4,804**	**5,029**	**18,652**	**41,670**
On-budget	2,285	2,426	2,667	2,763	2,858	2,974	3,099	3,242	3,389	3,550	3,722	3,906	14,362	32,171
Off-budget[a]	736	763	793	824	857	891	926	962	1,001	1,040	1,081	1,124	4,291	9,499
Memorandum:														
Gross Domestic Product	17,251	18,016	18,832	19,701	20,558	21,404	22,315	23,271	24,261	25,287	26,352	27,456	102,810	229,438
							As a Percentage of Gross Domestic Product							
Individual Income Taxes	8.1	8.3	8.7	8.9	8.9	9.0	9.0	9.1	9.2	9.3	9.4	9.5	8.9	9.1
Payroll Taxes	5.9	5.9	5.8	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.8	5.7
Corporate Income Taxes	1.9	1.8	2.3	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.8	2.2	2.0
Other														
Excise taxes	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5
Federal Reserve remittances	0.6	0.6	0.4	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Customs duties	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Estate and gift taxes	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Miscellaneous fees and fines	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Subtotal	1.6	1.7	1.5	1.4	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total	**17.5**	**17.7**	**18.4**	**18.2**	**18.1**	**18.1**	**18.0**	**18.1**	**18.1**	**18.2**	**18.2**	**18.3**	**18.1**	**18.2**
On-budget	13.2	13.5	14.2	14.0	13.9	13.9	13.9	13.9	14.0	14.0	14.1	14.2	14.0	14.0
Off-budget[a]	4.3	4.2	4.2	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.2	4.1

Source: Congressional Budget Office.

a. Receipts from Social Security payroll taxes.

Including other recently enacted legislation—which will have smaller effects—CBO estimates that changes in tax provisions will generate little net change in revenues in 2015 and will boost revenues relative to GDP by about 0.2 percentage points in 2016.

Other Factors. CBO anticipates that individual income tax revenues will also increase relative to GDP this year and next for a number of other reasons. The most significant one is that taxable distributions from tax-deferred retirement accounts, such as individual retirement accounts and 401(k) plans, are estimated to have risen substantially in 2014 and are expected to do so again in 2015 and 2016. Those larger projected distributions are the result of an increase in asset values (mainly because of rising equity prices over the past few years) that has raised the balances in people's retirement accounts. That factor and others are expected to boost revenues relative to GDP by about 0.3 percentage points between 2014 and 2016.

Table 4-2.

Payroll Tax Revenues Projected in CBO's Baseline

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Social Security	736	763	793	824	857	891	926	962	1,001	1,040	1,081	1,124	4,291	9,499
Medicare	224	234	245	258	270	282	295	309	323	338	354	370	1,351	3,045
Unemployment Insurance	55	51	48	44	42	44	50	55	56	58	60	65	229	523
Railroad Retirement	5	5	5	5	5	5	5	6	6	6	6	7	26	56
Other Retirement[a]	3	4	4	4	4	4	5	5	6	6	7	7	21	52
Total	**1,024**	**1,056**	**1,095**	**1,136**	**1,179**	**1,227**	**1,281**	**1,337**	**1,391**	**1,449**	**1,508**	**1,573**	**5,917**	**13,175**

Source: Congressional Budget Office.

a. Consists primarily of federal employees' contributions to the Federal Employees Retirement System and the Civil Service Retirement System.

Steady Growth in Receipts Relative to GDP After 2016

CBO projects that, under current law, individual income tax receipts will rise from about $1.6 trillion in 2016 to about $2.6 trillion in 2025, for an average annual increase of roughly 5 percent; as a result, those receipts will climb from 8.7 percent of GDP in 2016 to 9.5 percent in 2025. Real bracket creep and several other factors will generate that increase, CBO projects.

Real Bracket Creep. Real bracket creep will raise individual income tax receipts relative to GDP by 0.4 percentage points between 2016 and 2025, CBO projects. That increase accounts for just over half of the total increase in individual income tax receipts as a percentage of GDP for the period.

Other Factors. CBO anticipates that individual income tax receipts will rise relative to GDP by 0.3 percentage points between 2016 and 2025 for other reasons. As the population ages, for example, taxable distributions from tax-deferred retirement accounts will tend to grow more rapidly than GDP. Earnings also are expected to grow faster for higher-income people than for others during the next decade—as they have for the past several decades—causing a larger share of income to be taxed at higher income tax rates. Furthermore, total earnings are projected to rise slightly relative to GDP from 2016 to 2025, reflecting a small increase in the labor share of national income (see Chapter 2 for a more detailed discussion).

Payroll Taxes

Receipts from payroll taxes, which fund social insurance programs, totaled about $1.0 trillion in 2014, or 5.9 percent of GDP. Under current law, CBO projects, those receipts will fall to 5.7 percent of GDP by 2018 and then roughly stabilize relative to GDP through 2025.

Sources of Payroll Tax Receipts

The two largest sources of payroll tax receipts are the taxes that are dedicated to Social Security and Part A of Medicare. Much smaller amounts are collected in the form of unemployment insurance taxes (most imposed by states but classified as federal revenues); employers' and employees' contributions to the Railroad Retirement System; and other contributions to federal retirement programs, mainly those made by federal employees (see Table 4-2). The premiums that Medicare enrollees pay for Part B (the Medical Insurance program) and Part D (prescription drug benefits) are voluntary and thus are not counted as tax revenues; rather, they are considered offsets to spending and appear on the spending side of the budget as offsetting receipts.

Payroll taxes for Social Security and Medicare are calculated as percentages of people's earnings. The Social Security tax is usually 12.4 percent of earnings, with the employer and employee each paying half. The tax applies only up to a certain amount of a worker's annual earnings (called the taxable maximum, currently $118,500) that is indexed to grow over time at the same pace as average earnings for all workers. The Medicare tax applies to all earnings (with no taxable maximum) and is levied at a rate of 2.9 percent, with the employer and employee each paying half. Starting in 2013, an additional Medicare tax of 0.9 percent has been assessed on the amount of an individual's earnings over $200,000 (or $250,000 for married couples filing joint income tax returns), bringing the total Medicare tax on such earnings to 3.8 percent.

Slight Decline in Projected Receipts Relative to GDP

Although wages and salaries, the main tax bases for payroll taxes, are projected to be fairly stable relative to GDP over the next several years, CBO estimates that payroll tax receipts will decline slightly relative to GDP through 2018 for two main reasons. First, payroll taxes are expected to decrease relative to wages and salaries—and hence GDP—because a growing share of earnings is anticipated to be above the taxable maximum amount for Social Security taxes.[4] Second, between 2014 and 2018, receipts from unemployment insurance taxes are projected to decline relative to wages and salaries. Those receipts grew rapidly from 2010 through 2012 as states raised their tax rates and tax bases to replenish unemployment insurance trust funds that had been depleted because of high unemployment; CBO expects unemployment insurance receipts to fall to more typical levels in the coming years.

For the rest of the projection period, from 2019 to 2025, CBO projects that offsetting factors will cause payroll tax receipts to be roughly stable relative to GDP. The share of earnings above the taxable maximum for Social Security taxes is expected to continue to increase, lowering payroll tax revenues relative to wages and salaries. However, that effect is largely offset by small projected increases in wages and salaries as a share of GDP.

Corporate Income Taxes

In 2014, receipts from corporate income taxes totaled $321 billion, or 1.9 percent of GDP—near the 50-year average. CBO expects corporate tax receipts to rise a little in nominal terms in 2015 and then to increase sharply in 2016 because of the expiration of several tax provisions. As a result, estimated receipts fall slightly as a share of GDP in 2015 and then jump to 2.3 percent of GDP in 2016. Thereafter through 2025, CBO projects, those receipts will fall relative to GDP—down to 1.8 percent—largely because profits are projected to decline relative to GDP.

Little Growth in Receipts in 2015

CBO expects income tax payments by corporations, net of refunds, to increase by about 2 percent this year, to $328 billion, even though the agency projects that domestic economic profits will grow by 8.5 percent. Because revenue growth is projected to rise at less than half the pace of GDP growth, projected revenues as a share of GDP decline slightly to 1.8 percent.

That projected slow growth in corporate income tax receipts results mostly from the retroactive one-year extension—enacted in December 2014 in the Tax Increase Prevention Act of 2014—of various provisions that reduce tax liabilities. The largest revenue impact will stem from the extension of rules that allowed businesses with large amounts of investment to expense—that is, to immediately deduct—50 percent of their investments in equipment.[5]

Because the more favorable rules for investment deductions and other tax-reducing provisions were not initially extended when they expired at the end of calendar year 2013, many companies paid more in estimated taxes during calendar year 2014. Because those provisions were extended retroactively late in the year, those businesses will receive refunds or make smaller final payments when they file their 2014 tax returns in 2015. The effect will be to slow growth in receipts this year.

Sharp Increase in Receipts in 2016

Under current law, CBO projects, corporate income tax revenues will rise to $429 billion in 2016, an increase of roughly $100 billion, or 31 percent, from the amount projected for 2015. As a result, corporate income tax revenues are projected to climb from 1.8 percent of GDP in 2015 to 2.3 percent in 2016, which would be the highest percentage since 2007. Of that 0.5 percentage-point increase, 0.4 percentage points stems from the retroactively enacted extension of the more favorable rules for

4. Because the income tax has a progressive rate structure, the increase in the share of earnings above the Social Security taxable maximum is projected to produce an increase in individual income tax receipts that will more than offset the decrease in payroll tax receipts.

5. By contrast, since 1982 businesses with relatively small amounts of investment in new equipment have been allowed to fully deduct those costs in the year in which the equipment is placed in service. Although that provision remains in effect today, the maximum amount of those deductions has changed over time.

depreciation and other tax-reducing provisions. That one-year extension lowers projected receipts in 2015 but not in 2016, thereby boosting growth between those years.

Most of the remaining increase in corporate tax revenues relative to GDP in 2016 results from an expected reversion in the average tax rate on domestic economic profits—that is, corporate taxes divided by domestic economic profits as measured in the NIPAs—toward more typical levels. That measure of the average tax rate fell sharply during the latest recession because of a combination of a sharp drop in capital gains realizations by corporations, a sharp increase in deductions of bad debts from corporate income, and changes in tax law. Since the recession ended in June 2009, that measure has recovered only partially, and the reasons for the slow recovery in that measure will not be known with certainty until additional information from tax returns becomes available in the future. Nevertheless, CBO expects that whatever factors have been at work will gradually dissipate over the next few years, and the average tax rate will return closer to its prerecession level.

Decline in Receipts Relative to GDP After 2016

In CBO's projections, corporate income tax receipts fall from 2.3 percent of GDP in 2016 to 1.8 percent in 2025. That decline occurs mostly because of a concurrent drop projected for domestic economic profits—from 9.8 percent of GDP in 2016 to 7.8 percent in 2025—primarily because of increases in labor costs and interest payments on businesses' debt relative to GDP.

CBO incorporated three other factors into its projection of a decline in corporate tax revenue as a percentage of GDP after 2016. First is the above-noted expiration of more favorable rules for deducting the cost of investment in business equipment. Under those rules, deductions were larger when investments were first made and smaller thereafter. Under the less favorable rules in effect under current law for calendar year 2015 and subsequent years, deductions are smaller when investments are made and larger thereafter. Projected receipts in fiscal year 2016 (the first fiscal year that fully reflects the less favorable rules) thus are higher because of the smaller initial deductions for new investments. Over time, however, that effect diminishes as larger deductions are taken for investments made under the less favorable rules.

Another factor contributing to the projected decline in corporate tax revenues relative to GDP is a pair of strategies that CBO expects corporations will follow to reduce their tax liabilities. One strategy is to continue decreasing the share of business activity that occurs in C corporations (which are taxed under the corporate income tax) while increasing the share that occurs in pass-through entities such as S corporations (which are taxed under the individual income tax rather than the corporate tax).[6] Another strategy is to increase the amount of corporate income that is shifted out of the United States through a combination of more aggressive transfer-pricing methods and intercompany loans, additional corporate inversions, and other techniques.[7] CBO expects that increasing adoption of such strategies will result in progressively larger reductions in corporate receipts over the 2015–2025 projection period. By 2025, in CBO's baseline, corporate income tax receipts are roughly 5 percent lower than they would be without that further erosion of the corporate tax base; slightly more than half of that difference is attributable to the shifting of additional income out of the United States.

A final factor that partially offsets the effects of the others—pushing corporate tax revenue up as a percentage of GDP—is the agency's expectation that, by 2019, the average tax rate on domestic economic profits will be closer to its historical average.

Smaller Sources of Revenues

The remaining sources of federal revenues are excise taxes, remittances from the Federal Reserve System to the Treasury, customs duties, estate and gift taxes, and miscellaneous fees and fines. Revenues from those sources totaled $282 billion in 2014, or 1.6 percent of GDP (see Table 4-3). CBO's baseline projection shows such revenues increasing to $302 billion in 2015, or 1.7 percent of GDP, and then falling to 1.2 percent or 1.3 percent

6. For a detailed analysis of the taxation of business income through the individual income tax, see Congressional Budget Office, *Taxing Businesses Through the Individual Income Tax* (December 2012), www.cbo.gov/publication/43750.

7. Under a corporate inversion, a U.S. corporation can change its country of tax residence, often by merging with a foreign company. Inversions reduce U.S. corporate tax revenue both because the inverted U.S. corporation no longer must pay U.S. taxes on earnings in other countries and because a corporation can shift additional income out of the United States through the use of intercompany loans and the resulting interest expenses.

Table 4-3.

Smaller Sources of Revenues Projected in CBO's Baseline

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Excise Taxes														
Highway	37	38	39	39	39	39	39	39	39	38	38	38	195	388
Tobacco	15	14	14	14	13	13	13	13	12	12	12	12	67	128
Aviation	13	14	15	15	16	16	17	18	18	19	20	20	78	173
Alcohol	10	10	10	10	11	11	11	11	11	11	12	12	53	110
Health insurance providers	7	11	11	13	14	15	15	16	17	18	19	20	68	159
Other	10	9	10	11	12	13	13	14	15	16	17	18	58	137
Subtotal	93	96	98	102	105	107	108	111	113	115	117	119	520	1,094
Federal Reserve Remittances	99	102	76	40	17	27	31	34	37	42	47	52	191	404
Customs Duties	34	36	39	41	43	45	48	50	53	56	59	63	216	497
Estate and Gift Taxes	19	20	21	22	22	23	24	25	26	27	27	28	113	246
Miscellaneous Fees and Fines														
Universal Service Fund fees	10	10	11	12	12	12	12	12	13	13	13	13	59	123
Other fees and fines	26	38	46	52	51	55	57	60	63	66	68	69	261	587
Subtotal	36	48	57	63	63	67	69	73	76	78	81	82	320	710
Total	**282**	**302**	**292**	**269**	**251**	**269**	**280**	**293**	**305**	**318**	**330**	**345**	**1,361**	**2,952**

Source: Congressional Budget Office.

Note: This table shows all sources of revenues other than individual and corporate income taxes and payroll taxes.

of GDP each year from 2018 to 2025. The projected decline in those revenues relative to GDP stems largely from an expected drop in Federal Reserve remittances as the size and composition of the central bank's portfolio return to more typical conditions.

Excise Taxes

Unlike taxes on income, excise taxes are levied on the production or purchase of a particular type of good or service. Under the assumptions that govern CBO's baseline, almost 90 percent of excise tax receipts over the coming decade are projected to come from taxes related to highways, tobacco and alcohol, aviation, and health insurance. Receipts from excise taxes are expected to decrease slightly relative to GDP over the next decade, from 0.5 percent in 2015 to 0.4 percent in 2025. That decrease occurs largely because gasoline and tobacco taxes will decline in nominal dollars, which implies significant reductions relative to the size of the economy.

Highway Taxes. About 40 percent of excise tax receipts currently comes from highway taxes, primarily on the consumption of gasoline, diesel fuel, and blends of those fuels with ethanol, as well as on the retail sale of trucks. Annual receipts from highway taxes, which are largely dedicated to the Highway Trust Fund, are projected to stay at $38 billion or $39 billion each year between 2015 and 2025 and therefore to shrink as a percentage of GDP.

That pattern is the net effect of generally declining receipts from taxes on gasoline and rising receipts from taxes on diesel fuel and trucks. CBO expects that gasoline consumption will decline over time, as improvements in vehicles' fuel economy resulting from tighter federal standards for fuel economy more than offset increases in the number of miles that people drive stemming from both population increases and real income gains per person. For 2015, however, the recent decline in gasoline prices will also boost miles driven, so CBO projects that gasoline use and tax revenues will be roughly in line with last year's figures; with prices of crude oil expected to rise again later this year, further price-induced increases in miles driven are not anticipated (see Box 2-2 on page 31).[8] Increasing fuel economy will likewise reduce the consumption of diesel fuel per miles driven—but not by enough over the next decade, according to CBO's projections, to offset an increase in the total number of miles driven in diesel-powered trucks.

Under current law, most of the federal excise taxes used to fund highways are scheduled to expire on September 30, 2016. In general, CBO's baseline incorporates the assumption that expiring tax provisions will follow the schedules set forth in current law. However, the Balanced Budget and Emergency Deficit Control Act of 1985 specifies that CBO's baseline should incorporate the assumption that expiring excise taxes dedicated to trust funds (including most of the highway taxes) will be extended.

Tobacco and Alcohol Taxes. Taxes on tobacco products will generate $14 billion in revenues in 2015, CBO projects. That amount is expected to decrease by about 2 percent per year over the next decade, as the decline in tobacco use that has been occurring for many years continues. By contrast, receipts from taxes on alcoholic beverages, which are expected to total $10 billion in 2015, are projected to rise at an average rate of 1.5 percent a year through 2025, the result of expected increases in consumption.

Aviation Taxes. CBO projects that receipts from taxes on airline tickets, aviation fuels, and other aviation-related items will increase from $14 billion in 2015 to $20 billion in 2025, yielding an average annual rate of growth of about 4 percent. That growth is close to the projected increase of GDP over the period, in part because the largest component of aviation excise taxes (a passenger ticket tax) is levied not on the number of units transacted (as gasoline taxes are, for example) but as a percentage of the dollar value of transactions—which causes receipts to increase as prices and real economic activity increase. Under current law, most aviation-related taxes are scheduled to expire on September 30, 2015, but CBO's baseline projections are required to incorporate the assumption that they, like the highway taxes described above, will be extended.

Tax on Health Insurance Providers. Under the Affordable Care Act (ACA), health insurers are subject to an excise tax. The amount is specified in law and must be divided among insurers according to their share of total premiums charged. However, several categories of health insurers—such as self-insured plans, federal and state governments, and tax-exempt providers—are fully or partially exempt from the tax. CBO estimates that revenues from the tax totaled $7 billion in 2014 and will rise to $11 billion in 2015 and to $20 billion by 2025.

Other Excise Taxes. Other excise taxes are projected to generate $9 billion in revenues in 2015 and $137 billion over the next decade. Of that 10-year amount, $96 billion stems from three charges instituted by the ACA, each estimated to yield revenue of between $31 billion and $33 billion over the 2016–2025 period: an annual fee charged on manufacturers and importers of brand-name drugs; a 2.3 percent tax on manufacturers and importers of certain medical devices; and a tax, beginning in 2018, on certain high-cost employment-based health insurance plans.[9]

Remittances From the Federal Reserve System

The income produced by the various activities of the Federal Reserve System, minus the cost of generating that income and the cost of the system's operations, is remitted to the Treasury and counted as revenues. The largest component of such income is what the Federal Reserve earns as interest on its holdings of securities. Over the past seven years, the central bank has quintupled the size of its asset holdings through purchases of Treasury securities and mortgage-backed securities issued by Fannie Mae, Freddie Mac, and the Government National Mortgage Association (known as Ginnie Mae). Those purchases raised remittances of the Federal Reserve from $34 billion (0.2 percent of GDP) in 2008 to $99 billion (0.6 percent of GDP) in 2014.

CBO expects remittances to remain around $100 billion in 2015 and then to decline sharply in subsequent years, falling to $17 billion (less than 0.1 percent of GDP) in 2018. That drop largely reflects a projected increase in

8. The recent decline in gasoline prices also has shifted the composition of vehicle purchases toward vehicles with lower fuel economy. Despite that change, the new vehicles still have higher fuel economy than those they are replacing, so overall fuel economy continues to improve.

9. The excise tax on high-cost health insurance plans also increases the amounts CBO projects for revenues from individual income and payroll taxes because businesses are expected to respond to the tax by shifting to lower-cost insurance plans—thereby reducing nontaxable labor compensation and increasing taxable compensation.

the rate at which the Federal Reserve pays interest to the financial institutions that hold deposits on reserve with it, thus increasing its interest expenses. CBO also projects an increase in interest rates on Treasury securities in the next several years, which will boost earnings for the Federal Reserve—but only gradually as it purchases new securities earning higher yields. (See Chapter 2 for a discussion of CBO's forecasts of monetary policy and interest rates in the coming decade.)

After 2018, CBO anticipates, the size and composition of the Federal Reserve's portfolio, along with its remittances to the Treasury, will gradually return to conditions more in line with historical experience. According to CBO's projections, remittances over the 2022–2025 period will average 0.2 percent of GDP, roughly matching the 2000–2009 average.

Customs Duties, Estate and Gift Taxes, and Miscellaneous Fees and Fines

Customs duties, which are assessed on certain imports, have totaled 0.2 percent of GDP in recent years, amounting to $34 billion in 2014. CBO projects that, under current law, those receipts will continue at that level relative to GDP throughout the next decade.

Receipts from estate and gift taxes in 2014 totaled $19 billion, or 0.1 percent of GDP. CBO projects that, under current law, those receipts will remain at that same percentage of GDP through 2025.

Miscellaneous fees and fines totaled $36 billion in 2014 (0.2 percent of GDP) and under current law will total $48 billion in 2015 (0.3 percent of GDP), CBO projects. The increase stems largely from provisions of the ACA, including the risk-adjustment process for which collections and payments begin this year. Under risk adjustment, health insurance plans whose enrollees are expected to have below-average health care costs must make payments to the government, which will distribute those sums to plans whose enrollees are expected to have above-average health care costs.[10] Miscellaneous fees and fines will continue to average 0.3 percent of GDP from 2016 through 2025, CBO projects.

10. Miscellaneous receipts related to the ACA also include collections for the reinsurance program, which will expire after 2016 and generate receipts through 2017. See Appendix B for more information.

Tax Expenditures

Many exclusions, deductions, preferential rates, and credits in the individual income tax, payroll tax, and corporate income tax systems cause revenues to be much lower than they would otherwise be for any underlying structure of tax rates. Some of those provisions, called tax expenditures, resemble federal spending in that they provide financial assistance to particular activities, entities, or groups of people.

Like conventional federal spending, tax expenditures contribute to the federal budget deficit. They also influence people's choices about working, saving, and investing, and they affect the distribution of income. The Congressional Budget and Impoundment Control Act of 1974 defines tax expenditures as "those revenue losses attributable to provisions of the Federal tax laws which allow a special exclusion, exemption, or deduction from gross income or which provide a special credit, a preferential rate of tax, or a deferral of tax liability."[11] That law requires the federal budget to list tax expenditures, and each year JCT and the Treasury's Office of Tax Analysis publish estimates of individual and corporate income tax expenditures.[12]

Tax expenditures are more similar to the largest benefit programs than they are to discretionary spending programs: Tax expenditures are not subject to annual appropriations, and any person or entity that meets the legal

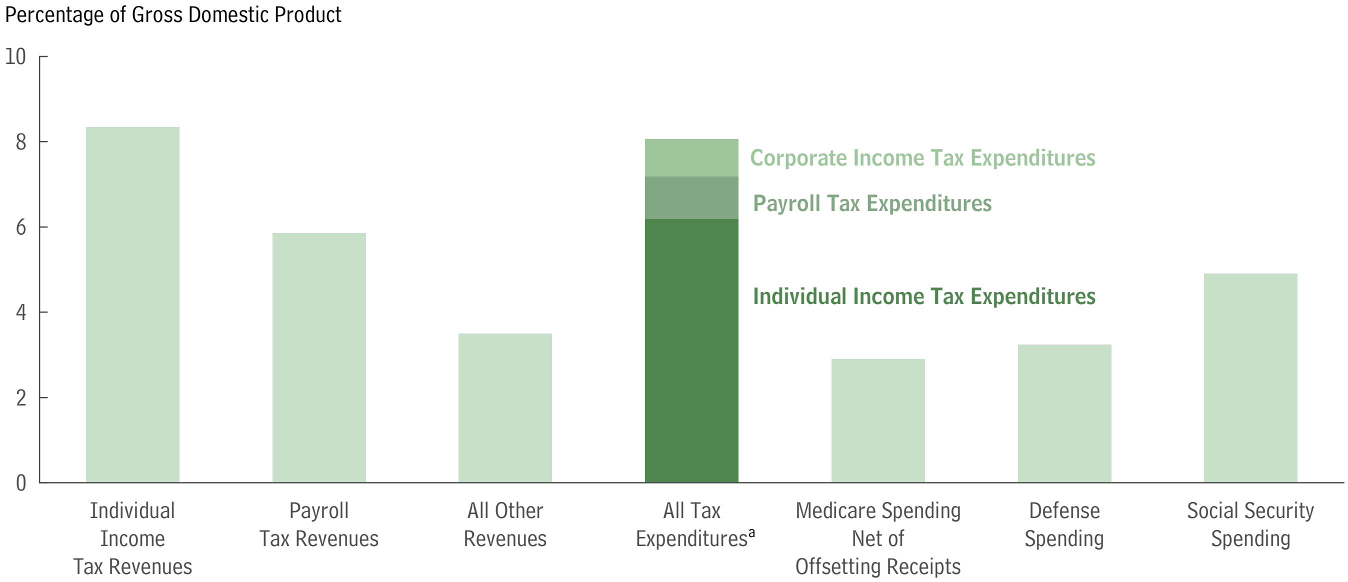
11. Section 3(3) of the Congressional Budget and Impoundment Control Act of 1974, P.L. 93-344 (codified at 2 U.S.C. §622(3) (2006)).

12. For this analysis, CBO follows JCT's definition of tax expenditures as deviations from a "normal" income tax structure. For the individual income tax, that structure incorporates existing regular tax rates, the standard deduction, personal exemptions, and deductions of business expenses. For the corporate income tax, that structure includes the top statutory tax rate, defines income on an accrual basis, and allows for cost recovery according to a specified depreciation system. For more information, see Joint Committee on Taxation, *Estimates of Federal Tax Expenditures for Fiscal Years 2014–2018*, JCX-97-14 (August 2014), http://go.usa.gov/zDb5. Unlike JCT, CBO includes estimates of the largest payroll tax expenditures. CBO defines a normal payroll tax structure to include the existing payroll tax rates as applied to a broad definition of compensation—which consists of cash wages and fringe benefits. The Office of Management and Budget's definition of tax expenditures is broadly similar to JCT's. See Office of Management and Budget, *Budget of the U.S. Government, Fiscal Year 2015: Analytical Perspectives* (March 2014), pp. 203–239, http://go.usa.gov/zNQ5.

Figure 4-3.

Revenues, Tax Expenditures, and Selected Components of Spending in 2015

Tax expenditures, projected to total $1.5 trillion in 2015, cause revenues to be lower than they would be otherwise and, like spending programs, contribute to the federal deficit.



Source: Congressional Budget Office based on estimates by the staff of the Joint Committee on Taxation.

a. This total is the sum of the estimates for all of the separate tax expenditures and does not account for any interactions among them. However, CBO estimates that in 2015, the total of all tax expenditures roughly equals the sum of each considered separately. Furthermore, because estimates of tax expenditures are based on people's behavior with the tax expenditures in place, the estimates do not reflect the amount of revenue that would be raised if those provisions of the tax code were eliminated and taxpayers adjusted their activities in response to the changes.

requirements can receive the benefits. Because of their budgetary treatment, however, tax expenditures are much less transparent than spending on benefit programs.

The Magnitude of Tax Expenditures

Tax expenditures have a major impact on the federal budget. On the basis of the estimates prepared by JCT, CBO projects that the more than 200 tax expenditures in the individual and corporate income tax systems will total roughly $1.5 trillion in fiscal year 2015—or 8.1 percent of GDP—if their effects on payroll taxes as well as on income taxes are included.[13] That amount equals nearly half of all federal revenues projected for 2015 and exceeds projected spending on Social Security, defense, or Medicare (see Figure 4-3).

A simple total of the estimates for particular tax expenditures does not account for the interactions among them if they are considered together. For instance, the tax expenditure for all itemized deductions taken as a group is smaller than the sum of the separate tax expenditures for each deduction; the reason is that, if the entire group of deductions did not exist, more taxpayers would claim the standard deduction instead of itemizing deductions than would be the case if any single deduction did not exist. However, the structure of tax brackets and marginal rates ensures that the opposite would be the case with income exclusions; that is, the tax expenditure for all exclusions considered together would be greater than the sum of the separate tax expenditures for each exclusion. Currently, those and other factors are approximately offsetting, so

13. Most estimates of tax expenditures include only their effects on individual and corporate income taxes. However, tax expenditures can also reduce the amount of income subject to payroll taxes. JCT has previously estimated the effect on payroll taxes of the provision that excludes employers' contributions for health insurance premiums from their workers' taxable income. See Joint Committee on Taxation, *Background Materials for Senate Committee on Finance Roundtable on Health Care Financing*, JCX-27-09 (May 2009), http://go.usa.gov/ZJcx. Tax expenditures that reduce the tax base for payroll taxes will eventually decrease spending for Social Security by reducing the earnings base on which Social Security benefits are calculated.

the total amount of tax expenditures roughly equals the sum of all of the individual tax expenditures.

However, the total amount of tax expenditures does not represent the increase in revenues that would occur if all tax expenditures were eliminated, because repealing a tax expenditure would change incentives and lead taxpayers to modify their behavior in ways that would diminish the revenue impact of the repeal. For example, if preferential tax rates on capital gains realizations were eliminated, taxpayers would reduce the amount of capital gains they realized; as a result, the amount of additional revenues that would be produced by eliminating the preferential rates would be smaller than the estimated size of the tax expenditure.

Economic and Distributional Effects of Tax Expenditures

Tax expenditures are generally designed to further societal goals. For example, those for health insurance costs, pension contributions, and mortgage interest payments may help to promote a healthier population, adequate financial resources for retirement and greater national saving, and stable communities of homeowners. But tax expenditures also have a broad range of effects that may not always further societal goals. They may lead to an inefficient allocation of economic resources by encouraging more consumption of the goods and services that receive preferential treatment, and they may subsidize an activity that would have taken place even without the tax incentives. Moreover, by providing benefits to particular activities, entities, or groups of people, tax expenditures increase the extent of federal involvement in the economy. Tax expenditures also reduce the amount of revenue that is collected for any given set of statutory tax rates—and therefore require higher rates to collect any particular amount of revenue. All else being equal, those higher tax rates lessen people's incentives to work and save, thus decreasing output and income.

Tax expenditures are distributed unevenly across the income scale. When measured in dollars, much more of the tax expenditures go to higher-income households than to lower-income households. As a percentage of people's income, tax expenditures are greater for the highest-income and lowest-income households than for households in the middle of the income distribution.[14]

The Largest Tax Expenditures

CBO estimates that the 11 largest tax expenditures will account for almost three-quarters of the total budgetary effects of all tax expenditures in fiscal year 2015 and will total 6.6 percent of GDP over the period from 2016 to 2025.[15] Those 11 tax expenditures fall into four categories: exclusions from taxable income, itemized deductions, preferential tax rates, and tax credits.

Exclusions From Taxable Income. Exclusions of certain types of income from taxation account for the greatest share of total tax expenditures. The largest items in that category are employers' contributions for their employees' health care, health insurance premiums, and long-term-care insurance premiums; contributions to and earnings of pension funds (minus pension benefits that are included in taxable income); Medicare benefits (net of premiums paid); and profits earned abroad, which certain corporations may exclude from their taxable income until those profits are returned to the United States.

The exclusion of employers' health insurance contributions is the single largest tax expenditure in the individual income tax code; including effects on payroll taxes, it is projected to equal 1.6 percent of GDP over the 2016–2025 period (see Figure 4-4). The exclusion of pension contributions and earnings has the next-largest impact, resulting in tax expenditures, including effects on payroll taxes, estimated to total 1.1 percent of GDP over the same period.[16] Over the coming decade, the tax expenditures for the deferral of corporate profits earned abroad and for the exclusion of Medicare benefits are each projected to equal 0.4 percent of GDP.

14. For a detailed analysis, see Congressional Budget Office, *The Distribution of Major Tax Expenditures in the Individual Income Tax System* (May 2013), www.cbo.gov/publication/43768.

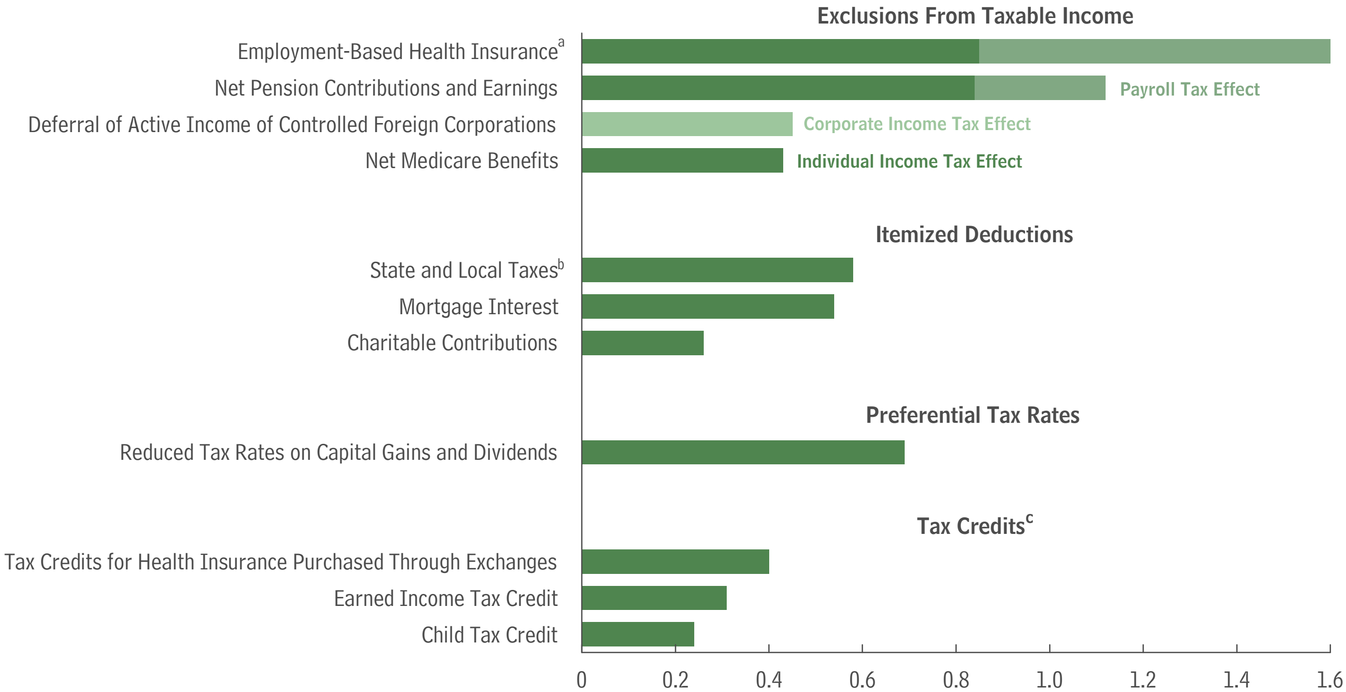
15. Those 11 tax expenditures are the ones whose budgetary effects, according to JCT's estimates, will equal more than 0.25 percent of GDP over the 2014–2018 period. CBO combined the components of certain tax expenditures that JCT reported separately, such as tax expenditures for different types of charitable contributions. CBO also extrapolated JCT's estimates for the 2014–2018 period through 2025. (Those extrapolated estimates would not precisely match estimates produced by JCT.) See Joint Committee on Taxation, *Estimates of Federal Tax Expenditures for Fiscal Years 2014–2018*, JCX-97-14 (August 2014), http://go.usa.gov/zDb5.

16. That total includes amounts from defined benefit and defined contribution plans offered by employers; it does not include amounts from self-directed individual retirement arrangements or from Keogh plans that cover partners and sole proprietors, although contributions to and earnings in those plans also are excluded from taxable income.

Figure 4-4.

Budgetary Effects of the Largest Tax Expenditures From 2016 to 2025

Percentage of Gross Domestic Product



Source: Congressional Budget Office based on estimates by the staff of the Joint Committee on Taxation.

Note: These effects are calculated as the sum of the tax expenditures over the 2016–2025 period divided by the sum of gross domestic product over the same 10 years. Because estimates of tax expenditures are based on people's behavior with the tax expenditures in place, the estimates do not reflect the amount of revenue that would be raised if those provisions of the tax code were eliminated and taxpayers adjusted their activities in response to the changes.

a. Includes employers' contributions for health care, health insurance premiums, and long-term-care insurance premiums.

b. Consists of nonbusiness income, sales, real estate, and personal property taxes paid to state and local governments.

c. Includes effect on outlays.

Itemized Deductions. Itemized deductions for certain types of payments allow taxpayers to further reduce their taxable income. The tax expenditures for deductions for state and local taxes (on nonbusiness income, sales, real estate, and personal property) are projected to equal 0.6 percent of GDP between 2016 and 2025. Those for interest paid on mortgages for owner-occupied residences and for charitable contributions are projected to equal 0.5 percent and 0.3 percent of GDP respectively over that period.

Preferential Tax Rates. Under the individual income tax, preferential tax rates apply to some forms of income, including dividends and long-term capital gains.[17] Tax expenditures for the preferential tax rates on dividends and long-term capital gains are projected to total 0.7 percent of GDP between 2016 and 2025.[18]

Tax Credits. Tax credits reduce eligible taxpayers' tax liability. Nonrefundable tax credits cannot reduce a

17. Not all analysts agree that those lower tax rates on investment income constitute tax expenditures. Although such tax preferences are tax expenditures relative to a pure income tax, which is the benchmark used by JCT and the Office of Management and Budget in calculating tax expenditures, they are not tax expenditures relative to a pure consumption tax, because investment income generally is excluded from taxation under a consumption tax.

18. Taxpayers with income over certain thresholds—$200,000 for single filers and $250,000 for married couples filing joint returns—face a surtax equal to 3.8 percent of their investment income (including capital gains and dividend income, as well as interest income and some passive business income). That surtax effectively reduces the preferential tax rate on dividends and capital gains. JCT treats the surtax as a negative tax expenditure—that is, as a deviation from the tax system that increases rather than decreases taxes—and it is not included in the figures presented here.

taxpayer's income tax liability to below zero, but refundable tax credits may provide direct payments to taxpayers who do not owe any income taxes.

The ACA provides refundable tax credits, called premium assistance credits, to help low- and moderate-income people purchase health insurance through exchanges (see Appendix B). Tax expenditures for those credits are projected to total 0.4 percent of GDP over the next decade.

The next-largest refundable credits are the earned income tax credit and the child tax credit. Both credits were significantly expanded in 2001 and again in later years, but expansions enacted since 2008 are scheduled to expire at the end of December 2017. Thus, under current law, the budgetary effect of those two credits will decline modestly after that. Including the refundable portion, the tax expenditures for the earned income tax credit are projected to be 0.3 percent of GDP between 2016 and 2025. Tax expenditures for the child tax credit, again including the refundable portion, are projected to be 0.2 percent of GDP over the same period.

APPENDIX

A

Changes in CBO's Baseline Since August 2014

The Congressional Budget Office anticipates that in the absence of further legislation affecting spending and revenues, the budget deficit for fiscal year 2015 will total $468 billion. That amount is almost identical to the deficit that CBO projected in August 2014—when it released its previous set of baseline projections—and it is the result of changes to CBO's estimates of revenues and outlays that almost exactly offset each other (see Table A-1).[1] CBO currently expects that revenues this year will be $93 billion (about 3 percent) less and outlays will be $94 billion (or about 2½ percent) less than it previously projected.

CBO projects that over the 2015–2024 period the cumulative deficit would be $175 billion less than it projected in August—$7.0 trillion rather than $7.2 trillion—if current laws remained the same. Almost all of that reduction occurs in the projections for fiscal years 2016 through 2018; baseline deficits for other years are virtually unchanged. The cumulative projections of both revenues and outlays are lower than those CBO published in August 2014. On net, about half of the differences arise from the enactment of new legislation.

1. Those projections were published in Congressional Budget Office, *An Update to the Budget and Economic Outlook: 2014 to 2024* (August 2014), www.cbo.gov/publication/45653. CBO constructs its baseline projections in accordance with provisions of the Balanced Budget and Emergency Deficit Control Act of 1985 and the Congressional Budget and Impoundment Control Act of 1974. To project revenues and mandatory spending, CBO assumes that current laws, with only a few exceptions, will remain unchanged throughout the 10-year projection period. To project discretionary spending, CBO assumes that annual appropriations through 2021 will adhere to the caps and automatic spending reductions established in the Budget Control Act of 2011 (Public Law 112-25), as amended, and that appropriations for 2022 through 2025 will increase from the 2021 amounts at the rate of inflation. CBO assumes that certain discretionary appropriations not constrained by the caps, such as those for overseas contingency operations, will increase in future years at the rate of inflation. The resulting baseline projections are not intended to be a prediction of future budgetary outcomes; rather, they serve as a benchmark against which to measure the potential effects of changes in laws governing taxes and spending.

Changes to Projections of Outlays

CBO has trimmed its estimate of outlays for 2015 by $94 billion, mainly because of technical updates—notably, larger-than-expected receipts to the U.S. Treasury from auctions of licenses for commercial use of the electromagnetic spectrum and the recording of receipts from the mortgage finance institutions Fannie Mae and Freddie Mac. In both cases, those collections are recorded in the budget as offsetting receipts, which are a credit against outlays.

CBO has reduced its projections of outlays for the 2015–2024 period by $590 billion (or 1.2 percent). Nearly half of that change is the result of revisions to its economic forecast.

Economic Changes

CBO's current economic forecast incorporates updated projections of gross domestic product (GDP), the unemployment rate, interest rates, inflation, and other factors that affect federal spending and revenues (see Chapter 2 for details). Those updates led the agency to reduce its estimates of outlays by $25 billion for 2015 and by $272 billion for the 2015–2024 period. That 10-year change is almost entirely the result of projections of lower spending for mandatory programs ($105 billion) and reduced net interest costs ($147 billion).

Mandatory Spending. Revisions to the economic forecast led CBO to reduce its projections of mandatory spending by $6 billion for 2015 and by $105 billion for the 2015–2024 period. The largest changes occurred in CBO's projections for Social Security and Medicare.

Table A-1.

Changes in CBO's Baseline Projections of the Deficit Since August 2014

Billions of Dollars

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total 2015-2019	Total 2015-2024
Deficit in CBO's August 2014 Baseline	-469	-556	-530	-560	-661	-737	-820	-946	-957	-960	-2,777	-7,196
						Changes to Revenue Projections						
Legislative Changes												
Individual income taxes	-31	6	4	3	2	*	*	*	*	*	-16	-16
Corporate income taxes	-50	12	7	4	3	1	*	-1	-1	-1	-24	-27
Payroll taxes	*	*	*	*	*	*	*	*	*	*	*	*
Other	*	*	*	*	*	*	*	*	*	*	*	*
Subtotal	-81	18	11	7	5	1	*	-1	-2	-2	-40	-44
Economic Changes												
Individual income taxes	12	9	-4	-15	-21	-25	-26	-25	-25	-25	-19	-146
Corporate income taxes	18	5	-3	-2	-2	-1	4	8	12	18	17	58
Payroll taxes	-1	-4	-8	-14	-18	-16	-21	-21	-21	-20	-45	-144
Other	1	1	-2	-4	5	3	*	-2	-2	-1	1	-1
Subtotal	29	11	-17	-34	-36	-39	-43	-40	-36	-29	-47	-234
Technical Changes												
Individual income taxes	-3	6	11	9	7	7	8	6	7	9	30	68
Corporate income taxes	-30	-1	-18	-18	-17	-17	-17	-17	-17	-18	-83	-169
Payroll taxes	-8	-3	-2	-1	-4	-12	-2	-4	-3	-2	-17	-40
Other	*	5	-1	3	2	1	1	*	-2	-4	9	4
Subtotal	-40	7	-11	-6	-11	-20	-9	-15	-16	-16	-61	-137
Total Revenue Changes	**-93**	**37**	**-17**	**-33**	**-43**	**-58**	**-52**	**-56**	**-53**	**-46**	**-149**	**-415**
						Changes to Outlay Projections						
Legislative Changes												
Discretionary outlays	*	-9	-8	-13	-14	-16	-16	-16	-16	-16	-44	-125
Mandatory outlays	*	-2	-1	*	3	*	1	*	*	*	-1	-1
Net interest outlays (Debt service)	*	1	1	*	*	-1	-1	-2	-3	-3	1	-9
All Legislative Changes	1	-10	-9	-13	-12	-17	-17	-18	-19	-20	-44	-134
Economic Changes												
Mandatory outlays												
Social Security	-3	-11	-13	-11	-11	-11	-12	-12	-13	-14	-49	-110
Medicare	*	*	1	2	4	6	8	10	12	13	7	57
Unemployment compensation	-2	-2	-2	-3	-2	-2	-2	-2	-2	-1	-11	-19
Medicaid	*	-2	-2	-2	-2	-2	-2	-2	-2	-2	-8	-16
Other	*	-4	-5	-4	-2	-1	-1	*	*	*	-15	-16
Subtotal	-6	-18	-21	-18	-13	-9	-8	-5	-4	-3	-75	-105
Discretionary outlays	*	*	*	-1	*	*	*	*	*	*	-2	-3
Net interest outlays												
Effect of rates and inflation	-19	-6	-5	-2	-12	-19	-20	-21	-21	-21	-45	-147
Debt service	*	-1	-2	-3	-2	-2	-2	-2	-1	-1	-8	-17
Subtotal	-19	-8	-7	-4	-15	-21	-22	-23	-23	-23	-53	-164
All Economic Changes	-25	-26	-29	-22	-28	-31	-30	-28	-27	-26	-130	-272

Continued

Table A-1. **Continued**

Changes in CBO's Baseline Projections of the Deficit Since August 2014

Billions of Dollars

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total 2015-2019	Total 2015-2024
						Changes to Outlay Projections (Continued)						
Technical Changes												
Mandatory outlays												
Spectrum auctions	-30	10	1	-7	-5	-2	-2	-1	*	*	-31	-35
Fannie Mae and Freddie Mac	-29	*	1	1	1	1	*	*	*	1	-25	-23
Health insurance subsidies and related spending	-5	-13	-11	-2	-3	-6	-7	-8	-9	-8	-34	-71
Social Security	-1	-3	-6	-6	-7	-7	-8	-8	-9	-10	-23	-65
Medicaid	7	-4	-9	-9	-8	-7	-6	-6	-8	-10	-23	-60
Student loans	2	3	4	4	4	4	4	4	5	5	17	39
Other	4	*	4	2	5	5	4	8	7	9	15	48
Subtotal	-52	-5	-16	-18	-13	-12	-15	-10	-13	-14	-104	-168
Discretionary outlays	-13	-7	-4	-2	-1	*	1	1	*	*	-27	-25
Net interest outlays												
Debt service	*	1	1	1	1	1	1	2	2	2	5	12
Other	-6	-5	-2	1	2	3	2	1	*	2	-10	-3
Subtotal	-5	-4	-1	2	3	4	3	2	2	4	-6	9
All Technical Changes	-70	-16	-21	-17	-12	-8	-11	-7	-11	-9	-137	-184
Total Outlay Changes	**-94**	**-52**	**-58**	**-53**	**-52**	**-55**	**-58**	**-54**	**-57**	**-55**	**-310**	**-590**
						All Changes						
Total Effect on the Deficit[a]	**2**	**89**	**41**	**20**	**9**	**-3**	**6**	**-2**	**4**	**9**	**161**	**175**
Deficit in CBO's January 2015 Baseline	-468	-467	-489	-540	-652	-739	-814	-948	-953	-951	-2,615	-7,021
Memorandum:[a]												
Total Legislative Changes	-82	28	20	21	17	18	17	17	17	18	4	91
Total Economic Changes	54	37	12	-12	-8	-8	-13	-12	-9	-3	83	38
Total Technical Changes	30	24	10	11	1	-12	2	-8	-5	-6	75	46

Source: Congressional Budget Office.

Note: * = between -$500 million and $500 million.

a. Negative numbers indicate an increase in the deficit; positive numbers indicate a decrease in the deficit.

Social Security. Because of changes in the economic forecast since August, CBO's projections of Social Security spending over the 2015–2024 period have declined by $110 billion (or 1 percent). The cost-of-living adjustment of 1.7 percent that Social Security beneficiaries received in January 2015 is 0.5 percentage points less than CBO had projected. CBO also anticipates a smaller cost-of-living adjustment in 2016 (0.9 percent compared with 1.9 percent in the August forecast). Those reductions are partially offset by an increase in CBO's projections for inflation over the 2016–2021 period. Taken together, those changes reduce the agency's estimates of benefit payments for the period by $81 billion. A further reduction of $29 billion resulted from revisions to CBO's projections of growth in wages and salaries (which affect its projections of initial benefit amounts for new retirees).

Medicare. Under current law, payment rates for much of Medicare's fee-for-service sector (such as hospital care and services provided by physicians, home health agencies, and skilled nursing facilities) are updated automatically. Those updates are tied to changes in the prices of the labor, goods, and services that health care providers purchase, coupled with an adjustment for economywide gains in productivity (the ability to produce the same output using fewer inputs, such as hours of labor, than before) over a 10-year period. CBO's current projections of productivity growth are slightly lower than the agency forecast in August. Consequently, CBO now anticipates higher payment rates for Medicare services than it did in August—a change that increases its projections of outlays over the 2015–2024 period by $57 billion (or 0.8 percent).

Unemployment Compensation. CBO's forecast of the unemployment rate over the next 10 years was revised downward by an average of 0.2 percentage points for each year. As a result, projections of outlays for unemployment compensation have dropped by a total of $19 billion (or 4 percent) for 2015 through 2024.

Medicaid. Reductions in the prices projected for most medical services and in projected labor costs, combined with a drop in the anticipated unemployment rate, have reduced estimates of Medicaid spending—by about $16 billion (or 0.4 percent)—over the 2015–2024 period.

Net Interest. Since August, CBO has revised its projections of net interest costs because of changes in the agency's forecasts for interest rates and inflation as well as changes in CBO's projections of government borrowing that resulted from changes in the economic outlook (labeled in Table A-1 as debt service). Together, those revisions led CBO to reduce—by $164 billion—the amount it projects for net interest spending over the 2015–2024 period, mostly because of the revisions related to interest rates and inflation.

Specifically, CBO now expects that interest rates on most Treasury securities will be lower throughout the period. The agency also has markedly reduced (by about 1 percentage point) its estimate of inflation for 2015, which results in a lower projection of the cost of Treasury inflation-protected securities, but has slightly increased its estimate (by no more than 0.2 percentage points) of inflation over the 2016–2024 period. Overall, those and other changes to CBO's economic forecast since last August have led the agency to project net interest outlays that are $19 billion lower for 2015 and an additional $128 billion lower for the 2016–2024 period.

Furthermore, changes to CBO's economic projections have reduced the agency's calculation of the total deficit for the 2015–2024 period by $21 billion (the net effect of updates to projections of revenues and outlays). Because of the reduced borrowing associated with lower deficits, CBO has decreased its projections of debt-service costs for the 2015–2024 period by $17 billion.

Legislative Changes

Laws enacted since August have led CBO to increase its estimate of outlays in 2015 by less than $1 billion and to reduce its 10-year projection by $134 billion (or 0.3 percent). Changes to projections of discretionary spending for activities that are not constrained by the annual funding caps established in the Budget Control Act of 2011 are responsible for almost all of that decrease.

Discretionary Spending. On net, legislative changes to discretionary programs led CBO to leave its estimates for 2015 outlays nearly unchanged but to cut $125 billion from its outlay projections for the 2015–2024 period. Because most discretionary spending is subject to the caps, the changes to spending projections in the baseline result mostly from changes in appropriations that are not constrained by the caps—those for overseas contingency operations, disaster relief, emergency requirements, and program integrity initiatives.[2]

In CBO's current baseline, the changes in discretionary spending that are attributable to legislation stem primarily from funding for overseas contingency operations (that is, military operations and related activities in Afghanistan and other countries). As a result of legislation enacted to date, such funding for 2015 is $18 billion less than the amount provided for 2014. Because projections of future appropriations for such operations are based on the assumption that they will equal current appropriations with an adjustment for inflation, the smaller amount provided for 2015 caused CBO to reduce its projection of discretionary outlays for the 2015–2024 period by about $200 billion.

In contrast, lawmakers provided $5.4 billion in emergency funding for responding to the outbreak of the Ebola virus (no emergency funding was provided for 2014), and funding in 2015 for disaster relief and program integrity initiatives is about $1 billion higher than it

2. Program integrity initiatives are aimed at reducing improper benefit payments in one or more of the following programs: Disability Insurance, Supplemental Security Income, Medicare, Medicaid, and the Children's Health Insurance Program. For more information on the discretionary caps, see Congressional Budget Office, *Final Sequestration Report for Fiscal Year 2015* (January 2015), www.cbo.gov/publication/49889.

was in 2014; extrapolating those amounts adds about $65 billion to the projection for discretionary outlays.

Mandatory Spending. Legislative activity since August has not substantially changed CBO's estimates of mandatory outlays either for the current year or for the 2015–2024 period.

Net Interest. All told, the changes that CBO made to its projections of revenues and outlays because of recently enacted legislation reduce its projection of the cumulative deficit for the 2015–2024 period by $82 billion (excluding interest costs). The resulting decrease in the estimate of federal borrowing led CBO to reduce its projection of outlays for interest payments on federal debt by $9 billion through 2024.

Technical Changes

As a result of technical updates to spending estimates for various programs and certain receipts, CBO has lowered its estimate of outlays in 2015 by $70 billion. Such changes have led CBO to reduce its projection of outlays for the 10-year period by $184 billion (or 0.4 percent), mostly because of lower projections of mandatory outlays.

Mandatory Spending. Technical revisions have reduced the amount of mandatory outlays projected for the current year by $52 billion, mostly because of receipts related to auctions of the electromagnetic spectrum and the recording of the Treasury's transactions with Fannie Mae and Freddie Mac. For the 2015–2024 period, technical updates involving several programs lowered the total projection for mandatory spending by $168 billion.

Spectrum Auctions. CBO estimates that receipts from auctions of licenses to use the electromagnetic spectrum will total $59 billion over the 2015–2024 period, which is $35 billion more than it projected in August 2014. (Those collections are classified as offsetting receipts and are shown in the budget as a reduction in outlays.) Most of the increase stems from bids for licenses already auctioned during this fiscal year. Those bids were much higher than expected: In all, on the basis of the bids that were placed at the time this report was completed, CBO estimates gross receipts of $45 billion from auctions held in 2015. After adjusting for bidding credits that will be awarded to certain firms, CBO estimates that the net proceeds over the next two years will be about $27 billion more than the agency had previously anticipated. Those results led CBO to boost its estimates of the net proceeds from other auctions that may be held before the Federal Communications Commission's auction authority expires in 2022. The year-by-year change in CBO's projections also reflects updated information about the timing of future auctions and revised estimates of the federal spending that will be needed to make portions of the spectrum available for commercial use.

Fannie Mae and Freddie Mac. Because the government placed Fannie Mae and Freddie Mac into conservatorship in 2008 and now controls their operations, CBO considers their activities to be governmental. For the 10-year period after the current fiscal year, CBO projected subsidy costs of the entities' new activities using procedures that are similar to those specified in the Federal Credit Reform Act of 1990 for determining the costs of federal credit programs, but with adjustments to reflect the market risk associated with those activities. The Administration, in contrast, considers Fannie Mae and Freddie Mac to be outside the federal government for budgetary purposes and records cash transactions between those entities and the Treasury as federal outlays or receipts. (In CBO's view, those transactions should be considered intragovernmental.)

To provide CBO's best estimate of the amount that the Treasury ultimately will report as the federal deficit for 2015, CBO's current baseline includes an estimate of the cash receipts from the two entities to the Treasury for this year (that is, adopting the Administration's treatment for 2015 while retaining CBO's risk-adjusted projections of subsidy costs for later years). CBO estimates that payments from Fannie Mae and Freddie Mac to the Treasury will total $26 billion in 2015 (on the basis of the entities' most recent quarterly financial releases); those payments are recorded in the budget as offsets to outlays (offsetting receipts). By comparison, CBO's August 2014 baseline showed an estimated subsidy cost—that is, additional outlays—of about $3 billion for the entities' activities in 2015. All told, that difference—mostly conceptual in nature—reduces CBO's estimate of outlays in 2015 by $29 billion.

For 2016 through 2024, CBO's baseline follows the agency's customary approach of showing the estimated subsidy costs of mortgage guarantees provided and loans purchased by Fannie Mae and Freddie Mac. Those estimates are calculated on a fair-value basis, reflecting the market risk associated with the activities of the two institutions. For the 2016–2024 period, CBO now estimates that those subsidy costs will total $19 billion—about

$6 billion more than it projected in August, mostly because Fannie Mae and Freddie Mac's regulator announced that in January 2015 the two entities will begin making cash contributions to certain affordable-housing programs. Those programs, and the annual contributions from Fannie Mae and Freddie Mac, were authorized in the Housing and Economic Recovery Act of 2008 (Public Law 110-289).

Health Insurance Subsidies and Related Spending. CBO and the staff of the Joint Committee on Taxation have reduced their projections of outlays for exchange subsidies and related spending by $71 billion for the 2015–2024 period. (The subsidies are provided to eligible people to purchase health insurance through exchanges established under the Affordable Care Act, or ACA, or to assist them in paying out-of-pocket costs.) That reduction largely consists of a $39 billion decrease in cost-sharing subsidies, primarily stemming from higher actual and projected enrollment in insurance plans for which those subsidies are not available, and a $24 billion decrease in outlays for premium assistance tax credits, mainly resulting from lower estimated enrollment through the exchanges in every year.[3] The remainder of the reduction is accounted for by the Administration's reclassification of the risk corridor program from a mandatory to a discretionary program, along with other small revisions to projected outlays for risk adjustment and grants to states for establishing health insurance exchanges.[4] (See Appendix B for a more extensive discussion of the changes in CBO's baseline projections related to the ACA's insurance coverage provisions.)

3. People who enroll in health insurance plans through the exchanges are potentially eligible for at least one of two types of subsidies. Premium assistance tax credits cover a portion of eligible individuals' and families' health insurance premiums, and cost-sharing subsidies reduce out-of-pocket payments for low-income enrollees. Eligible low-income people must enroll in a "silver" plan (one that pays about 70 percent of the costs of covered benefits) to receive cost-sharing subsidies, but they are not required to enroll in a silver plan to receive premium assistance tax credits.

4. The risk corridor program reduces risk for health insurers by using a portion of some insurers' large profits to partially offset others' large losses. CBO's April 2014 baseline included net collections and payments for risk corridors as mandatory outlays and revenues. The risk corridors program is now recorded in the budget as a discretionary program; CBO estimates, as it did prior to the reclassification, that payments and collections will offset each other in each year, resulting in no net budgetary effect. CBO now projects that those offsetting transactions will total about $5 billion over the 2015–2017 period, a decrease of about $4 billion from the agency's previous projection.

Social Security. CBO has reduced its projections of outlays for Social Security for the 2015–2024 period by $65 billion (or 0.6 percent) on the basis of updated population projections and new information about participation in the Old-Age and Survivors Insurance program and the Disability Insurance program. Specifically, CBO has reduced its projections of the total number of people eligible to receive benefits. In addition, CBO now expects that a slightly smaller percentage of eligible people will collect benefits for the Old-Age and Survivors Insurance program than it projected in August. Also, on the basis of recent data regarding new awards, CBO expects that fewer people will be newly awarded benefits under the Disability Insurance program than it had previously projected.

Medicaid. CBO reduced its projections of spending for Medicaid over the 2015–2024 period by $60 billion (or about 1.3 percent) compared with its August 2014 estimates. That drop represents the net effect of several adjustments. The largest change is attributable to a reduction in spending growth for long-term services and supports. CBO lowered its estimate of spending for those services for the 2015–2024 period by $69 billion on the basis of an analysis of recent growth in such spending, which slowed from an estimated average annual rate of 6 percent between 1999 and 2009 to less than 2 percent over the past four years. CBO also lowered its projections of Medicaid spending as a result of new analysis indicating a lower expected per capita cost for some children who would enroll in Medicaid if funding for the Children's Health Insurance Program (CHIP) declined in 2016, as it does in CBO's baseline projections. CBO now estimates that Medicaid costs for those children would be lower than the program average, and it therefore has reduced its estimate of outlays by $31 billion over the 10-year projection period. Finally, CBO lowered its projection for spending by $19 billion because of certain technical adjustments and because actual spending in 2014 was less than anticipated in August.

Partially offsetting those reductions in projected spending was an update to CBO's estimate of the effects of the ACA. The agency now projects that a larger share of Medicaid enrollees will consist of people who will be newly eligible under the act. That change boosts spending projections because the federal government pays states a higher matching rate for those enrollees—between 90 percent and 100 percent—depending on the year. In addition, CBO now projects, a drop in funding for CHIP that starts in 2016 (as assumed in the baseline) would shift more children into Medicaid and fewer into coverage obtained through the exchanges or from employment-based insurance. Together those changes increase spending estimates by $59 billion for the 2015–2024 period (see Appendix B).

Student Loans. CBO increased its projection of outlays for federal student loans by $39 billion over the 2015–2024 period. That increase is primarily attributable to higher projections of participation in repayment plans that are based on a borrower's income. Under those plans, the government forgives the loans of borrowers who meet certain criteria, so they cost more than other repayment plans.

Other Mandatory Programs. Technical updates led CBO to boost its projections of outlays for several other mandatory programs, by $4 billion for 2015 and by $48 billion over the 2015–2024 period. CBO now projects that spending for the agricultural programs of the Commodity Credit Corporation will be $18 billion higher over the 2015–2024 period than it projected in the August baseline, primarily because of lower estimated crop prices and higher estimates of spending for livestock disaster assistance. In addition, CBO boosted its projections of Medicare outlays by $14 billion (because of higher projected outlays for Part C, known as Medicare Advantage, and for prescription drug coverage under Part D) and for federal civilian retirement benefits by $13 billion (stemming largely from updated projections of federal employee retirements and other technical adjustments) over the 2015–2024 period.

Discretionary Spending. Technical updates to CBO's projections of discretionary spending have the net effect of reducing its estimates of outlays by $13 billion for 2015 and by $25 billion for the 2015–2024 period (mostly in the first three years). The largest reductions in the 10-year period stem from higher projections of receipts (which reduce outlays) related to mortgage guarantees provided by the Federal Housing Administration and from lower projections of outlays for some categories of military spending, mainly for military personnel and for operations and maintenance.

Net Interest. As a result of technical updates to its spending and revenue projections, CBO's estimate of net interest outlays declined by $5 billion for 2015 but increased by $9 billion for the 2015–2024 period.

Excluding debt service, CBO's estimate of interest outlays decreased by $13 billion for the 2015–2017 period but increased by $10 billion over the 2018–2024 period. Those changes are mainly attributable to new information about the Treasury's auctions of securities: Since CBO issued its projections in August, the Treasury has issued a higher proportion of bills, or short-term debt, than CBO had anticipated, leading CBO to project lower interest costs for the near term and higher costs for later in the baseline period as interest rates are forecast to rise. All told, such changes reduce the projection for net interest outlays by $3 billion over the 2015–2024 period.

In the opposite direction, CBO projects that higher debt-service costs—mostly related to what is known as other means of financing—will add $12 billion to net interest outlays over the same period.[5]

Changes to Projections of Revenues

Since releasing its baseline projections in August, CBO has reduced its estimates of revenues by $93 billion for 2015 and by $415 billion for the 2015–2024 period. Recent enactment of the Tax Increase Prevention Act of 2014 (Division A of P.L. 113-295) explains most of the reduction for 2015. In later years, economic factors—mostly slightly lower projections of GDP—account for the bulk of the reductions in the revenue projections. Technical factors (those not related to legislative activity or to changes in the economic forecast) resulted in smaller reductions.

Economic Changes

Revisions to CBO's economic projections have caused the agency to increase its revenue estimates by $29 billion (or 0.9 percent) for 2015 and by $11 billion (or 0.3 percent) for 2016 but to decrease them by $274 billion (or 0.8 percent) for the period from 2017 through 2024. CBO raised its revenue projections for the first two years of the 10-year period mostly because it now anticipates higher corporate profits than it did last year, which results in projections of higher payments of corporate income taxes and, to a much lesser extent, of individual income taxes. (Those upward revisions for revenues for 2015 were more than offset by technical and legislative changes, as described below.) The projection of larger profits is made

5. *Other means of financing* refers to the borrowing needs of the Treasury that are not directly included in budget totals; those factors include changes in the government's cash balances and the cash flows of federal programs that provide loans and loan guarantees.

on the basis of recent information from the national income and product accounts of the Bureau of Economic Analysis, which indicate that profits in 2014 were larger than CBO projected last August.

A change in CBO's forecast of economic growth lowered revenue projections for the 2017–2024 period. CBO has slightly reduced its projection for the pace of economic growth over the 2016–2019 period: Real (inflation-adjusted) GDP is now projected to be about 1.1 percent lower, on average, over the 2017–2024 period than CBO anticipated in August, and nominal GDP—the main source of taxable income—is projected to be lower by 1.2 percent over the same period. (The projection for inflation as measured by the price indexes for GDP is little changed.)

Consequently, CBO also has lowered its projections for wages and salaries—the most highly taxed type of income specified in the economic forecast—by an average of 1.2 percent over the 2017–2024 period. That change in the forecast has led CBO to make a downward adjustment—of slightly more than $300 billion (or 1.1 percent)—in its projections of revenue from individual income and payroll taxes for that period.

CBO's projections of corporate profits overall are up slightly from its previous forecast, mostly because lower interest costs for businesses are projected to raise profits; that effect is only partially offset by the reduction in CBO's projections of economic activity generally.[6] As a result of those and other smaller effects of the new economic forecast, CBO's updated projections for corporate income taxes are slightly higher, on net, for the 2021–2024 period.

Technical Changes

CBO has reduced its projections of revenues by $40 billion (or 1.2 percent) for 2015 and by $137 billion (or 0.3 percent) for the 2015–2024 period for reasons that are unrelated to new legislation or to changes in the economic outlook. Those technical changes can be traced to new information from tax returns and about recent tax collections, new analysis of elements of the projections, and other factors.

Of the projections for the different revenue sources, those for corporate income taxes have changed the most since August as a result of technical factors: Corporate income tax receipts are projected to be lower by $30 billion (or 7.6 percent) for 2015 and by $169 billion (or 3.8 percent) for the 10-year projection period. The largest effects arise from new information from corporate income tax returns and, to a lesser extent, from an updated projection of the growing reductions in the corporate tax base that are anticipated to result from corporations' following international tax avoidance strategies. Corporate inversion—in which a U.S. company merges with a foreign enterprise to become an affiliate of that foreign company—is one such strategy. CBO also incorporated an anticipated delay in the payment of corporate income taxes in 2015, with the effect of decreasing revenues in 2015 and increasing them equally in 2016. That change arises from rules that allow businesses to delay increasing their tax payments when their depreciation deductions drop significantly in a year, as occurs in 2015 under current law with the expiration at the end of 2014 of enhanced equipment-expensing provisions.

Legislative Changes

Legislation enacted since August 2014 has prompted CBO to reduce its revenue projections for 2015 by $81 billion (or 2.5 percent) but to raise them by $38 billion for the 2016–2024 period, resulting in a net $44 billion (or 0.1 percent) decrease for the 2015–2024 period.

Those changes result almost entirely from the Tax Increase Prevention Act of 2014, which extended about 50 expiring tax provisions for one year through 2014. Those provisions, which reduced the tax liabilities of individuals and businesses, include the tax credit for research and experimentation, certain eligibility rules for renewable energy facilities claiming energy tax credits, the deferral of certain active financing income of multinational corporations, and other provisions with smaller 10-year effects on revenues. The act will increase revenues over the 2016–2024 period largely because it retroactively extended (for 2014) enhanced expensing provisions that allowed businesses to take larger up-front deductions for investments in equipment or, for companies with relatively small investments in new equipment, to fully deduct those costs; that change will result in larger deductions being applied to the calculation of 2014 tax liabilities (when tax returns are filed in 2015), but it will lead to smaller deductions in later years.

6. The lower projected interest costs for businesses are also reflected in lower personal interest income, thereby reducing projected revenues from individual income taxes.

APPENDIX

B

Updated Estimates of the Insurance Coverage Provisions of the Affordable Care Act

In preparing the January 2015 baseline budget projections, the Congressional Budget Office and the staff of the Joint Committee on Taxation (JCT) have updated their estimates of the budgetary effects of the major provisions of the Affordable Care Act (ACA) that relate to health insurance coverage.[1] The new baseline estimates rely on analyses completed in the early part of December 2014 and incorporate information on enrollment made available by then and administrative actions issued through early November 2014. However, the estimates do not reflect CBO's updated economic projections (which were completed after the agency's analysis of insurance coverage was under way), the most recent data on enrollment through insurance exchanges, or any federal administrative actions or decisions by states about expanding Medicaid coverage that have occurred since that time. Hence, the updates are preliminary.

CBO and JCT currently estimate that the ACA's coverage provisions will result in net costs to the federal government of $76 billion in 2015 and $1,350 billion over the 2016–2025 period. Compared with the projection from last April, which spanned the 2015–2024 period, the current projection represents a downward revision in the net costs of those provisions of $101 billion over those 10 years, or a reduction of about 7 percent.[2] And compared with the projection made by CBO and JCT in March 2010, just before the ACA was enacted, the current estimate represents a downward revision in the net costs of those provisions of $139 billion—or 20 percent—for the five-year period ending in 2019, the last year of the 10-year budget window used in that original estimate.

Those estimates address only the insurance coverage provisions of the ACA and do not reflect all of the act's budgetary effects. Because the provisions of the ACA that relate to health insurance coverage established entirely new programs or components of programs and because those provisions have mostly just begun to be implemented, CBO and JCT have produced separate estimates of the effects of the provisions as part of the baseline process. By contrast, because the provisions of the ACA that do not relate directly to health insurance coverage generally modified existing federal programs (such as Medicare) or made various changes to the tax code, determining what would have happened since the enactment of the ACA had the law not been in effect is becoming increasingly difficult. The incremental budgetary effects of those noncoverage provisions are embedded in CBO's baseline projections for those programs and tax revenues, respectively, but they cannot all be separately identified using the agency's normal procedures. As a result, CBO does not produce estimates of the budgetary effects of the ACA as a whole as part of the baseline process. Moreover,

1. As referred to in this report, the Affordable Care Act comprises the Patient Protection and Affordable Care Act (Public Law 111-148); the health care provisions of the Health Care and Education Reconciliation Act of 2010 (P.L. 111-152); and the effects of subsequent judicial decisions, statutory changes, and administrative actions. In addition to provisions dealing with health insurance coverage, that act included other provisions that made changes to the federal tax code, Medicare, Medicaid, and other programs.

2. For the most recent previous baseline, published in August 2014, CBO and JCT did not update their detailed estimates of the coverage provisions of the ACA for any years after 2014, except for a $600 million decline in outlays relative to the April 2014 baseline for grants to states for operating exchanges over the 2015–2017 period. Therefore, this appendix compares the current baseline projections with the detailed projections from April 2014. See Congressional Budget Office, "Updated Estimates of the Effects of the Insurance Coverage Provisions of the Affordable Care Act, April 2014" (April 2014), www.cbo.gov/publication/45231, which was released together with Congressional Budget Office, *Updated Budget Projections: 2014 to 2024* (April 2014), www.cbo.gov/publication/45229.

as the implementation of the provisions related to insurance coverage proceeds and historical data increasingly include the effects of those provisions, CBO and JCT will also cease to make separate projections of the effects of all of those provisions.

CBO typically revises its baseline budget projections after the Administration releases its proposed budget for the coming year (in part because that release includes data on federal spending that has occurred during the previous year). The revised projections that CBO will prepare this spring will include further updates to CBO and JCT's estimates of the insurance coverage provisions of the ACA, incorporating new information about health insurance coverage and the insurance exchanges that has become available, as well as the economic projections published in this report.

Insurance Coverage Provisions

Among the key elements of the ACA's insurance coverage provisions that are encompassed by the estimates discussed here are the following:

- Many individuals and families are able to purchase subsidized health insurance through exchanges (often called marketplaces) operated by the federal government, by a state government, or through a partnership between the federal and state governments.
- States are permitted but not required to expand eligibility for Medicaid, and the federal government pays a larger share of the costs for individuals who are newly eligible under the ACA than for those who were eligible previously.
- The Children's Health Insurance Program (CHIP), which was previously funded through the end of fiscal year 2013, received funding under the ACA for fiscal years 2014 and 2015.
- Most citizens of the United States and noncitizens who are lawfully present in the country must either obtain health insurance or pay a penalty for not doing so (under a provision known as the individual mandate).
- Certain employers that decline to offer their employees health insurance coverage that meets specified standards will be assessed penalties.
- A federal excise tax will be imposed on some health insurance plans with high premiums.
- Most insurers offering policies either for purchase through the exchanges or directly to consumers outside of the exchanges must meet several requirements. In particular, they must accept all applicants regardless of health status, and they may vary premiums only by age, smoking status, and geographic location (and premiums charged for adults age 21 or older may not vary according to age by a ratio of more than 3 to 1).
- Certain small employers that provide health insurance to their employees are eligible to receive a tax credit of up to 50 percent of the cost of that insurance.

The ACA also made other changes to rules governing health insurance coverage that are not listed here. Those other provisions address coverage in the nongroup, small-group, and large-group markets, in some cases including employment-based plans that are financed by employers, which are often called self-insured plans.

Budgetary Effects of the Insurance Coverage Provisions

CBO and JCT currently estimate that the ACA's coverage provisions will result in net costs to the federal government of $76 billion in 2015 and $1,350 billion over the 2016–2025 period. The estimated net costs in 2015 stem almost entirely from spending for subsidies that are provided through insurance exchanges and from an increase in spending for Medicaid (see Table B-1). For the 2016–2025 period, the projected net costs consist of the following:

- Gross costs of $1,993 billion for subsidies for insurance obtained through the exchanges and related spending and revenues, for Medicaid and CHIP, and for tax credits for small employers, and
- An offsetting amount of $643 billion in net receipts from penalty payments, additional revenues resulting from the excise tax on certain high-premium insurance plans, and the effects on income and payroll tax revenues and associated outlays arising from projected changes in coverage offered through employers.

Table B-1.

Direct Spending and Revenue Effects of the Insurance Coverage Provisions of the Affordable Care Act

Billions of Dollars, by Fiscal Year

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total, 2016-2025
Exchange Subsidies and Related Spending and Revenues[a]	32	66	87	99	103	106	111	117	120	123	127	1,058
Medicaid and CHIP Outlays[b]	47	64	70	76	84	91	97	102	107	112	117	920
Small-Employer Tax Credits[c]	2	1	1	1	1	1	2	2	2	2	2	15
Gross Cost of Coverage Provisions	81	131	159	176	188	198	209	220	229	237	245	1,993
Penalty Payments by Uninsured People	-2	-4	-4	-4	-4	-4	-5	-5	-5	-5	-6	-47
Penalty Payments by Employers[c]	0	-7	-11	-13	-15	-15	-17	-19	-20	-22	-23	-164
Excise Tax on High-Premium Insurance Plans[c]	0	0	0	-5	-10	-13	-16	-19	-24	-29	-34	-149
Other Effects on Revenues and Outlays[d]	-3	-11	-19	-24	-27	-29	-31	-33	-35	-36	-38	-284
Net Cost of Coverage Provisions	**76**	**109**	**124**	**130**	**132**	**137**	**141**	**144**	**144**	**145**	**145**	**1,350**
Memorandum:												
Changes in Mandatory Spending	92	135	163	177	190	202	213	224	233	241	249	2,026
Changes in Revenues[e]	16	26	39	47	58	64	73	80	88	97	104	677

Sources: Congressional Budget Office; staff of the Joint Committee on Taxation.

Notes: These numbers exclude effects on the deficit of provisions of the Affordable Care Act that are not related to insurance coverage and effects on discretionary spending of the coverage provisions.

Except as noted, positive numbers indicate an increase in the deficit, and negative numbers indicate a decrease in the deficit.

CHIP = Children's Health Insurance Program.

a. Includes spending for exchange grants to states and net spending and revenues for risk adjustment and reinsurance. The risk corridors program is now recorded in the budget as a discretionary program; CBO estimates that payments and collections will offset each other in each year, resulting in no net budgetary effect.

b. Under current law, states have the flexibility to make programmatic and other budgetary changes to Medicaid and CHIP. CBO estimates that state spending on Medicaid and CHIP over the 2016–2025 period will be about $63 billion higher because of the coverage provisions of the Affordable Care Act than it would be otherwise.

c. These effects on the deficit include the associated effects of changes in taxable compensation on revenues.

d. Consists mainly of the effects of changes in taxable compensation on revenues. CBO estimates that outlays for Social Security benefits will increase by about $8 billion over the 2016–2025 period and that the coverage provisions will have negligible effects on outlays for other federal programs.

e. Positive numbers indicate an increase in revenues.

CBO and JCT estimate that the net costs of the coverage provisions of the ACA will rise sharply as the effects of the act phase in from 2015 through 2017, continue to rise steadily through 2022, and then change little from 2022 through 2025. The annual net costs are estimated to level off at about $145 billion in the last years of the projection period.

The projected costs stop growing toward the end of the period in large part because of the nature of the rules for the indexing of exchange subsidies and the high-premium excise tax, which over time will slow the growth of gross costs and increase the growth of receipts. The ACA specifies that if total exchange subsidies exceed a certain threshold in any year after 2017—a condition that CBO and JCT expect may be satisfied in some years—people will be required to pay a larger share of premiums in the following year than would otherwise be the case, thus restraining the amount that the federal government pays in subsidies. In addition, CBO and JCT expect that premiums for health insurance will tend to increase more rapidly than the threshold for determining liability for the high-premium excise tax, so the tax will affect an increasing share of coverage offered through employers and thus generate rising revenues. In response, many employers are expected to avoid the tax by holding premiums below the threshold, but the resulting shift in compensation from nontaxable insurance benefits to taxable wages and salaries would subject an increasing share of employees' compensation to taxes. Those trends in exchange subsidies and in revenues related to the high-premium excise tax will continue beyond 2025, CBO and JCT anticipate, causing the net costs of the ACA's coverage provisions to decline in subsequent years.

Effects of the Insurance Coverage Provisions on the Number of People With and Without Insurance

By CBO and JCT's estimates, about 42 million nonelderly residents of the United States were uninsured in 2014, about 12 million fewer than would have been uninsured in the absence of the ACA.[3] In 2015, the agencies estimate, 36 million nonelderly people will be uninsured—about 19 million fewer than would have been uninsured in the absence of the ACA. From 2016 through 2025, the annual number of uninsured is expected to decrease to between 29 million and 31 million—that is, between 24 million and 27 million fewer than would have been uninsured in the law's absence (see Table B-2).

The 31 million people projected to be uninsured in 2025 represent roughly one out of every nine residents under age 65 (see Figure B-1). In that year, about 30 percent of those uninsured people are expected to be unauthorized immigrants and thus ineligible for exchange subsidies or for most Medicaid benefits; about 10 percent will be ineligible for Medicaid because they live in a state that will not have chosen to expand coverage; about 15 percent to 20 percent will be eligible for Medicaid but will choose not to enroll; and the remaining 40 percent to 45 percent will not purchase insurance to which they have access through an employer, through an exchange, or directly from an insurer.

3. CBO and JCT's estimate of the outcome relative to what would have happened in the absence of the ACA is different from the result of subtracting the number of people who were uninsured in 2013 from the number who were uninsured in 2014. The agencies' estimate accounts for effects of the coverage provisions since the law's enactment, whereas tallies in any given year after the enactment would incorporate the incremental change in that year from both the effects of the ACA and any underlying trends that would have occurred in the absence of the law.

The projected gains in insurance coverage relative to what would have occurred in the absence of the ACA are the net result of several changes in the extent and types of coverage. In 2018 and later years, between 24 million and 25 million people are projected to have coverage through the exchanges, and 14 million to 16 million more, on net, are projected to have coverage through Medicaid and CHIP than would have had it in the absence of the ACA. Partly offsetting those increases, however, are projected net decreases of 9 million to 10 million in the number of people with employment-based coverage and 4 million to 5 million in the number of people with coverage in the nongroup market outside the exchanges.

Enrollment in and Subsidies for Coverage Through Exchanges

Subsidies for insurance obtained through exchanges and related spending and revenues account for a little more than half of the gross costs of the coverage provisions of the ACA. Those amounts depend on the number of people who purchase insurance through the exchanges, the premiums charged for such insurance, and other factors.

Enrollment in Exchange Coverage

CBO and JCT's estimate of total exchange subsidies for each year is based on the agencies' projection of the average number of people who will enroll in that year. That average number for each year will be less than the total number of people who will have coverage at some point during the year because some people will be covered for only part of the year. Coverage through the exchanges varies over the course of a year because people who experience qualifying life events (such as a change in income or family size, the loss of employment-based insurance, the birth of a child, and several other situations) are allowed to purchase coverage later in the year and because some people leave their exchange-based coverage as they become eligible for insurance through other sources or stop paying the premiums. In 2014, for example, despite a peak in April of about 8 million people who had selected a plan through an insurance exchange, only about 6 million, on average, were covered through the exchanges over the course of the calendar year, according to CBO and JCT's estimates. That average is less than the total number of people covered through the exchanges during some part of 2014 particularly because of lower enrollment during the open-enrollment period early in the year and net attrition of enrollees later in the year.

Table B-2.

Effects of the Affordable Care Act on Health Insurance Coverage

Millions of Nonelderly People, by Calendar Year

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Insurance Coverage Without the ACA[a]											
Medicaid and CHIP	35	34	33	33	34	34	34	35	35	35	35
Employment-based coverage	158	160	163	164	165	165	165	166	166	166	166
Nongroup and other coverage[b]	24	25	25	26	26	26	26	27	27	27	27
Uninsured[c]	55	55	55	55	56	56	56	57	57	57	57
Total	272	274	277	278	280	281	282	283	284	285	286
Change in Insurance Coverage Under the ACA											
Insurance exchanges	12	21	25	25	25	24	25	24	24	24	24
Medicaid and CHIP	11	13	13	14	15	16	16	16	16	16	16
Employment-based coverage[d]	-2	-7	-8	-9	-9	-9	-10	-9	-9	-9	-9
Nongroup and other coverage[b]	-3	-4	-4	-4	-4	-4	-4	-4	-5	-4	-4
Uninsured[c]	-19	-24	-26	-26	-26	-27	-27	-27	-27	-27	-27
Uninsured Under Current Law											
Number of uninsured nonelderly people[c]	36	31	30	30	29	29	29	30	30	30	31
Insured as a percentage of the nonelderly population											
Including all U.S. residents	87	89	89	89	90	90	90	89	89	89	89
Excluding unauthorized immigrants	89	91	92	92	92	92	92	92	92	92	92
Memorandum:											
Exchange Enrollees and Subsidies											
Number with access to unaffordable employment-based insurance[e]	*	*	1	1	1	1	1	1	1	1	1
Number of unsubsidized exchange enrollees[f]	3	5	6	6	6	6	7	6	7	7	7
Average exchange subsidy per subsidized enrollee (Dollars)	4,330	4,700	4,940	5,350	5,620	5,930	6,260	6,650	6,990	7,340	7,710

Sources: Congressional Budget Office; staff of the Joint Committee on Taxation.

Notes: Figures for the nonelderly population include residents of the 50 states and the District of Columbia who are younger than 65.

ACA = Affordable Care Act; CHIP = Children's Health Insurance Program; * = between zero and 500,000.

a. Figures reflect average enrollment over the course of a year and include spouses and dependents covered under family policies; people reporting multiple sources of coverage are assigned a primary source.

b. "Other" includes Medicare; the changes under the ACA are almost entirely for nongroup coverage.

c. The uninsured population includes people who will be unauthorized immigrants and thus ineligible either for exchange subsidies or for most Medicaid benefits; people who will be ineligible for Medicaid because they live in a state that has chosen not to expand coverage; people who will be eligible for Medicaid but will choose not to enroll; and people who will not purchase insurance to which they have access through an employer, through an exchange, or directly from an insurer.

d. The change in employment-based coverage is the net result of projected increases and decreases in offers of health insurance from employers and changes in enrollment by workers and their families.

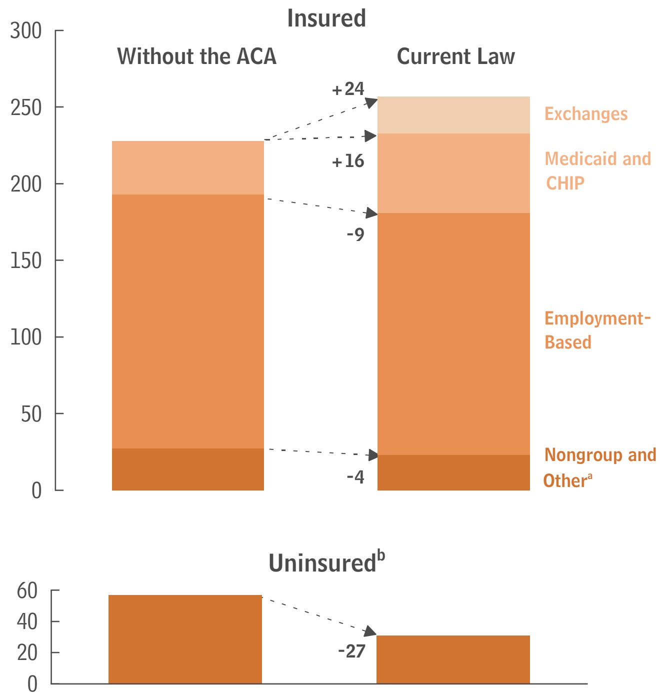
e. Under the ACA, health insurance coverage is considered affordable for a worker and related individuals if the worker would be required to pay no more than a specified share of his or her income (9.56 percent in 2015) for self-only coverage. If coverage is considered unaffordable, the worker and related individuals may receive subsidies through an exchange if other eligibility requirements are met.

f. Excludes coverage purchased directly from insurers outside of an exchange.

Figure B-1.

Effects of the Affordable Care Act on Health Insurance Coverage, 2025

Millions of Nonelderly People



Sources: Congressional Budget Office; staff of the Joint Committee on Taxation.

Notes: The nonelderly population consists of residents of the 50 states and the District of Columbia who are younger than 65.

ACA = Affordable Care Act; CHIP = Children's Health Insurance Program.

a. "Other" includes Medicare; the changes under the ACA are almost entirely for nongroup coverage.

b. The uninsured population includes people who will be unauthorized immigrants and thus ineligible for exchange subsidies or for most Medicaid benefits; people who will be ineligible for Medicaid because they live in a state that will not have chosen to expand coverage; people who will be eligible for Medicaid but will choose not to enroll; and people who will not purchase insurance to which they have access through an employer, through an exchange, or directly from an insurer.

Over the course of calendar year 2015, an average of 12 million people are expected to be covered by insurance through the exchanges, but the actual number will not be known precisely until after the year has ended. (The total number enrolled at any particular time during the year might be higher.) Average annual enrollments are projected to increase to 21 million people in 2016 and then to 24 million to 25 million people each year between 2017 and 2025. Roughly three-quarters of those enrollees are expected to receive subsidies for purchasing that insurance.

Premiums for Exchange Coverage

CBO and JCT currently estimate that the average cost of individual policies for the second-lowest-cost "silver" plan in the exchanges—that is, a plan that pays about 70 percent of the costs of covered benefits and represents the benchmark for determining exchange subsidies—is about $4,000 in calendar year 2015.[4] That estimate represents a national average, reflecting the agencies' projections of the age, sex, health status, and geographic distribution of those who will obtain coverage through the exchanges this year.

However, CBO and JCT expect to revise their estimates of premiums in the baseline projections to be published this spring. Those revisions will incorporate the economic projections that are included in this report, additional analysis of the available information about health care costs and insurance premiums, and revised estimates of the demographics of people receiving coverage through the exchanges. On the basis of the early stages of that analysis, CBO and JCT anticipate lowering their projections of premiums and thus the federal cost of exchange subsidies during the 2016–2025 period—though changes in other aspects of the coverage estimates and further analysis might lead to different conclusions.

Subsidies for Exchange Coverage

Exchange subsidies depend both on benchmark premiums for policies sold through the exchanges and on certain characteristics of enrollees, such as age, family size, and income. CBO and JCT estimate that, under current law, exchange subsidies and related spending and revenues will amount to a net cost of $32 billion in fiscal year 2015. That estimate is uncertain in part because the average number of people who will have such coverage during the fiscal year is not yet known and in part because detailed information on the demographics and income of the people who had such coverage last year is not yet available.

4. The size of the subsidy that someone will receive will be based in part on the premium of the second-lowest-cost silver plan offered through the exchange in which that person participates.

Over the 2016–2025 period, exchange subsidies and related spending and revenues are projected to result in a net cost of $1.1 trillion, distributed as follows:

- Outlays of $775 billion and a reduction in revenues of $134 billion for premium assistance tax credits (to cover a portion of eligible individuals' and families' health insurance premiums), which sum to $909 billion (see Table B-3);[5]
- Outlays of $147 billion for cost-sharing subsidies (which reduce out-of-pocket payments for low-income enrollees);
- Outlays of $1 billion in 2016 and 2017 for grants to states for operating exchanges; and
- Outlays of $181 billion and revenues of $180 billion related to payments and collections for risk adjustment and reinsurance (the projected outlays and revenues for those programs are exactly offsetting, with no net budgetary effect, when the amounts for 2015 are included).[6]

Subsidies in the exchanges are projected to average about $5,000 per subsidized enrollee from 2016 through 2018 and to reach almost $8,000 in 2025.[7]

The programs involving risk adjustment and reinsurance, along with another involving risk corridors, were established under the ACA to reduce the likelihood that particular health insurers will bear especially high costs to cover the expenses of a disproportionate share of less healthy enrollees. The programs, which took effect in 2014, generate payments by the federal government to insurers and collections by the federal government from insurers that reflect differences in the health status of each insurer's enrollees and the resulting costs to the insurers.

Payments and collections under the risk adjustment and reinsurance programs are recorded in the budget as mandatory outlays and revenues. Risk corridors are treated differently: The payments to insurers are recorded as discretionary spending, and the government's collections are recorded as offsets to discretionary spending. By CBO's projections, over the 2016–2025 period:

- Risk-adjustment payments and collections will both total $170 billion;
- Reinsurance payments will total $11 billion, and collections will total $10 billion (although the projected payments and collections are exactly offsetting when the amounts for 2015 are included); and
- Risk corridor payments and collections will both total $5 billion.[8]

Enrollment in Medicaid and CHIP and the Federal Cost of Such Coverage

In calendar year 2014, according to CBO and JCT's estimates, Medicaid enrollment increased by 6 million people who became newly eligible under the ACA, and Medicaid and CHIP enrollment increased by an additional 2 million people who were previously eligible and chose to enroll as a result of the ACA—for a total increase of 8 million people, on average, enrolled in Medicaid or CHIP compared with what would have occurred in the absence of the law. Over the coming years, the increase in the number of people enrolled in

5. The subsidies for health insurance premiums are structured as refundable tax credits; CBO and JCT treat the portions of such credits that exceed taxpayers' other income tax liabilities as outlays and the portions that reduce tax payments as reductions in revenues.
6. Because outlays are subject to sequestration in 2015, some of the revenues collected in 2015 will be spent in 2016.
7. The average exchange subsidy per subsidized enrollee includes both premium subsidies and cost-sharing subsidies and can therefore exceed the average benchmark premium in the exchanges.
8. Collections and payments for the risk adjustment, reinsurance, and risk corridor programs will occur after the close of a benefit year. Therefore, collections and payments for insurance provided in one year will occur in the next year. Under the reinsurance program, an additional $5 billion will be collected from health insurance plans and deposited into the general fund of the U.S. Treasury. That amount is the same as the sum appropriated for another program also established by the ACA, the Early Retiree Reinsurance Program, which was in operation before 2014 and which is not included here as part of the budgetary effects of the ACA's insurance coverage provisions. The risk corridors program does not extend throughout the projection period; instead, it covers insurance issued for calendar years 2014 to 2016, and corresponding payments and collections will occur during fiscal years 2015 to 2017. CBO expects that the payments and collections for that program will both total $1 billion in 2015, $1.5 billion in 2016, and $2.5 billion in 2017.

Table B-3.

Enrollment in, and Budgetary Effects of, Health Insurance Exchanges

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total, 2016-2025
	Exchange Enrollment (Millions of nonelderly people, by calendar year)[a]											
Individually Purchased Coverage												
Subsidized	9	16	19	19	18	18	18	18	17	17	17	n.a.
Unsubsidized[b]	3	5	6	6	6	6	7	6	7	7	7	n.a.
Total	**12**	**21**	**25**	**25**	**25**	**24**	**25**	**24**	**24**	**24**	**24**	**n.a.**
Employment-Based Coverage Purchased Through SHOP Exchanges[b]	1	3	4	4	4	4	4	4	4	4	4	n.a.
	Effects on Direct Spending and Revenues (Billions of dollars, by fiscal year)											
Changes in Mandatory Spending												
Outlays for premium credits	22	45	63	72	75	77	81	86	89	92	95	775
Cost-sharing subsidies	6	10	12	14	14	14	15	16	17	17	18	147
Exchange grants to states	1	1	*	0	0	0	0	0	0	0	0	1
Payments for risk adjustment and reinsurance[c]	16	16	17	15	17	19	19	20	20	19	19	181
Total, Exchange Subsidies and Related Spending	**45**	**71**	**93**	**101**	**106**	**110**	**116**	**122**	**125**	**128**	**131**	**1,104**
Changes in Revenues												
Reductions in revenues from premium credits	-5	-9	-12	-13	-14	-14	-14	-14	-14	-14	-14	-134
Collections for risk adjustment and reinsurance[c]	17	15	17	15	17	19	19	20	20	19	19	180
Total, Revenues	**12**	**5**	**5**	**2**	**3**	**4**	**5**	**5**	**5**	**5**	**5**	**46**
Net Increase in the Deficit From Exchange Subsidies and Related Spending and Revenues	32	66	87	99	103	106	111	117	120	123	127	1,058
Memorandum:												
Total Exchange Subsidies (Billions of dollars)[d]												
By fiscal year	32	64	87	99	103	106	111	117	120	123	127	1,057
By calendar year	38	75	92	102	104	106	113	118	121	124	128	1,084
Average Exchange Subsidy per Subsidized Enrollee (Dollars, by calendar year)	4,330	4,700	4,940	5,350	5,620	5,930	6,260	6,650	6,990	7,340	7,710	n.a.

Sources: Congressional Budget Office; staff of the Joint Committee on Taxation.

Note: SHOP = Small Business Health Options Program; n.a. = not applicable; * = between zero and $500 million.

a. Figures reflect average enrollment over the course of a year and include spouses and dependents covered under family policies. Figures for the nonelderly population include residents of the 50 states and the District of Columbia who are younger than 65.

b. Excludes coverage purchased directly from insurers outside of an exchange.

c. CBO's April 2014 baseline for direct spending and revenues also included the net collections and payments for risk corridors. The risk corridors program is included in CBO's January 2015 baseline as a discretionary program. CBO estimates that the payments and collections for the risk corridors program will each total $1 billion in fiscal year 2015, $1.5 billion in fiscal year 2016, and $2.5 billion in fiscal year 2017.

d. Total exchange subsidies include premium credit outlays, reductions in revenues from premium credits, and outlays for cost-sharing subsidies.

Medicaid or CHIP because of the ACA is expected to be even larger—about 11 million in 2015 and 13 million to 16 million in each year between 2016 and 2025 (see Table B-2 on page 119).

Several factors account for the increase over time in the number of additional people enrolled in Medicaid or CHIP because of the ACA. Some of those additional enrollees will be people who are eligible for Medicaid because of the ACA's expansion of coverage: CBO and JCT expect that, in future years, more states will expand eligibility for Medicaid, and more people in states that have already expanded eligibility will enroll in the program. Others of the additional enrollees will be people who would have been eligible for Medicaid or CHIP in the absence of the ACA but would not have enrolled: CBO and JCT expect that the ACA's individual mandate, increased outreach, and new opportunities for people deemed eligible for those programs to apply via the exchanges will increase enrollment among that group.[9]

As with enrollment through the exchanges, the numbers that CBO and JCT project for Medicaid and CHIP enrollment represent averages over the course of a year and differ from enrollment at any particular point during a year. Unlike exchange plans, for which enrollment opportunities are limited to an annual open-enrollment period and times at which people experience qualifying life events, people who are eligible for Medicaid or CHIP can enroll at any time during a year. People move into and out of those programs for many reasons, including changes in their need for health care, a change in their awareness of the availability of coverage, and changes in their financial circumstances.

The ACA's total effect on enrollment in Medicaid can never be precisely determined. In particular, the number of people who were previously eligible and who sign up for the program after 2013 because of the ACA can be estimated but not observed directly. However, the number of people who sign up who are newly eligible can eventually be determined because states that expand coverage under the ACA will report the number of enrollees who became eligible as a result of that expansion in order to receive the additional federal funding that is provided for such enrollees.

CBO and JCT estimate that the added costs to the federal government for Medicaid and CHIP resulting from the ACA will be $47 billion in 2015 and will grow to $76 billion in 2018 and $117 billion in 2025. For the 2016–2025 period as a whole, those costs are projected to total $920 billion (see Table B-1 on page 117).[10]

Tax Credits for Small Employers

Certain small employers are eligible to receive tax credits to defray the cost of providing health insurance to their employees. CBO and JCT project that those tax credits will total $2 billion in 2015 and $15 billion over the 2016–2025 period.

Penalty Payments and Excise Taxes

Under the ACA, some large employers who do not offer health insurance that meets certain standards will need to pay a penalty if they have full-time employees who receive a subsidy through an exchange. The standards specify thresholds for affordability and the share of the cost of covered benefits paid by the employer's insurance plan.[11] The requirement generally applies to employers with at least 50 full-time-equivalent (FTE) employees, but this year, employers with at least 50 but fewer than 100 FTE employees will be exempt from the requirement if they certify that they have not diminished health insurance coverage in certain ways or reduced their number

9. Under current law, CHIP is funded through 2015, and CBO's projection of annual spending for the program is expected to reach $10 billion in 2015. If the Congress does not provide additional funding for subsequent years, most state programs will terminate at some point during fiscal year 2016. However, under the rules governing baseline projections for expiring programs, CBO projects funding for CHIP after 2015 at an annualized amount of about $6 billion; the estimates of enrollment shown here are based on that projected amount of funding. Because such funding is substantially less than the funding provided through 2015, projected enrollment in CHIP in CBO's baseline declines after that year. (For details about the CHIP baseline, see Chapter 3.)

10. Under current law, states have the flexibility to make programmatic and other budgetary changes to Medicaid and CHIP. CBO estimates that state spending on Medicaid and CHIP over the 2016–2025 period will be about $63 billion higher because of the coverage provisions of the ACA than it would have been otherwise.

11. To meet the standards, the cost to the employee for self-only coverage must not exceed a specified share of income (which is 9.56 percent in 2015 and is indexed for inflation over time), and the plan must pay at least 60 percent of the cost of covered benefits.

of FTE employees to avoid the penalty. CBO and JCT estimate that payments of those penalties will total $164 billion over the 2016–2025 period.

In addition, most citizens of the United States and lawfully present noncitizens are required to obtain health insurance or pay a penalty. People who do not obtain coverage owe the greater of two amounts: (1) a flat dollar penalty per uninsured adult in a family, rising from $325 in 2015 to $695 in 2016 and indexed to inflation thereafter (the penalty for an uninsured child is half the amount for an uninsured adult, and an overall cap applies to family payments), or (2) a percentage of a household's adjusted gross income in excess of the income threshold for mandatory tax-filing—a share that will rise from 2.0 percent in 2015 to 2.5 percent in 2016 and subsequent years (also subject to a cap). CBO and JCT estimate that such payments from individuals will total $47 billion over the 2016–2025 period.

Among the roughly 36 million nonelderly residents that CBO and JCT estimate will be uninsured in 2015, the majority will be exempt from the penalty. Those who are exempt include unauthorized immigrants (who are prohibited from receiving exchange subsidies and almost all Medicaid benefits), people with income low enough that they do not file income tax returns, people who have income below 138 percent of federal poverty guidelines and are ineligible for Medicaid because their state did not expand the program, members of Indian tribes, people who are incarcerated, and people whose premiums exceed a specified share of their income (which is 8.05 percent in 2015 and is indexed for inflation over time).

According to CBO and JCT's estimates, federal revenues stemming from the excise tax on high-premium insurance plans will be $149 billion over the 2016–2025 period. Roughly one-quarter of that amount will stem from excise tax receipts, and three-quarters will come from the effects on revenues of changes in employees' taxable compensation. In particular, CBO and JCT anticipate that many employers and workers will shift to health plans with premiums that are below the specified thresholds to avoid paying the tax, resulting generally in higher taxable wages for affected workers.

Other Effects on Revenues and Outlays

Changes in insurance coverage under the ACA also affect federal tax revenues and outlays because fewer people will have employment-based health insurance and thus more of their income will take the form of taxable wages. CBO and JCT project that, as a result of the ACA, between 7 million and 10 million fewer people will have employment-based insurance coverage each year from 2016 through 2025 than would have been the case in the absence of the ACA. That difference is the net result of projected increases and decreases in offers of health insurance from employers and in decisions to enroll by active workers, early retirees (people under the age of 65 at retirement), and their families.

In 2019, for example, about 13 million people who would have enrolled in employment-based coverage in the absence of the ACA will not have an offer of such coverage under current law, CBO and JCT estimate; in addition, an estimated 3 million people who would have enrolled in employment-based coverage in the absence of the ACA will still have such an offer but will choose not to enroll in that coverage. Some of those 16 million people are expected to gain coverage through some other source; others will forgo health insurance. Those decreases in employment-based coverage will be partially offset, however. About 7 million people who would not have had employment-based coverage in the absence of the ACA are expected to receive such coverage under current law; they will either take up an offer of coverage they would have received anyway or take up a new offer. Some of those enrollees would have been uninsured in the absence of the ACA. On balance, an estimated 9 million fewer people will have employment-based insurance under current law than would have had it in the absence of the ACA.

Because of the net reduction in employment-based coverage, the share of workers' pay that takes the form of nontaxable benefits (such as payments toward health insurance premiums) will be smaller—and the share that takes the form of taxable wages will be larger—than would otherwise have been the case. That shift in compensation is projected to reduce deficits by a total of $292 billion over the 2016–2025 period by boosting federal tax receipts (and reducing outlays from certain refundable tax credits). Partially offsetting those added receipts will be an estimated $8 billion increase in Social Security benefits that will be paid because of the higher wages paid to workers. All told, CBO and JCT project, those changes will reduce federal budget deficits by $284 billion over the 2016–2025 period.

Changes in the Estimates Since April 2014

CBO and JCT currently project that the insurance coverage provisions of the ACA will have a smaller budgetary cost than they estimated in April 2014, when the agencies last published a detailed projection for those provisions. For the 2015–2024 period (the period covered by last April's estimates), CBO and JCT have lowered their estimate of the net costs, from $1,383 billion to $1,281 billion (see Table B-4).[12] That reduction of $101 billion (or 7 percent) largely comprises the following:

- A $68 billion reduction in the net cost of exchange subsidies and related spending and revenues;
- A $59 billion increase in federal spending for Medicaid and CHIP; and
- A $97 billion net increase in revenues (and decrease in outlays from certain refundable tax credits) arising from projected changes in coverage offered through employers.

In addition to those three sets of changes, which are discussed below, the revision also reflects an increase in net costs of $5 billion stemming from changes in estimated penalty payments and estimated collections from the excise tax on high-premium insurance plans.

Various factors, including new data and improvements in the agencies' modeling, account for the differences. Relevant updates of information included these: Average enrollment in the exchanges over the course of 2014 was slightly lower than anticipated; enrollment in "bronze" plans (which pay about 60 percent of the costs of covered benefits) during 2014 was higher than anticipated; and the estimated proportion of Medicaid enrollees who were newly eligible under the ACA was larger than expected.

Exchange Subsidies and Related Spending and Revenues

CBO and JCT now project that the government's net costs for exchange subsidies and related spending and revenues over the 2015–2024 period will be $964 billion, $68 billion (or 7 percent) below the previous projection:

- Premium assistance tax credits are projected to be $827 billion, about $28 billion (or 3 percent) less than in the previous projection, and
- Cost-sharing subsidies are projected to be $135 billion, about $39 billion (or 23 percent) less than in the previous projection.[13]

Premium Assistance Tax Credits. Lower estimated enrollment in coverage obtained through the exchanges in every year accounts for the majority of the $28 billion reduction in the estimated cost of premium assistance tax credits.

CBO and JCT have reduced their estimate of average enrollment over the course of 2015 by 1 million people, from 13 million to 12 million. That revision occurred for two reasons. First, attrition from exchange plans during calendar year 2014 was slightly greater than the agencies had previously anticipated. Second, enrollment between mid-November and mid-December for coverage in 2015 was slightly lower than the agencies had previously anticipated. (About 7 million people selected a plan during that period.)[14] CBO and JCT expect that many people will sign up near the end of the ongoing open-enrollment period, which lasts through mid-February, following a pattern similar to last year's. Even so, the agencies now view 12 million (rather than 13 million) as being closer to

12. See Congressional Budget Office, *Updated Estimates of the Effects of the Insurance Coverage Provisions of the Affordable Care Act, April 2014* (April 2014), www.cbo.gov/publication/45231.

13. In addition, the risk corridors program has been reclassified in the federal budget as discretionary rather than mandatory. As a result, collections and payments for that program are included in the discretionary portion of CBO's baseline estimates and are no longer included here as part of "exchange subsidies and related spending and revenues." Because CBO had previously estimated that collections and payments for the program would exactly offset each other, that reclassification has no effect on CBO and JCT's estimates of the net costs of the insurance coverage provisions of the ACA. However, the change reduces both mandatory outlays and revenues relative to previous projections.

14. About 6.4 million people enrolled through federally facilitated exchanges through December 19 (see Department of Health and Human Services, "Open Enrollment Week 5: December 13–December 19, 2014," *HHS Blog* [December 23, 2014], http://go.usa.gov/znbA), and another 0.6 million people enrolled through state-based exchanges through December 13 (see Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation, *Health Insurance Marketplace 2015 Open Enrollment Period: December Enrollment Report*, ASPE Issue Brief [December 2014], http://go.usa.gov/tVx4).

Table B-4.

Comparison of CBO and JCT's Current and Previous Estimates of the Effects of the Insurance Coverage Provisions of the Affordable Care Act

	April 2014 Baseline	January 2015 Baseline	Difference
	Change in Insurance Coverage Under the ACA in 2024 (Millions of nonelderly people, by calendar year)[a]		
Insurance Exchanges	25	24	-1
Medicaid and CHIP	13	16	3
Employment-Based Coverage[b]	-7	-9	-1
Nongroup and Other Coverage[c]	-5	-4	*
Uninsured[d]	-26	-27	-1
	Effects on the Cumulative Federal Deficit, 2015 to 2024[e] (Billions of dollars)		
Exchange Subsidies and Related Spending and Revenues[f]	1,032	964	-68
Medicaid and CHIP Outlays	792	851	59
Small-Employer Tax Credits[g]	15	14	**
Gross Cost of Coverage Provisions	1,839	1,829	-9
Penalty Payments by Uninsured People	-46	-43	3
Penalty Payments by Employers[g]	-139	-140	-1
Excise Tax on High-Premium Insurance Plans[g]	-120	-116	4
Other Effects on Revenues and Outlays[h]	-152	-249	-97
Net Cost of Coverage Provisions	**1,383**	**1,281**	**-101**

Sources: Congressional Budget Office; staff of the Joint Committee on Taxation.

Note: ACA = Affordable Care Act; CHIP = Children's Health Insurance Program; * = between zero and 500,000; ** = between -$500 million and zero.

a. Figures for the nonelderly population include residents of the 50 states and the District of Columbia who are younger than 65.

b. The change in employment-based coverage is the net result of projected increases and decreases in offers of health insurance from employers and changes in enrollment by workers and their families.

c. "Other" includes Medicare; the changes under the ACA are almost entirely for nongroup coverage.

d. The uninsured population includes people who will be unauthorized immigrants and thus ineligible either for exchange subsidies or for most Medicaid benefits; people who will be ineligible for Medicaid because they live in a state that has chosen not to expand coverage; people who will be eligible for Medicaid but will choose not to enroll; and people who will not purchase insurance to which they have access through an employer, through an exchange, or directly from an insurer.

e. Positive numbers indicate an increase in the deficit; negative numbers indicate a decrease in the deficit. These numbers exclude effects on the deficit of provisions of the ACA that are not related to insurance coverage and discretionary spending effects of the coverage provisions.

f. Includes spending for exchange grants to states and net spending and revenues for risk adjustment and reinsurance. The risk corridors program is now recorded in the budget as a discretionary program; CBO estimates that payments and collections will offset each other in each year, resulting in no net budgetary effect.

g. These effects on the deficit include the associated effects of changes in taxable compensation on revenues.

h. Consists mainly of the effects of changes in taxable compensation on revenues.

the middle of the distribution of possible outcomes for average enrollment during 2015 as a whole.

For 2016, CBO and JCT have also revised downward their estimate of average enrollment through exchanges, from 24 million to 21 million. The agencies still expect enrollment to grow rapidly over the next two years in response to increased outreach by state health agencies and others and to increased awareness of the individual mandate; however, that growth is now anticipated to occur a little more gradually than it was previously.

In addition, for most years after 2016, CBO and JCT currently estimate that enrollment through exchanges will be 1 million lower than previously thought. That reduction primarily reflects an increase in the number of children who are expected to receive coverage through Medicaid, as discussed below.

CBO and JCT have incorporated several improvements to the modeling of benchmark premiums for exchange plans to better reflect the premium structure observed in 2014 and 2015. Those revisions resulted in higher projected premiums for some people and lower projected premiums for others, yielding largely offsetting effects on total exchange enrollment and a slight increase (on net) in premium assistance tax credits.

Cost-Sharing Subsidies. Outlays for cost-sharing subsidies over the 2015–2024 period are currently projected to be $39 billion less than previously estimated, primarily because CBO and JCT now expect that more people will forgo those subsidies by choosing to enroll in a bronze plan instead of a silver plan. (Although eligible low-income individuals must enroll in a silver plan to receive cost-sharing subsidies, they are not required to enroll in a silver plan to receive premium assistance tax credits.)

The agencies had previously estimated that few people would forgo cost-sharing subsidies; however, data released since April 2014 show that 15 percent of people who chose a plan through an exchange during the open-enrollment period for 2014 and who qualified for a premium assistance tax credit chose a bronze plan.[15]

15. See Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation, *Health Insurance Marketplace: Summary Enrollment Report for the Initial Annual Open Enrollment Period, ASPE Issue Brief* (May 2014), p. 21, http://go.usa.gov/MwFF.

Those data suggest that a significant number of people are selecting plans that minimize their monthly premium payments, even if the amounts they ultimately pay for health care (including out-of-pocket payments) exceed what they would pay under silver plans. Over time, CBO and JCT expect, some enrollees will switch from bronze plans to silver plans because they incur large medical bills or become concerned (perhaps because of outreach efforts by insurers or others) about the possibility of incurring large out-of-pocket payments. Nonetheless, the agencies expect that some people purchasing coverage through exchanges solely to comply with the individual mandate will be focused on minimizing their premium payments and thus will continue to choose bronze plans. Therefore, CBO and JCT now estimate that, in years after 2015, 3 million people who would have been eligible for cost-sharing subsidies if enrolled in a silver plan will forgo those subsidies by signing up for a bronze plan.

Medicaid and CHIP Outlays

CBO and JCT now project that the federal cost of the additional enrollment in Medicaid and CHIP under the ACA over the 2015–2024 period will be $851 billion, $59 billion (7 percent) more than the April 2014 projection. Roughly half of the upward revision reflects an increase in the estimated share of people enrolling in Medicaid under the ACA who will be newly eligible because of the law (and a decrease in the share who would have been eligible but would not have enrolled in the absence of the law). The remainder of the upward revision can be attributed mostly to an increase in the number of children who are projected to enroll in Medicaid after 2015, when CHIP is no longer funded under current law.

The Composition of Enrollment in Medicaid. CBO and JCT now estimate that enrollment in Medicaid in 2014 among those eligible for the program because of the ACA's coverage expansion was higher than originally thought and that enrollment among those previously eligible for the program was lower. As a result, the agencies now project that newly eligible Medicaid enrollees will represent a larger share of the projected increment to Medicaid enrollment under the ACA in future years as well. For 2015 and beyond, the agencies currently expect that roughly 70 percent of the people who will receive Medicaid coverage because of the ACA will be newly eligible for the program, compared with 55 percent to 65 percent in the previous projection.

Federal costs per Medicaid enrollee are much higher for those who are newly eligible than for those who were previously eligible because the federal government pays a larger share of the costs for newly eligible enrollees (100 percent to 90 percent, depending on the year) than for other enrollees (an average of 57 percent). Therefore, the revision to the mix of enrollees resulted in a $29 billion increase in projected federal spending for Medicaid over the 2015–2024 period.

Enrollment of Children in CHIP and Medicaid. Under current law, states will receive no new budget authority for their CHIP programs in fiscal year 2016 and later. However, under the rules governing baseline projections for expiring programs, CBO projects funding for CHIP in each of those years of about $6 billion. That assumed funding level compares to total state allotments in 2014 of $9.7 billion. If CHIP is funded at the reduced $6 billion level, CBO and JCT expect that some children will lose coverage through CHIP and will instead receive coverage through Medicaid, obtain private coverage (through the exchanges or their parents' employers), or become uninsured. On the basis of information provided by the Medicaid and CHIP Payment and Advisory Commission regarding requirements in current law to provide Medicaid coverage to certain children if CHIP funding is reduced, CBO and JCT now estimate that more of those children (about 3 million by 2024) will receive coverage through Medicaid rather than through the exchanges and employment-based coverage than the agencies previously estimated.[16] As a result, the agencies project greater spending for Medicaid (and reductions in enrollment through the exchanges and employment-based coverage, with corresponding budgetary effects).

Other Effects on Revenues and Outlays

CBO and JCT now anticipate that the ACA's insurance coverage provisions will have other effects on revenues and outlays that will, on net, reduce the deficit by $97 billion more for the 2015–2024 period than was anticipated previously. That revision stems from improvements in estimating methodology and from a downward revision to the number of people who are projected to have employment-based coverage in most years.

16. Medicaid and CHIP Payment and Access Commission, *Report to Congress on Medicaid and CHIP* (June 2014), pp. 6 and 8, www.macpac.gov/reports.

The lower estimate of the number of people who will have employment-based coverage (about 1 million fewer in most years of the projection period than thought previously) derives largely from an increase in the number of children who are expected to receive coverage through Medicaid after 2015. Less employment-based coverage means that nontaxable compensation in the form of health benefits provided by employers will be less and taxable compensation in the form of wages and salaries will be greater, as total compensation is expected to remain roughly the same. And to the extent that wages and salaries do not increase as much as payments for health benefits are reduced, corporate profits—which are also taxable—would increase. Therefore, the decrease in the estimate of employment-based coverage implies higher federal revenues than projected previously.

Other methodological improvements also increased CBO and JCT's estimate of tax revenues stemming from projected changes in coverage through employers. For example, as previously discussed, the new projections include modeling improvements to benchmark premiums for exchange plans. Although those changes resulted in largely offsetting effects on the number of people projected to have employment-based health insurance, the average income of those projected to no longer obtain employment-based insurance under the ACA is now higher than previously estimated. As a result, the reduction in employment-based insurance under the ACA yields a larger increase in federal revenues than previously estimated.

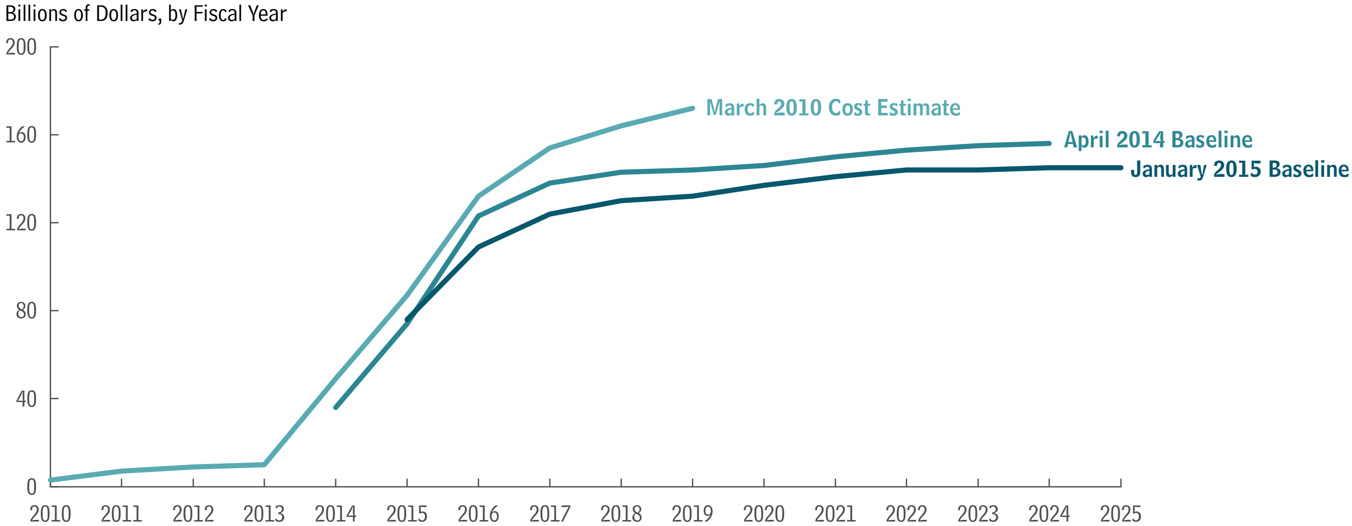
Changes in the Estimates Since the Enactment of the ACA

CBO and JCT have updated their baseline estimates of the budgetary effects of the ACA's insurance coverage provisions many times since the law was enacted in March 2010. As time has passed, projected costs over the subsequent 10 years have risen because the period spanned by the estimates has changed: Each time the projection period changes, a less expensive early year is replaced by a more expensive later year. But when compared year by year, CBO and JCT's estimates of the net budgetary impact of the ACA's insurance coverage provisions have decreased, on balance, over the past five years (see Figure B-2).

In March 2010, CBO and JCT projected that the provisions of the ACA related to health insurance coverage

Figure B-2.

Comparison of CBO and JCT's Estimates of the Net Budgetary Effects of the Coverage Provisions of the Affordable Care Act



Sources: Congressional Budget Office; staff of the Joint Committee on Taxation.

Note: These numbers exclude effects on the deficit of provisions of the Affordable Care Act that are not related to insurance coverage and effects on discretionary spending of the coverage provisions.

would cost the federal government $710 billion during fiscal years 2015 through 2019 (the last year of the 10-year projection period used in that estimate). The newest projections indicate that those provisions will cost $571 billion over that same period, a reduction of 20 percent. For 2019, for example, CBO and JCT projected in March 2010 that the ACA's insurance coverage provisions would have a net federal cost of $172 billion; the current projections show a cost of $132 billion—a reduction of $40 billion, or 23 percent.

The downward revision since March 2010 to CBO and JCT's estimate of the net federal costs of the ACA's insurance coverage provisions (when measured on a year-by-year basis) is attributable to many factors: Changes in law, revisions to CBO's economic projections, the Supreme Court decision that made the expansion of eligibility for Medicaid optional for states, administrative actions, new data, and numerous improvements in CBO and JCT's modeling have all affected the projections. Another notable influence on the downward revision to projected federal costs is the slowdown in the growth of health care costs that has been experienced by private insurers, as well as by the Medicare and Medicaid programs. Although views differ on how much of the slowdown is attributable to the recession and its aftermath and how much to other factors, the slower growth has been sufficiently broad and persistent to persuade the agencies to significantly lower their projections of federal health care spending. In particular, since early 2010, CBO and JCT have reduced their 2016 projections of both insurance premiums for policies purchased through the exchanges and Medicaid spending per beneficiary by between 10 percent and 15 percent.

APPENDIX

C

How Changes in Economic Projections Might Affect Budget Projections

The federal budget is highly sensitive to economic conditions. Revenues depend on the amount of taxable income, including wages and salaries, other income received by individuals, and corporate profits. Those types of income generally rise or fall with overall economic activity, although not necessarily in proportion. Spending for many mandatory programs depends on inflation, either through explicit cost-of-living adjustments or in other ways. In addition, the U.S. Treasury regularly refinances portions of the government's outstanding debt—and issues more debt to finance new deficits—at market interest rates. Thus, the amount that the federal government spends for interest on its debt is directly tied to those rates.

To show how projections for the economy can affect projections of the federal budget, the Congressional Budget Office has constructed simplified "rules of thumb." The rules provide a rough sense of how differences in individual economic variables, taken in isolation, would affect the budget totals; they are not, however, substitutes for a full analysis of the implications of alternative economic forecasts.

The rules of thumb have been developed for three variables:

- Growth of real (inflation-adjusted) gross domestic product (GDP),
- Interest rates, and
- Inflation.

All three rules of thumb reflect alternative assumptions about economic conditions beginning in January 2015. CBO's rule of thumb for the growth of real GDP shows the effects of growth rates that are 0.1 percentage point lower each year than the rates that underlie the agency's baseline budget projections. (The budget projections are summarized in Chapter 1, and the economic projections are described in Chapter 2.) The rule of thumb for interest rates shows the effects of rates that are 1 percentage point higher each year than the rates used in the baseline; because inflation is held equal to its baseline projection in this rule of thumb, the results show the effects of higher real interest rates. Finally, the rule of thumb for inflation shows the effects of inflation that is 1 percentage point higher each year than projected in the baseline.

Each rule of thumb is roughly symmetrical. Thus, if instead economic growth was 0.1 percentage point higher than in CBO's baseline, or if interest rates or inflation were 1 percentage point lower, the effects would be about the same as those shown here, but with the opposite sign.[1]

CBO chose variations of 0.1 percentage point and 1 percentage point solely for simplicity. Those differences do not necessarily indicate the extent to which actual economic performance might differ from CBO's projections. For example, although the rule of thumb for real GDP growth shows the effects of a difference of 0.1 percentage point, the standard deviation of the 10-year average of growth rates for real GDP is 0.7 percentage points.[2] And

1. Interest rates on short-term Treasury securities could not be much lower in the near term. Those rates are currently near zero, and CBO does not project them to rise much until fiscal year 2016.

2. Standard deviation is a conventional measure of variability. In the case of real GDP growth, CBO calculated the extent to which actual growth over 10-year periods differed from the post–World War II average. The standard deviation is the size of the difference that was exceeded about one-third of the time.

although the rules of thumb for real interest rates and inflation show the effects of a difference of 1 percentage point, the standard deviations of the 10-year averages of real interest rates for 10-year Treasury notes and inflation are 1.5 and 2.1 percentage points, respectively.

Lower Real Growth

Stronger economic growth improves the budget's bottom line, and weaker growth worsens it. The first rule of thumb illustrates the effects of economic growth that is slightly weaker than expected. A change in the rate of real economic growth could affect inflation, unemployment, and interest rates; however, CBO's rule of thumb does not include the effects of changes in those variables.

CBO's baseline includes real GDP growth of between 2.7 percent and 3.0 percent for the next three calendar years and an average of 2.1 percent from 2018 to 2025. If 0.1 percentage point was subtracted from each of those rates, by 2025 GDP would be roughly 1 percent smaller than the amount underlying CBO's baseline.

Slower GDP growth would have several effects on the budget. If growth was 0.1 percentage point lower per year, it would result in less growth in taxable income and thus lower tax revenues—$2 billion less in 2015 and $59 billion less in 2025 (see Table C-1). With a smaller amount of revenues, the federal government would need to borrow more and thus would incur higher interest costs. Additional payments to service federal debt would be very small during the first few years of the projection period but larger in later years, reaching $11 billion by 2025. Mandatory spending, however, would be only slightly affected by a decline in economic growth of that magnitude: Medicare outlays would be somewhat lower, but that decrease would be partially offset by higher outlays for the refundable portions of the earned income and child tax credits.[3]

All told, if growth of real GDP each year was 0.1 percentage point lower than in CBO's baseline projections, annual deficits would be larger by amounts that would climb to $69 billion by 2025. The cumulative deficit for 2016 through 2025 would be $326 billion higher.

Higher Interest Rates

The second rule of thumb illustrates the sensitivity of the budget to changes in interest rates, which affect the flow of interest payments to and from the federal government. When the budget is in deficit, the Treasury must borrow additional funds from the public to cover the shortfall. Moreover, each year the Treasury refinances a substantial portion of the nation's outstanding debt at market interest rates. Those rates also help determine how much the Federal Reserve remits to the Treasury.

If interest rates on all types of Treasury securities were 1 percentage point higher each year through 2025 than projected in the baseline and all other economic variables were unchanged, the government's interest costs would be substantially larger. The difference would amount to only $12 billion in 2015 because most marketable government debt is in the form of securities that have maturities greater than one year. As the Treasury replaced maturing securities, however, the budgetary effects of higher interest rates would mount, climbing to an additional $198 billion in 2025 under this scenario (see Table C-1).

As part of its conduct of monetary policy, the Federal Reserve buys and sells Treasury securities and other securities, including, over the past few years, a large amount of mortgage-backed securities. The Federal Reserve also pays interest on reserves (deposits that banks hold at the central bank). The interest that the Federal Reserve earns on its portfolio of securities and the interest that it pays on reserves affect its remittances to the Treasury, which are counted as revenues. If all interest rates were 1 percentage point higher for the coming decade than CBO projects, the Federal Reserve's remittances would be lower for a number of years because higher interest payments on reserves would outstrip additional interest earnings on its portfolio. However, over time, the current holdings in the portfolio would mature and be replaced with higher-yielding investments; CBO projects that by 2023 the Federal Reserve's remittances would be higher if projected interest rates were higher. Overall, rates that were 1 percentage point higher than in CBO's baseline would

3. Medicare's payment rates for physicians' services are computed using a formula that compares annual spending with a target amount that partly reflects the growth of GDP. Slower GDP growth leads to a lower target and therefore to smaller Medicare payments to physicians. Tax credits reduce a taxpayer's income tax liability; if a refundable credit exceeds a taxpayer's other liability, all or a portion of the excess is refunded to the taxpayer and recorded as an outlay in the budget.

Table C-1.

How Selected Economic Changes Might Affect CBO's Baseline Budget Projections

Billions of Dollars

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Growth Rate of Real GDP Is 0.1 Percentage Point Lower per Year													
Change in Revenues	-2	-5	-9	-14	-19	-24	-30	-36	-43	-50	-59	-71	-288
Change in Outlays													
Mandatory spending	*	*	*	*	*	*	*	-1	-1	-1	-1	*	-4
Debt service	*	*	*	1	2	2	4	5	7	9	11	5	41
Total	*	*	*	1	1	2	3	4	6	8	10	5	37
Change in the Deficit[a]	**-2**	**-5**	**-9**	**-14**	**-20**	**-26**	**-33**	**-41**	**-49**	**-59**	**-69**	**-75**	**-326**
Interest Rates Are 1 Percentage Point Higher per Year													
Change in Revenues	-23	-28	-24	-17	-15	-9	-6	-3	1	3	5	-93	-93
Change in Outlays													
Higher interest rates	12	40	66	92	112	131	146	161	175	188	198	440	1,307
Debt service	*	2	5	11	18	26	35	45	56	68	79	63	345
Total	12	42	71	103	130	157	181	206	230	256	277	503	1,653
Change in the Deficit[a]	**-35**	**-70**	**-95**	**-120**	**-145**	**-166**	**-187**	**-209**	**-230**	**-253**	**-272**	**-596**	**-1,745**
Inflation Is 1 Percentage Point Higher per Year													
Change in Revenues	-6	21	63	109	155	208	264	323	388	459	536	555	2,526
Change in Outlays													
Discretionary spending[b]	0	1	1	2	3	4	5	13	24	36	50	11	139
Mandatory spending	3	15	34	57	86	116	150	191	229	270	325	308	1,473
Higher interest rates[c]	17	54	83	112	135	157	175	194	210	228	241	540	1,589
Debt service	*	2	4	7	11	15	20	24	30	35	40	39	188
Total	20	72	122	178	235	292	350	422	493	569	656	899	3,389
Change in the Deficit[a]	**-27**	**-50**	**-60**	**-70**	**-80**	**-85**	**-86**	**-99**	**-104**	**-110**	**-120**	**-344**	**-863**
Memorandum:													
Deficit in CBO's January 2015 Baseline	-468	-467	-489	-540	-652	-739	-814	-948	-953	-951	-1,088	-2,887	-7,641

Source: Congressional Budget Office.

Note: GDP = gross domestic product; * = between -$500 million and $500 million.

a. Negative numbers indicate an increase in the deficit.

b. Most discretionary spending through 2021 is governed by caps established by the Budget Control Act of 2011; in CBO's baseline, that spending would not be affected by changes in projected inflation.

c. The change in outlays attributable to higher interest rates in this scenario differs from the estimate in the scenario for interest rates because the principal of inflation-protected securities issued by the Treasury grows with inflation.

(holding all else equal) cause revenues to be $93 billion lower between 2016 and 2025.

The larger deficits generated by the increase in interest rates would require the Treasury to borrow more than is projected in the baseline. That extra borrowing would raise the cost of servicing the debt by amounts that would reach $79 billion in 2025.

All told, if interest rates were 1 percentage point higher than projected in CBO's baseline, the deficit would worsen progressively over the projection period by amounts increasing from $35 billion in 2015 to $272 billion in 2025. The cumulative deficit would be $1.7 trillion higher over the 2016–2025 period.

Higher Inflation

The third rule of thumb shows the budgetary effects of inflation that is 1 percentage point higher than is projected in CBO's baseline—with no differences in other economic variables except for interest rates, as described below. Although higher inflation increases both revenues and outlays, the net effect would be substantially larger budget deficits.

Larger increases in prices generally lead to greater wages, profits, and other income, which in turn generate larger collections of individual income taxes, payroll taxes, and corporate income taxes. The parameters in the individual income tax system that affect most taxpayers—including the income thresholds for both the regular and alternative minimum tax brackets, the standard deduction, and personal exemptions—are indexed for inflation. Therefore, the share of taxpayers' income taxed at certain rates does not change very much when income is higher because of higher inflation, so tax collections tend to rise roughly proportionally with income under those circumstances. However, some parameters of the individual income tax system are not indexed for inflation: For example, the income thresholds for the surtax on investment income are fixed in nominal dollars, so if income was higher because of higher inflation, the surtax would apply to a larger share of taxpayers' income.

For the payroll tax, rates are mostly the same across income levels, and the maximum amount of earnings subject to the Social Security tax rises with average wages in the economy, which generally rise more when inflation is higher; therefore, higher inflation leads to an increase in revenues that is roughly proportional to the increase in earnings. Similarly, because the brackets under the corporate income tax are not indexed for inflation and nearly all corporate profits are taxed at the top rate, an increase in profits due to higher inflation generates a roughly proportional increase in corporate tax revenues.

Higher inflation also increases the cost of many mandatory spending programs. Benefits for many mandatory programs are automatically adjusted each year to reflect increases in prices. Specifically, benefits paid for Social Security, federal employees' retirement programs, Supplemental Security Income, disability compensation for veterans, the Supplemental Nutrition Assistance Program, and child nutrition programs, among others, are adjusted (with a lag) for changes in the consumer price index or one of its components. Many of Medicare's payment rates also are adjusted annually for inflation. Spending for some other programs, such as Medicaid, is not formally indexed to price changes but tends to grow with inflation because the costs of providing benefits under those programs increase as prices rise. In addition, to the extent that initial benefit payments to participants in retirement and disability programs are linked to wages, increases in nominal wages resulting from higher inflation boost future outlays for those programs.

Higher inflation would raise CBO's baseline projections of future spending for discretionary programs, but only by a small amount. The Budget Control Act of 2011 (Public Law 112-25), as modified by subsequent legislation, imposes caps on most discretionary budget authority through 2021, and CBO's baseline incorporates the assumption that appropriations for most purposes will be equal to those caps. Higher inflation would not alter those caps and thus would have no effect on CBO's projections of those appropriations.

However, higher inflation would raise other projected appropriations for two reasons. First, the law specifies that the caps may be adjusted to accommodate appropriations for certain purposes. In 2015, those adjustments include $74 billion designated for overseas contingency operations, $6 billion in funding provided for disaster relief, $5 billion in emergency funding for responding to the outbreak of the Ebola virus, and $1.5 billion for initiatives aimed at enhancing program integrity by reducing improper payments from certain benefit programs. CBO's baseline extrapolates the funding provided for those purposes in future years on the basis of the 2015 amount with adjustments for inflation; if inflation was 1 percentage point higher, projected outlays from such funding would increase by $48 billion between 2016 and 2025. Second, CBO's baseline projections incorporate the assumption that the discretionary funding that is capped through 2021 will increase thereafter with inflation (from the amount of the cap in 2021); inflation that was 1 percentage point higher than in the baseline would boost projected outlays in those years by a total of $92 billion.

Although the caps on discretionary appropriations are not indexed for inflation, higher inflation would diminish the amount of goods that could be acquired and the benefits and services that could be provided under those fixed caps. If, over time, higher inflation led lawmakers to adjust the discretionary caps, the impact on spending would be greater and the net impact on the deficit would be more severe.

Inflation also has an impact on outlays for net interest because it affects interest rates. If inflation was 1 percentage point higher than CBO projects, for example, then interest rates would be 1 percentage point higher (all else being equal). As a result, new federal borrowing would incur higher interest costs, and outstanding inflation-indexed securities would be more costly for the federal government. In addition, higher interest rates would first reduce and then increase revenues from the Federal Reserve's remittances to the Treasury, as explained above.

If inflation each year was 1 percentage point higher than the rate underlying CBO's baseline, total revenues and outlays over the 10-year period would be about 6 percent and 7 percent greater, respectively, than in the baseline. Over the 2016–2025 period, the deficit would be $863 billion higher (see Table C-1).

APPENDIX

D

The Effects of Automatic Stabilizers on the Federal Budget as of 2015

During recessions, federal tax liabilities and, therefore, federal revenues automatically shrink because of the reductions in the taxable income of individuals and corporations that accompany downturns in the economy's total output of goods and services. In addition, some federal outlays—payments of unemployment benefits, for example—automatically increase in a recession. Such reductions in tax collections and increases in outlays help bolster economic activity during downturns—thus they are known as automatic stabilizers—but they also temporarily boost budget deficits. By contrast, when real (inflation-adjusted) output—the nation's gross domestic product (GDP)—moves closer to the economy's maximum sustainable output (called potential GDP), revenues automatically rise and outlays automatically fall. Under those circumstances, automatic stabilizers provide less of a boost to economic activity. (In both cases, the effects of automatic stabilizers are additional to the effects of any legislated changes in tax and spending policies.)

The Congressional Budget Office uses statistical techniques to estimate the automatic effects of cyclical movements in real output and unemployment on federal revenues and outlays and, thus, on federal budget deficits. According to CBO's estimates, automatic stabilizers added significantly to the budget deficit—and thereby substantially strengthened economic activity relative to what it would have been otherwise—in fiscal years 2009 through 2014. On the basis of CBO's economic and budgetary projections under current law, the agency expects that automatic stabilizers will continue to add significantly to the budget deficit and to support economic activity in 2015 but to decline in size in 2016 and 2017 as the economy strengthens further. For the period from 2018 to 2025, CBO projects that GDP will fall slightly short of potential GDP, on average, which causes the automatic stabilizers to add small amounts to the projected budget deficit during those years. (See Chapter 2 for a discussion of CBO's economic projections for the next 10 years.)

How Large Were the Budgetary Effects of Automatic Stabilizers Last Year?

In fiscal year 2014, automatic stabilizers added $192 billion to the federal budget deficit, an amount equal to 1.1 percent of potential GDP, according to CBO's analysis (see Table D-1 and Table D-2).[1] That outcome marked the sixth consecutive year that automatic stabilizers added to the deficit by more than 1 percent of potential GDP—the longest such period over the past 50 years (see Figure D-1 on page 142). (The estimated sizes of the automatic stabilizers in different years are presented as percentages of potential rather than actual GDP because potential GDP excludes fluctuations that are attributable to the business cycle.)[2]

1. CBO's estimates of the automatic stabilizers reflect the assumption that discretionary spending and interest payments do not respond automatically to the business cycle. For a description of a methodology for estimating automatic stabilizers that is similar to CBO's methodology, see Darrel Cohen and Glenn Follette, "The Automatic Fiscal Stabilizers: Quietly Doing Their Thing," *Economic Policy Review*, Federal Reserve Bank of New York, vol. 6, no. 1 (April 2000), pp. 35–68, http://tinyurl.com/pcxcohz. See also Glenn Follette and Byron Lutz, *Fiscal Policy in the United States: Automatic Stabilizers, Discretionary Fiscal Policy Actions, and the Economy,* Finance and Economics Discussion Series Paper 2010–43 (Board of Governors of the Federal Reserve System, June 2010), http://tinyurl.com/nl6qc6e.

2. For CBO's previous estimates of the automatic stabilizers, see Congressional Budget Office, *The Budget and Economic Outlook: 2014 to 2024* (February 2014), Appendix E, www.cbo.gov/publication/45010. Revisions to estimates since that publication stem from the July 2014 annual revision of the national income and product accounts by the Bureau of Economic Analysis, changes to CBO's economic estimates and projections, and technical improvements in CBO's approach to estimating the automatic stabilizers.

Table D-1.

Deficit or Surplus With and Without CBO's Estimate of Automatic Stabilizers, and Related Estimates, in Billions of Dollars

	Deficit (-) or Surplus With Automatic Stabilizers	– Automatic Stabilizers	= Deficit (-) or Surplus Without Automatic Stabilizers	Revenues and Outlays Without Automatic Stabilizers		GDP Gap[a]	Unemployment Gap (Percent)[b]
				Revenues	Outlays		
1965	-1	4	-5	114	119	10	-0.7
1966	-4	11	-15	122	137	35	-1.7
1967	-9	11	-20	141	161	34	-2.0
1968	-25	10	-36	146	182	31	-2.0
1969	3	13	-10	178	188	36	-2.4
1970	-3	6	-9	191	200	12	-1.9
1971	-23	-4	-19	192	211	-10	-0.2
1972	-23	-2	-21	210	231	-2	-0.1
1973	-15	11	-26	222	248	39	-0.9
1974	-6	10	-16	257	273	24	-1.2
1975	-53	-20	-33	297	330	-63	1.2
1976	-74	-26	-48	317	365	-60	1.8
1977	-54	-15	-39	366	404	-37	1.1
1978	-59	-1	-58	400	458	-7	*
1979	-41	7	-48	458	506	9	-0.4
1980	-74	-21	-53	536	589	-68	0.6
1981	-79	-33	-46	624	670	-74	1.2
1982	-128	-78	-50	677	727	-210	3.0
1983	-208	-104	-104	673	777	-249	4.1
1984	-185	-34	-151	689	840	-92	1.8
1985	-212	-12	-200	740	940	-47	1.2
1986	-221	-9	-212	772	985	-34	1.0
1987	-150	-14	-136	866	1,001	-50	0.4
1988	-155	4	-159	907	1,066	5	-0.3
1989	-153	19	-172	976	1,148	47	-0.7
1990	-221	9	-230	1,026	1,256	16	-0.5
1991	-269	-57	-212	1,107	1,319	-177	0.8
1992	-290	-73	-217	1,152	1,369	-185	1.7
1993	-255	-67	-188	1,209	1,397	-174	1.5
1994	-203	-51	-153	1,301	1,454	-130	0.9
1995	-164	-40	-124	1,389	1,513	-122	0.3
1996	-107	-40	-68	1,490	1,558	-113	0.2
1997	-22	-3	-19	1,588	1,606	-16	*
1998	69	25	44	1,702	1,658	63	-0.5
1999	126	72	54	1,764	1,710	191	-0.7

Continued

Table D-1. **Continued**

Deficit or Surplus With and Without CBO's Estimate of Automatic Stabilizers, and Related Estimates, in Billions of Dollars

	Deficit (-) or Surplus With Automatic Stabilizers	–	Automatic Stabilizers	=	Deficit (-) or Surplus Without Automatic Stabilizers	Revenues and Outlays Without Automatic Stabilizers		GDP Gap[a]	Unemployment Gap (Percent)[b]
						Revenues	Outlays		
2000	236		115		121	1,923	1,802	295	-1.0
2001	128		57		71	1,944	1,873	101	-0.7
2002	-158		-44		-114	1,890	2,004	-139	0.7
2003	-378		-94		-284	1,862	2,146	-266	1.0
2004	-413		-55		-357	1,923	2,281	-132	0.6
2005	-318		-15		-303	2,164	2,467	-30	0.2
2006	-248		11		-259	2,399	2,658	19	-0.3
2007	-161		-7		-154	2,583	2,737	-58	-0.5
2008	-459		-70		-389	2,592	2,980	-249	0.3
2009	-1,413		-320		-1,093	2,365	3,458	-1,012	3.5
2010	-1,294		-373		-921	2,443	3,364	-944	4.6
2011	-1,300		-336		-964	2,550	3,514	-857	3.9
2012	-1,087		-272		-815	2,650	3,465	-713	3.0
2013	-680		-247		-432	2,968	3,400	-662	2.1
2014	-483		-192		-291	3,183	3,474	-522	1.0
2015	-468		-124		-343	3,303	3,646	-353	0.2
2016	-467		-61		-406	3,518	3,923	-164	0.1
2017	-489		-19		-470	3,606	4,075	-49	*
2018	-540		-13		-527	3,727	4,254	-40	*
2019	-652		-33		-620	3,893	4,513	-91	0.2
2020	-739		-43		-696	4,062	4,758	-108	0.2
2021	-814		-46		-768	4,242	5,010	-113	0.2
2022	-948		-47		-901	4,428	5,329	-117	0.2
2023	-953		-49		-904	4,631	5,536	-122	0.2
2024	-951		-51		-900	4,846	5,745	-127	0.2
2025	-1,088		-53		-1,034	5,073	6,108	-132	0.2

Sources: Congressional Budget Office; Office of Management and Budget.

Notes: Automatic stabilizers are automatic changes in revenues and outlays that are attributable to cyclical movements in real (inflation-adjusted) output and unemployment.

Shaded amounts are actual deficits or surpluses.

GDP = gross domestic product; * = between -0.05 percent and 0.05 percent.

a. The GDP gap equals actual or projected GDP minus CBO's estimate of potential GDP (the maximum sustainable output of the economy).

b. The unemployment gap equals the actual or projected rate of unemployment minus the underlying long-term rate of unemployment.

Table D-2.

Deficit or Surplus With and Without CBO's Estimate of Automatic Stabilizers, and Related Estimates, as a Percentage of Potential Gross Domestic Product

	Deficit (-) or Surplus With Automatic Stabilizers	– Automatic Stabilizers	= Deficit (-) or Surplus Without Automatic Stabilizers	Revenues and Outlays Without Automatic Stabilizers: Revenues	Revenues and Outlays Without Automatic Stabilizers: Outlays	GDP Gap[a]	Unemployment Gap (Percent)[b]
1965	-0.2	0.5	-0.7	16.3	17.0	1.5	-0.7
1966	-0.5	1.5	-1.9	16.4	18.3	4.7	-1.7
1967	-1.1	1.4	-2.5	17.5	20.0	4.3	-2.0
1968	-2.9	1.2	-4.1	16.8	20.9	3.6	-2.0
1969	0.3	1.4	-1.1	18.8	19.9	3.8	-2.4
1970	-0.3	0.6	-0.8	18.4	19.3	1.1	-1.9
1971	-2.0	-0.3	-1.7	17.0	18.7	-0.8	-0.2
1972	-1.9	-0.2	-1.7	17.2	18.9	-0.2	-0.1
1973	-1.1	0.9	-2.0	16.8	18.8	2.9	-0.9
1974	-0.4	0.7	-1.1	17.6	18.7	1.6	-1.2
1975	-3.2	-1.2	-2.0	17.7	19.7	-3.8	1.2
1976	-4.0	-1.4	-2.6	17.1	19.7	-3.2	1.8
1977	-2.6	-0.7	-1.9	17.7	19.6	-1.8	1.1
1978	-2.6	*	-2.6	17.5	20.1	-0.3	*
1979	-1.6	0.3	-1.9	17.9	19.8	0.3	-0.4
1980	-2.6	-0.7	-1.9	18.7	20.5	-2.4	0.6
1981	-2.5	-1.0	-1.4	19.4	20.9	-2.3	1.2
1982	-3.6	-2.2	-1.4	19.2	20.6	-6.0	3.0
1983	-5.5	-2.7	-2.7	17.8	20.5	-6.6	4.1
1984	-4.6	-0.8	-3.7	17.0	20.8	-2.3	1.8
1985	-4.9	-0.3	-4.6	17.1	21.8	-1.1	1.2
1986	-4.8	-0.2	-4.6	16.9	21.6	-0.7	1.0
1987	-3.1	-0.3	-2.8	17.9	20.7	-1.0	0.4
1988	-3.0	0.1	-3.1	17.6	20.7	0.1	-0.3
1989	-2.8	0.3	-3.1	17.7	20.8	0.8	-0.7
1990	-3.7	0.2	-3.9	17.4	21.3	0.3	-0.5
1991	-4.3	-0.9	-3.4	17.6	21.0	-2.8	0.8
1992	-4.4	-1.1	-3.3	17.4	20.7	-2.8	1.7
1993	-3.7	-1.0	-2.7	17.3	20.0	-2.5	1.5
1994	-2.8	-0.7	-2.1	17.8	19.8	-1.8	0.9
1995	-2.1	-0.5	-1.6	18.0	19.6	-1.6	0.3
1996	-1.3	-0.5	-0.8	18.4	19.3	-1.4	0.2
1997	-0.3	*	-0.2	18.7	18.9	-0.2	*
1998	0.8	0.3	0.5	19.1	18.6	0.7	-0.5
1999	1.3	0.8	0.6	18.9	18.4	2.1	-0.7

Continued

Table D-2. **Continued**

Deficit or Surplus With and Without CBO's Estimate of Automatic Stabilizers, and Related Estimates, as a Percentage of Potential Gross Domestic Product

	Deficit (-) or Surplus With Automatic Stabilizers	– Automatic Stabilizers	= Deficit (-) or Surplus Without Automatic Stabilizers	Revenues and Outlays Without Automatic Stabilizers: Revenues	Revenues and Outlays Without Automatic Stabilizers: Outlays	GDP Gap[a]	Unemployment Gap (Percent)[b]
2000	2.4	1.2	1.2	19.5	18.3	3.0	-1.0
2001	1.2	0.5	0.7	18.6	17.9	1.0	-0.7
2002	-1.4	-0.4	-1.0	17.2	18.2	-1.3	0.7
2003	-3.3	-0.8	-2.4	16.1	18.5	-2.3	1.0
2004	-3.4	-0.5	-2.9	15.7	18.7	-1.1	0.6
2005	-2.5	-0.1	-2.3	16.7	19.1	-0.2	0.2
2006	-1.8	0.1	-1.9	17.6	19.5	0.1	-0.3
2007	-1.1	*	-1.1	18.0	19.0	-0.4	-0.5
2008	-3.1	-0.5	-2.6	17.3	19.9	-1.7	0.3
2009	-9.2	-2.1	-7.1	15.3	22.4	-6.6	3.5
2010	-8.2	-2.4	-5.9	15.5	21.4	-6.0	4.6
2011	-8.0	-2.1	-5.9	15.7	21.6	-5.3	3.9
2012	-6.5	-1.6	-4.9	15.8	20.7	-4.3	3.0
2013	-3.9	-1.4	-2.5	17.2	19.7	-3.8	2.1
2014	-2.7	-1.1	-1.6	17.9	19.5	-2.9	1.0
2015	-2.5	-0.7	-1.9	18.0	19.8	-1.9	0.2
2016	-2.5	-0.3	-2.1	18.5	20.7	-0.9	0.1
2017	-2.5	-0.1	-2.4	18.3	20.6	-0.2	*
2018	-2.6	-0.1	-2.6	18.1	20.7	-0.2	*
2019	-3.0	-0.2	-2.9	18.1	21.0	-0.4	0.2
2020	-3.3	-0.2	-3.1	18.1	21.2	-0.5	0.2
2021	-3.5	-0.2	-3.3	18.1	21.4	-0.5	0.2
2022	-3.9	-0.2	-3.7	18.2	21.9	-0.5	0.2
2023	-3.8	-0.2	-3.6	18.2	21.8	-0.5	0.2
2024	-3.6	-0.2	-3.4	18.3	21.7	-0.5	0.2
2025	-3.9	-0.2	-3.7	18.4	22.1	-0.5	0.2

Sources: Congressional Budget Office; Office of Management and Budget.

Notes: Automatic stabilizers are automatic changes in revenues and outlays that are attributable to cyclical movements in real (inflation-adjusted) output and unemployment.

Shaded amounts are actual deficits or surpluses.

GDP = gross domestic product; * = between -0.05 percent and 0.05 percent.

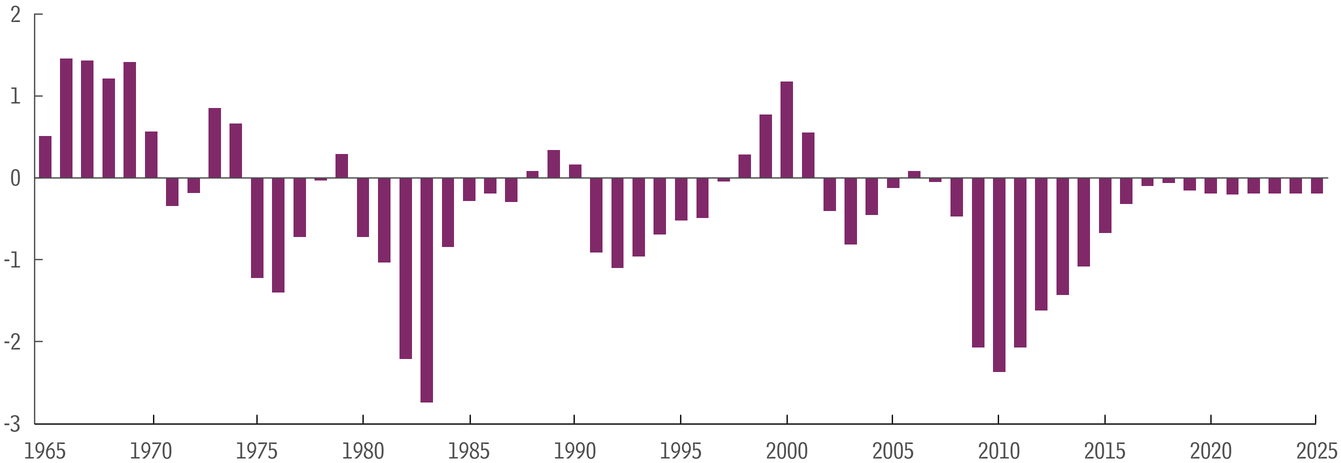
a. The GDP gap equals the difference between actual or projected GDP and CBO's estimate of potential GDP (the maximum sustainable output of the economy, expressed as a percentage of potential GDP).

b. The unemployment gap equals the actual or projected rate of unemployment minus the underlying long-term rate of unemployment.

Figure D-1.

Contribution of Automatic Stabilizers to Budget Deficits and Surpluses

Percentage of Potential Gross Domestic Product



Sources: Congressional Budget Office; Office of Management and Budget.

Notes: Automatic stabilizers are automatic changes in revenues and outlays that are attributable to cyclical movements in real (inflation-adjusted) output and unemployment.

Potential gross domestic product is CBO's estimate of the maximum sustainable output of the economy.

How Large Will the Budgetary Effects of Automatic Stabilizers Be Over the Next Decade?

According to CBO's projections under current law, the contribution of automatic stabilizers to the federal budget deficit will fall to 0.7 percent of potential GDP in fiscal year 2015. That amount accounts for a bit more than a quarter of the estimated deficit this year, just a little below the average share between 2009 and 2014.

CBO expects that the budgetary effects of automatic stabilizers will be significant this year but smaller than in the six preceding years because of the continued—albeit diminishing—weakness in the economy. Specifically, CBO projects that the gap between actual and potential GDP will amount to about 2 percent of potential GDP in fiscal year 2015, compared with roughly 3 percent in 2014 and more than 5 percent, on average, for the period from 2009 through 2013.

The contribution of the automatic stabilizers to the budget deficit is projected to fall further in 2016 and 2017—to 0.3 percent and then to 0.1 percent of potential GDP—as the output gap continues to narrow. That contribution is then projected to remain at 0.1 percent of potential GDP in 2018, before settling at 0.2 percent of potential GDP in 2019 and later years.[3] CBO projects that GDP will be one-half of a percent below potential GDP, on average, during the 2020–2025 period (although in any particular year the gap could be larger or smaller than one-half of a percent).[4] As a result, the automatic stabilizers are estimated to continue to add to budget deficits in those years.

How Large Will Budget Deficits Without Automatic Stabilizers Be Over the Next Decade?

The federal budget deficit or surplus with the effects of automatic stabilizers filtered out is an estimate of what the deficit or surplus would be if GDP was at its potential, the unemployment rate was at its underlying

3. The estimated budgetary impact of automatic stabilizers is smaller in 2017 and 2018 than in subsequent years because CBO projects that the GDP gap will temporarily be narrower than it will be, on average, in later years.

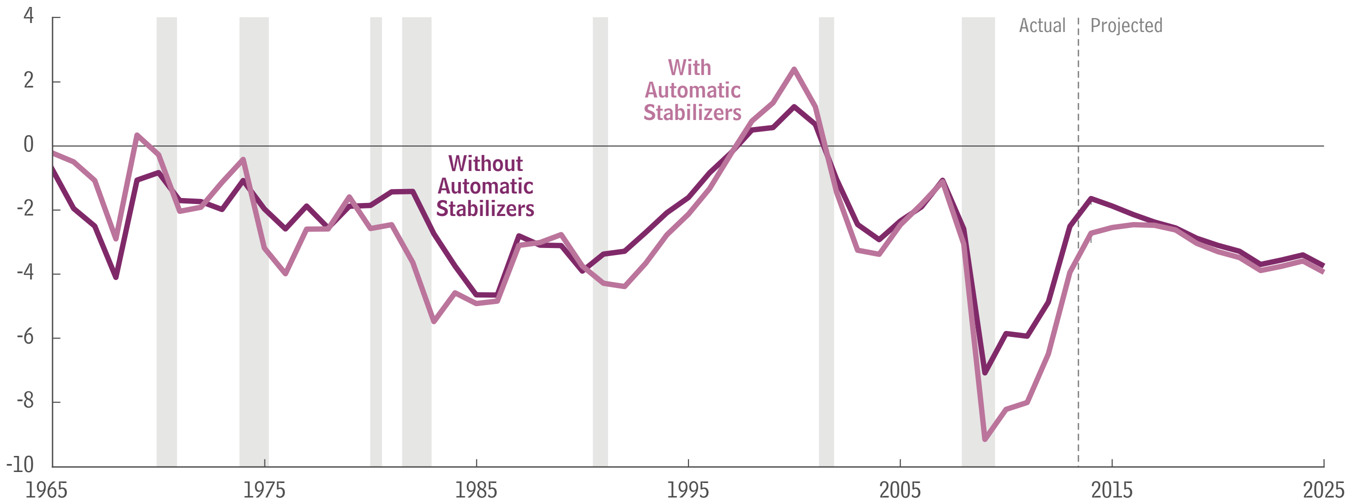
4. That difference is based on CBO's estimate that output has been that much lower than potential output, on average, over the period from 1961 to 2009. For further discussion, see Chapter 2.

Figure D-2.

Budget Deficits and Surpluses With and Without Automatic Stabilizers

The estimated deficit without automatic stabilizers has tended to increase during recessions and early in recoveries in part as a result of legislation enacted to boost the economy.

Percentage of Potential Gross Domestic Product



Sources: Congressional Budget Office; Office of Management and Budget.

Notes: Automatic stabilizers are automatic changes in revenues and outlays that are attributable to cyclical movements in real (inflation-adjusted) output and unemployment.

Potential gross domestic product is CBO's estimate of the maximum sustainable output of the economy.

long-term rate, and all other factors were unchanged. (The budget deficit without automatic stabilizers also has been called the cyclically adjusted or structural deficit.) That measure, when compared with the budget deficit with automatic stabilizers, is useful for analysts who wish to evaluate the extent to which changes in the budget deficit or surplus are caused by cyclical developments in the economy and thus are likely to prove temporary rather than enduring.

Under current law, CBO projects, the budget deficit without automatic stabilizers will equal 1.9 percent of potential GDP in fiscal year 2015, up from 1.6 percent in 2014, but still well below the values in the period from 2008 through 2013 (see Figure D-2). The increase between 2014 and 2015 results from a projected rise in outlays without automatic stabilizers relative to potential GDP. That rise can be attributed primarily to an increase in the estimated cost of the insurance coverage provisions of the Affordable Care Act that outweighs the declines relative to potential GDP that are anticipated for discretionary outlays and interest payments.

For the decade after 2015, CBO projects ongoing increases in the budget deficit without automatic stabilizers: By 2025, the projected budget deficit without automatic stabilizers equals 3.7 percent of potential GDP. (Small declines projected for 2023 and 2024 are the result of shifts in the timing of certain payments that occur when scheduled payment dates fall on weekends or holidays.) Essentially all of the anticipated increase in the deficit without automatic stabilizers between 2016 and 2025 under current law can be attributed to increases in mandatory spending without automatic stabilizers and in interest payments that are only partly offset by a decline in discretionary spending (all measured as a percentage of potential GDP).

Why Do Budget Deficits Appear Cyclical Even After the Estimated Effects of Automatic Stabilizers Are Filtered Out?

Despite adjustments to revenues and outlays for the estimated effects of the business cycle, the estimated deficit without automatic stabilizers exhibits movements that appear to be correlated with the business cycle. In particular, the estimated deficit without automatic stabilizers tends to increase during times of recession and early in a recovery.

That pattern probably reflects several factors. One factor is that estimates of the budgetary impact of automatic stabilizers may only partly remove the effects of certain changes (such as large fluctuations in the stock market) that have not had a sufficiently regular relationship to business cycles to be viewed as mostly cyclical. Another factor is that policymakers often choose to support a weak economy by cutting taxes or increasing government spending, both of which increase the deficit (or reduce the surplus). Such responses to recessions and high unemployment require legislation, so their budgetary effects are not automatic, and they are not viewed as automatic stabilizers. During the past several years, for example, lawmakers have enacted the Tax Increase Prevention Act of 2014 (Public Law 113-295); the American Taxpayer Relief Act of 2012 (P.L. 112-240); the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (P.L. 111-312); the American Recovery and Reinvestment Act of 2009 (P.L. 111-5); the Emergency Economic Stabilization Act of 2008 (P.L. 110-343); and the Housing and Economic Recovery Act of 2008 (P.L. 110-289).

APPENDIX

E

Trust Funds

The federal government uses several accounting mechanisms to link earmarked receipts—money designated for a specific purpose—with corresponding expenditures. Those mechanisms include trust funds (such as the Social Security trust funds), special funds (such as the fund that the Department of Defense uses to finance its health care program for military retirees), and revolving funds (such as the Federal Employees' Group Life Insurance fund). When the receipts designated for those funds exceed the amounts needed for expenditures, the funds are credited with nonmarketable debt instruments known as Government Account Series (GAS) securities, which are issued by the Treasury. At the end of fiscal year 2014, there was $5.0 trillion in such securities outstanding, over 90 percent of which was held by trust funds.[1]

The federal budget has numerous trust funds, although most of the money credited to such funds goes to fewer than a dozen of them. By far the largest trust funds are the Social Security Old-Age and Survivors Insurance Trust Fund, Medicare's Hospital Insurance Trust Fund, and the funds dedicated to the government's retirement programs for its military and civilian personnel (see Table E-1).

Ordinarily, when a trust fund receives cash that is not needed immediately to pay benefits or cover other expenses, the Treasury issues GAS securities in that amount to the fund and then uses the extra income to reduce the amount of new federal borrowing that is necessary to finance the governmentwide deficit. In other words, in the absence of changes to other tax and spending policies, the government borrows less from the public than it would without that extra net income. The reverse happens when revenues for a trust fund program fall short of expenses.

The balance of a trust fund at any given time is a measure of the historical relationship between the related program's receipts and expenditures. That balance (in the form of government securities) is an asset for the individual program, such as Social Security, but a liability for the rest of the government. The resources required to redeem a trust fund's government securities—and thereby pay for benefits or other spending—in some future year must be generated through taxes, income from other government sources, or borrowing from the public in that year. Trust funds have an important legal meaning in that their balances are a measure of the amounts that the government has the legal authority to spend for certain purposes under current law, but they have little relevance in an economic or budgetary sense.

To assess how all federal activities, taken together, affect the economy and financial markets, it is useful to include the cash receipts and expenditures of trust funds in the budget totals along with the receipts and expenditures of other federal programs. Therefore, the Congressional Budget Office, the Office of Management and Budget, and other fiscal analysts generally focus on the total deficit in that "unified budget," which includes the transactions of trust funds.

According to CBO's current baseline projections, the balances held by federal trust funds will increase by $82 billion in fiscal year 2015. CBO projects that, in total, income credited to the trust funds will exceed outlays in each year from 2015 through 2020; however, in each year thereafter, spending from the trust funds is projected to exceed income by an increasing amount.

1. Debt issued in the form of government account securities is included in a measure of federal debt designated "gross debt." Because such debt is intragovernmental in nature, however, it is not included in the measure "debt held by the public." (For a discussion of different measures of federal debt, see Chapter 1.)

Table E-1.

Trust Fund Balances Projected in CBO's Baseline

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Social Security												
Old-Age and Survivors Insurance	2,713	2,763	2,802	2,826	2,828	2,806	2,755	2,676	2,566	2,422	2,239	2,012
Disability Insurance[a]	70	40	9	0	0	0	0	0	0	0	0	0
Subtotal	2,783	2,802	2,811	2,826	2,828	2,806	2,755	2,676	2,566	2,422	2,239	2,012
Medicare												
Hospital Insurance (Part A)	202	204	201	207	218	216	208	194	161	132	107	57
Supplementary Medical Insurance (Part B)	68	67	67	67	67	67	67	67	67	68	68	68
Subtotal	271	271	267	274	284	282	275	261	229	199	175	125
Military Retirement	483	533	592	670	759	850	947	1,052	1,159	1,278	1,411	1,547
Civilian Retirement[b]	876	895	910	927	943	959	976	992	1,008	1,024	1,041	1,057
Unemployment Insurance	29	37	41	44	45	45	48	53	57	60	62	65
Highway and Mass Transit[a]	15 [c]	1	0	0	0	0	0	0	0	0	0	0
Airport and Airway	13	12	11	11	12	12	13	15	17	19	21	24
Railroad Retirement (Treasury holdings)[d]	3	3	3	3	3	3	3	3	3	3	3	3
Other[e]	108	110	112	113	115	117	119	121	123	125	127	129
Total Trust Fund Balance	**4,581**	**4,662**	**4,747**	**4,869**	**4,989**	**5,074**	**5,136**	**5,173**	**5,161**	**5,130**	**5,078**	**4,963**
Memorandum:												
Railroad Retirement (Non-Treasury holdings)[d]	26	25	24	23	22	21	21	20	19	19	18	18

Source: Congressional Budget Office.

Note: These balances are for the end of the fiscal year and include only securities invested in Treasury holdings, unless otherwise noted.

a. In keeping with the rules in section 257 of the Deficit Control Act of 1985, CBO's baseline incorporates the assumption that scheduled payments will continue to be made in full after the balance of the trust fund has been exhausted, although there is no legal authority to make such payments. Because the manner by which those payments would continue would depend on future legislation, CBO shows zero rather than a cumulative negative balance in the trust fund after the exhaustion date.

b. Includes Civil Service Retirement, Foreign Service Retirement, and several smaller retirement trust funds.

c. Includes $4 billion in uninvested balances.

d. The Railroad Retirement and Survivors' Improvement Act of 2001 established the National Railroad Retirement Investment Trust, which is allowed to invest in non-Treasury securities, such as stocks and corporate bonds.

e. Consists primarily of trust funds for federal employees' health and life insurance, Superfund, and various insurance programs for veterans.

All told, CBO projects a cumulative net deficit of $219 billion over the 2016–2025 period (see Table E-2).

Some of the trust funds' income is in the form of intragovernmental transfers—which are projected to total $658 billion in 2015 and to reach nearly $1.1 trillion in 2025. Those transfers consist of interest credited to the trust funds; payments from general funds to cover most of the costs of Medicare's payments for outpatient services, prescription drugs, and some other services; the government's share of payments for federal employees' retirement; and certain other transfers of general funds. Such transfers shift resources from one category of the budget to another, but they do not directly change the total deficit or the government's borrowing needs. With those intragovernmental transfers excluded and only income from sources outside of the government (such as payroll taxes and Medicare premiums) counted, the trust funds will add to federal deficits throughout the 2016–2025 period by amounts that grow from $596 billion in 2016 to $1.2 trillion in 2025, CBO projects.

Without legislative action to address shortfalls, balances in two trust funds are projected to be exhausted during

Table E-2.

Trust Fund Deficits or Surpluses Projected in CBO's Baseline

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
Social Security														
Old-Age and Survivors Insurance	57	50	40	24	2	-22	-51	-79	-110	-145	-183	-227	-7	-750
Disability Insurance[a]	-31	-30	-30	-32	-34	-34	-35	-39	-42	-45	-49	-51	-165	-390
Subtotal	27	19	9	-7	-31	-57	-86	-118	-151	-189	-231	-278	-173	-1,141
Medicare														
Hospital Insurance (Part A)	-4	2	-3	7	10	-2	-7	-14	-33	-30	-25	-50	4	-147
Supplementary Medical Insurance (Part B)	1	-2	*	*	*	*	*	*	*	*	*	*	*	2
Subtotal	-3	*	-3	7	10	-2	-7	-14	-33	-29	-25	-50	5	-146
Military Retirement	62	50	59	78	89	91	97	105	107	119	133	136	414	1,013
Civilian Retirement[b]	138	19	16	17	16	16	16	16	16	16	17	17	81	163
Unemployment Insurance	6	7	4	3	1	0	3	6	3	3	2	3	11	29
Highway and Mass Transit[a]	9	-14	-14	-14	-14	-15	-16	-17	-18	-19	-20	-21	-73	-169
Airport and Airway	1	-1	*	*	*	1	1	1	2	2	3	3	2	13
Other[c]	4	2	2	1	1	2	2	2	2	2	2	2	8	19
Total Trust Fund Deficit (-) or Surplus	**244**	**82**	**72**	**85**	**73**	**36**	**10**	**-18**	**-72**	**-96**	**-121**	**-188**	**275**	**-219**
Intragovernmental Transfers to Trust Funds[d]	972	658	668	692	707	747	791	837	897	949	973	1,052	3,604	8,313
Net Budgetary Impact of Trust Fund Programs	**-728**	**-577**	**-596**	**-606**	**-635**	**-711**	**-781**	**-855**	**-969**	**-1,045**	**-1,094**	**-1,240**	**-3,329**	**-8,532**

Source: Congressional Budget Office.

Notes: Negative numbers indicate that the trust fund transactions add to total budget deficits.

* = between -$500 million and $500 million.

a. CBO projects that the balance of this trust fund will be exhausted during the 2016–2025 period. However, in keeping with the rules in section 257 of the Deficit Control Act of 1985, CBO's baseline incorporates the assumption that scheduled payments will continue to be made in full after the balance of the trust fund has been exhausted, although there is no legal authority to make such payments. The manner by which those payments continue would depend on future legislation.

b. Includes Civil Service Retirement, Foreign Service Retirement, and several smaller retirement trust funds.

c. Consists primarily of trust funds for railroad workers' retirement, federal employees' health and life insurance, Superfund, and various insurance programs for veterans.

d. Includes interest paid to trust funds, payments from the Treasury's general fund to the Supplementary Medical Insurance Trust Fund, the government's share of payments for federal employees' retirement, lump-sum payments to the Civil Service and Military Retirement Trust Funds, taxes on Social Security benefits, and smaller miscellaneous payments.

that period: the Highway Trust Fund (early in fiscal year 2016) and Social Security's Disability Insurance Trust Fund (early in fiscal year 2017).

Social Security Trust Funds

Social Security provides benefits to retired workers, their families, and some survivors of deceased workers through the Old-Age and Survivors Insurance (OASI) program; it also provides benefits to some people with disabilities and their families through the Disability Insurance (DI) program. Those benefits are financed mainly through payroll taxes collected on workers' earnings, at a rate of 12.4 percent—6.2 percent of which is paid by the worker and 6.2 percent by the employer.

Table E-3.

Deficits, Surpluses, and Balances Projected in CBO's Baseline for the OASI, DI, and HI Trust Funds

Billions of Dollars

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total 2016-2020	Total 2016-2025
OASI Trust Fund														
Beginning-of-Year Balance	2,656	2,713	2,763	2,802	2,826	2,828	2,806	2,755	2,676	2,566	2,422	2,239	n.a.	n.a.
Income (Excluding interest)	667	696	724	754	786	818	852	887	924	962	1,002	1,043	3,933	8,752
Expenditures	-706	-740	-775	-820	-875	-934	-997	-1,061	-1,127	-1,198	-1,272	-1,351	-4,401	-10,411
Noninterest Deficit	-39	-45	-51	-66	-90	-116	-145	-174	-203	-236	-270	-308	-468	-1,659
Interest received	96	94	90	90	92	94	94	95	94	91	87	81	461	909
Total Deficit (-) or Surplus	57	50	40	24	2	-22	-51	-79	-110	-145	-183	-227	-7	-750
End-of-Year Balance	**2,713**	**2,763**	**2,802**	**2,826**	**2,828**	**2,806**	**2,755**	**2,676**	**2,566**	**2,422**	**2,239**	**2,012**	**n.a.**	**n.a.**
DI Trust Fund[a]														
Beginning-of-Year Balance	101	70	40	9	0	0	0	0	0	0	0	0	n.a.	n.a.
Income (Excluding interest)	110	115	119	124	129	134	139	145	151	157	163	169	646	1,430
Expenditures	-145	-148	-152	-157	-162	-168	-175	-183	-192	-202	-212	-221	-814	-1,824
Noninterest Deficit	-34	-33	-33	-33	-34	-34	-35	-39	-42	-45	-49	-51	-169	-394
Interest received	4	3	2	1	0	0	0	0	0	0	0	0	3	3
Total Deficit	-31	-30	-30	-32	-34	-34	-35	-39	-42	-45	-49	-51	-165	-390
End-of-Year Balance	**70**	**40**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**n.a.**	**n.a.**
HI Trust Fund														
Beginning-of-Year Balance	206	202	204	201	207	218	216	208	194	161	132	107	n.a.	n.a.
Income (Excluding interest)	262	273	287	303	317	332	348	366	384	404	424	446	1,587	3,610
Expenditures	-275	-281	-300	-306	-316	-344	-365	-389	-426	-441	-455	-500	-1,632	-3,843
Noninterest Deficit (-) or Surplus	-13	-8	-13	-3	1	-12	-17	-23	-42	-37	-31	-55	-45	-232
Interest received	9	10	10	10	10	10	10	9	9	7	6	4	49	85
Total Deficit (-) or Surplus	-4	2	-3	7	10	-2	-7	-14	-33	-30	-25	-50	4	-147
End-of-Year Balance	**202**	**204**	**201**	**207**	**218**	**216**	**208**	**194**	**161**	**132**	**107**	**57**	**n.a.**	**n.a.**

Source: Congressional Budget Office.

Notes: Balances shown are invested in Treasury Government Account Series securities.

DI = Disability Insurance; HI = Hospital Insurance; OASI = Old-Age and Survivors Insurance; n.a. = not applicable.

a. In keeping with the rules in section 257 of the Deficit Control Act of 1985, CBO's baseline incorporates the assumption that scheduled payments will continue to be made in full after the balance of the trust fund has been exhausted, although there is no legal authority to make such payments. Because the manner by which those payments would continue would depend on future legislation, CBO shows zero rather than a cumulative negative balance in the trust fund after the exhaustion date.

Old-Age and Survivors Insurance

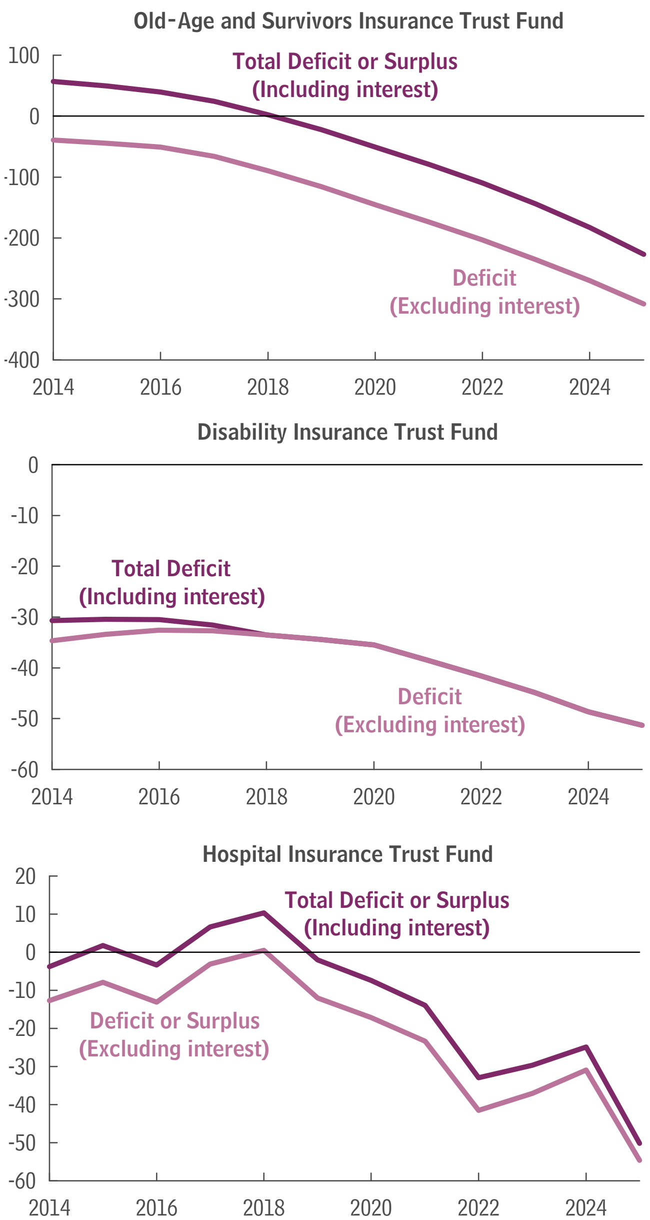
The OASI trust fund is by far the largest of all federal trust funds, with $2.7 trillion in holdings of government account securities at the end of 2014. CBO projects that the fund's annual income, excluding interest on those securities, will amount to $696 billion in 2015 and increase to more than $1.0 trillion by 2025 (see Table E-3).[2] Annual expenditures from the fund are projected to be greater and to grow faster than noninterest income, rising from $740 billion in 2015 to nearly $1.4 trillion in 2025. With expenditures growing by an average of about

2. Although it is an employer, the federal government does not pay taxes. However, it makes an intragovernmental transfer from the general fund of the Treasury to the OASI and DI trust funds to cover the employer's share of the Social Security payroll tax for federal workers. That transfer is included in the income line in Table E-3.

Figure E-1.

Annual Deficits or Surpluses Projected in CBO's Baseline for the OASI, DI, and HI Trust Funds

Billions of Dollars



Source: Congressional Budget Office.

Note: DI = Disability Insurance; HI = Hospital Insurance; OASI = Old-Age and Survivors Insurance.

6 percent a year and noninterest income (mostly from payroll taxes) growing by an average of about 4 percent a year, the annual cash flows of the OASI program, excluding interest credited to the trust fund, will add to federal deficits in every year of the coming decade by amounts that will grow to $308 billion in 2025, CBO estimates.

With interest receipts included, the OASI trust fund will show a surplus in every year through 2018 but by amounts that will decline over that period. By 2019, even taking into account interest receipts, the trust fund is projected to start recording deficits that will reach $227 billion in 2025 (see Figure E-1).[3]

Disability Insurance

The DI trust fund is much smaller than the OASI fund, with a balance of $70 billion at the end of 2014. In its current baseline, CBO projects that, excluding interest, the yearly income of the DI fund will rise from $115 billion in 2015 to $169 billion in 2025 (see Table E-3). But, as with the OASI fund, annual expenditures from the DI fund are expected to be greater than noninterest income, rising steadily from $148 billion in 2015 to $221 billion in 2025. Thus, the annual cash flows of the DI program, excluding interest, will also add to federal deficits in each year of the projection period, by amounts that increase from $33 billion early in the period to $51 billion in 2025, CBO estimates. Even with interest receipts included, the DI trust fund is expected to run a yearly deficit throughout that period (see Figure E-1). In the absence of legislative action, the balance of the DI fund will be exhausted in 2017, CBO projects (the same year the agency projected in its August 2014 baseline).

Medicare Trust Funds

Cash flows for payments to hospitals and payments for other services covered by Medicare are accounted for in two trust funds. The Hospital Insurance (HI) Trust Fund accounts for payments made to hospitals and providers of post-acute care services under Part A of the Medicare program, and the Supplementary Medical Insurance (SMI) Trust Fund accounts for payments made for outpatient services, prescription drugs, and other services under Parts B and D of Medicare.[4]

Hospital Insurance Trust Fund

The HI fund is the larger of the two Medicare trust funds, with a balance of $202 billion at the end of 2014. The fund's income is derived largely from the Medicare

3. According to CBO's most recent projections, the balance of the OASI trust fund will be exhausted in calendar year 2032. See Congressional Budget Office, *The 2014 Long-Term Budget Outlook* (July 2014), www.cbo.gov/publication/45471.

4. Part C of Medicare (known as Medicare Advantage) specifies the rules under which private health care plans can assume responsibility for, and be compensated for, providing benefits covered under Parts A, B, and D.

payroll tax (2.9 percent of workers' earnings, divided equally between the worker and the employer); in 2014, those taxes accounted for 87 percent of the $262 billion in noninterest income credited to the HI trust fund.[5] Another 7 percent came from part of the income taxes on Social Security benefits collected from beneficiaries with relatively high income. The remaining 6 percent of noninterest income credited to the HI trust fund consisted largely of premiums paid by beneficiaries; amounts paid to providers and later recovered; fines, penalties and other amounts collected by the Health Care Fraud and Abuse Control program; and other transfers and appropriations. In addition, the trust fund is credited with interest on its balances; that interest amounted to $9 billion in 2014.

The fund's noninterest income is projected to increase from $273 billion in 2015 to $446 billion in 2025—an average annual increase of about 5 percent. But annual expenditures from the HI fund are projected to grow more rapidly—at an average annual rate of close to 6 percent, rising from $281 billion in 2015 to $500 billion in 2025. CBO expects expenditures to outstrip income, excluding interest, in all years through 2025 other than in 2018, producing annual deficits that are relatively small in the first half of the period but rise to $55 billion in 2025.[6] Including interest receipts, the trust fund is expected to run deficits in most years during the baseline period (see Table E-3 and Figure E-1). By 2025, CBO projects, the annual deficit (including interest receipts) will reach $50 billion and the fund's balance will be down to $57 billion. CBO has not projected the fund's balance beyond the 10-year period spanned by the baseline, but it is likely that such projections would show the fund continuing to incur deficits in subsequent years. CBO anticipates that, if current law remained in place, the fund's balance would probably be exhausted early in the decade after 2025.

5. Starting in 2013, an additional Medicare tax of 0.9 percent has been assessed on the amount of an individual's earnings over $200,000 (or $250,000 for married couples filing joint income tax returns). As it does with the Social Security payroll tax, the federal government makes an intragovernmental transfer from the general fund of the Treasury to the HI trust fund to cover the employer's share of the Medicare payroll tax for federal workers.

6. The small surplus in 2018 occurs because October 1, 2017, falls on a weekend. Therefore, payments to private Medicare plans for that month will be accelerated into fiscal year 2017, resulting in one fewer payment during fiscal year 2018. (The same type of shift occurs from 2017 to 2016, from 2023 to 2022, and from 2024 to 2023.)

Supplementary Medical Insurance Trust Fund

The SMI trust fund contains two separate accounts: one that pays for physicians' services and other health care provided on an outpatient basis under Part B of Medicare (Medical Insurance) and one that pays for prescription drug benefits under Part D. The funding mechanisms used for the two accounts differ slightly:

- The Part B portion of the SMI fund is financed primarily through transfers from the general fund of the Treasury and through monthly premium payments from Medicare beneficiaries. The basic monthly premium for the SMI program is set to cover approximately 25 percent of the program's spending (with adjustments to maintain a contingency reserve to cover unexpected spikes in spending); an additional premium is assessed on beneficiaries with relatively high income. The amount transferred from the general fund equals about three times the amount expected to be collected from basic premiums minus the amount collected from the income-related premiums and fees from drug manufacturers.

- The Part D portion of the SMI fund is financed mainly through transfers from the general fund, monthly premium payments from beneficiaries, and transfers from states (which are based on the number of people in a state who would have received prescription drug coverage under Medicaid in the absence of Part D). The basic monthly premium for Part D is set to cover 25.5 percent of the program's estimated spending, under the assumption that all participants would pay it. However, low-income people who receive subsidies available under Part D are not required to pay Part D premiums, so receipts are projected to cover less than 25.5 percent of the program's costs. Higher-income participants in Part D pay an income-related premium. The amount transferred from the general fund is set to cover total expected spending for benefits and administrative costs, net of the amounts transferred from states and collected from basic and income-related premiums.

Unlike the HI trust fund, the income to the SMI fund (other than interest) does not consist mainly of a specified set of revenues collected from the public. Rather, the amounts credited to those accounts from the general fund of the Treasury are automatically adjusted to cover the differences between program spending and specified revenues. (In 2014, for example, $245 billion was transferred from general funds to the SMI fund, accounting for about three-quarters of its income.) Thus, the balance in the SMI fund cannot be exhausted.

The SMI fund currently holds $68 billion in government account securities, and the amount of such holdings is projected to remain at about that level throughout the next decade.

Highway Trust Fund

The Highway Trust Fund comprises two accounts: the highway account, which funds construction of highways and highway safety programs, and the transit account, which funds mass transit programs. Revenues credited to those accounts are derived mostly from excise taxes on gasoline and certain other motor fuels, which account for more than 85 percent of all receipts to the trust fund.[7]

Almost all spending from the fund is controlled by limitations on obligations set in appropriation acts. Over the past eight years, spending has exceeded the fund's revenues by $64 billion. In addition, CBO expects spending to exceed revenues by $14 billion in 2015, reflecting outlays of $53 billion and revenues of $39 billion. To keep the Highway Trust Fund from delaying payments to state and local governments, starting in 2008, lawmakers have authorized a series of transfers to the fund. Including amounts transferred in accordance with the most recent authorization for highway and transit programs, those transfers have totaled more than $65 billion, mostly from the general fund of the Treasury.

For its baseline spending projections, CBO assumes that future limitations on obligations will be equal to amounts set for 2015, adjusted annually for inflation. Under those circumstances, and without further legislative action, the two accounts would be unable to meet all obligations in a timely manner at some point in 2015, and the fund's balance would be exhausted in early fiscal year 2016. The Department of Transportation has indicated that it needs $5 billion in cash—$4 billion in the highway account and $1 billion in the transit account—to make required payments. The most recent authorization for highway and transit programs expires on May 31, 2015.

Other Trust Funds

Among the remaining trust funds in the federal budget, the largest balances are held by various civilian employee retirement funds (a total of $876 billion at the end of 2014) and by the Military Retirement Trust Fund ($483 billion).[8] In its current baseline, CBO projects that the balances of those funds will increase steadily over the coming decade, reaching $1.1 trillion for the civilian funds and $1.5 trillion for the military retirement fund in 2025, more in total than the balance of the OASI trust fund (see Table E-1 on page 146). Unlike the Social Security and Medicare trust funds, these funds are projected to run surpluses throughout the coming decade, growing to more than $150 billion combined in 2025. The balances of the military retirement fund will grow at a rapid rate over the next 10 years because the Treasury is making additional payments to that fund to cover the initial unfunded liabilities that arose from the fund's creation.

7. The other revenues credited to the Highway Trust Fund come from excise taxes on trucks and trailers, on truck tires, and on the use of certain kinds of vehicles.

8. Those civilian retirement funds include the Civil Service Retirement Trust Fund, the Foreign Service Retirement Trust Fund, and several smaller retirement funds.

APPENDIX

F

CBO's Economic Projections for 2015 to 2025

The tables in this appendix expand on the information in Chapter 2 by showing the Congressional Budget Office's economic projections for each year from 2015 to 2025 (by calendar year in Table F-1 and by fiscal year in Table F-2). For years after 2019, CBO did not attempt to forecast the frequency or size of fluctuations in the business cycle. Instead, the values shown in these tables for 2020 to 2025 reflect CBO's assessment of the effects in the medium term of economic and demographic trends, federal tax and spending policies under current law, the 2007–2009 recession, and the slow economic recovery since then.

Table F-1.

CBO's Economic Projections, by Calendar Year

	Estimated, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	Percentage Change From Year to Year											
Gross Domestic Product												
Real (Inflation-adjusted)	2.2	2.8	3.0	2.7	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.1
Nominal	3.9	4.5	4.6	4.6	4.3	4.1	4.3	4.3	4.2	4.2	4.2	4.2
Inflation												
PCE price index	1.4	1.1	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Core PCE price index[a]	1.4	1.7	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Consumer price index[b]	1.6 [c]	1.1	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Core consumer price index[a]	1.7 [c]	2.0	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
GDP price index	1.6	1.6	1.6	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Employment Cost Index[d]	2.0	2.7	3.0	3.5	3.6	3.6	3.5	3.5	3.4	3.4	3.3	3.3
	Calendar Year Average											
Unemployment Rate (Percent)	6.2 [c]	5.5	5.4	5.3	5.4	5.5	5.5	5.5	5.4	5.4	5.4	5.4
Payroll Employment (Monthly change, in thousands)[e]	234 [c]	184	148	111	70	68	75	77	79	80	80	80
Interest Rates (Percent)												
Three-month Treasury bills	* [c]	0.2	1.2	2.6	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Ten-year Treasury notes	2.5 [c]	2.8	3.4	3.9	4.2	4.5	4.6	4.6	4.6	4.6	4.6	4.6
Tax Bases (Percentage of GDP)												
Wages and salaries	42.7	42.6	42.6	42.7	42.8	42.8	42.9	42.9	43.0	43.0	43.1	43.1
Domestic economic profits	9.9	10.0	9.7	9.4	9.0	8.6	8.4	8.2	8.0	7.9	7.8	7.8
Tax Bases (Billions of dollars)												
Wages and salaries	7,432	7,755	8,118	8,503	8,880	9,259	9,665	10,090	10,533	10,994	11,472	11,965
Domestic economic profits	1,716	1,825	1,843	1,867	1,875	1,865	1,889	1,924	1,962	2,016	2,086	2,161
Nominal GDP (Billions of dollars)	17,422	18,204	19,045	19,919	20,768	21,625	22,550	23,515	24,515	25,550	26,625	27,736

Sources: Congressional Budget Office; Bureau of Labor Statistics; Federal Reserve.

Note: GDP = gross domestic product; PCE = personal consumption expenditures; * = between zero and 0.05 percent.

a. Excludes prices for food and energy.

b. The consumer price index for all urban consumers.

c. Actual value for 2014.

d. The employment cost index for wages and salaries of workers in private industries.

e. Calculated as the monthly average of the fourth-quarter-to-fourth-quarter change in payroll employment.

Table F-2.

CBO's Economic Projections, by Fiscal Year

	Actual, 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
					Percentage Change From Year to Year							
Gross Domestic Product												
Real (Inflation-adjusted)	2.6	2.7	3.0	2.8	2.3	2.0	2.2	2.2	2.2	2.1	2.1	2.1
Nominal	4.1	4.4	4.5	4.6	4.3	4.1	4.3	4.3	4.3	4.2	4.2	4.2
Inflation												
PCE price index	1.3	1.1	1.7	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Core PCE price index[a]	1.4	1.6	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Consumer price index[b]	1.6	1.1	2.0	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4
Core consumer price index[a]	1.7	1.9	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
GDP price index	1.5	1.7	1.5	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Employment Cost Index[c]	1.9	2.7	2.9	3.4	3.6	3.6	3.6	3.5	3.4	3.4	3.3	3.3
					Fiscal Year Average							
Unemployment Rate (Percent)	6.5	5.6	5.4	5.4	5.3	5.4	5.5	5.5	5.5	5.4	5.4	5.4
Payroll Employment (Monthly change, in thousands)[d]	217	208	153	119	80	65	75	76	79	79	80	79
Interest Rates (Percent)												
Three-month Treasury bills	*	0.1	0.9	2.2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Ten-year Treasury notes	2.7	2.6	3.2	3.8	4.1	4.4	4.6	4.6	4.6	4.6	4.6	4.6
Tax Bases (Percentage of GDP)												
Wages and salaries	42.6	42.6	42.6	42.7	42.7	42.8	42.8	42.9	43.0	43.0	43.1	43.1
Domestic economic profits	9.8	10.1	9.8	9.4	9.1	8.7	8.4	8.2	8.0	7.9	7.8	7.8
Tax Bases (Billions of dollars)												
Wages and salaries	7,350	7,668	8,024	8,406	8,787	9,162	9,562	9,982	10,421	10,877	11,351	11,840
Domestic economic profits	1,684	1,827	1,842	1,861	1,878	1,863	1,880	1,916	1,951	2,001	2,068	2,142
Nominal GDP (Billions of dollars)	17,263	18,016	18,832	19,701	20,558	21,404	22,315	23,271	24,261	25,287	26,352	27,456

Sources: Congressional Budget Office; Bureau of Labor Statistics; Federal Reserve.

Note: GDP = gross domestic product; PCE = personal consumption expenditures; * = between zero and 0.05 percent.

a. Excludes prices for food and energy.

b. The consumer price index for all urban consumers.

c. The employment cost index for wages and salaries of workers in private industries.

d. Calculated as the monthly average of the fourth-quarter-to-fourth-quarter change in payroll employment.

APPENDIX

G

Historical Budget Data

This appendix provides historical data on revenues, outlays, and the deficit or surplus—in forms consistent with the projections in Chapters 1, 3, and 4—for fiscal years 1965 to 2014. The data, which come from the Congressional Budget Office and the Office of Management and Budget, are shown both in nominal dollars and as a percentage of gross domestic product. Some of the numbers have been revised since August 2014, when these tables were previously published on CBO's website (www.cbo.gov/publication/45653).

Federal revenues, outlays, the deficit or surplus, and debt held by the public are shown in Table G-1. Revenues, outlays, and the deficit or surplus have both on-budget and off-budget components. Social Security's receipts and outlays were placed off-budget by the Balanced Budget and Emergency Deficit Control Act of 1985. For the sake of consistency, Table G-1 shows the budgetary components of Social Security as off-budget before that year. The Postal Service was classified as off-budget by the Omnibus Budget Reconciliation Act of 1989.

The major sources of federal revenues (including off-budget revenues) are presented in Table G-2 on page 160. Payroll taxes include payments by employers and employees for Social Security, Medicare, Railroad Retirement, and unemployment insurance, as well as pension contributions by federal workers. Excise taxes are levied on certain products and services, such as gasoline, alcoholic beverages, and air travel. Estate and gift taxes are levied on assets when they are transferred. Miscellaneous receipts consist of earnings of the Federal Reserve System and income from numerous fees and charges.

Total outlays for major categories of spending (including off-budget outlays) appear in Table G-3 on page 162. Spending controlled by the appropriation process is classified as discretionary. Spending governed by laws other than appropriation acts, such as laws that set eligibility requirements for certain programs, is considered mandatory. Offsetting receipts include the government's contributions to retirement programs for its employees, as well as fees, charges (such as Medicare premiums), and receipts from the use of federally controlled land and offshore territory. Net interest consists mostly of the government's interest payments on federal debt offset by its interest income.

Table G-4 on page 164 divides discretionary spending into its defense and nondefense components. Table G-5 on page 166 shows mandatory outlays for three major benefit programs—Social Security, Medicare, and Medicaid—and for other categories of mandatory spending. Income security programs provide benefits to recipients with limited income and assets; those programs include unemployment compensation, Supplemental Security Income, and the Supplemental Nutrition Assistance Program (formerly known as the Food Stamp program). Other federal retirement and disability programs provide benefits to federal civilian employees, members of the military, and veterans. The category of other mandatory programs includes the activities of the Commodity Credit Corporation, the Medicare-Eligible Retiree Health Care Fund, the subsidy costs of federal student loan programs, and the Children's Health Insurance Program.

Table G-1.

Revenues, Outlays, Deficits, Surpluses, and Debt Held by the Public Since 1965

			Deficit (-) or Surplus				
	Revenues	Outlays	On-Budget	Social Security	Postal Service	Total	Debt Held by the Public[a]
				In Billions of Dollars			
1965	116.8	118.2	-1.6	0.2	0	-1.4	260.8
1966	130.8	134.5	-3.1	-0.6	0	-3.7	263.7
1967	148.8	157.5	-12.6	4.0	0	-8.6	266.6
1968	153.0	178.1	-27.7	2.6	0	-25.2	289.5
1969	186.9	183.6	-0.5	3.7	0	3.2	278.1
1970	192.8	195.6	-8.7	5.9	0	-2.8	283.2
1971	187.1	210.2	-26.1	3.0	0	-23.0	303.0
1972	207.3	230.7	-26.1	3.1	-0.4	-23.4	322.4
1973	230.8	245.7	-15.2	0.5	-0.2	-14.9	340.9
1974	263.2	269.4	-7.2	1.8	-0.8	-6.1	343.7
1975	279.1	332.3	-54.1	2.0	-1.1	-53.2	394.7
1976	298.1	371.8	-69.4	-3.2	-1.1	-73.7	477.4
1977	355.6	409.2	-49.9	-3.9	0.2	-53.7	549.1
1978	399.6	458.7	-55.4	-4.3	0.5	-59.2	607.1
1979	463.3	504.0	-39.6	-2.0	0.9	-40.7	640.3
1980	517.1	590.9	-73.1	-1.1	0.4	-73.8	711.9
1981	599.3	678.2	-73.9	-5.0	-0.1	-79.0	789.4
1982	617.8	745.7	-120.6	-7.9	0.6	-128.0	924.6
1983	600.6	808.4	-207.7	0.2	-0.3	-207.8	1,137.3
1984	666.4	851.8	-185.3	0.3	-0.4	-185.4	1,307.0
1985	734.0	946.3	-221.5	9.4	-0.1	-212.3	1,507.3
1986	769.2	990.4	-237.9	16.7	*	-221.2	1,740.6
1987	854.3	1,004.0	-168.4	19.6	-0.9	-149.7	1,889.8
1988	909.2	1,064.4	-192.3	38.8	-1.7	-155.2	2,051.6
1989	991.1	1,143.7	-205.4	52.4	0.3	-152.6	2,190.7
1990	1,032.0	1,253.0	-277.6	58.2	-1.6	-221.0	2,411.6
1991	1,055.0	1,324.2	-321.4	53.5	-1.3	-269.2	2,689.0
1992	1,091.2	1,381.5	-340.4	50.7	-0.7	-290.3	2,999.7
1993	1,154.3	1,409.4	-300.4	46.8	-1.4	-255.1	3,248.4
1994	1,258.6	1,461.8	-258.8	56.8	-1.1	-203.2	3,433.1
1995	1,351.8	1,515.7	-226.4	60.4	2.0	-164.0	3,604.4
1996	1,453.1	1,560.5	-174.0	66.4	0.2	-107.4	3,734.1
1997	1,579.2	1,601.1	-103.2	81.3	*	-21.9	3,772.3
1998	1,721.7	1,652.5	-29.9	99.4	-0.2	69.3	3,721.1
1999	1,827.5	1,701.8	1.9	124.7	-1.0	125.6	3,632.4
2000	2,025.2	1,789.0	86.4	151.8	-2.0	236.2	3,409.8
2001	1,991.1	1,862.8	-32.4	163.0	-2.3	128.2	3,319.6
2002	1,853.1	2,010.9	-317.4	159.0	0.7	-157.8	3,540.4
2003	1,782.3	2,159.9	-538.4	155.6	5.2	-377.6	3,913.4
2004	1,880.1	2,292.8	-568.0	151.1	4.1	-412.7	4,295.5
2005	2,153.6	2,472.0	-493.6	173.5	1.8	-318.3	4,592.2
2006	2,406.9	2,655.1	-434.5	185.2	1.1	-248.2	4,829.0
2007	2,568.0	2,728.7	-342.2	186.5	-5.1	-160.7	5,035.1
2008	2,524.0	2,982.5	-641.8	185.7	-2.4	-458.6	5,803.1
2009	2,105.0	3,517.7	-1,549.7	137.3	-0.3	-1,412.7	7,544.7
2010	2,162.7	3,457.1	-1,371.4	81.7	-4.7	-1,294.4	9,018.9
2011	2,303.5	3,603.1	-1,366.8	68.0	-0.8	-1,299.6	10,128.2
2012	2,450.0	3,537.0	-1,148.9	64.6	-2.7	-1,087.0	11,281.1
2013	2,775.1	3,454.6	-719.0	37.6	1.9	-679.5	11,982.6
2014	3,020.8	3,504.2	-512.8	32.0	-2.5	-483.3	12,779.4

Continued

Table G-1. **Continued**

Revenues, Outlays, Deficits, Surpluses, and Debt Held by the Public Since 1965

			Deficit (-) or Surplus				
	Revenues	Outlays	On-Budget	Social Security	Postal Service	Total	Debt Held by the Public[a]
			As a Percentage of Gross Domestic Product				
1965	16.4	16.6	-0.2	**	0	-0.2	36.7
1966	16.7	17.2	-0.4	-0.1	0	-0.5	33.7
1967	17.8	18.8	-1.5	0.5	0	-1.0	31.8
1968	17.0	19.8	-3.1	0.3	0	-2.8	32.2
1969	19.0	18.7	-0.1	0.4	0	0.3	28.3
1970	18.4	18.7	-0.8	0.6	0	-0.3	27.0
1971	16.7	18.8	-2.3	0.3	0	-2.1	27.1
1972	17.0	18.9	-2.1	0.3	**	-1.9	26.4
1973	17.0	18.1	-1.1	**	**	-1.1	25.1
1974	17.7	18.1	-0.5	0.1	-0.1	-0.4	23.1
1975	17.3	20.6	-3.4	0.1	-0.1	-3.3	24.5
1976	16.6	20.8	-3.9	-0.2	-0.1	-4.1	26.7
1977	17.5	20.2	-2.5	-0.2	**	-2.6	27.1
1978	17.5	20.1	-2.4	-0.2	**	-2.6	26.6
1979	18.0	19.6	-1.5	-0.1	**	-1.6	24.9
1980	18.5	21.1	-2.6	**	**	-2.6	25.5
1981	19.1	21.6	-2.4	-0.2	**	-2.5	25.2
1982	18.6	22.5	-3.6	-0.2	**	-3.9	27.9
1983	17.0	22.8	-5.9	**	**	-5.9	32.1
1984	16.9	21.5	-4.7	**	**	-4.7	33.1
1985	17.2	22.2	-5.2	0.2	**	-5.0	35.3
1986	17.0	21.8	-5.2	0.4	**	-4.9	38.4
1987	17.9	21.0	-3.5	0.4	**	-3.1	39.5
1988	17.6	20.6	-3.7	0.8	**	-3.0	39.8
1989	17.8	20.5	-3.7	0.9	**	-2.7	39.3
1990	17.4	21.2	-4.7	1.0	**	-3.7	40.8
1991	17.3	21.7	-5.3	0.9	**	-4.4	44.0
1992	17.0	21.5	-5.3	0.8	**	-4.5	46.6
1993	17.0	20.7	-4.4	0.7	**	-3.8	47.8
1994	17.5	20.3	-3.6	0.8	**	-2.8	47.7
1995	17.8	20.0	-3.0	0.8	**	-2.2	47.5
1996	18.2	19.6	-2.2	0.8	**	-1.3	46.8
1997	18.6	18.9	-1.2	1.0	**	-0.3	44.5
1998	19.2	18.5	-0.3	1.1	**	0.8	41.6
1999	19.2	17.9	**	1.3	**	1.3	38.2
2000	20.0	17.6	0.9	1.5	**	2.3	33.6
2001	18.8	17.6	-0.3	1.5	**	1.2	31.4
2002	17.0	18.5	-2.9	1.5	**	-1.5	32.6
2003	15.7	19.1	-4.8	1.4	**	-3.3	34.5
2004	15.6	19.0	-4.7	1.3	**	-3.4	35.5
2005	16.7	19.2	-3.8	1.3	**	-2.5	35.6
2006	17.6	19.4	-3.2	1.4	**	-1.8	35.3
2007	17.9	19.1	-2.4	1.3	**	-1.1	35.2
2008	17.1	20.2	-4.4	1.3	**	-3.1	39.3
2009	14.6	24.4	-10.8	1.0	**	-9.8	52.3
2010	14.6	23.4	-9.3	0.6	**	-8.7	60.9
2011	15.0	23.4	-8.9	0.4	**	-8.5	65.9
2012	15.3	22.1	-7.2	0.4	**	-6.8	70.4
2013	16.7	20.8	-4.3	0.2	**	-4.1	72.3
2014	17.5	20.3	-3.0	0.2	**	-2.8	74.1

Sources: Congressional Budget Office; Office of Management and Budget.

Note: * = between -$500 million and $500 million; ** = between -0.05 and 0.05 percent.

a. End of year.

Table G-2.

Revenues, by Major Source, Since 1965

	Individual Income Taxes	Payroll Taxes	Corporate Income Taxes	Excise Taxes	Estate and Gift Taxes	Customs Duties	Miscellaneous Receipts	Total
				In Billions of Dollars				
1965	48.8	22.2	25.5	14.6	2.7	1.4	1.6	116.8
1966	55.4	25.5	30.1	13.1	3.1	1.8	1.9	130.8
1967	61.5	32.6	34.0	13.7	3.0	1.9	2.1	148.8
1968	68.7	33.9	28.7	14.1	3.1	2.0	2.5	153.0
1969	87.2	39.0	36.7	15.2	3.5	2.3	2.9	186.9
1970	90.4	44.4	32.8	15.7	3.6	2.4	3.4	192.8
1971	86.2	47.3	26.8	16.6	3.7	2.6	3.9	187.1
1972	94.7	52.6	32.2	15.5	5.4	3.3	3.6	207.3
1973	103.2	63.1	36.2	16.3	4.9	3.2	3.9	230.8
1974	119.0	75.1	38.6	16.8	5.0	3.3	5.4	263.2
1975	122.4	84.5	40.6	16.6	4.6	3.7	6.7	279.1
1976	131.6	90.8	41.4	17.0	5.2	4.1	8.0	298.1
1977	157.6	106.5	54.9	17.5	7.3	5.2	6.5	355.6
1978	181.0	121.0	60.0	18.4	5.3	6.6	7.4	399.6
1979	217.8	138.9	65.7	18.7	5.4	7.4	9.3	463.3
1980	244.1	157.8	64.6	24.3	6.4	7.2	12.7	517.1
1981	285.9	182.7	61.1	40.8	6.8	8.1	13.8	599.3
1982	297.7	201.5	49.2	36.3	8.0	8.9	16.2	617.8
1983	288.9	209.0	37.0	35.3	6.1	8.7	15.6	600.6
1984	298.4	239.4	56.9	37.4	6.0	11.4	17.0	666.4
1985	334.5	265.2	61.3	36.0	6.4	12.1	18.5	734.0
1986	349.0	283.9	63.1	32.9	7.0	13.3	19.9	769.2
1987	392.6	303.3	83.9	32.5	7.5	15.1	19.5	854.3
1988	401.2	334.3	94.5	35.2	7.6	16.2	20.2	909.2
1989	445.7	359.4	103.3	34.4	8.7	16.3	23.2	991.1
1990	466.9	380.0	93.5	35.3	11.5	16.7	28.0	1,032.0
1991	467.8	396.0	98.1	42.4	11.1	15.9	23.6	1,055.0
1992	476.0	413.7	100.3	45.6	11.1	17.4	27.2	1,091.2
1993	509.7	428.3	117.5	48.1	12.6	18.8	19.4	1,154.3
1994	543.1	461.5	140.4	55.2	15.2	20.1	23.1	1,258.6
1995	590.2	484.5	157.0	57.5	14.8	19.3	28.5	1,351.8
1996	656.4	509.4	171.8	54.0	17.2	18.7	25.5	1,453.1
1997	737.5	539.4	182.3	56.9	19.8	17.9	25.4	1,579.2
1998	828.6	571.8	188.7	57.7	24.1	18.3	32.6	1,721.7
1999	879.5	611.8	184.7	70.4	27.8	18.3	34.9	1,827.5
2000	1,004.5	652.9	207.3	68.9	29.0	19.9	42.8	2,025.2
2001	994.3	694.0	151.1	66.2	28.4	19.4	37.7	1,991.1
2002	858.3	700.8	148.0	67.0	26.5	18.6	33.9	1,853.1
2003	793.7	713.0	131.8	67.5	22.0	19.9	34.5	1,782.3
2004	809.0	733.4	189.4	69.9	24.8	21.1	32.6	1,880.1
2005	927.2	794.1	278.3	73.1	24.8	23.4	32.7	2,153.6
2006	1,043.9	837.8	353.9	74.0	27.9	24.8	44.6	2,406.9
2007	1,163.5	869.6	370.2	65.1	26.0	26.0	47.5	2,568.0
2008	1,145.7	900.2	304.3	67.3	28.8	27.6	50.0	2,524.0
2009	915.3	890.9	138.2	62.5	23.5	22.5	52.1	2,105.0
2010	898.5	864.8	191.4	66.9	18.9	25.3	96.8	2,162.7
2011	1,091.5	818.8	181.1	72.4	7.4	29.5	102.8	2,303.5
2012	1,132.2	845.3	242.3	79.1	14.0	30.3	106.8	2,450.0
2013	1,316.4	947.8	273.5	84.0	18.9	31.8	102.6	2,775.1
2014	1,394.6	1,023.9	320.7	93.4	19.3	33.9	135.0	3,020.8

Continued

Table G-2. **Continued**

Revenues, by Major Source, Since 1965

	Individual Income Taxes	Payroll Taxes	Corporate Income Taxes	Excise Taxes	Estate and Gift Taxes	Customs Duties	Miscellaneous Receipts	Total
				As a Percentage of Gross Domestic Product				
1965	6.9	3.1	3.6	2.1	0.4	0.2	0.2	16.4
1966	7.1	3.3	3.8	1.7	0.4	0.2	0.2	16.7
1967	7.3	3.9	4.1	1.6	0.4	0.2	0.3	17.8
1968	7.6	3.8	3.2	1.6	0.3	0.2	0.3	17.0
1969	8.9	4.0	3.7	1.6	0.4	0.2	0.3	19.0
1970	8.6	4.2	3.1	1.5	0.3	0.2	0.3	18.4
1971	7.7	4.2	2.4	1.5	0.3	0.2	0.3	16.7
1972	7.8	4.3	2.6	1.3	0.4	0.3	0.3	17.0
1973	7.6	4.7	2.7	1.2	0.4	0.2	0.3	17.0
1974	8.0	5.1	2.6	1.1	0.3	0.2	0.4	17.7
1975	7.6	5.2	2.5	1.0	0.3	0.2	0.4	17.3
1976	7.4	5.1	2.3	0.9	0.3	0.2	0.4	16.6
1977	7.8	5.3	2.7	0.9	0.4	0.3	0.3	17.5
1978	7.9	5.3	2.6	0.8	0.2	0.3	0.3	17.5
1979	8.5	5.4	2.6	0.7	0.2	0.3	0.4	18.0
1980	8.7	5.6	2.3	0.9	0.2	0.3	0.5	18.5
1981	9.1	5.8	1.9	1.3	0.2	0.3	0.4	19.1
1982	9.0	6.1	1.5	1.1	0.2	0.3	0.5	18.6
1983	8.2	5.9	1.0	1.0	0.2	0.2	0.4	17.0
1984	7.5	6.1	1.4	0.9	0.2	0.3	0.4	16.9
1985	7.8	6.2	1.4	0.8	0.2	0.3	0.4	17.2
1986	7.7	6.3	1.4	0.7	0.2	0.3	0.4	17.0
1987	8.2	6.3	1.8	0.7	0.2	0.3	0.4	17.9
1988	7.8	6.5	1.8	0.7	0.1	0.3	0.4	17.6
1989	8.0	6.5	1.9	0.6	0.2	0.3	0.4	17.8
1990	7.9	6.4	1.6	0.6	0.2	0.3	0.5	17.4
1991	7.7	6.5	1.6	0.7	0.2	0.3	0.4	17.3
1992	7.4	6.4	1.6	0.7	0.2	0.3	0.4	17.0
1993	7.5	6.3	1.7	0.7	0.2	0.3	0.3	17.0
1994	7.5	6.4	2.0	0.8	0.2	0.3	0.3	17.5
1995	7.8	6.4	2.1	0.8	0.2	0.3	0.4	17.8
1996	8.2	6.4	2.2	0.7	0.2	0.2	0.3	18.2
1997	8.7	6.4	2.1	0.7	0.2	0.2	0.3	18.6
1998	9.3	6.4	2.1	0.6	0.3	0.2	0.4	19.2
1999	9.2	6.4	1.9	0.7	0.3	0.2	0.4	19.2
2000	9.9	6.4	2.0	0.7	0.3	0.2	0.4	20.0
2001	9.4	6.6	1.4	0.6	0.3	0.2	0.4	18.8
2002	7.9	6.4	1.4	0.6	0.2	0.2	0.3	17.0
2003	7.0	6.3	1.2	0.6	0.2	0.2	0.3	15.7
2004	6.7	6.1	1.6	0.6	0.2	0.2	0.3	15.6
2005	7.2	6.2	2.2	0.6	0.2	0.2	0.3	16.7
2006	7.6	6.1	2.6	0.5	0.2	0.2	0.3	17.6
2007	8.1	6.1	2.6	0.5	0.2	0.2	0.3	17.9
2008	7.8	6.1	2.1	0.5	0.2	0.2	0.3	17.1
2009	6.4	6.2	1.0	0.4	0.2	0.2	0.4	14.6
2010	6.1	5.8	1.3	0.5	0.1	0.2	0.7	14.6
2011	7.1	5.3	1.2	0.5	*	0.2	0.7	15.0
2012	7.1	5.3	1.5	0.5	0.1	0.2	0.7	15.3
2013	7.9	5.7	1.6	0.5	0.1	0.2	0.6	16.7
2014	8.1	5.9	1.9	0.5	0.1	0.2	0.8	17.5

Sources: Congressional Budget Office; Office of Management and Budget.

Note: * = between zero and 0.05 percent.

Table G-3.

Outlays, by Major Category, Since 1965

		Mandatory			
	Discretionary	Programmatic Outlays[a]	Offsetting Receipts	Net Interest	Total
			In Billions of Dollars		
1965	77.8	39.7	-7.9	8.6	118.2
1966	90.1	43.4	-8.4	9.4	134.5
1967	106.5	50.9	-10.2	10.3	157.5
1968	118.0	59.7	-10.6	11.1	178.1
1969	117.3	64.6	-11.0	12.7	183.6
1970	120.3	72.5	-11.5	14.4	195.6
1971	122.5	86.9	-14.1	14.8	210.2
1972	128.5	100.8	-14.1	15.5	230.7
1973	130.4	116.0	-18.0	17.3	245.7
1974	138.2	130.9	-21.2	21.4	269.4
1975	158.0	169.4	-18.3	23.2	332.3
1976	175.6	189.1	-19.6	26.7	371.8
1977	197.1	203.7	-21.5	29.9	409.2
1978	218.7	227.4	-22.8	35.5	458.7
1979	240.0	247.0	-25.6	42.6	504.0
1980	276.3	291.2	-29.2	52.5	590.9
1981	307.9	339.4	-37.9	68.8	678.2
1982	326.0	370.8	-36.0	85.0	745.7
1983	353.3	410.6	-45.3	89.8	808.4
1984	379.4	405.5	-44.2	111.1	851.8
1985	415.8	448.2	-47.1	129.5	946.3
1986	438.5	461.7	-45.9	136.0	990.4
1987	444.2	474.2	-52.9	138.6	1,004.0
1988	464.4	505.0	-56.8	151.8	1,064.4
1989	488.8	546.1	-60.1	169.0	1,143.7
1990	500.6	625.6	-57.5	184.3	1,253.0
1991	533.3	702.0	-105.5	194.4	1,324.2
1992	533.8	717.7	-69.3	199.3	1,381.5
1993	539.8	736.8	-65.9	198.7	1,409.4
1994	541.3	786.0	-68.5	202.9	1,461.8
1995	544.8	817.5	-78.7	232.1	1,515.7
1996	532.7	857.6	-70.9	241.1	1,560.5
1997	547.0	895.5	-85.4	244.0	1,601.1
1998	552.0	942.9	-83.5	241.1	1,652.5
1999	572.1	979.4	-79.4	229.8	1,701.8
2000	614.6	1,032.4	-81.0	222.9	1,789.0
2001	649.0	1,096.8	-89.2	206.2	1,862.8
2002	734.0	1,196.3	-90.3	170.9	2,010.9
2003	824.3	1,283.4	-100.9	153.1	2,159.9
2004	895.1	1,346.4	-108.9	160.2	2,292.8
2005	968.5	1,448.1	-128.7	184.0	2,472.0
2006	1,016.6	1,556.1	-144.3	226.6	2,655.1
2007	1,041.6	1,627.9	-177.9	237.1	2,728.7
2008	1,134.9	1,780.3	-185.4	252.8	2,982.5
2009	1,237.5	2,287.8	-194.6	186.9	3,517.7
2010	1,347.2	2,110.2	-196.5	196.2	3,457.1
2011	1,347.1	2,234.9	-209.0	230.0	3,603.1
2012	1,286.1	2,258.8	-228.3	220.4	3,537.0
2013	1,202.1	2,336.4	-304.8	220.9	3,454.6
2014	1,178.7	2,372.6	-276.3	229.2	3,504.2

Continued

Table G-3. **Continued**

Outlays, by Major Category, Since 1965

	Discretionary	Mandatory: Programmatic Outlays[a]	Mandatory: Offsetting Receipts	Net Interest	Total
	As a Percentage of Gross Domestic Product				
1965	10.9	5.6	-1.1	1.2	16.6
1966	11.5	5.5	-1.1	1.2	17.2
1967	12.7	6.1	-1.2	1.2	18.8
1968	13.1	6.6	-1.2	1.2	19.8
1969	11.9	6.6	-1.1	1.3	18.7
1970	11.5	6.9	-1.1	1.4	18.7
1971	10.9	7.8	-1.3	1.3	18.8
1972	10.5	8.3	-1.2	1.3	18.9
1973	9.6	8.6	-1.3	1.3	18.1
1974	9.3	8.8	-1.4	1.4	18.1
1975	9.8	10.5	-1.1	1.4	20.6
1976	9.8	10.6	-1.1	1.5	20.8
1977	9.7	10.0	-1.1	1.5	20.2
1978	9.6	10.0	-1.0	1.6	20.1
1979	9.3	9.6	-1.0	1.7	19.6
1980	9.9	10.4	-1.0	1.9	21.1
1981	9.8	10.8	-1.2	2.2	21.6
1982	9.8	11.2	-1.1	2.6	22.5
1983	10.0	11.6	-1.3	2.5	22.8
1984	9.6	10.3	-1.1	2.8	21.5
1985	9.7	10.5	-1.1	3.0	22.2
1986	9.7	10.2	-1.0	3.0	21.8
1987	9.3	9.9	-1.1	2.9	21.0
1988	9.0	9.8	-1.1	2.9	20.6
1989	8.8	9.8	-1.1	3.0	20.5
1990	8.5	10.6	-1.0	3.1	21.2
1991	8.7	11.5	-1.7	3.2	21.7
1992	8.3	11.2	-1.1	3.1	21.5
1993	7.9	10.8	-1.0	2.9	20.7
1994	7.5	10.9	-1.0	2.8	20.3
1995	7.2	10.8	-1.0	3.1	20.0
1996	6.7	10.7	-0.9	3.0	19.6
1997	6.4	10.6	-1.0	2.9	18.9
1998	6.2	10.5	-0.9	2.7	18.5
1999	6.0	10.3	-0.8	2.4	17.9
2000	6.1	10.2	-0.8	2.2	17.6
2001	6.1	10.4	-0.8	2.0	17.6
2002	6.7	11.0	-0.8	1.6	18.5
2003	7.3	11.3	-0.9	1.4	19.1
2004	7.4	11.1	-0.9	1.3	19.0
2005	7.5	11.2	-1.0	1.4	19.2
2006	7.4	11.4	-1.1	1.7	19.4
2007	7.3	11.4	-1.2	1.7	19.1
2008	7.7	12.1	-1.3	1.7	20.2
2009	8.6	15.9	-1.4	1.3	24.4
2010	9.1	14.3	-1.3	1.3	23.4
2011	8.8	14.5	-1.4	1.5	23.4
2012	8.0	14.1	-1.4	1.4	22.1
2013	7.3	14.1	-1.8	1.3	20.8
2014	6.8	13.8	-1.6	1.3	20.3

Sources: Congressional Budget Office; Office of Management and Budget.

a. Excludes offsetting receipts.

Table G-4.

Discretionary Outlays Since 1965

	Defense	Nondefense	Total
		In Billions of Dollars	
1965	51.0	26.8	77.8
1966	59.0	31.1	90.1
1967	72.0	34.5	106.5
1968	82.2	35.8	118.0
1969	82.7	34.6	117.3
1970	81.9	38.4	120.3
1971	79.0	43.5	122.5
1972	79.3	49.2	128.5
1973	77.1	53.3	130.4
1974	80.7	57.5	138.2
1975	87.6	70.4	158.0
1976	89.9	85.7	175.6
1977	97.5	99.6	197.1
1978	104.6	114.1	218.7
1979	116.8	123.2	240.0
1980	134.6	141.7	276.3
1981	158.0	149.9	307.9
1982	185.9	140.0	326.0
1983	209.9	143.4	353.3
1984	228.0	151.4	379.4
1985	253.1	162.7	415.8
1986	273.8	164.7	438.5
1987	282.5	161.6	444.2
1988	290.9	173.5	464.4
1989	304.0	184.8	488.8
1990	300.1	200.4	500.6
1991	319.7	213.6	533.3
1992	302.6	231.2	533.8
1993	292.4	247.3	539.8
1994	282.3	259.1	541.3
1995	273.6	271.2	544.8
1996	266.0	266.8	532.7
1997	271.7	275.4	547.0
1998	270.3	281.7	552.0
1999	275.5	296.7	572.1
2000	295.0	319.7	614.6
2001	306.1	343.0	649.0
2002	349.0	385.0	734.0
2003	404.9	419.4	824.3
2004	454.1	441.0	895.1
2005	493.6	474.9	968.5
2006	520.0	496.7	1,016.6
2007	547.9	493.7	1,041.6
2008	612.4	522.5	1,134.9
2009	656.7	580.8	1,237.5
2010	688.9	658.3	1,347.2
2011	699.4	647.7	1,347.1
2012	670.5	615.6	1,286.1
2013	625.8	576.4	1,202.1
2014	595.8	582.9	1,178.7

Continued

Table G-4. **Continued**

Discretionary Outlays Since 1965

	Defense	Nondefense	Total
		As a Percentage of Gross Domestic Product	
1965	7.2	3.8	10.9
1966	7.5	4.0	11.5
1967	8.6	4.1	12.7
1968	9.1	4.0	13.1
1969	8.4	3.5	11.9
1970	7.8	3.7	11.5
1971	7.1	3.9	10.9
1972	6.5	4.0	10.5
1973	5.7	3.9	9.6
1974	5.4	3.9	9.3
1975	5.4	4.4	9.8
1976	5.0	4.8	9.8
1977	4.8	4.9	9.7
1978	4.6	5.0	9.6
1979	4.5	4.8	9.3
1980	4.8	5.1	9.9
1981	5.0	4.8	9.8
1982	5.6	4.2	9.8
1983	5.9	4.1	10.0
1984	5.8	3.8	9.6
1985	5.9	3.8	9.7
1986	6.0	3.6	9.7
1987	5.9	3.4	9.3
1988	5.6	3.4	9.0
1989	5.5	3.3	8.8
1990	5.1	3.4	8.5
1991	5.2	3.5	8.7
1992	4.7	3.6	8.3
1993	4.3	3.6	7.9
1994	3.9	3.6	7.5
1995	3.6	3.6	7.2
1996	3.3	3.3	6.7
1997	3.2	3.2	6.4
1998	3.0	3.1	6.2
1999	2.9	3.1	6.0
2000	2.9	3.2	6.1
2001	2.9	3.2	6.1
2002	3.2	3.5	6.7
2003	3.6	3.7	7.3
2004	3.8	3.6	7.4
2005	3.8	3.7	7.5
2006	3.8	3.6	7.4
2007	3.8	3.4	7.3
2008	4.2	3.5	7.7
2009	4.6	4.0	8.6
2010	4.7	4.4	9.1
2011	4.5	4.2	8.8
2012	4.2	3.8	8.0
2013	3.8	3.5	7.3
2014	3.5	3.4	6.8

Sources: Congressional Budget Office; Office of Management and Budget.

Table G-5.

Mandatory Outlays Since 1965

	Social Security	Medicare[a]	Medicaid	Income Security[b]	Other Retirement and Disability	Other Programs	Offsetting Receipts	Total	Memorandum: Major Health Care Programs (Net)[c]
					In Billions of Dollars				
1965	17.1	0	0.3	5.4	7.9	9.0	-7.9	31.8	0.3
1966	20.3	0	0.8	5.1	8.4	8.8	-8.4	35.0	0.8
1967	21.3	3.2	1.2	5.1	9.3	10.9	-10.2	40.7	3.7
1968	23.3	5.1	1.8	5.9	10.1	13.4	-10.6	49.1	6.2
1969	26.7	6.3	2.3	6.5	11.1	11.8	-11.0	53.6	7.7
1970	29.6	6.8	2.7	8.2	12.4	12.8	-11.5	61.0	8.6
1971	35.1	7.5	3.4	13.4	14.5	13.0	-14.1	72.8	9.6
1972	39.4	8.4	4.6	16.4	16.2	15.8	-14.1	86.7	11.6
1973	48.2	9.0	4.6	14.5	18.5	21.3	-18.0	98.0	12.2
1974	55.0	10.7	5.8	17.4	20.9	21.1	-21.2	109.7	14.8
1975	63.6	14.1	6.8	28.9	26.4	29.6	-18.3	151.1	19.1
1976	72.7	16.9	8.6	37.6	27.7	25.6	-19.6	169.5	23.6
1977	83.7	20.8	9.9	34.6	31.2	23.6	-21.5	182.2	28.5
1978	92.4	24.3	10.7	32.1	33.9	34.0	-22.8	204.6	32.5
1979	102.6	28.2	12.4	32.2	38.7	32.9	-25.6	221.4	37.9
1980	117.1	34.0	14.0	44.3	44.4	37.5	-29.2	262.1	45.0
1981	137.9	41.3	16.8	49.9	50.8	42.6	-37.9	301.6	54.8
1982	153.9	49.2	17.4	53.2	55.0	42.1	-36.0	334.8	62.7
1983	168.5	55.5	19.0	64.0	58.0	45.5	-45.3	365.2	70.2
1984	176.1	61.1	20.1	51.7	59.8	36.7	-44.2	361.3	76.1
1985	186.4	69.7	22.7	52.3	61.0	56.2	-47.1	401.1	86.7
1986	196.5	74.2	25.0	54.2	63.4	48.4	-45.9	415.8	93.4
1987	205.1	79.9	27.4	55.0	66.5	40.2	-52.9	421.2	100.8
1988	216.8	85.7	30.5	57.3	71.1	43.7	-56.8	448.2	107.4
1989	230.4	93.2	34.6	62.9	57.3	67.6	-60.1	485.9	117.3
1990	246.5	107.0	41.1	68.7	60.0	102.2	-57.5	568.1	136.9
1991	266.8	114.2	52.5	86.9	64.4	117.1	-105.5	596.5	154.6
1992	285.2	129.4	67.8	110.8	66.5	58.0	-69.3	648.4	184.0
1993	302.0	143.2	75.8	117.1	68.3	30.4	-65.9	670.9	203.7
1994	316.9	159.6	82.0	116.1	72.3	39.1	-68.5	717.5	223.9
1995	333.3	177.1	89.1	116.6	75.2	26.2	-78.7	738.8	246.0
1996	347.1	191.3	92.0	121.6	77.3	28.4	-70.9	786.7	263.3
1997	362.3	207.9	95.6	122.5	80.5	26.8	-85.4	810.1	283.0
1998	376.1	211.0	101.2	122.1	82.5	49.8	-83.5	859.3	291.5
1999	387.0	209.3	108.0	129.0	85.3	60.8	-79.4	900.0	296.3
2000	406.0	216.0	117.9	133.9	87.8	70.6	-81.0	951.4	313.3
2001	429.4	237.9	129.4	143.1	92.7	64.4	-89.2	1,007.6	347.1
2002	452.1	253.7	147.5	180.3	96.1	66.6	-90.3	1,106.0	378.9
2003	470.5	274.2	160.7	196.2	99.8	82.1	-100.9	1,182.5	410.8
2004	491.5	297.0	176.2	190.6	103.6	87.4	-108.9	1,237.5	445.7
2005	518.7	335.1	181.7	196.9	109.7	105.9	-128.7	1,319.4	481.2
2006	543.9	376.8	180.6	200.0	113.1	141.6	-144.3	1,411.8	511.0
2007	581.4	436.1	190.6	203.1	122.4	94.2	-177.9	1,450.0	567.4
2008	612.1	456.0	201.4	260.7	128.9	121.3	-185.4	1,594.9	594.1
2009	677.7	499.9	250.9	350.2	137.7	371.4	-194.6	2,093.2	683.6
2010	700.8	520.5	272.8	437.3	138.4	40.5	-196.5	1,913.7	727.1
2011	724.9	559.6	275.0	404.1	144.2	127.2	-209.0	2,026.0	763.5
2012	767.7	551.2	250.5	353.6	143.5	192.2	-228.3	2,030.5	725.8
2013	807.8	585.2	265.4	339.5	152.5	185.9	-304.8	2,031.6	767.6
2014	844.9	599.9	301.5	311.1	163.9	151.3	-276.3	2,096.3	831.1

Continued

Table G-5. **Continued**

Mandatory Outlays Since 1965

	Social Security	Medicare[a]	Medicaid	Income Security[b]	Other Retirement and Disability	Other Programs	Offsetting Receipts	Total	Memorandum: Major Health Care Programs (Net)[c]
				As a Percentage of Gross Domestic Product					
1965	2.4	0	*	0.8	1.1	1.3	-1.1	4.5	*
1966	2.6	0	0.1	0.7	1.1	1.1	-1.1	4.5	0.1
1967	2.5	0.4	0.1	0.6	1.1	1.3	-1.2	4.9	0.4
1968	2.6	0.6	0.2	0.7	1.1	1.5	-1.2	5.5	0.7
1969	2.7	0.6	0.2	0.7	1.1	1.2	-1.1	5.5	0.8
1970	2.8	0.6	0.3	0.8	1.2	1.2	-1.1	5.8	0.8
1971	3.1	0.7	0.3	1.2	1.3	1.2	-1.3	6.5	0.9
1972	3.2	0.7	0.4	1.3	1.3	1.3	-1.2	7.1	1.0
1973	3.6	0.7	0.3	1.1	1.4	1.6	-1.3	7.2	0.9
1974	3.7	0.7	0.4	1.2	1.4	1.4	-1.4	7.4	1.0
1975	3.9	0.9	0.4	1.8	1.6	1.8	-1.1	9.4	1.2
1976	4.1	0.9	0.5	2.1	1.5	1.4	-1.1	9.5	1.3
1977	4.1	1.0	0.5	1.7	1.5	1.2	-1.1	9.0	1.4
1978	4.1	1.1	0.5	1.4	1.5	1.5	-1.0	9.0	1.4
1979	4.0	1.1	0.5	1.3	1.5	1.3	-1.0	8.6	1.5
1980	4.2	1.2	0.5	1.6	1.6	1.3	-1.0	9.4	1.6
1981	4.4	1.3	0.5	1.6	1.6	1.4	-1.2	9.6	1.7
1982	4.6	1.5	0.5	1.6	1.7	1.3	-1.1	10.1	1.9
1983	4.8	1.6	0.5	1.8	1.6	1.3	-1.3	10.3	2.0
1984	4.5	1.5	0.5	1.3	1.5	0.9	-1.1	9.1	1.9
1985	4.4	1.6	0.5	1.2	1.4	1.3	-1.1	9.4	2.0
1986	4.3	1.6	0.6	1.2	1.4	1.1	-1.0	9.2	2.1
1987	4.3	1.7	0.6	1.2	1.4	0.8	-1.1	8.8	2.1
1988	4.2	1.7	0.6	1.1	1.4	0.8	-1.1	8.7	2.1
1989	4.1	1.7	0.6	1.1	1.0	1.2	-1.1	8.7	2.1
1990	4.2	1.8	0.7	1.2	1.0	1.7	-1.0	9.6	2.3
1991	4.4	1.9	0.9	1.4	1.1	1.9	-1.7	9.8	2.5
1992	4.4	2.0	1.1	1.7	1.0	0.9	-1.1	10.1	2.9
1993	4.4	2.1	1.1	1.7	1.0	0.4	-1.0	9.9	3.0
1994	4.4	2.2	1.1	1.6	1.0	0.5	-1.0	10.0	3.1
1995	4.4	2.3	1.2	1.5	1.0	0.3	-1.0	9.7	3.2
1996	4.4	2.4	1.2	1.5	1.0	0.4	-0.9	9.9	3.3
1997	4.3	2.5	1.1	1.4	0.9	0.3	-1.0	9.5	3.3
1998	4.2	2.4	1.1	1.4	0.9	0.6	-0.9	9.6	3.3
1999	4.1	2.2	1.1	1.4	0.9	0.6	-0.8	9.5	3.1
2000	4.0	2.1	1.2	1.3	0.9	0.7	-0.8	9.4	3.1
2001	4.1	2.3	1.2	1.4	0.9	0.6	-0.8	9.5	3.3
2002	4.2	2.3	1.4	1.7	0.9	0.6	-0.8	10.2	3.5
2003	4.2	2.4	1.4	1.7	0.9	0.7	-0.9	10.4	3.6
2004	4.1	2.5	1.5	1.6	0.9	0.7	-0.9	10.2	3.7
2005	4.0	2.6	1.4	1.5	0.9	0.8	-1.0	10.2	3.7
2006	4.0	2.8	1.3	1.5	0.8	1.0	-1.1	10.3	3.7
2007	4.1	3.0	1.3	1.4	0.9	0.7	-1.2	10.1	4.0
2008	4.1	3.1	1.4	1.8	0.9	0.8	-1.3	10.8	4.0
2009	4.7	3.5	1.7	2.4	1.0	2.6	-1.4	14.5	4.7
2010	4.7	3.5	1.8	3.0	0.9	0.3	-1.3	12.9	4.9
2011	4.7	3.6	1.8	2.6	0.9	0.8	-1.4	13.2	5.0
2012	4.8	3.4	1.6	2.2	0.9	1.2	-1.4	12.7	4.5
2013	4.9	3.5	1.6	2.0	0.9	1.1	-1.8	12.3	4.6
2014	4.9	3.5	1.7	1.8	1.0	0.9	-1.6	12.2	4.8

Sources: Congressional Budget Office; Office of Management and Budget.

Note: * = between zero and 0.05 percent.

a. Excludes offsetting receipts.

b. Includes unemployment compensation, Supplemental Security Income, the refundable portion of the earned income and child tax credits, the Supplemental Nutrition Assistance Program, family support, child nutrition, and foster care.

c. Spending on Medicare (net of offsetting receipts), Medicaid, the Children's Health Insurance Program, and subsidies for health insurance purchased through exchanges and related spending.

List of Tables and Figures

Tables

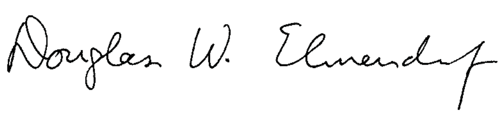
Figures

About This Document

This volume is one of a series of reports on the state of the budget and the economy that the Congressional Budget Office issues each year. It satisfies the requirement of section 202(e) of the Congressional Budget Act of 1974 for CBO to submit to the Committees on the Budget periodic reports about fiscal policy and to provide baseline projections of the federal budget. In keeping with CBO's mandate to provide objective, impartial analysis, this report makes no recommendations.

CBO's Panel of Economic Advisers commented on an early version of the economic forecast underlying this report. Members of the panel are Rosanne Altshuler, Alan J. Auerbach, Markus K. Brunnermeier, Mary C. Daly, Steven J. Davis, Roger W. Ferguson Jr., Claudia Goldin, Robert E. Hall, Jan Hatzius, Simon Johnson, Anil Kashyap, Lawrence Katz, Donald Kohn, N. Gregory Mankiw, Adam S. Posen, James Poterba, Joel Prakken, Valerie A. Ramey, Carmen M. Reinhart, Brian Sack, Robert Shimer, Justin Wolfers, and Mark Zandi. John Fernald and Erica Groshen attended the panel's meeting as guests. Although CBO's outside advisers provided considerable assistance, they are not responsible for the contents of this report.

The CBO staff members who contributed to this report—by preparing the economic, revenue, and spending projections; writing the report; reviewing, editing, and publishing it; compiling the supplemental materials posted along with it on CBO's website (www.cbo.gov/publication/49892); and providing other support—are listed on the following pages.



Douglas W. Elmendorf
Director

January 2015

Economic Projections

The economic projections were prepared by the Macroeconomic Analysis Division, with contributions from analysts in other divisions. That work was supervised by Wendy Edelberg, Kim Kowalewski, Robert Arnold, and Benjamin Page.

Alexander Arnon	Housing, research assistance
Lauren Bresnahan	Inflation
Gabriel Ehrlich	Interest rates, monetary policy, house prices
Daniel Fried	Net exports, exchange rates, energy prices
Edward Gamber	Current quarter analysis
Ronald Gecan	Energy prices
Mark Lasky	Business investment, housing
Leah Loversky	Motor vehicle sector, model and data management
Joshua Montes	Labor markets
Frank Russek	Federal, state, and local government spending and revenues
Robert Shackleton	Potential output, productivity
Christopher Williams	Consumer spending, incomes
Shiqi Zheng	Research assistance

Revenue Projections

The revenue projections were prepared by the Tax Analysis Division, supervised by David Weiner, Mark Booth, Edward Harris, and Janet Holtzblatt. In addition, the staff of the Joint Committee on Taxation provided valuable assistance.

Paul Burnham	Retirement income
Nathaniel Frentz	Federal Reserve System earnings, customs duties, miscellaneous fees and fines
Jennifer Gravelle	International taxation, depreciation
Pamela Greene	Corporate income taxes
Robert McClelland	Capital gains realizations
Shannon Mok	Estate and gift taxes, refundable tax credits
Kevin Perese	Tax modeling, Federal Reserve System earnings
Molly Saunders-Scott	International taxation, business taxation
Kurt Seibert	Payroll taxes, depreciation, tax modeling
Joshua Shakin	Individual income taxes, refundable tax credits
Logan Timmerhoff	Excise taxes
Marvin Ward	Tax modeling

Spending Projections

The spending projections were prepared by the Budget Analysis Division, with contributions from analysts in other divisions; that work was supervised by Peter Fontaine, Theresa Gullo, Holly Harvey, Janet Airis, Tom Bradley, Kim Cawley, Chad Chirico, Jeffrey Holland, Sarah Jennings, and Sam Papenfuss of the Budget Analysis Division, as well as by Jessica Banthin of the Health, Retirement, and Long-Term Analysis Division and Damien Moore of the Financial Analysis Division.

Defense, International Affairs, and Veterans' Affairs

Kent Christensen	Defense (projections, working capital funds, operation and maintenance, procurement, scorekeeping)
Sunita D'Monte	International affairs
Ann Futrell	Veterans' health care, international food assistance
Raymond Hall	Defense (research and development, stockpile sales, atomic energy, other programs)
William Ma	Veterans' readjustment benefits, reservists' education benefits
David Newman	Defense (military construction and family housing, military activities in Afghanistan), veterans' housing
Dawn Sauter Regan	Defense (military personnel)
Matthew Schmit	Military retirement, military health care
Jason Wheelock	Defense (operation and maintenance, procurement, compensation for radiation exposure and energy employees' occupational illness, other defense programs)
Dwayne Wright	Veterans' compensation and pensions

Health

Julia Christensen	Food and Drug Administration, prescription drugs
Kate Fritzsche	Health insurance exchanges, other programs
Daniel Hoople	Medicaid, Children's Health Insurance Program
Lori Housman	Medicare
Paul Jacobs	Health insurance coverage
Sean Lyons	Health insurance coverage
Paul Masi	Medicare, Federal Employees Health Benefits program
Sarah Masi	Health insurance exchanges, other programs
Jamease Miles	Medicare, Public Health Service
Alexandra Minicozzi	Health insurance coverage
Eamon Molloy	Health insurance coverage
Andrea Noda	Medicaid prescription drugs, long-term care, Public Health Service
Romain Parsad	Health insurance coverage

Health (Continued)

Allison Percy	Health insurance coverage
Lisa Ramirez-Branum	Medicaid, health insurance coverage, Health Resources and Services Administration
Lara Robillard	Medicare
Erica Socker	Medicare
Robert Stewart	Medicaid, Children's Health Insurance Program, Indian Health Service
Sam Trachtman	Health insurance coverage
Ellen Werble	Prescription drugs, Public Health Service
Zoe Williams	Medicare
Rebecca Yip	Medicare Part D, prescription drugs, Public Health Service

Income Security and Education

Christina Hawley Anthony	Unemployment insurance, training programs, Administration on Aging, Smithsonian Institution, arts and humanities
Sheila Dacey	Old-Age and Survivors Insurance, Social Security trust funds, Pension Benefit Guaranty Corporation
Elizabeth Cove Delisle	Housing assistance
Kathleen FitzGerald	Supplemental Nutrition Assistance Program and other nutrition programs
Jennifer Gray	Social Services Block Grant, Child and Family Services, child nutrition and other nutrition programs
Justin Humphrey	Elementary and secondary education, Pell grants, student loans
Deborah Kalcevic	Student loans, higher education
David Rafferty	Temporary Assistance for Needy Families, Child Support Enforcement, foster care, child care programs, Low Income Home Energy Assistance Program, refugee assistance
Emily Stern	Disability Insurance, Supplemental Security Income

Natural and Physical Resources

Marin Burnett	Administration of justice, science and space exploration, recreational resources
Megan Carroll	Energy, air transportation

Natural and Physical Resources (Continued)

Martin von Gnechten	Community and regional development, Federal Emergency Management Agency, Bureau of Indian Affairs, credit unions
Mark Grabowicz	Administration of justice, Postal Service
Kathleen Gramp	Energy, Outer Continental Shelf receipts, spectrum auction receipts, Orderly Liquidation Fund
David Hull	Agriculture
Jeff LaFave	Conservation and land management, other natural resources
James Langley	Agriculture
Susanne Mehlman	Pollution control and abatement, Federal Housing Administration and other housing credit programs
Matthew Pickford	General government, legislative branch
Sarah Puro	Highways, mass transit, Amtrak, water transportation
Aurora Swanson	Water resources, Fannie Mae and Freddie Mac
Susan Willie	Commerce, Small Business Administration, Universal Service Fund, agricultural trade and credit

Other Areas and Functions

Janet Airis	Appropriation bill (Legislative Branch)
Shane Beaulieu	Computer support
Barry Blom	Federal pay, monthly Treasury data
Joanna Capps	Appropriation bills (Labor, Health and Human Services, and Education; State and Foreign Operations)
Gabriel Ehrlich	Fannie Mae and Freddie Mac, Federal Housing Administration
Mary Froehlich	Computer support
Avi Lerner	Troubled Asset Relief Program, automatic budget enforcement and sequestration, interest on the public debt, other interest, Federal Deposit Insurance Corporation
Amber Marcellino	Federal civilian retirement, historical data
Virginia Myers	Appropriation bills (Commerce, Justice, and Science; Financial Services and General Government)
Jeffrey Perry	Fannie Mae and Freddie Mac, Federal Housing Administration
Dan Ready	Various federal retirement programs, national income and product accounts, federal pay

Other Areas and Functions (Continued)

Mitchell Remy	Fannie Mae and Freddie Mac, Federal Housing Administration
Mark Sanford	Appropriation bills (Agriculture and Food and Drug Administration; Defense)
Esther Steinbock	Appropriation bills (Transportation and Housing and Urban Development; Military Construction and Veterans Affairs; Energy and Water Development)
J'nell Blanco Suchy	Authorization bills
Patrice Watson	Database system administrator
Adam Wilson	Appropriation bills (Homeland Security; Interior)

Writing

Christina Hawley Anthony wrote the summary. Barry Blom wrote Chapter 1, with assistance from Mark Booth and Jeffrey Holland. Daniel Fried and Charles Whalen wrote Chapter 2. Christina Hawley Anthony, Megan Carroll, Avi Lerner, and Amber Marcellino wrote Chapter 3. Mark Booth, Pamela Greene, Joshua Shakin, and David Weiner wrote Chapter 4. Amber Marcellino wrote Appendix A, with assistance from Nathaniel Frentz. Sarah Masi and Kate Fritzsche wrote Appendix B, with assistance from Jessica Banthin, Holly Harvey, and Chad Chirico. Dan Ready wrote Appendix C, with assistance from Nathaniel Frentz. Frank Russek wrote Appendix D; Jeffrey Holland wrote Appendix E. Shiqi Zheng compiled Appendix F, and Amber Marcellino compiled Appendix G.

Review, Editing, and Publishing

Jeffrey Kling and Robert Sunshine reviewed the report. The editing and publishing were handled by CBO's editing and publishing group, supervised by John Skeen, and the agency's web team, supervised by Deborah Kilroe.

Christine Bogusz, Kate Kelly, Loretta Lettner, Bo Peery, Benjamin Plotinsky, Jeanine Rees, and John Skeen edited the report; Leigh Angres, Maureen Costantino, and Jeanine Rees prepared it for publication; and Robert Dean, Annette Kalicki, Adam Russell, and Simone Thomas published it on CBO's website.

Sarah Puro coordinated the preparation of tables of baseline projections for selected programs, and Leah Loversky and Logan Timmerhoff compiled supplemental economic and tax data—all posted with this report on the agency's website. Jeanine Rees and Simone Thomas coordinated the presentation of those materials.

This file presents economic data and projections in CBO's January 2015 report *The Budget and E*
www.cbo.gov/publication/49892

Additional supplemental data related to CBO's budget outlook can be found in Budget Data and F
www.cbo.gov/publication/45069

Contents

A. Economic Baseline Projections

B. Data Underlying the Figures

Data underlying summary figures 1 and 2, and the figures in Chapters 1, 3, and 4, and Appendixes B, D, and E are available in Budget Data and Projections (January 2015), www.cbo.gov/publication/45069.

C. Automatic Stabilizers

The worksheets below present the tables in Appendix D, along with additional information about a stabilizers.

D. Key Inputs in Projecting Potential GDP

E. Historical and Projected Estimates of Potential GDP and the Related Unemployment Rat

The worksheets below present estimates of potential GDP and related series that CBO has made used several concepts of the unemployment rate that would exist if the economy's output were at CBO used the nonaccelerating inflation rate of unemployment (NAIRU), which is the rate that was with a constant inflation rate. Since 2006, CBO used the natural rate of unemployment, which is t unemployment arising from all sources except fluctuations in aggregate demand. From 2011 to 2 of short-term and long-term natural rates of unemployment. The short-term natural rate incorpora boosted the natural rate beginning in 2008. (CBO did not estimate a short-term natural rate befor long-term natural rate incorporated only longer-lasting structural factors. After 2013, CBO's natura factors that have boosted the natural rate beginning in 2008, and its underlying long-term rate of only longer-lasting structural factors. CBO uses the underlying long-term rate of unemployment to

Economic Outlook: 2015 to 2025 .

Projections (January 2015).

Rate

automatic

Fiscal Year, in Billions of Dollars
Fiscal Year, as a Percentage of Potential Gross Domestic Product

: Automatic Stabilizers
ers, Based on the National Income and Product Accounts

te

e in previous years. CBO has
: its potential level. Until 2006,
s estimated to be consistent
he estimated rate of
013, CBO published estimates
ated structural factors that have
e the recent downturn.) The
al rate incorporates structural
unemployment incorporated
o compute potential GDP.

January 2015 Baseline Forecast—Data Release (Quarterly)

	Units	2013Q1	2013Q2	2013Q3	2013Q4	2014Q1	2014Q2
Output							
Gross Domestic Product (GDP)	Billions of dollars	16502	16619	16872	17078	17044	17328
	Percentage change, annual rate	4.2	2.9	6.2	5.0	-0.8	6.8
Gross National Product (GNP)	Billions of dollars	16711	16834	17103	17321	17255	17542
	Percentage change, annual rate	3.8	3.0	6.6	5.2	-1.5	6.8
Potential GDP	Billions of dollars	17181	17296	17434	17566	17690	17852
	Percentage change, annual rate	2.8	2.7	3.2	3.1	2.9	3.7
Real GDP	Billions of 2009 dollars	15538	15607	15780	15916	15832	16010
	Percentage change, annual rate	2.7	1.8	4.5	3.5	-2.1	4.6
Real GNP	Billions of 2009 dollars	15717	15791	15978	16124	16010	16190
	Percentage change, annual rate	2.3	1.9	4.8	3.7	-2.8	4.6
Real Potential GDP	Billions of 2009 dollars	16182	16241	16302	16364	16427	16490
	Percentage change, annual rate	1.4	1.5	1.5	1.5	1.6	1.6
Prices							
Price Index, Personal Consumption Expenditures (PCE)	2009=100	107.0	107.1	107.5	107.8	108.2	108.8
	Percentage change, annual rate	1.0	0.5	1.7	1.0	1.4	2.3
Price Index, PCE, Excluding food and energy	2009=100	105.6	105.9	106.3	106.6	106.9	107.4
	Percentage change, annual rate	1.4	1.0	1.4	1.3	1.2	2.0
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	232.0	232.2	233.5	234.1	235.2	237.0
	Percentage change, annual rate	1.2	0.4	2.2	1.1	1.9	3.0
CPI-U, Excluding Food and Energy	1982-84=100	232.4	233.2	234.3	235.2	236.2	237.7
	Percentage change, annual rate	2.0	1.4	1.8	1.6	1.6	2.5
GDP Price Index	2009=100	106.2	106.5	106.9	107.3	107.7	108.3
	Percentage change, annual rate	1.3	1.2	1.7	1.5	1.3	2.1
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	117.3	118.0	118.5	119.1	119.3	120.2
	Percentage change, annual rate	1.7	2.4	1.7	2.0	0.7	3.1
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	98.8	97.4	103.1	92.9	94.2	98.6
FHFA House Price Index, Purchase Only	1991Q1=100	193.8	198.2	201.8	204.3	207.1	209.1
Labor							
Unemployment Rate, Civilian, 16 Years or Older	Percent	7.7	7.5	7.2	7.0	6.7	6.2
Noninstitutional Population, Civilian, 16 Years or Older	Millions	245	245	246	247	247	248
	Percentage change, annual rate	1.1	0.9	1.0	1.0	0.9	0.9
Labor Force, Civilian, 16 Years or Older	Millions	155	156	156	155	156	156
	Percentage change, annual rate	0	0.4	-0.2	-1.5	2.2	-0.6
Employment, Civilian, 16 Years or Older (Household Survey	Millions	143	144	144	144	145	146
	Percentage change, annual rate	0.4	1.3	1.0	-0.2	3.5	1.4
Employment, Total Nonfarm (Establishment Survey)	Millions	135	136	137	137	138	139
	Percentage change, annual rate	1.9	1.8	1.6	1.8	1.5	2.2
Interest Rates							
10-Year Treasury Note	Percent	2.0	2.0	2.7	2.8	2.8	2.6
3-Month Treasury Bill	Percent	0.1	0.1	0.0	0.1	0.1	0.0
Income							
Income, Personal	Billions of dollars	13977	14131	14247	14312	14485	14661
	Percentage of GDP	84.7	85.0	84.4	83.8	85.0	84.6
Compensation of Employees, Paid	Billions of dollars	8734	8826	8872	8947	9096	9160
	Percentage of GDP	52.9	53.1	52.6	52.4	53.4	52.9
Wages and Salaries	Billions of dollars	7034	7111	7145	7209	7340	7392
	Percentage of GDP	42.6	42.8	42.3	42.2	43.1	42.7
Nonwage Income	Billions of dollars	3939	4003	4057	4050	4064	4143
	Percentage of GDP	23.9	24.1	24.0	23.7	23.8	23.9
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	92	84	87	70	58	73
	Percentage of GDP	0.6	0.5	0.5	0.4	0.3	0.4
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1236	1247	1259	1273	1293	1308
	Percentage of GDP	7.5	7.5	7.5	7.5	7.6	7.5
Income, Rental, with CCAdj	Billions of dollars	575	591	604	613	623	635
	Percentage of GDP	3.5	3.6	3.6	3.6	3.7	3.7
Interest Income, Personal	Billions of dollars	1246	1254	1259	1263	1262	1270
	Percentage of GDP	7.5	7.5	7.5	7.4	7.4	7.3
Dividend Income, Personal	Billions of dollars	790	828	848	831	828	857
	Percentage of GDP	4.8	5.0	5.0	4.9	4.9	4.9
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2039	2104	2141	2144	1942	2106
	Percentage of GDP	12.4	12.7	12.7	12.6	11.4	12.2

Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	1653	1711	1731	1720	1545	1712
	Percentage of GDP	10.0	10.3	10.3	10.1	9.1	9.9

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital consumption adjustment.

January 2015 Baseline Forecast—Data Release (Quarterly)

	Units	2014Q3	2014Q4	2015Q1	2015Q2	2015Q3	2015Q4
Output							
Gross Domestic Product (GDP)	Billions of dollars	17555	17760	17921	18083	18298	18512
	Percentage change, annual rate	5.3	4.8	3.7	3.7	4.8	4.8
Gross National Product (GNP)	Billions of dollars	17767	17965	18117	18279	18493	18699
	Percentage change, annual rate	5.3	4.5	3.4	3.6	4.8	4.5
Potential GDP	Billions of dollars	17986	18168	18298	18428	18582	18734
	Percentage change, annual rate	3.0	4.1	2.9	2.9	3.4	3.3
Real GDP	Billions of 2009 dollars	16164	16248	16346	16448	16578	16713
	Percentage change, annual rate	3.9	2.1	2.4	2.5	3.2	3.3
Real GNP	Billions of 2009 dollars	16342	16417	16505	16606	16734	16861
	Percentage change, annual rate	3.8	1.9	2.2	2.5	3.1	3.1
Real Potential GDP	Billions of 2009 dollars	16554	16621	16690	16761	16836	16913
	Percentage change, annual rate	1.6	1.6	1.7	1.7	1.8	1.9
Prices							
Price Index, Personal Consumption Expenditures (PCE)	2009=100	109.1	109.2	109.4	109.8	110.3	110.8
	Percentage change, annual rate	1.3	0.4	0.6	1.5	1.8	1.9
Price Index, PCE, Excluding food and energy	2009=100	107.8	108.2	108.7	109.2	109.7	110.2
	Percentage change, annual rate	1.4	1.5	1.6	1.7	1.8	1.9
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	237.7	237.6	237.9	238.8	240.0	241.2
	Percentage change, annual rate	1.1	-0.1	0.4	1.6	2.0	2.1
CPI-U, Excluding Food and Energy	1982-84=100	238.4	239.6	240.7	242.0	243.3	244.6
	Percentage change, annual rate	1.3	1.9	2.0	2.1	2.2	2.2
GDP Price Index	2009=100	108.6	109.3	109.6	109.9	110.4	110.8
	Percentage change, annual rate	1.4	2.5	1.2	1.1	1.6	1.4
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	121.1	121.9	122.7	123.5	124.3	125.2
	Percentage change, annual rate	3.0	2.6	2.7	2.7	2.7	2.9
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	93.8	76.6	70.0	70.8	71.7	72.5
FHFA House Price Index, Purchase Only	1991Q1=100	211.0	212.5	214.0	215.3	217.0	218.3
Labor							
Unemployment Rate, Civilian, 16 Years or Older	Percent	6.1	5.8	5.6	5.6	5.5	5.5
Noninstitutional Population, Civilian, 16 Years or Older	Millions	248	249	249	250	250	251
	Percentage change, annual rate	1.0	0.5	0.9	1.0	1.0	1.0
Labor Force, Civilian, 16 Years or Older	Millions	156	156	157	157	157	158
	Percentage change, annual rate	1.0	1.0	1.1	0.8	0.9	0.9
Employment, Civilian, 16 Years or Older (Household Survey	Millions	146	147	148	148	149	149
	Percentage change, annual rate	1.5	2.5	1.6	1.1	1.1	1.1
Employment, Total Nonfarm (Establishment Survey)	Millions	139	140	141	141	142	142
	Percentage change, annual rate	2.1	2.2	2.0	1.5	1.5	1.4
Interest Rates							
10-Year Treasury Note	Percent	2.5	2.4	2.5	2.7	2.8	3.0
3-Month Treasury Bill	Percent	0.0	0.0	0.0	0.1	0.3	0.5
Income							
Income, Personal	Billions of dollars	14801	14936	15112	15264	15420	15626
	Percentage of GDP	84.3	84.1	84.3	84.4	84.3	84.4
Compensation of Employees, Paid	Billions of dollars	9238	9335	9444	9546	9650	9753
	Percentage of GDP	52.6	52.6	52.7	52.8	52.7	52.7
Wages and Salaries	Billions of dollars	7458	7540	7628	7711	7796	7884
	Percentage of GDP	42.5	42.5	42.6	42.6	42.6	42.6
Nonwage Income	Billions of dollars	4173	4183	4226	4281	4334	4393
	Percentage of GDP	23.8	23.6	23.6	23.7	23.7	23.7
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	62	55	52	50	49	48
	Percentage of GDP	0.4	0.3	0.3	0.3	0.3	0.3
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1325	1350	1364	1377	1394	1412
	Percentage of GDP	7.5	7.6	7.6	7.6	7.6	7.6
Income, Rental, with CCAdj	Billions of dollars	648	657	666	672	674	677
	Percentage of GDP	3.7	3.7	3.7	3.7	3.7	3.7
Interest Income, Personal	Billions of dollars	1267	1239	1253	1284	1309	1339
	Percentage of GDP	7.2	7.0	7.0	7.1	7.2	7.2
Dividend Income, Personal	Billions of dollars	871	882	891	899	908	917
	Percentage of GDP	5.0	5.0	5.0	5.0	5.0	5.0
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2150	2248	2211	2185	2214	2223
	Percentage of GDP	12.2	12.7	12.3	12.1	12.1	12.0

Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	1755	1853	1828	1803	1823	1844
	Percentage of GDP	10.0	10.4	10.2	10.0	10.0	10.0

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital c

January 2015 Baseline Forecast—Data Release (Quarterly)

	Units	2016Q1	2016Q2	2016Q3	2016Q4	2017Q1	2017Q2
Output							
Gross Domestic Product (GDP)	Billions of dollars	18732	18938	19146	19366	19599	19815
	Percentage change, annual rate	4.9	4.5	4.5	4.7	4.9	4.5
Gross National Product (GNP)	Billions of dollars	18912	19111	19308	19521	19749	19957
	Percentage change, annual rate	4.6	4.3	4.2	4.5	4.8	4.3
Potential GDP	Billions of dollars	18913	19080	19256	19446	19651	19849
	Percentage change, annual rate	3.9	3.6	3.7	4.0	4.3	4.1
Real GDP	Billions of 2009 dollars	16833	16954	17072	17190	17310	17421
	Percentage change, annual rate	2.9	2.9	2.8	2.8	2.8	2.6
Real GNP	Billions of 2009 dollars	16972	17086	17193	17304	17417	17520
	Percentage change, annual rate	2.7	2.7	2.5	2.6	2.6	2.4
Real Potential GDP	Billions of 2009 dollars	16995	17081	17170	17262	17355	17451
	Percentage change, annual rate	2.0	2.0	2.1	2.2	2.2	2.2
Prices							
Price Index, Personal Consumption Expenditures (PCE)	2009=100	111.3	111.9	112.4	112.9	113.5	114.0
	Percentage change, annual rate	1.9	1.9	1.9	1.9	1.9	1.9
Price Index, PCE, Excluding food and energy	2009=100	110.7	111.2	111.8	112.3	112.8	113.3
	Percentage change, annual rate	1.9	1.9	1.9	1.9	1.9	1.9
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	242.6	243.9	245.3	246.7	248.2	249.6
	Percentage change, annual rate	2.3	2.2	2.3	2.3	2.4	2.2
CPI-U, Excluding Food and Energy	1982-84=100	246.0	247.3	248.7	250.1	251.5	252.9
	Percentage change, annual rate	2.2	2.2	2.2	2.2	2.2	2.3
GDP Price Index	2009=100	111.3	111.7	112.1	112.7	113.2	113.7
	Percentage change, annual rate	1.9	1.5	1.6	1.8	2.1	1.8
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	126.1	127.1	128.1	129.2	130.4	131.5
	Percentage change, annual rate	2.9	3.2	3.3	3.4	3.6	3.6
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	73.3	74.2	75.0	75.8	76.7	77.5
FHFA House Price Index, Purchase Only	1991Q1=100	219.5	220.5	221.5	222.6	223.8	225.0
Labor							
Unemployment Rate, Civilian, 16 Years or Older	Percent	5.4	5.4	5.4	5.4	5.4	5.3
Noninstitutional Population, Civilian, 16 Years or Older	Millions	252	252	253	254	254	255
	Percentage change, annual rate	1.1	1.0	1.0	1.0	1.0	1.0
Labor Force, Civilian, 16 Years or Older	Millions	158	158	159	159	159	159
	Percentage change, annual rate	0.9	0.8	0.7	0.7	0.6	0.6
Employment, Civilian, 16 Years or Older (Household Survey	Millions	149	150	150	150	151	151
	Percentage change, annual rate	1.0	0.9	0.8	0.8	0.7	0.7
Employment, Total Nonfarm (Establishment Survey)	Millions	143	143	144	144	144	145
	Percentage change, annual rate	1.4	1.3	1.2	1.2	1.0	0.9
Interest Rates							
10-Year Treasury Note	Percent	3.2	3.3	3.4	3.6	3.7	3.8
3-Month Treasury Bill	Percent	0.8	1.0	1.3	1.7	2.0	2.4
Income							
Income, Personal	Billions of dollars	15818	15995	16180	16375	16601	16779
	Percentage of GDP	84.4	84.5	84.5	84.6	84.7	84.7
Compensation of Employees, Paid	Billions of dollars	9870	9983	10099	10212	10334	10452
	Percentage of GDP	52.7	52.7	52.7	52.7	52.7	52.8
Wages and Salaries	Billions of dollars	7978	8070	8164	8260	8358	8455
	Percentage of GDP	42.6	42.6	42.6	42.7	42.6	42.7
Nonwage Income	Billions of dollars	4426	4461	4504	4557	4624	4679
	Percentage of GDP	23.6	23.6	23.5	23.5	23.6	23.6
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	48	48	48	48	48	48
	Percentage of GDP	0.3	0.3	0.2	0.2	0.2	0.2
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1429	1446	1461	1477	1494	1509
	Percentage of GDP	7.6	7.6	7.6	7.6	7.6	7.6
Income, Rental, with CCAdj	Billions of dollars	677	675	671	666	659	651
	Percentage of GDP	3.6	3.6	3.5	3.4	3.4	3.3
Interest Income, Personal	Billions of dollars	1346	1359	1383	1415	1462	1501
	Percentage of GDP	7.2	7.2	7.2	7.3	7.5	7.6
Dividend Income, Personal	Billions of dollars	926	934	942	952	961	970
	Percentage of GDP	4.9	4.9	4.9	4.9	4.9	4.9
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2239	2256	2262	2273	2287	2298
	Percentage of GDP	12.0	11.9	11.8	11.7	11.7	11.6

Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	1842	1842	1842	1847	1864	1867
	Percentage of GDP	9.8	9.7	9.6	9.5	9.5	9.4

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital c

January 2015 Baseline Forecast—Data Release (Quarterly)

	Units	2017Q3	2017Q4	2018Q1	2018Q2	2018Q3	2018Q4
Output							
Gross Domestic Product (GDP)	Billions of dollars	20027	20235	20458	20669	20871	21073
	Percentage change, annual rate	4.4	4.2	4.5	4.2	4.0	3.9
Gross National Product (GNP)	Billions of dollars	20166	20374	20596	20810	21012	21219
	Percentage change, annual rate	4.2	4.2	4.4	4.2	4.0	4.0
Potential GDP	Billions of dollars	20054	20265	20492	20708	20926	21148
	Percentage change, annual rate	4.2	4.3	4.6	4.3	4.3	4.3
Real GDP	Billions of 2009 dollars	17525	17621	17717	17814	17901	17987
	Percentage change, annual rate	2.4	2.2	2.2	2.2	2.0	1.9
Real GNP	Billions of 2009 dollars	17620	17715	17808	17906	17993	18081
	Percentage change, annual rate	2.3	2.2	2.1	2.2	2.0	2.0
Real Potential GDP	Billions of 2009 dollars	17548	17647	17746	17847	17949	18051
	Percentage change, annual rate	2.3	2.3	2.3	2.3	2.3	2.3
Prices							
Price Index, Personal Consumption Expenditures (PCE)	2009=100	114.6	115.1	115.7	116.3	116.8	117.4
	Percentage change, annual rate	2.0	2.0	2.0	1.9	1.9	2.0
Price Index, PCE, Excluding food and energy	2009=100	113.9	114.4	115.0	115.6	116.1	116.7
	Percentage change, annual rate	1.9	2.0	2.0	2.0	2.0	2.0
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	251.0	252.5	254.1	255.5	256.9	258.4
	Percentage change, annual rate	2.4	2.4	2.4	2.2	2.3	2.3
CPI-U, Excluding Food and Energy	1982-84=100	254.3	255.8	257.2	258.7	260.2	261.7
	Percentage change, annual rate	2.3	2.3	2.3	2.3	2.3	2.3
GDP Price Index	2009=100	114.3	114.8	115.5	116.0	116.6	117.2
	Percentage change, annual rate	1.9	2.0	2.2	1.9	2.0	2.0
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	132.7	133.8	135.0	136.2	137.4	138.6
	Percentage change, annual rate	3.6	3.6	3.6	3.6	3.6	3.6
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	78.3	79.2	80.0	80.4	80.7	80.9
FHFA House Price Index, Purchase Only	1991Q1=100	226.4	227.8	229.3	230.7	232.2	233.8
Labor							
Unemployment Rate, Civilian, 16 Years or Older	Percent	5.3	5.3	5.3	5.3	5.4	5.4
Noninstitutional Population, Civilian, 16 Years or Older	Millions	255	256	257	257	258	258
	Percentage change, annual rate	1.0	1.0	1.0	1.0	1.0	1.0
Labor Force, Civilian, 16 Years or Older	Millions	160	160	160	160	161	161
	Percentage change, annual rate	0.6	0.6	0.7	0.7	0.7	0.7
Employment, Civilian, 16 Years or Older (Household Survey	Millions	151	151	152	152	152	152
	Percentage change, annual rate	0.6	0.6	0.7	0.6	0.6	0.5
Employment, Total Nonfarm (Establishment Survey)	Millions	145	145	146	146	146	146
	Percentage change, annual rate	0.9	0.9	0.7	0.6	0.6	0.5
Interest Rates							
10-Year Treasury Note	Percent	3.9	4.0	4.1	4.2	4.3	4.3
3-Month Treasury Bill	Percent	2.8	3.1	3.4	3.6	3.6	3.5
Income							
Income, Personal	Billions of dollars	16976	17175	17413	17620	17824	18023
	Percentage of GDP	84.8	84.9	85.1	85.2	85.4	85.5
Compensation of Employees, Paid	Billions of dollars	10570	10682	10794	10907	11020	11135
	Percentage of GDP	52.8	52.8	52.8	52.8	52.8	52.8
Wages and Salaries	Billions of dollars	8551	8647	8742	8834	8926	9018
	Percentage of GDP	42.7	42.7	42.7	42.7	42.8	42.8
Nonwage Income	Billions of dollars	4741	4801	4879	4948	5014	5081
	Percentage of GDP	23.7	23.7	23.8	23.9	24.0	24.1
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	48	48	49	49	49	50
	Percentage of GDP	0.2	0.2	0.2	0.2	0.2	0.2
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1524	1538	1555	1570	1584	1598
	Percentage of GDP	7.6	7.6	7.6	7.6	7.6	7.6
Income, Rental, with CCAdj	Billions of dollars	645	641	634	624	614	609
	Percentage of GDP	3.2	3.2	3.1	3.0	2.9	2.9
Interest Income, Personal	Billions of dollars	1544	1584	1642	1695	1746	1795
	Percentage of GDP	7.7	7.8	8.0	8.2	8.4	8.5
Dividend Income, Personal	Billions of dollars	979	990	1000	1010	1020	1030
	Percentage of GDP	4.9	4.9	4.9	4.9	4.9	4.9
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2306	2322	2334	2348	2351	2352
	Percentage of GDP	11.5	11.5	11.4	11.4	11.3	11.2

Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	1865	1871	1885	1884	1873	1860
	Percentage of GDP	9.3	9.2	9.2	9.1	9.0	8.8

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital c

January 2015 Baseline Forecast—Data Release (Quarterly)

	Units	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2
Output							
Gross Domestic Product (GDP)	Billions of dollars	21299	21513	21731	21958	22203	22432
	Percentage change, annual rate	4.4	4.1	4.1	4.3	4.5	4.2
Gross National Product (GNP)	Billions of dollars	21441	21657	21878	22105	22349	22577
	Percentage change, annual rate	4.3	4.1	4.1	4.2	4.5	4.2
Potential GDP	Billions of dollars	21386	21610	21837	22065	22311	22541
	Percentage change, annual rate	4.6	4.2	4.3	4.3	4.5	4.2
Real GDP	Billions of 2009 dollars	18079	18173	18269	18371	18473	18575
	Percentage change, annual rate	2.1	2.1	2.1	2.3	2.2	2.2
Real GNP	Billions of 2009 dollars	18169	18264	18360	18461	18561	18660
	Percentage change, annual rate	1.9	2.1	2.1	2.2	2.2	2.2
Real Potential GDP	Billions of 2009 dollars	18153	18256	18358	18461	18563	18666
	Percentage change, annual rate	2.3	2.3	2.3	2.3	2.2	2.2
Prices							
Price Index, Personal Consumption Expenditures (PCE)	2009=100	118.0	118.6	119.1	119.7	120.4	120.9
	Percentage change, annual rate	2.0	2.0	2.0	2.0	2.1	2.0
Price Index, PCE, Excluding food and energy	2009=100	117.2	117.8	118.4	119.0	119.6	120.1
	Percentage change, annual rate	2.0	2.0	2.0	2.0	2.0	2.0
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	259.9	261.4	263.0	264.6	266.2	267.8
	Percentage change, annual rate	2.5	2.3	2.4	2.5	2.5	2.3
CPI-U, Excluding Food and Energy	1982-84=100	263.1	264.6	266.1	267.7	269.2	270.7
	Percentage change, annual rate	2.3	2.3	2.3	2.3	2.3	2.3
GDP Price Index	2009=100	117.8	118.4	118.9	119.5	120.2	120.8
	Percentage change, annual rate	2.3	1.9	2.0	2.0	2.2	1.9
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	139.9	141.1	142.3	143.6	144.8	146.1
	Percentage change, annual rate	3.6	3.6	3.6	3.6	3.5	3.5
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	81.8	82.7	83.6	84.5	85.4	86.3
FHFA House Price Index, Purchase Only	1991Q1=100	235.3	236.9	238.4	240.2	242.0	244.0
Labor							
Unemployment Rate, Civilian, 16 Years or Older	Percent	5.4	5.5	5.5	5.5	5.5	5.5
Noninstitutional Population, Civilian, 16 Years or Older	Millions	259	260	260	261	262	262
	Percentage change, annual rate	1.0	1.0	1.0	1.0	0.9	1.0
Labor Force, Civilian, 16 Years or Older	Millions	161	161	162	162	162	162
	Percentage change, annual rate	0.5	0.6	0.6	0.6	0.5	0.6
Employment, Civilian, 16 Years or Older (Household Survey	Millions	152	153	153	153	153	153
	Percentage change, annual rate	0.4	0.4	0.5	0.5	0.5	0.6
Employment, Total Nonfarm (Establishment Survey)	Millions	146	147	147	147	147	147
	Percentage change, annual rate	0.5	0.5	0.6	0.6	0.6	0.6
Interest Rates							
10-Year Treasury Note	Percent	4.4	4.5	4.5	4.6	4.6	4.6
3-Month Treasury Bill	Percent	3.4	3.4	3.4	3.4	3.4	3.4
Income							
Income, Personal	Billions of dollars	18237	18432	18630	18838	19088	19310
	Percentage of GDP	85.6	85.7	85.7	85.8	86.0	86.1
Compensation of Employees, Paid	Billions of dollars	11255	11375	11498	11624	11755	11885
	Percentage of GDP	52.8	52.9	52.9	52.9	52.9	53.0
Wages and Salaries	Billions of dollars	9114	9209	9307	9407	9510	9613
	Percentage of GDP	42.8	42.8	42.8	42.8	42.8	42.9
Nonwage Income	Billions of dollars	5139	5204	5269	5335	5404	5467
	Percentage of GDP	24.1	24.2	24.2	24.3	24.3	24.4
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	50	51	51	52	53	53
	Percentage of GDP	0.2	0.2	0.2	0.2	0.2	0.2
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1613	1629	1645	1662	1680	1698
	Percentage of GDP	7.6	7.6	7.6	7.6	7.6	7.6
Income, Rental, with CCAdj	Billions of dollars	606	602	598	597	596	592
	Percentage of GDP	2.8	2.8	2.7	2.7	2.7	2.6
Interest Income, Personal	Billions of dollars	1829	1873	1916	1954	1996	2035
	Percentage of GDP	8.6	8.7	8.8	8.9	9.0	9.1
Dividend Income, Personal	Billions of dollars	1040	1050	1060	1069	1079	1089
	Percentage of GDP	4.9	4.9	4.9	4.9	4.9	4.9
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2371	2377	2379	2389	2408	2418
	Percentage of GDP	11.1	11.0	10.9	10.9	10.8	10.8

Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	1868	1865	1861	1868	1882	1885
	Percentage of GDP	8.8	8.7	8.6	8.5	8.5	8.4

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital c

January 2015 Baseline Forecast—Data Release (Quarterly)

	Units	2020Q3	2020Q4	2021Q1	2021Q2	2021Q3	2021Q4
Output							
Gross Domestic Product (GDP)	Billions of dollars	22665	22902	23155	23393	23634	23879
	Percentage change, annual rate	4.2	4.2	4.5	4.2	4.2	4.2
Gross National Product (GNP)	Billions of dollars	22810	23045	23300	23533	23773	24017
	Percentage change, annual rate	4.2	4.2	4.5	4.1	4.1	4.2
Potential GDP	Billions of dollars	22776	23013	23267	23506	23749	23995
	Percentage change, annual rate	4.2	4.2	4.5	4.2	4.2	4.2
Real GDP	Billions of 2009 dollars	18678	18780	18883	18986	19089	19192
	Percentage change, annual rate	2.2	2.2	2.2	2.2	2.2	2.2
Real GNP	Billions of 2009 dollars	18760	18860	18963	19061	19161	19262
	Percentage change, annual rate	2.2	2.2	2.2	2.1	2.1	2.1
Real Potential GDP	Billions of 2009 dollars	18768	18871	18974	19078	19181	19284
	Percentage change, annual rate	2.2	2.2	2.2	2.2	2.2	2.2
Prices							
Price Index, Personal Consumption Expenditures (PCE)	2009=100	121.6	122.2	122.8	123.4	124.0	124.6
	Percentage change, annual rate	2.0	2.0	2.1	2.0	2.0	2.1
Price Index, PCE, Excluding food and energy	2009=100	120.7	121.3	121.9	122.5	123.1	123.7
	Percentage change, annual rate	2.0	2.0	2.0	2.0	2.0	2.0
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	269.4	271.0	272.7	274.3	276.0	277.7
	Percentage change, annual rate	2.5	2.5	2.5	2.3	2.5	2.5
CPI-U, Excluding Food and Energy	1982-84=100	272.2	273.8	275.4	276.9	278.5	280.1
	Percentage change, annual rate	2.3	2.3	2.3	2.3	2.3	2.3
GDP Price Index	2009=100	121.4	121.9	122.6	123.2	123.8	124.4
	Percentage change, annual rate	2.0	2.0	2.2	1.9	2.0	2.0
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	147.4	148.6	149.9	151.2	152.5	153.8
	Percentage change, annual rate	3.5	3.5	3.5	3.5	3.5	3.5
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	87.2	88.1	89.0	90.0	90.9	92.0
FHFA House Price Index, Purchase Only	1991Q1=100	246.0	247.9	249.9	252.0	254.1	256.3
Labor							
Unemployment Rate, Civilian, 16 Years or Older	Percent	5.5	5.5	5.5	5.5	5.5	5.5
Noninstitutional Population, Civilian, 16 Years or Older	Millions	263	263	264	265	265	266
	Percentage change, annual rate	1.0	1.0	1.0	1.0	0.9	0.9
Labor Force, Civilian, 16 Years or Older	Millions	163	163	163	163	163	164
	Percentage change, annual rate	0.6	0.6	0.6	0.6	0.6	0.6
Employment, Civilian, 16 Years or Older (Household Survey	Millions	154	154	154	154	155	155
	Percentage change, annual rate	0.6	0.6	0.6	0.6	0.6	0.6
Employment, Total Nonfarm (Establishment Survey)	Millions	148	148	148	148	149	149
	Percentage change, annual rate	0.6	0.6	0.6	0.6	0.6	0.6
Interest Rates							
10-Year Treasury Note	Percent	4.6	4.6	4.6	4.6	4.6	4.6
3-Month Treasury Bill	Percent	3.4	3.4	3.4	3.4	3.4	3.4
Income							
Income, Personal	Billions of dollars	19546	19769	20029	20241	20459	20692
	Percentage of GDP	86.2	86.3	86.5	86.5	86.6	86.7
Compensation of Employees, Paid	Billions of dollars	12015	12145	12282	12416	12552	12690
	Percentage of GDP	53.0	53.0	53.0	53.1	53.1	53.1
Wages and Salaries	Billions of dollars	9717	9821	9929	10035	10143	10252
	Percentage of GDP	42.9	42.9	42.9	42.9	42.9	42.9
Nonwage Income	Billions of dollars	5531	5589	5657	5716	5777	5840
	Percentage of GDP	24.4	24.4	24.4	24.4	24.4	24.5
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	54	54	55	56	56	57
	Percentage of GDP	0.2	0.2	0.2	0.2	0.2	0.2
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1715	1734	1753	1771	1790	1809
	Percentage of GDP	7.6	7.6	7.6	7.6	7.6	7.6
Income, Rental, with CCAdj	Billions of dollars	589	591	593	592	592	597
	Percentage of GDP	2.6	2.6	2.6	2.5	2.5	2.5
Interest Income, Personal	Billions of dollars	2073	2101	2137	2167	2198	2226
	Percentage of GDP	9.1	9.2	9.2	9.3	9.3	9.3
Dividend Income, Personal	Billions of dollars	1099	1109	1120	1130	1140	1150
	Percentage of GDP	4.8	4.8	4.8	4.8	4.8	4.8
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2428	2454	2475	2488	2501	2516
	Percentage of GDP	10.7	10.7	10.7	10.6	10.6	10.5

Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	1887	1902	1918	1921	1925	1931
	Percentage of GDP	8.3	8.3	8.3	8.2	8.1	8.1

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital (

January 2015 Baseline Forecast—Data Release (Quarterly)

	Units	2022Q1	2022Q2	2022Q3	2022Q4	2023Q1	2023Q2
Output							
Gross Domestic Product (GDP)	Billions of dollars	24141	24388	24638	24891	25163	25418
	Percentage change, annual rate	4.5	4.1	4.2	4.2	4.4	4.1
Gross National Product (GNP)	Billions of dollars	24279	24521	24769	25020	25289	25538
	Percentage change, annual rate	4.4	4.1	4.1	4.1	4.4	4.0
Potential GDP	Billions of dollars	24258	24505	24757	25012	25284	25540
	Percentage change, annual rate	4.5	4.1	4.2	4.2	4.4	4.1
Real GDP	Billions of 2009 dollars	19295	19398	19501	19605	19710	19814
	Percentage change, annual rate	2.2	2.2	2.2	2.2	2.2	2.1
Real GNP	Billions of 2009 dollars	19363	19462	19562	19663	19763	19862
	Percentage change, annual rate	2.1	2.1	2.1	2.1	2.1	2.0
Real Potential GDP	Billions of 2009 dollars	19388	19492	19596	19700	19805	19909
	Percentage change, annual rate	2.2	2.2	2.2	2.1	2.1	2.1
Prices							
Price Index, Personal Consumption Expenditures (PCE)	2009=100	125.3	125.9	126.5	127.2	127.8	128.4
	Percentage change, annual rate	2.0	2.0	2.0	2.1	2.1	2.0
Price Index, PCE, Excluding food and energy	2009=100	124.3	124.9	125.5	126.1	126.8	127.4
	Percentage change, annual rate	2.0	2.0	2.0	2.0	2.0	2.0
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	279.4	281.0	282.7	284.4	286.2	287.8
	Percentage change, annual rate	2.5	2.3	2.5	2.5	2.5	2.3
CPI-U, Excluding Food and Energy	1982-84=100	281.7	283.3	284.9	286.6	288.2	289.9
	Percentage change, annual rate	2.3	2.3	2.3	2.3	2.3	2.3
GDP Price Index	2009=100	125.1	125.7	126.3	127.0	127.7	128.3
	Percentage change, annual rate	2.3	1.9	2.0	2.0	2.2	1.9
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	155.1	156.4	157.7	159.0	160.4	161.7
	Percentage change, annual rate	3.4	3.4	3.4	3.4	3.4	3.4
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	92.9	93.9	94.8	95.9	96.9	97.9
FHFA House Price Index, Purchase Only	1991Q1=100	258.6	260.9	263.2	265.5	267.8	270.1
Labor							
Unemployment Rate, Civilian, 16 Years or Older	Percent	5.5	5.5	5.5	5.4	5.4	5.4
Noninstitutional Population, Civilian, 16 Years or Older	Millions	267	267	268	268	269	270
	Percentage change, annual rate	0.9	0.9	1.0	1.0	1.0	1.0
Labor Force, Civilian, 16 Years or Older	Millions	164	164	164	165	165	165
	Percentage change, annual rate	0.5	0.6	0.6	0.6	0.7	0.6
Employment, Civilian, 16 Years or Older (Household Survey	Millions	155	155	155	156	156	156
	Percentage change, annual rate	0.5	0.6	0.6	0.6	0.7	0.6
Employment, Total Nonfarm (Establishment Survey)	Millions	149	149	150	150	150	150
	Percentage change, annual rate	0.7	0.7	0.6	0.6	0.6	0.6
Interest Rates							
10-Year Treasury Note	Percent	4.6	4.6	4.6	4.6	4.6	4.6
3-Month Treasury Bill	Percent	3.4	3.4	3.4	3.4	3.4	3.4
Income							
Income, Personal	Billions of dollars	20956	21181	21409	21632	21904	22131
	Percentage of GDP	86.8	86.9	86.9	86.9	87.0	87.1
Compensation of Employees, Paid	Billions of dollars	12833	12973	13115	13257	13406	13552
	Percentage of GDP	53.2	53.2	53.2	53.3	53.3	53.3
Wages and Salaries	Billions of dollars	10366	10477	10589	10702	10820	10935
	Percentage of GDP	42.9	43.0	43.0	43.0	43.0	43.0
Nonwage Income	Billions of dollars	5904	5963	6024	6085	6148	6207
	Percentage of GDP	24.5	24.5	24.4	24.4	24.4	24.4
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	58	58	59	60	61	61
	Percentage of GDP	0.2	0.2	0.2	0.2	0.2	0.2
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1829	1848	1868	1888	1909	1929
	Percentage of GDP	7.6	7.6	7.6	7.6	7.6	7.6
Income, Rental, with CCAdj	Billions of dollars	602	603	604	610	616	617
	Percentage of GDP	2.5	2.5	2.5	2.5	2.4	2.4
Interest Income, Personal	Billions of dollars	2254	2282	2311	2335	2360	2385
	Percentage of GDP	9.3	9.4	9.4	9.4	9.4	9.4
Dividend Income, Personal	Billions of dollars	1161	1171	1182	1192	1203	1214
	Percentage of GDP	4.8	4.8	4.8	4.8	4.8	4.8
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2544	2558	2574	2595	2625	2641
	Percentage of GDP	10.5	10.5	10.4	10.4	10.4	10.4

Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	1951	1956	1964	1977	1999	2009
	Percentage of GDP	8.1	8.0	8.0	7.9	7.9	7.9

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital c

January 2015 Baseline Forecast—Data Release (Quarterly)

	Units	2023Q3	2023Q4	2024Q1	2024Q2	2024Q3	2024Q4
Output							
Gross Domestic Product (GDP)	Billions of dollars	25678	25941	26222	26488	26758	27031
	Percentage change, annual rate	4.2	4.2	4.4	4.1	4.2	4.2
Gross National Product (GNP)	Billions of dollars	25795	26057	26339	26603	26873	27146
	Percentage change, annual rate	4.1	4.1	4.4	4.1	4.1	4.1
Potential GDP	Billions of dollars	25802	26066	26348	26615	26887	27162
	Percentage change, annual rate	4.2	4.2	4.4	4.1	4.2	4.2
Real GDP	Billions of 2009 dollars	19918	20023	20127	20233	20339	20444
	Percentage change, annual rate	2.1	2.1	2.1	2.1	2.1	2.1
Real GNP	Billions of 2009 dollars	19962	20065	20168	20271	20375	20480
	Percentage change, annual rate	2.0	2.1	2.1	2.1	2.1	2.1
Real Potential GDP	Billions of 2009 dollars	20014	20119	20224	20330	20437	20543
	Percentage change, annual rate	2.1	2.1	2.1	2.1	2.1	2.1
Prices							
Price Index, Personal Consumption Expenditures (PCE)	2009=100	129.1	129.7	130.4	131.0	131.7	132.3
	Percentage change, annual rate	2.0	2.1	2.0	1.9	2.0	2.0
Price Index, PCE, Excluding food and energy	2009=100	128.0	128.6	129.3	129.9	130.5	131.2
	Percentage change, annual rate	2.0	2.0	2.0	2.0	2.0	2.0
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	289.6	291.4	293.2	294.8	296.6	298.4
	Percentage change, annual rate	2.5	2.5	2.5	2.3	2.4	2.4
CPI-U, Excluding Food and Energy	1982-84=100	291.5	293.2	294.9	296.6	298.3	300.0
	Percentage change, annual rate	2.3	2.3	2.3	2.3	2.3	2.3
GDP Price Index	2009=100	128.9	129.6	130.3	130.9	131.6	132.2
	Percentage change, annual rate	2.0	2.0	2.3	2.0	2.0	2.0
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	163.0	164.4	165.7	167.1	168.5	169.8
	Percentage change, annual rate	3.4	3.3	3.3	3.3	3.3	3.3
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	98.9	99.9	100.6	101.2	101.7	102.4
FHFA House Price Index, Purchase Only	1991Q1=100	272.3	274.5	276.7	278.9	281.0	283.2
Labor							
Unemployment Rate, Civilian, 16 Years or Older	Percent	5.4	5.4	5.4	5.4	5.4	5.4
Noninstitutional Population, Civilian, 16 Years or Older	Millions	270	271	272	272	273	274
	Percentage change, annual rate	1.0	1.0	1.0	0.9	0.9	0.9
Labor Force, Civilian, 16 Years or Older	Millions	165	166	166	166	166	167
	Percentage change, annual rate	0.6	0.6	0.6	0.6	0.6	0.6
Employment, Civilian, 16 Years or Older (Household Survey	Millions	156	157	157	157	157	158
	Percentage change, annual rate	0.6	0.6	0.6	0.6	0.6	0.6
Employment, Total Nonfarm (Establishment Survey)	Millions	150	151	151	151	151	152
	Percentage change, annual rate	0.6	0.6	0.6	0.6	0.6	0.6
Interest Rates							
10-Year Treasury Note	Percent	4.6	4.6	4.6	4.6	4.6	4.6
3-Month Treasury Bill	Percent	3.4	3.4	3.4	3.4	3.4	3.4
Income							
Income, Personal	Billions of dollars	22361	22601	22891	23136	23383	23642
	Percentage of GDP	87.1	87.1	87.3	87.3	87.4	87.5
Compensation of Employees, Paid	Billions of dollars	13699	13846	13999	14149	14300	14452
	Percentage of GDP	53.3	53.4	53.4	53.4	53.4	53.5
Wages and Salaries	Billions of dollars	11052	11169	11291	11411	11531	11653
	Percentage of GDP	43.0	43.1	43.1	43.1	43.1	43.1
Nonwage Income	Billions of dollars	6267	6327	6391	6452	6514	6589
	Percentage of GDP	24.4	24.4	24.4	24.4	24.3	24.4
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	62	63	64	64	65	66
	Percentage of GDP	0.2	0.2	0.2	0.2	0.2	0.2
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1949	1970	1991	2012	2033	2054
	Percentage of GDP	7.6	7.6	7.6	7.6	7.6	7.6
Income, Rental, with CCAdj	Billions of dollars	620	626	633	636	640	646
	Percentage of GDP	2.4	2.4	2.4	2.4	2.4	2.4
Interest Income, Personal	Billions of dollars	2412	2433	2457	2482	2506	2541
	Percentage of GDP	9.4	9.4	9.4	9.4	9.4	9.4
Dividend Income, Personal	Billions of dollars	1225	1236	1247	1258	1270	1281
	Percentage of GDP	4.8	4.8	4.8	4.7	4.7	4.7
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2662	2689	2724	2746	2770	2796
	Percentage of GDP	10.4	10.4	10.4	10.4	10.4	10.3

Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	2020	2038	2064	2078	2093	2110
	Percentage of GDP	7.9	7.9	7.9	7.8	7.8	7.8

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital c

January 2015 Baseline Forecast—Data Release (Calendar Year)

	Units	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Output														
Gross Domestic Product (GDP)	Billions of dollars	16768	17422	18204	19045	19919	20768	21625	22551	23515	24515	25550	26625	27736
	Percentage change	3.7	3.9	4.5	4.6	4.6	4.3	4.1	4.3	4.3	4.3	4.2	4.2	4.2
Gross National Product (GNP)	Billions of dollars	16992	17632	18397	19213	20062	20909	21770	22695	23656	24647	25670	26740	27855
	Percentage change	3.7	3.8	4.3	4.4	4.4	4.2	4.1	4.3	4.2	4.2	4.2	4.2	4.2
Potential GDP	Billions of dollars	17369	17924	18511	19174	19955	20818	21725	22660	23629	24633	25673	26753	27870
	Percentage change	3.0	3.2	3.3	3.6	4.1	4.3	4.4	4.3	4.3	4.3	4.2	4.2	4.2
Real GDP	Billions of 2009 dollars	15710	16064	16521	17012	17469	17855	18223	18627	19037	19450	19866	20286	20709
	Percentage change	2.2	2.3	2.9	3.0	2.7	2.2	2.1	2.2	2.2	2.2	2.1	2.1	2.1
Real GNP	Billions of 2009 dollars	15902	16240	16677	17139	17568	17947	18313	18710	19112	19512	19913	20324	20744
	Percentage change	2.2	2.1	2.7	2.8	2.5	2.2	2.0	2.2	2.1	2.1	2.1	2.1	2.1
Real Potential GDP	Billions of 2009 dollars	16272	16523	16800	17127	17501	17898	18307	18717	19129	19544	19962	20384	20809
	Percentage change	1.4	1.5	1.7	2.0	2.2	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1
Prices														
Price Index, Personal Consumption Expenditures (PCE)	2009=100	107.3	108.8	110.1	112.1	114.3	116.5	118.9	121.3	123.7	126.2	128.8	131.3	134.0
	Percentage change	1.2	1.4	1.2	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Price Index, PCE, Excluding food and energy	2009=100	106	108	109	111	114	116	118	120	123	125	128	130	133
	Percentage change	1.3	1.4	1.7	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	233	237	239	245	250	256	262	269	275	282	289	296	303
	Percentage change	1.5	1.7	1.1	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
CPI-U, Excluding Food and Energy	1982-84=100	234	238	243	248	254	259	265	271	278	284	291	297	304
	Percentage change	1.8	1.8	2.0	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
GDP Price Index	2009=100	106.7	108.5	110.2	111.9	114.0	116.3	118.7	121.1	123.5	126.0	128.6	131.2	133.9
	Percentage change	1.5	1.6	1.6	1.6	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	118.2	120.6	123.9	127.7	132.1	136.8	141.7	146.7	151.9	157.1	162.4	167.8	173.3
	Percentage change	1.9	2.0	2.8	3.0	3.5	3.6	3.6	3.5	3.5	3.4	3.4	3.3	3.3
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	98.0	90.8	71.3	74.6	77.9	80.5	83.1	86.7	90.5	94.4	98.4	101.5	103.9
FHFA House Price Index, Purchase Only	1991Q1=100	199.5	209.9	216.1	221.0	225.7	231.5	237.7	245.0	253.1	262.1	271.2	279.9	288.6
Labor														
Unemployment Rate, Civilian, 16 Years or Older	Percent	7.4	6.2	5.6	5.4	5.3	5.4	5.5	5.5	5.5	5.5	5.4	5.4	5.4
Noninstitutional Population, Civilian, 16 Years or Older	Millions	246	248	250	253	255	258	260	262	265	267	270	273	275
	Percentage change	1.0	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0	0.9	0.9
Labor Force, Civilian, 16 Years or Older	Millions	155	156	157	159	160	161	162	162	163	164	165	166	167
	Percentage change	0.3	0.3	0.8	0.8	0.6	0.7	0.6	0.6	0.6	0.5	0.6	0.6	0.6
Employment, Civilian, 16 Years or Older (Household Survey)	Millions	144	146	149	150	151	152	153	153	154	155	156	157	158
	Percentage change	1.0	1.6	1.5	1.0	0.7	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6
Employment, Total Nonfarm (Establishment Survey)	Millions	136	139	141	143	145	146	147	148	148	149	150	151	152
	Percentage change	1.7	1.8	1.9	1.3	1.0	0.7	0.5	0.6	0.6	0.6	0.6	0.6	0.6
Interest Rates														
10-Year Treasury Note	Percent	2.4	2.6	2.8	3.4	3.9	4.2	4.5	4.6	4.6	4.6	4.6	4.6	4.6
3-Month Treasury Bill	Percent	0.1	0.0	0.2	1.2	2.6	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Income														

Income, Personal	Billions of dollars	14167	14721	15356	16092	16883	17720	18534	19428	20355	21294	22249	23263	24324
	Percentage of GDP	84.5	84.5	84.4	84.5	84.8	85.3	85.7	86.2	86.6	86.9	87.1	87.4	87.7
Compensation of Employees, Paid	Billions of dollars	8845	9207	9598	10041	10509	10964	11438	11950	12485	13044	13626	14225	14840
	Percentage of GDP	52.7	52.8	52.7	52.7	52.8	52.8	52.9	53.0	53.1	53.2	53.3	53.4	53.5
Wages and Salaries	Billions of dollars	7125	7432	7755	8118	8503	8880	9259	9665	10090	10533	10994	11472	11966
	Percentage of GDP	42.5	42.7	42.6	42.6	42.7	42.8	42.8	42.9	42.9	43.0	43.0	43.1	43.1
Nonwage Income	Billions of dollars	4012	4141	4308	4487	4711	4980	5237	5497	5748	5994	6237	6486	6752
	Percentage of GDP	23.9	23.8	23.7	23.6	23.7	24.0	24.2	24.4	24.4	24.5	24.4	24.4	24.3
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	83	62	50	48	48	49	51	54	56	59	62	65	68
	Percentage of GDP	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1254	1319	1387	1453	1516	1576	1637	1707	1781	1858	1939	2023	2109
	Percentage of GDP	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Income, Rental, with CCAdj	Billions of dollars	596	641	672	672	649	620	601	592	594	605	620	639	657
	Percentage of GDP	3.6	3.7	3.7	3.5	3.3	3.0	2.8	2.6	2.5	2.5	2.4	2.4	2.4
Interest Income, Personal	Billions of dollars	1255	1260	1296	1376	1523	1720	1893	2051	2182	2296	2397	2497	2607
	Percentage of GDP	7.5	7.2	7.1	7.2	7.6	8.3	8.8	9.1	9.3	9.4	9.4	9.4	9.4
Dividend Income, Personal	Billions of dollars	824.6	859.6	903.6	938.2	975.0	1014.9	1054.6	1094.2	1134.9	1176.4	1219.2	1263.8	1310.9
	Percentage of GDP	4.9	4.9	5.0	4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.7	4.7
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2107	2112	2208	2257	2303	2346	2379	2427	2495	2568	2654	2759	2870
	Percentage of GDP	12.6	12.1	12.1	11.9	11.6	11.3	11.0	10.8	10.6	10.5	10.4	10.4	10.3
Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	1704	1716	1825	1843	1867	1875	1865	1889	1924	1962	2016	2086	2161
	Percentage of GDP	10.2	9.9	10.0	9.7	9.4	9.0	8.6	8.4	8.2	8.0	7.9	7.8	7.8

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital consumption adjustment.

January 2015 Baseline Forecast—Data Release (Fiscal Year)

	Units	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Output														
Gross Domestic Product (GDP)	Billions of dollars	16582	17251	18016	18832	19701	20558	21404	22315	23271	24262	25287	26352	27456
	Percentage change	3.5	4.0	4.4	4.5	4.6	4.4	4.1	4.3	4.3	4.3	4.2	4.2	4.2
Gross National Product (GNP)	Billions of dollars	16802	17471	18213	19007	19848	20698	21549	22460	23413	24396	25411	26468	27573
	Percentage change	3.3	4.0	4.3	4.4	4.4	4.3	4.1	4.2	4.2	4.2	4.2	4.2	4.2
Potential GDP	Billions of dollars	17244	17774	18369	18996	19750	20598	21495	22423	23384	24379	25410	26479	27588
	Percentage change	3.0	3.1	3.4	3.4	4.0	4.3	4.4	4.3	4.3	4.3	4.2	4.2	4.2
Real GDP	Billions of 2009 dollars	15590	15981	16405	16893	17361	17763	18127	18524	18934	19346	19762	20180	20603
	Percentage change	1.8	2.5	2.7	3.0	2.8	2.3	2.1	2.2	2.2	2.2	2.2	2.1	2.1
Real GNP	Billions of 2009 dollars	15779	16166	16566	17028	17465	17856	18218	18610	19011	19412	19812	20220	20638
	Percentage change	1.7	2.5	2.5	2.8	2.6	2.2	2.0	2.2	2.2	2.1	2.1	2.1	2.1
Real Potential GDP	Billions of 2009 dollars	16213	16459	16727	17040	17404	17797	18204	18614	19026	19440	19857	20278	20702
	Percentage change	1.4	1.5	1.6	1.9	2.1	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.1
Prices														
Price Index, Personal Consumption Expenditures (PCE)	2009=100	107.1	108.5	109.7	111.6	113.7	116.0	118.3	120.7	123.1	125.6	128.1	130.7	133.3
	Percentage change	1.4	1.3	1.1	1.7	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Price Index, PCE, Excluding food and energy	2009=100	105.7	107.2	108.9	111.0	113.1	115.3	117.5	119.8	122.2	124.6	127.1	129.6	132.1
	Percentage change	1.4	1.4	1.6	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Consumer Price Index, All Urban Consumers (CPI-U)	1982-84=100	232.3	236.0	238.6	243.3	248.9	254.7	260.7	267.0	273.5	280.2	287.0	294.0	301.0
	Percentage change	1.6	1.6	1.1	2.0	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4
CPI-U, Excluding Food and Energy	1982-84=100	232.8	236.9	241.4	246.6	252.2	258.0	263.9	269.9	276.1	282.5	289.1	295.8	302.6
	Percentage change	1.8	1.8	1.9	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
GDP Price Index	2009=100	106.4	108.0	109.8	111.5	113.5	115.7	118.1	120.5	122.9	125.4	128.0	130.6	133.3
	Percentage change	1.6	1.5	1.7	1.5	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
Employment Cost Index (ECI), Private Wages and Salaries	December 2005=100	117.7	119.9	123.1	126.7	130.9	135.6	140.5	145.5	150.6	155.8	161.0	166.4	171.9
	Percentage change	1.8	1.9	2.7	2.9	3.4	3.6	3.6	3.6	3.5	3.5	3.4	3.3	3.3
Refiners' Acquisition Cost of Crude Oil, Imported	Dollars per barrel	99.2	94.9	72.3	73.8	77.1	80.1	82.2	85.8	89.5	93.4	97.4	100.9	103.3
FHFA House Price Index, Purchase Only	1991Q1=100	195.9	207.9	214.7	219.9	224.4	230.0	236.1	243.0	251.0	259.8	268.9	277.8	286.4
Labor														
Unemployment Rate, Civilian, 16 Years or Older	Percent	7.6	6.5	5.6	5.4	5.4	5.3	5.4	5.5	5.5	5.5	5.4	5.4	5.4
Noninstitutional Population, Civilian, 16 Years or Older	Millions	245	247	249	252	254	257	259	262	264	267	269	272	274
	Percentage change	1.1	0.9	0.8	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0	1.0	0.9
Labor Force, Civilian, 16 Years or Older	Millions	155	156	157	158	159	160	161	162	163	164	165	166	167
	Percentage change	0.6	0.1	0.8	0.9	0.7	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6
Employment, Civilian, 16 Years or Older (Household Survey)	Millions	144	145	148	150	151	152	153	153	154	155	156	157	158
	Percentage change	1.3	1.2	1.8	1.1	0.8	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6
Employment, Total Nonfarm (Establishment Survey)	Millions	136	138	141	143	144	146	146	147	148	149	150	151	152
	Percentage change	1.7	1.8	2.0	1.4	1.1	0.8	0.5	0.6	0.6	0.6	0.6	0.6	0.6
Interest Rates														
10-Year Treasury Note	Percent	2.1	2.7	2.6	3.2	3.8	4.1	4.4	4.6	4.6	4.6	4.6	4.6	4.6
3-Month Treasury Bill	Percent	0.1	0.0	0.1	0.9	2.2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Income														
Income, Personal	Billions of dollars	14163	14565	15183	15905	16682	17508	18331	19195	20125	21059	22007	23003	24054
	Percentage of GDP	85.4	84.4	84.3	84.5	84.7	85.2	85.6	86.0	86.5	86.8	87.0	87.3	87.6
Compensation of Employees, Paid	Billions of dollars	8804	9110	9494	9926	10392	10851	11316	11820	12349	12903	13479	14073	14685
	Percentage of GDP	53.1	52.8	52.7	52.7	52.7	52.8	52.9	53.0	53.1	53.2	53.3	53.4	53.5
Wages and Salaries	Billions of dollars	7094	7349	7669	8024	8406	8787	9162	9562	9982	10421	10877	11351	11840
	Percentage of GDP	42.8	42.6	42.6	42.6	42.7	42.7	42.8	42.8	42.9	43.0	43.0	43.1	43.1
Nonwage Income	Billions of dollars	4027	4108	4256	4446	4650	4910	5173	5434	5685	5933	6177	6421	6683
	Percentage of GDP	24.3	23.8	23.6	23.6	23.6	23.9	24.2	24.4	24.4	24.5	24.4	24.4	24.3
Proprietors' Income, Farm, with IVA & CCAdj	Billions of dollars	84	66	52	48	48	49	51	53	55	58	61	64	67
	Percentage of GDP	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Proprietors' Income, Nonfarm, with IVA & CCAdj	Billions of dollars	1240	1300	1371	1437	1501	1562	1621	1689	1762	1839	1919	2002	2087
	Percentage of GDP	7.5	7.5	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Income, Rental, with CCAdj	Billions of dollars	580	630	667	675	655	628	604	594	592	602	616	634	652
	Percentage of GDP	3.5	3.7	3.7	3.6	3.3	3.1	2.8	2.7	2.5	2.5	2.4	2.4	2.4
Interest Income, Personal	Billions of dollars	1254	1266	1271	1357	1481	1667	1853	2015	2151	2269	2373	2469	2577
	Percentage of GDP	7.6	7.3	7.1	7.2	7.5	8.1	8.7	9.0	9.2	9.4	9.4	9.4	9.4
Dividend Income, Personal	Billions of dollars	869	847	895	930	966	1005	1045	1084	1125	1166	1208	1253	1299
	Percentage of GDP	5.2	4.9	5.0	4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.8	4.7
Profits, Corporate, with IVA & CCAdj	Billions of dollars	2083	2086	2215	2245	2291	2339	2370	2411	2480	2548	2631	2732	2842
	Percentage of GDP	12.6	12.1	12.3	11.9	11.6	11.4	11.1	10.8	10.7	10.5	10.4	10.4	10.4
Profits, Corporate, Domestic, with IVA & CCAdj	Billions of dollars	1685	1683	1827	1843	1861	1878	1863	1880	1917	1951	2001	2068	2142
	Percentage of GDP	10.2	9.8	10.1	9.8	9.4	9.1	8.7	8.4	8.2	8.0	7.9	7.8	7.8

Source: Congressional Budget Office.

Notes: Actual values reflect data released as of December 9, 2014. Forecast values are shaded.

FHFA = Federal Housing Finance Agency; IVA = inventory valuation adjustment; CCAdj = capital consumption adjustment.

This file presents data that underly the figures in CBO's January 2015 report *The Budget*
www.cbo.gov/publication/49892

Summary Figure 3.
Actual Values and CBO's Projections of Key Economic Indicators

	Real GDP (Percentage change)	Unemployment Rate (Percent)	Infla (Percentage Ch
			Overall Inflation
2000	2.9	4.0	2.5
2001	0.2	4.7	1.3
2002	2.0	5.8	1.9
2003	4.4	6.0	1.8
2004	3.1	5.5	2.9
2005	3.0	5.1	3.1
2006	2.4	4.6	1.8
2007	1.9	4.6	3.3
2008	-2.8	5.8	1.5
2009	-0.2	9.3	1.2
2010	2.7	9.6	1.3
2011	1.7	8.9	2.7
2012	1.6	8.1	1.6
2013	3.1	7.4	1.0
2014	2.1	6.2	1.3
2015	2.9	5.6	1.4
2016	2.9	5.4	1.9
2017	2.5	5.3	2.0
2018	2.1	5.4	2.0
2019	2.1	5.5	2.0
2020	2.2	5.5	2.0
2021	2.2	5.5	2.0
2022	2.2	5.5	2.0
2023	2.1	5.4	2.0
2024	2.1	5.4	2.0
2025	2.1	5.4	2.0

Source: Congressional Budget Office; Bureau of Economic Analysis; Bureau of Labor St

Notes: Real gross domestic product is the output of the economy adjusted to remove the jobless people who are available for work and are actively seeking jobs, expressed as a price index for personal consumption expenditures; the core rate excludes prices for food

Data are annual. For real GDP growth and inflation, actual data are plotted through 2013 quarters and do not incorporate data released by the Bureau of Economic Analysis since data are plotted through 2014.

For real GDP growth and inflation, percentage changes in GDP and prices are measured next.

GDP = gross domestic product.

: *and Economic Outlook: 2015 to 2025* .

ıtion ıange in Prices)	Interest Rates (Percent)	
Core Inflation	3-Month Treasury Bills	10-Year Treasury Notes
1.8	5.8	6.0
1.8	3.4	5.0
1.8	1.6	4.6
1.4	1.0	4.0
2.1	1.4	4.3
2.3	3.2	4.3
2.2	4.7	4.8
2.3	4.4	4.6
1.6	1.4	3.7
1.4	0.2	3.3
1.0	0.1	3.2
1.9	0.1	2.8
1.7	0.1	1.8
1.3	0.1	2.4
1.5	0.0	2.5
1.8	0.2	2.8
1.9	1.2	3.4
1.9	2.6	3.9
2.0	3.5	4.2
2.0	3.4	4.5
2.0	3.4	4.6
2.0	3.4	4.6
2.0	3.4	4.6
2.0	3.4	4.6
2.0	3.4	4.6
2.0	3.4	4.6

atistics; Federal Reserve.

: effects of inflation. The unemployment rate is a measure of the number of percentage of the labor force. The overall inflation rate is based on the d and energy.

; the values for 2014 reflect CBO's estimates for the third and fourth : early December 2014. For the unemployment and interest rates, actual

d from the fourth quarter of one calendar year to the fourth quarter of the

Summary Figure 3.

Actual Values and CBO's Projections of Key Economic Indicators

Sources: Congressional Budget Office; Bureau of Economic Analysis; Bureau of Labor Statistic

Notes: Real gross domestic product is the output of the economy adjusted to remove the effe measure of the number of jobless people who are available for work and are actively s labor force. The overall inflation rate is based on the price index for personal consumpt for food and energy.

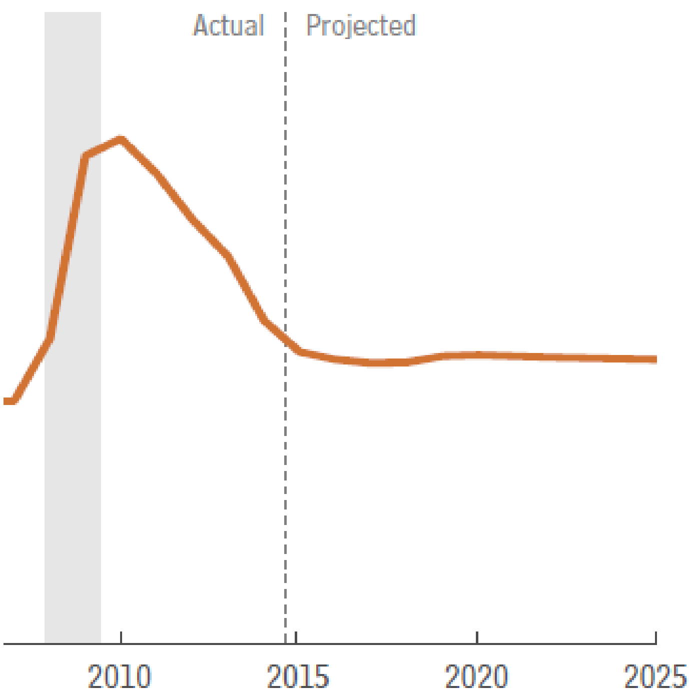
Data are annual. For real GDP growth and inflation, actual data are plotted through 20 for the third and fourth quarters and do not incorporate data released by the Bureau of For the unemployment and interest rates, actual data are plotted through 2014.

For real GDP growth and inflation, percentage changes in GDP and prices are measure to the fourth quarter of the next.

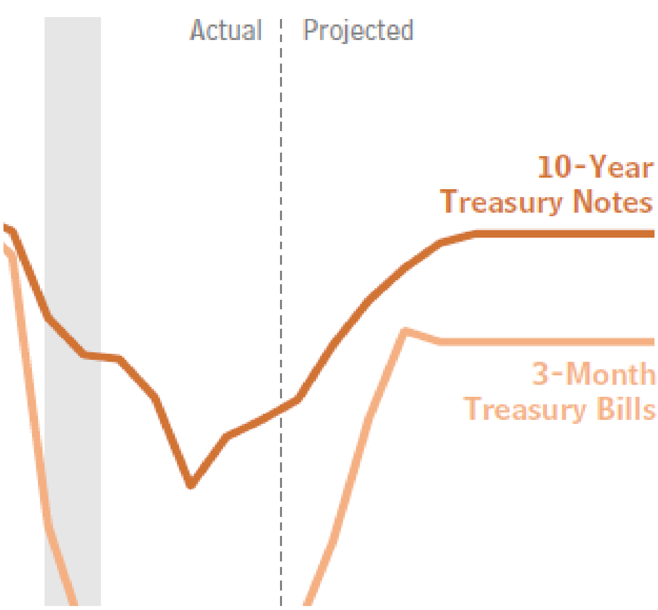
GDP = gross domestic product.

s

Unemployment Rate



Interest Rates



cs; Federal Reserve.

ects of inflation. The unemployment rate is a
eeking jobs, expressed as a percentage of the
tion expenditures; the core rate excludes prices

13; the values for 2014 reflect CBO's estimates
Economic Analysis since early December 2014.

ed from the fourth quarter of one calendar year

This file presents data that underly the figures in CBO's January 2015 report *The Budget and Ec*
www.cbo.gov/publication/49892

Figure 2-1.
Projected Growth in Real GDP
(Percentage change)

2014	2.1
2015	2.9
2016	2.9
2017	2.5

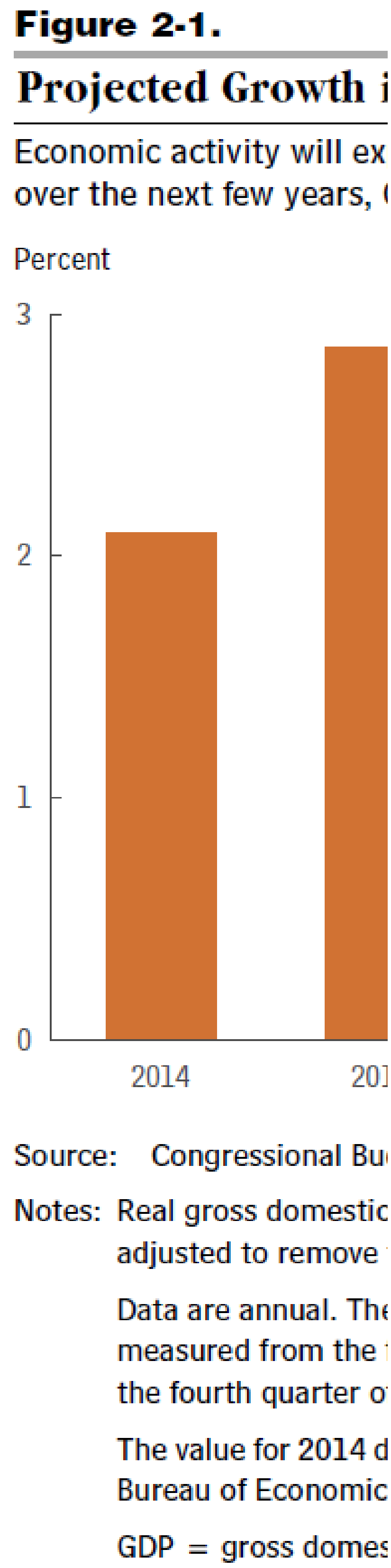
Source: Congressional Budget Office.

Notes: Real gross domestic product is the output of the economy adjusted to remove the effects of inflation.

Data are annual. The percentage change in real GDP is measured from the fourth quarter of one calendar year to the fourth quarter of the next year.

The value for 2014 does not incorporate data released by the Bureau of Economic Analysis since early December 2014.

GDP = gross domestic product.



;onomic Outlook: 2015 to 2025 .

in Real GDP

;pand at a solid pace in 2015 and
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dget Office.

: product is the output of the economy
the effects of inflation.

e percentage change in real GDP is
fourth quarter of one calendar year to
f the next year.

loes not incorporate data released by the
: Analysis since early December 2014.

stic product.

This file presents data that underly the figures in CBO's January 2015 report *The Budget and Economic*
www.cbo.gov/publication/49892

Figure 2-2.
Interest Rates on Treasury Securities
(Percent)

Year	3-Month Treasury Bills	10-Year Treasury Notes
2000	5.8	6.0
2001	3.4	5.0
2002	1.6	4.6
2003	1.0	4.0
2004	1.4	4.3
2005	3.2	4.3
2006	4.7	4.8
2007	4.4	4.6
2008	1.4	3.7
2009	0.2	3.3
2010	0.1	3.2
2011	0.1	2.8
2012	0.1	1.8
2013	0.1	2.4
2014	0.0	2.5
2015	0.2	2.8
2016	1.2	3.4
2017	2.6	3.9
2018	3.5	4.2
2019	3.4	4.5
2020	3.4	4.6
2021	3.4	4.6
2022	3.4	4.6
2023	3.4	4.6
2024	3.4	4.6
2025	3.4	4.6

Sources: Congressional Budget Office; Federal Reserve.

Note: Data are annual. Actual data are plotted through 2014.

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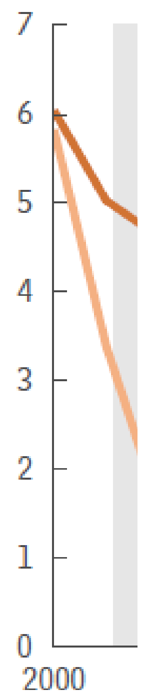
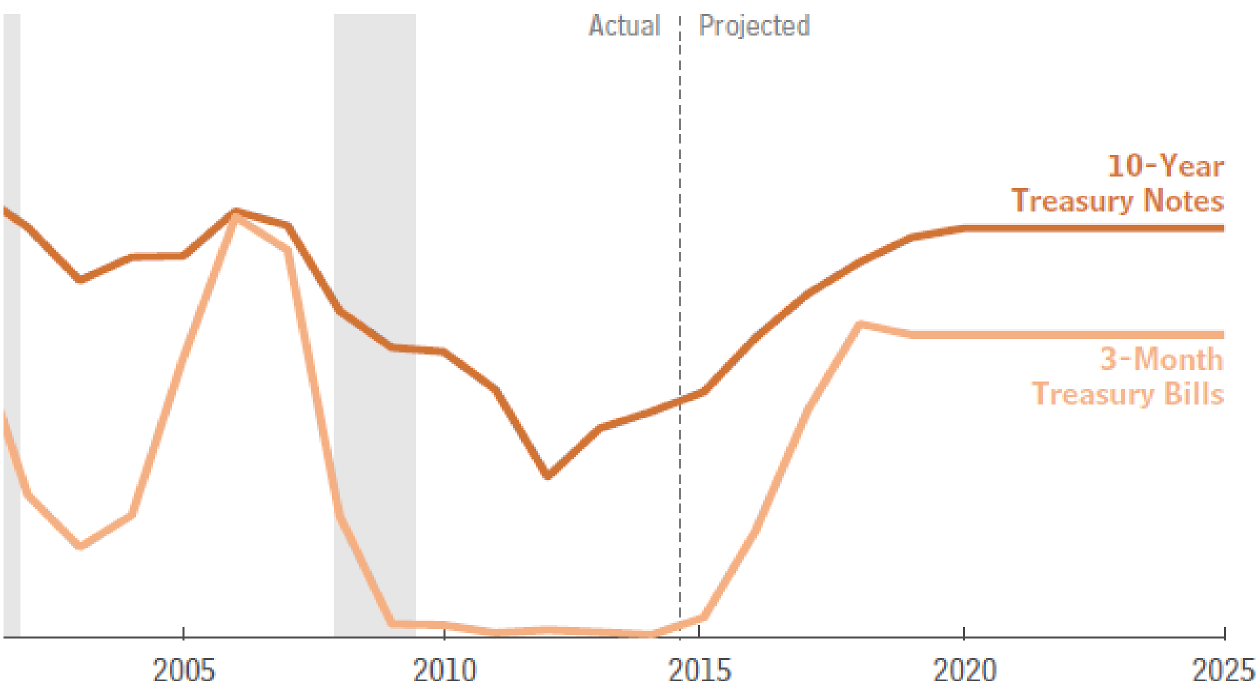


Sources:
Note: D

Outlook: 2015 to 2025 .

e 2-2.

est Rates on Treasury Securities



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: Congressional Budget Office; Federal Reserve.

Data are annual. Actual data are plotted through 2014.

:r the next several years, interest
:s are projected to be pushed up
ı tightening of monetary policy by
Federal Reserve and by market
ticipants' expectations of an
roving economy.

This file presents data that underly the figures in CBO's January 2015 report *The I*
www.cbo.gov/publication/49892

Figure 2-3.
Projected Contributions to the Growth of Real GDP
(Percentage points)

	Consumer Spending	Business Investment	Residential Investment
2014	1.5	0.7	0.1
2015	2.3	0.6	0.4
2016	1.8	0.8	0.5
2017	1.3	0.5	0.4

Source: Congressional Budget Office.

Notes: Data are annual. The values show the percentage-point contribution of the to-fourth-quarter growth rate of real GDP (output adjusted to remove the effects of consumption expenditures. Business investment includes purchases of equipment property products and the change in inventories. Residential investment includes t structures, manufactured homes, and dormitories; spending on home improvemer ownership-transfer costs. The measure of purchases by federal, state, and local g and product accounts. Net exports are exports minus imports. The values for 2014 Bureau of Economic Analysis since early December 2014.

GDP = gross domestic product.

Budget and Economic Outlook: 2015 to 2025.

Purchases by Federal, State and Local Governments	Net Exports
0.2	-0.3
0.0	-0.3
0.1	-0.2
0.1	0.2

major components of GDP to the fourth-quarter-
f inflation). Consumer spending is personal
t, nonresidential structures, and intellectual
the construction of single-family and multifamily
nts; and brokers' commissions and other
overnments is taken from the national income
4 do not incorporate data released by the

Figure 2-3.

Projected Contribu

Consumer spending and

Percentage Points

Consumer Spen

Business Investr

Residential Inve

Purchases by
Federal, State, a
Local Governme

Net Exports

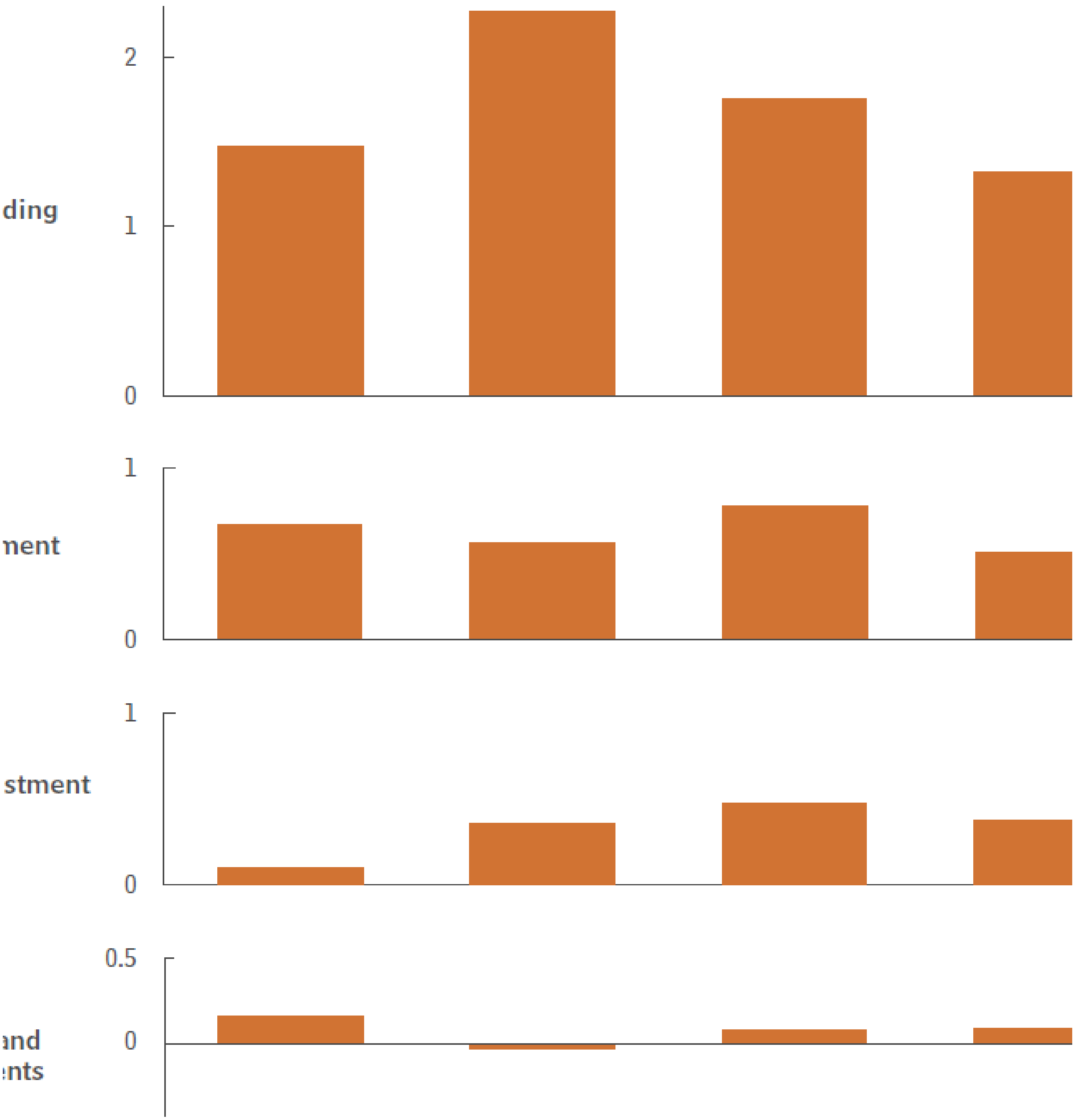
Source: Congressional Bu

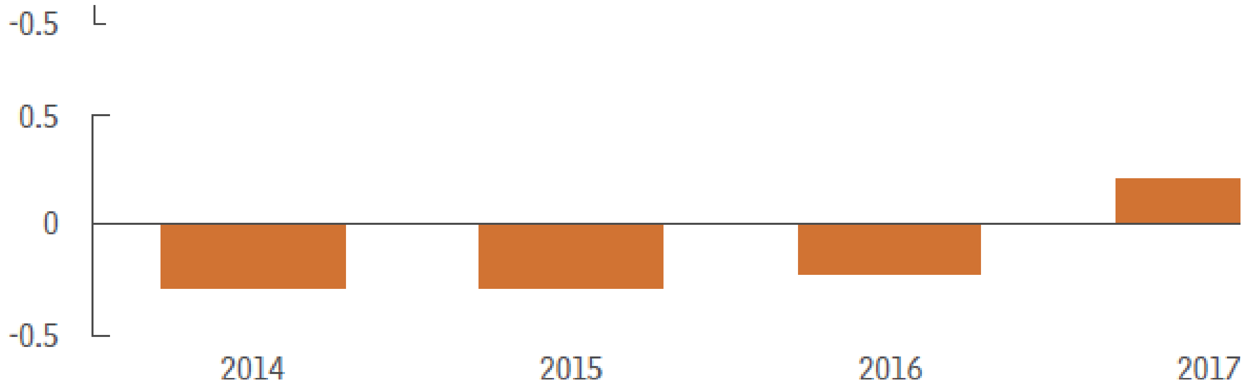
Notes: Data are annual. The
quarter growth rate
expenditures. Busine
the change in invent
homes, and dormito
measure of purchas
are exports minus in
December 2014.

GDP = gross domes

ıtions to the Growth of Real GDP

investment will drive the growth of real GDP over the next few years, CBO expects.





dget Office.

e values show the percentage-point contribution of the major components of GDP to the fourth
of real GDP (output adjusted to remove the effects of inflation). Consumer spending is person
ess investment includes purchases of equipment, nonresidential structures, and intellectual pro
tories. Residential investment includes the construction of single-family and multifamily structu
ories; spending on home improvements; and brokers' commissions and other ownership-transfe
es by federal, state, and local governments is taken from the national income and product acco
nports. The values for 2014 do not incorporate data released by the Bureau of Economic Analy

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This file presents data that underly the figures in CBO's January 2015 report *The Bu*
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Figure 2-4.
Factors Underlying the Projected Contributions to the Growth of Output

Year	Inflation-Adjusted Compensation of Employees (Percentage change)	Capital Services (Percentage change)
2000	5.6	6.02
2001	1.3	3.76
2002	0.2	2.52
2003	1.6	2.15
2004	3.4	2.77
2005	2.2	3.01
2006	3.1	3.65
2007	2.7	3.89
2008	-0.8	2.55
2009	-3.5	0.6
2010	0.6	1.26
2011	1.4	1.99
2012	2.2	2.31
2013	1.6	2.01
2014	2.7	2.43
2015	3.1	2.91
2016	2.7	3.37
2017	2.7	3.55
2018	2.3	3.4
2019	2.3	3.17
2020	2.4	3.02
2021	2.4	2.84
2022	2.4	2.61
2023	2.4	2.45
2024	2.4	2.46
2025	2.3	2.51

Sources: Congressional Budget Office; Bureau of Economic Analysis; Bureau of the

Notes: Data are annual. Actual data are plotted through 2013. Values for 2014 are C

In the first panel, inflation-adjusted compensation of employees is total wages, salar
Percentage changes are measured from the average of one calendar year to the ne

In the second panel, capital services are a measure of the flow of services availabl
intellectual property products, inventories, and land). Percentage changes are meas

In the third panel, household formation is the change in the number of households f

In the fourth panel, the percentage change in real (inflation-adjusted) gross domesti
the rates of growth of their real GDPs, weighted by their shares of U.S. exports. The
Japan, Mexico, Singapore, South Korea, Switzerland, Taiwan, the United Kingdom,
of one calendar year to the fourth quarter of the next.

GDP = gross domestic product.

ıdget and Economic Outlook: 2015 to 2025 .

	Growth of Real GDP in the United States Relative to That Among Its Major Trading Partners (Percentage change)	
Household Formation (Millions)	United States	Leading Trading Partners
1.2	2.9	4.0
1.3	0.2	0.6
1.4	2.0	3.0
0.8	4.4	2.8
1.5	3.1	3.4
1.9	3.0	4.0
1.2	2.4	3.9
0.6	1.9	4.1
0.4	-2.8	-1.3
0.6	-0.2	0.7
0.5	2.7	4.3
0.5	1.7	2.6
0.8	1.6	1.9
0.5	3.1	3.0
0.6	2.1	2.7
0.9	2.9	2.9
1.3	2.9	3.0
1.5	2.5	3.1
1.3	2.1	3.0
1.2	2.1	3.0
1.1	2.2	2.9
1.1	2.2	2.9
1.1	2.2	2.8
1.1	2.1	2.8
1.1	2.1	2.8
1.1	2.1	2.8

: Census; Consensus Economics.

:BO's estimates.

ies, and supplements divided by the price index for personal consumption expenditures.
ext.

e for production from the real (inflation-adjusted) stock of capital (equipment, structures,
sured from the average of one calendar year to the next.

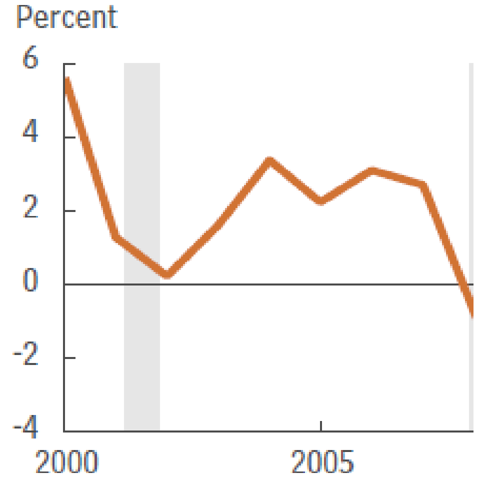
rom one calendar year to the next.

c product among the United States' leading trading partners is calculated using an average of
e trading partners included in the average are Australia, Brazil, Canada, China, Hong Kong,
and the countries of the euro zone. Percentage changes are measured from the fourth quarter

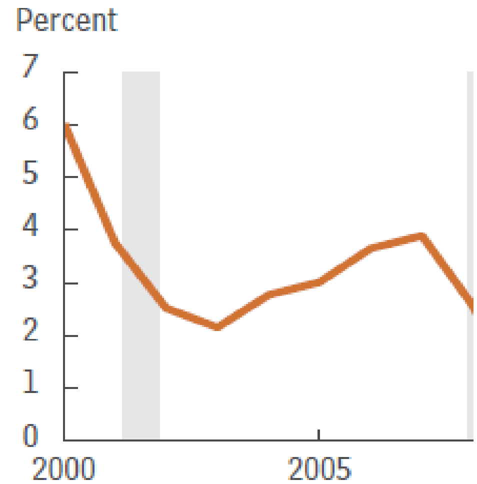
Figure 2-4.

Factors Underlying the Projected Contributions to

Solid **growth in the inflation-adjusted compensation of employees** is projected to support faster growth in consumer spending in the next two years.



The **growth of capital services** is projected to rise over the next few years because increases in the demand for goods and services will spur business investment.



Sources: Congressional Budget Office; Bureau of Economic Analysis; Bure

Notes: Data are annual. Actual data are plotted through 2013. Values for 2

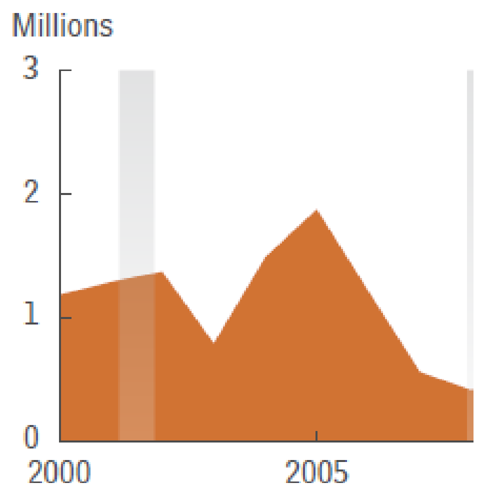
In the top panel, inflation-adjusted compensation of employees is
for personal consumption expenditures. Percentage changes are m

In the bottom panel, capital services are a measure of the flow of s
stock of capital (equipment, structures, intellectual property produ
the average of one calendar year to the next.

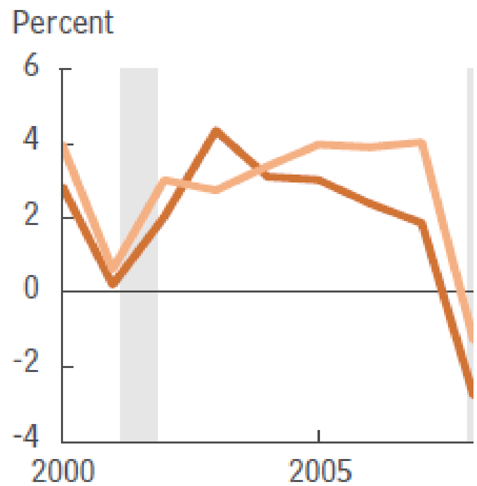
Figure 2-4.

Factors Underlying the Projected Contributions to

A rise in **household formation** is projected to boost the demand for housing and spur residential investment for the next few years.



The rise in the **growth of real GDP in the United States relative to that among its leading trading partners** is projected to contribute to lower net exports this year.

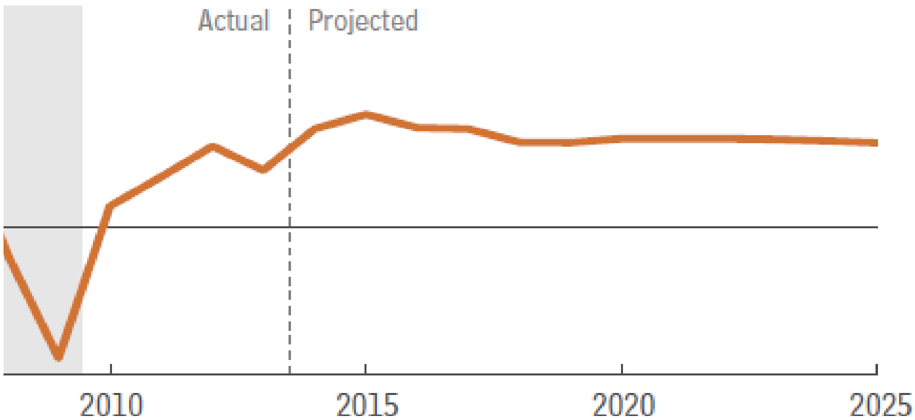


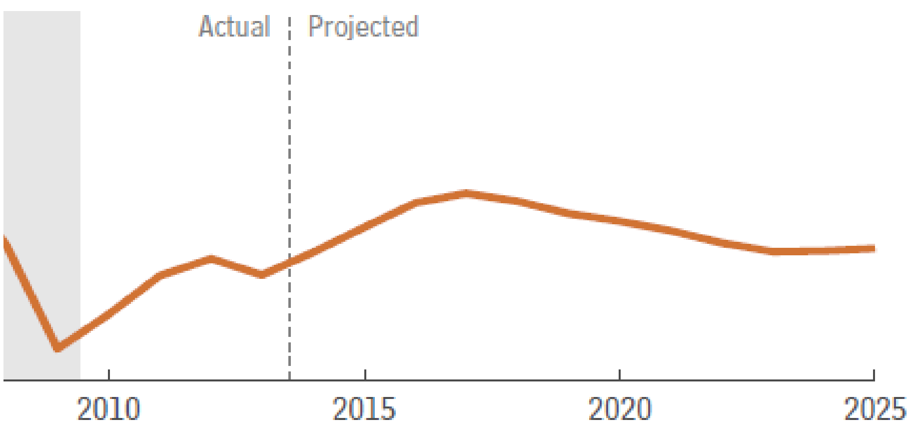
Notes: In the top panel, household formation is the change in the number

In the bottom panel, the percentage change in real (inflation-adjus
trading partners is calculated using an average of the rates of grow
trading partners included in the average are Australia, Brazil, Canac
Switzerland, Taiwan, the United Kingdom, and the countries of the
quarter of one calendar year to the fourth quarter of the next.

GDP = gross domestic product.

the Growth of Real GDP





:au of the Census; Consensus Economics.

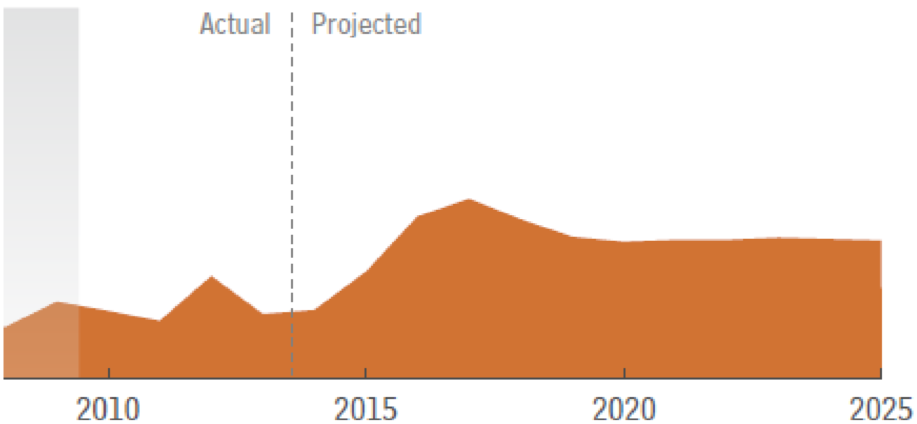
!014 are CBO's estimates.

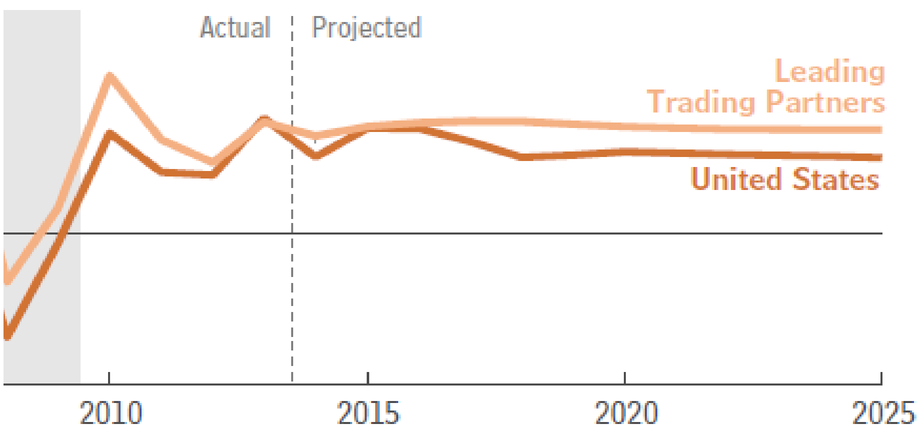
total wages, salaries, and supplements divided by the price index
ıeasured from the average of one calendar year to the next.

services available for production from the real (inflation-adjusted)
ıcts, inventories, and land). Percentage changes are measured from

Continued

the Growth of Real GDP





of households from one calendar year to the next.

sted) gross domestic product among the United States' leading th of their real GDPs, weighted by their shares of U.S. exports. The da, China, Hong Kong, Japan, Mexico, Singapore, South Korea, euro zone. Percentage changes are measured from the fourth

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www.cbo.gov/publication/49892

Figure 2-5.
Change in Private and Public Employment Since the End of 2007
(Millions)

Year	Private	Public
2007Q1	-0.5	-0.2
2007Q2	-0.2	-0.1
2007Q3	-0.1	-0.1
2007Q4	0.0	0.0
2008Q1	0.0	0.1
2008Q2	-0.6	0.1
2008Q3	-1.4	0.2
2008Q4	-3.0	0.2
2009Q1	-5.2	0.2
2009Q2	-7.2	0.2
2009Q3	-8.0	0.2
2009Q4	-8.5	0.2
2010Q1	-8.7	0.1
2010Q2	-8.3	0.1
2010Q3	-8.0	0.0
2010Q4	-7.5	-0.1
2011Q1	-7.1	-0.1
2011Q2	-6.4	-0.2
2011Q3	-5.8	-0.3
2011Q4	-5.2	-0.4
2012Q1	-4.4	-0.4
2012Q2	-4.0	-0.4
2012Q3	-3.6	-0.4
2012Q4	-2.9	-0.4
2013Q1	-2.3	-0.5
2013Q2	-1.7	-0.5
2013Q3	-1.1	-0.5
2013Q4	-0.5	-0.5
2014Q1	0.0	-0.5
2014Q2	0.7	-0.5
2014Q3	1.4	-0.4
2014Q4	2.2	-0.4

Sources: Congressional Budget Office; Bureau of Labor Statistics.

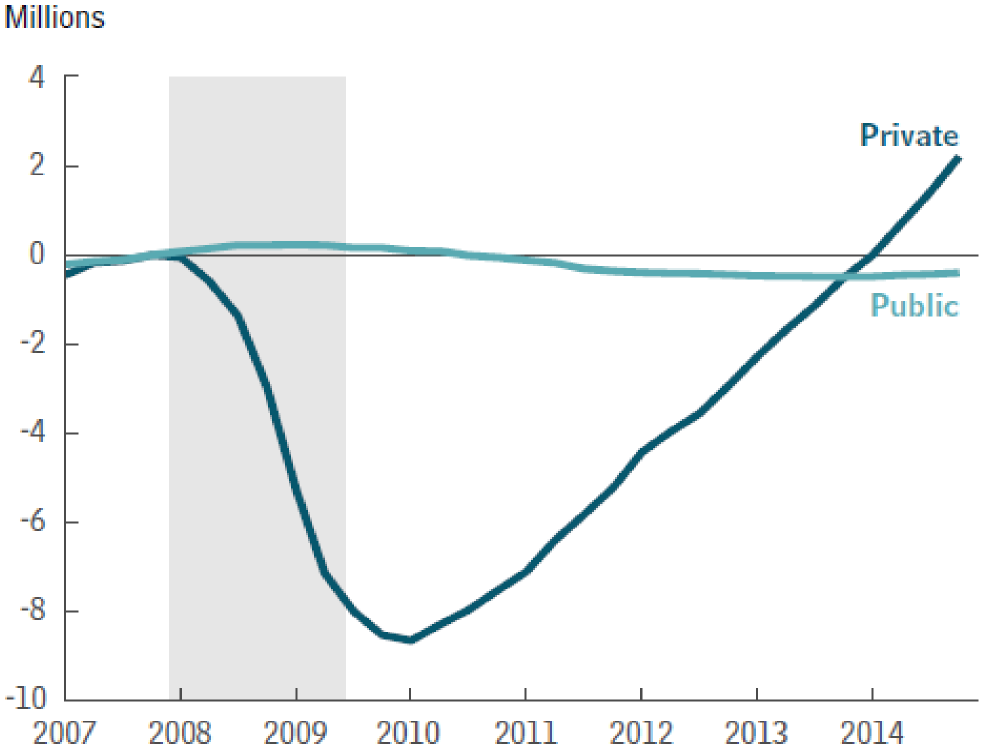
Notes: Private employment consists of all employees on the payrolls of nonfarm private industries. Public employment consists of all employees on government payrolls, excluding temporary and intermittent workers hired by the federal government for the decennial census.

Changes are measured from the beginning of the recession in the fourth quarter of 2007.

Data are quarterly and are plotted through the fourth quarter of 2014.

Figure 2-5.

Changes in Private and Public Employment Since the End of 2007



Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: Private employment consists of all employees on the payrolls of nonfarm private industries. Public employment consists of all employees on government payrolls, excluding temporary and intermittent workers hired by the federal government for the decennial census.

Changes are measured from the beginning of the recession in the fourth quarter of 2007.

Data are quarterly and are plotted through the fourth quarter of 2014.

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Figure 2-6.
Rates of Short- and Long-Term Unemployment
(Percent)

Year	Short-Term Unemployment	Long-Term Unemployment
1994Q1	5.2	1.4
1994Q2	4.9	1.3
1994Q3	4.8	1.2
1994Q4	4.5	1.1
1995Q1	4.5	1.0
1995Q2	4.7	1.0
1995Q3	4.7	0.9
1995Q4	4.7	0.9
1996Q1	4.6	0.9
1996Q2	4.5	1.0
1996Q3	4.3	1.0
1996Q4	4.5	0.9
1997Q1	4.4	0.8
1997Q2	4.2	0.8
1997Q3	4.1	0.8
1997Q4	4.0	0.7
1998Q1	4.0	0.7
1998Q2	3.8	0.6
1998Q3	3.9	0.6
1998Q4	3.8	0.6
1999Q1	3.8	0.5
1999Q2	3.7	0.5
1999Q3	3.7	0.5
1999Q4	3.6	0.5
2000Q1	3.6	0.5
2000Q2	3.5	0.4
2000Q3	3.5	0.5
2000Q4	3.5	0.4
2001Q1	3.8	0.5
2001Q2	4.0	0.5
2001Q3	4.2	0.6
2001Q4	4.8	0.7
2002Q1	4.9	0.9
2002Q2	4.8	1.1
2002Q3	4.6	1.1
2002Q4	4.6	1.2
2003Q1	4.6	1.2
2003Q2	4.8	1.4

2003Q3	4.8	1.4
2003Q4	4.5	1.3
2004Q1	4.4	1.3
2004Q2	4.3	1.2
2004Q3	4.3	1.1
2004Q4	4.3	1.2
2005Q1	4.2	1.1
2005Q2	4.1	1.0
2005Q3	4.1	0.9
2005Q4	4.1	0.9
2006Q1	3.9	0.9
2006Q2	3.8	0.8
2006Q3	3.8	0.9
2006Q4	3.7	0.7
2007Q1	3.7	0.8
2007Q2	3.8	0.8
2007Q3	3.8	0.8
2007Q4	4.0	0.9
2008Q1	4.1	0.9
2008Q2	4.4	1.0
2008Q3	4.8	1.2
2008Q4	5.4	1.5
2009Q1	6.3	1.9
2009Q2	6.8	2.6
2009Q3	6.2	3.3
2009Q4	6.1	3.8
2010Q1	5.7	4.1
2010Q2	5.3	4.3
2010Q3	5.4	4.1
2010Q4	5.4	4.1
2011Q1	5.1	4.0
2011Q2	5.1	4.0
2011Q3	5.0	4.0
2011Q4	5.0	3.7
2012Q1	4.8	3.5
2012Q2	4.8	3.4
2012Q3	4.8	3.3
2012Q4	4.7	3.1
2013Q1	4.7	3.0
2013Q2	4.7	2.8
2013Q3	4.5	2.7
2013Q4	4.4	2.6
2014Q1	4.3	2.4
2014Q2	4.1	2.1
2014Q3	4.1	1.9
2014Q4	3.9	1.8

Sources: Congressional Budget Office; Bureau of Labor Statistics.

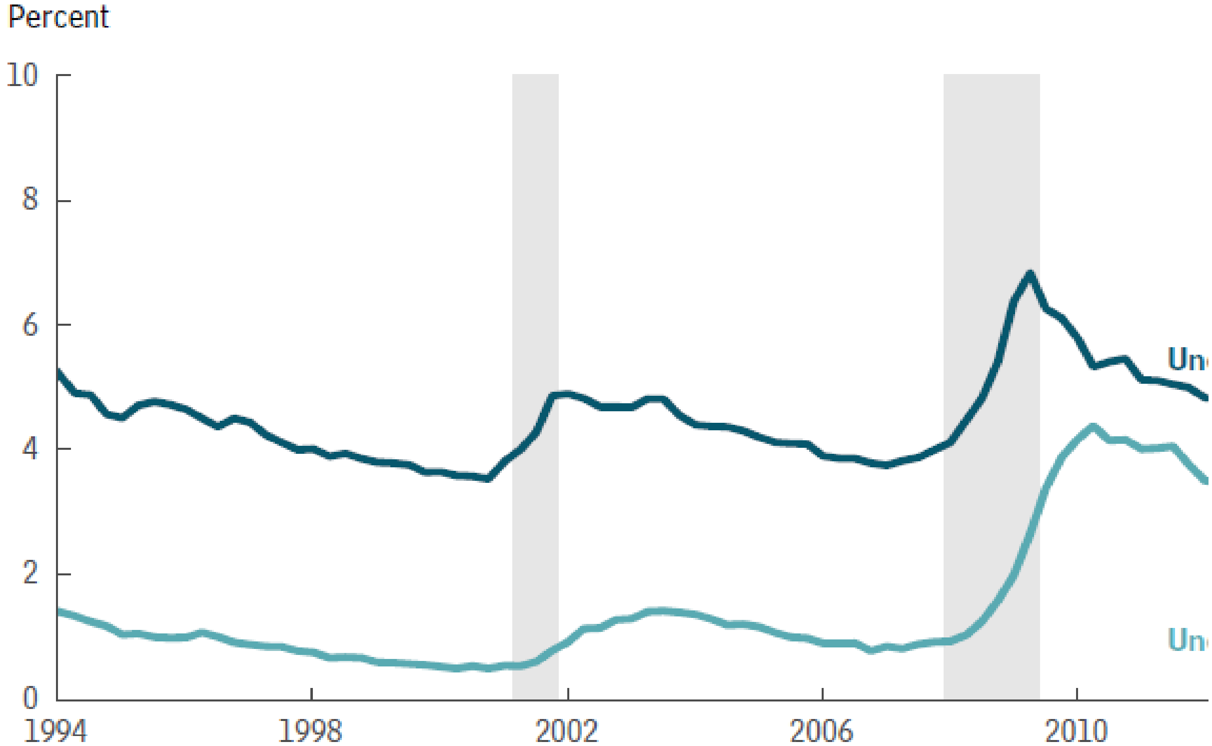
Notes: The rate of short-term unemployment is the percentage of the labor force that has been out of work for 26 weeks or less. The rate of long-term unemployment is the percentage of the labor force that has been out of work for at least 27 consecutive weeks.

Data are quarterly and are plotted through the fourth quarter of 2014.

nomic Outlook: 2015 to 2025 .

Figure 2-6.

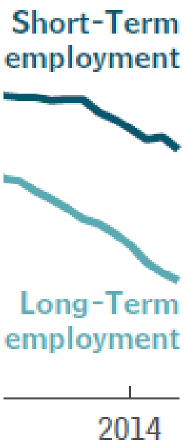
Rates of Short- and Long-Term Unemployment



Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: The rate of short-term unemployment is the percentage of the labor force th
long-term unemployment is the percentage of the labor force that has been

Data are quarterly and are plotted through the fourth quarter of 2014.



The overall unemployment rate remains elevated partly because of weakness in the demand for goods and services and partly because of the stigma and erosion of skills that can stem from long-term unemployment.

ıat has been out of work for 26 weeks or less. The rate of
out of work for at least 27 consecutive weeks.

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Figure 2-7.
Underuse of Labor
(Percentage of the labor force plus marginally attached workers)

Year	Marginally Attached	Part Time for Economic Reasons	Unemployed
1994Q1	1.5	3.7	6.5
1994Q2	1.3	3.6	6.1
1994Q3	1.4	3.3	5.9
1994Q4	1.3	3.3	5.6
1995Q1	1.3	3.3	5.4
1995Q2	1.1	3.4	5.6
1995Q3	1.2	3.4	5.6
1995Q4	1.2	3.3	5.5
1996Q1	1.3	3.2	5.5
1996Q2	1.2	3.2	5.4
1996Q3	1.1	3.2	5.2
1996Q4	1.1	3.1	5.3
1997Q1	1.1	3.1	5.2
1997Q2	1.1	3.0	4.9
1997Q3	1.0	2.9	4.8
1997Q4	1.0	2.8	4.6
1998Q1	1.1	2.8	4.6
1998Q2	0.9	2.7	4.4
1998Q3	1.0	2.6	4.5
1998Q4	0.9	2.4	4.4
1999Q1	0.9	2.5	4.3
1999Q2	0.9	2.4	4.2
1999Q3	0.8	2.4	4.2
1999Q4	0.8	2.3	4.1
2000Q1	0.9	2.2	4.0
2000Q2	0.8	2.2	3.9
2000Q3	0.8	2.2	4.0
2000Q4	0.8	2.3	3.9
2001Q1	0.9	2.3	4.2
2001Q2	0.8	2.4	4.4
2001Q3	0.9	2.6	4.8
2001Q4	0.9	3.0	5.5
2002Q1	1.0	2.9	5.7
2002Q2	1.0	2.8	5.8
2002Q3	1.0	2.9	5.7
2002Q4	1.0	3.0	5.8
2003Q1	1.1	3.2	5.8

2003Q2	1.0	3.1	6.1
2003Q3	1.1	3.1	6.0
2003Q4	1.0	3.2	5.8
2004Q1	1.1	3.1	5.6
2004Q2	1.0	3.1	5.5
2004Q3	1.1	3.0	5.4
2004Q4	1.0	3.1	5.3
2005Q1	1.1	2.9	5.2
2005Q2	1.0	2.9	5.1
2005Q3	1.0	3.0	4.9
2005Q4	1.0	2.8	4.9
2006Q1	1.0	2.7	4.7
2006Q2	0.9	2.7	4.6
2006Q3	1.0	2.8	4.6
2006Q4	0.9	2.8	4.4
2007Q1	1.0	2.8	4.5
2007Q2	0.9	2.8	4.5
2007Q3	0.9	2.9	4.6
2007Q4	0.9	2.9	4.8
2008Q1	1.0	3.1	4.9
2008Q2	0.9	3.4	5.3
2008Q3	1.0	3.8	6.0
2008Q4	1.2	4.7	6.8
2009Q1	1.3	5.5	8.2
2009Q2	1.4	5.8	9.2
2009Q3	1.4	5.7	9.5
2009Q4	1.5	5.8	9.8
2010Q1	1.6	5.7	9.7
2010Q2	1.5	5.7	9.5
2010Q3	1.6	5.7	9.3
2010Q4	1.7	5.7	9.4
2011Q1	1.7	5.5	8.9
2011Q2	1.6	5.5	8.9
2011Q3	1.7	5.6	8.9
2011Q4	1.6	5.4	8.5
2012Q1	1.7	5.2	8.1
2012Q2	1.5	5.1	8.1
2012Q3	1.6	5.2	7.9
2012Q4	1.6	5.1	7.7
2013Q1	1.6	5.0	7.6
2013Q2	1.5	5.1	7.4
2013Q3	1.5	5.0	7.1
2013Q4	1.4	5.0	6.9
2014Q1	1.5	4.6	6.6
2014Q2	1.3	4.7	6.1
2014Q3	1.4	4.6	6.0
2014Q4	1.4	4.3	5.6

Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: Part-time employment for economic reasons refers to part-time employment a
would prefer full-time employment. People who are marginally attached to the labor f
not currently looking for work but have looked for work in the past 12 months.

Data are quarterly and are plotted through the fourth quarter of 2014.

dget and Economic Outlook: 2015 to 2025 .

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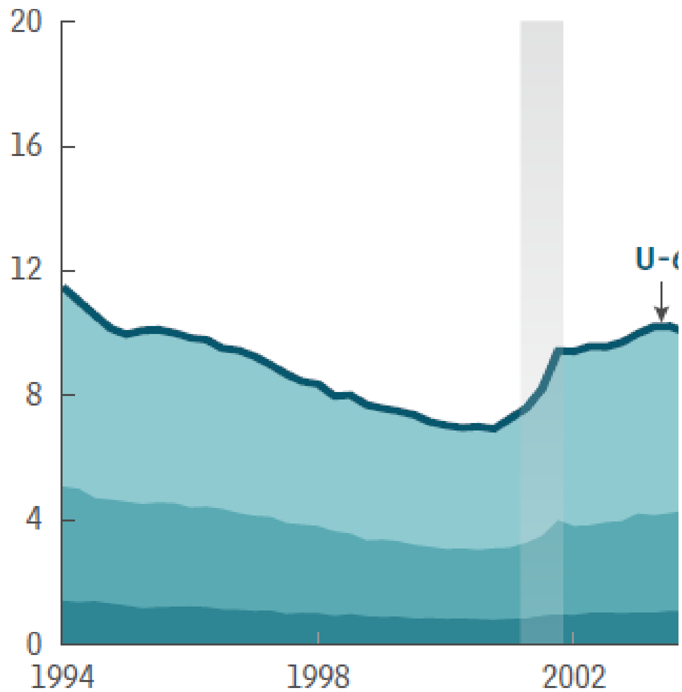
Figure 2-7.

Underuse of Labor

Percentage of the Labor Force Plus Marginally Atta



Sources: Congressional Budget Office; Bureau

Notes: Part-time employment for economic re
People who are marginally attached to t
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Data are quarterly and are plotted thro

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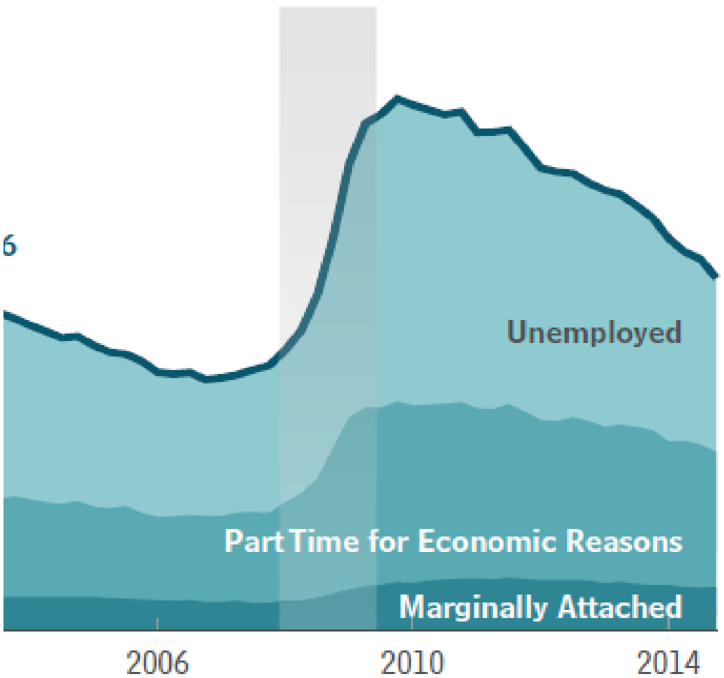


The **U-6 measure of the underuse of labor** has fallen since the end of the recession but remains quite high: The rate of **unemployed** people, the rate of people who are employed **part-time for economic reasons**, and the rate of people who are **marginally attached** to the labor force are all greater than they were before the recession began.

ı of Labor Statistics.

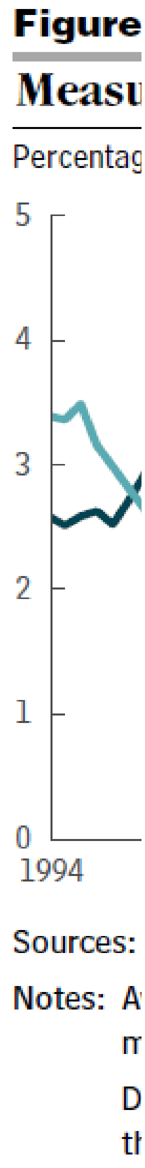
asons refers to part-time employment among workers who would prefer full-time employment.
the labor force are those who are not currently looking for work but have looked for work in the

ugh the fourth quarter of 2014.

This file presents data that underly the figures in CBO's January 2015 report *The Budget and Econom*
www.cbo.gov/publication/49892

Figure 2-8.
Measures of Compensation Paid to Employees
(Percentage change)

Year	Average Hourly Earnings	Compensation of Private Industry Workers
1994Q1	2.6	3.4
1994Q2	2.5	3.4
1994Q3	2.6	3.5
1994Q4	2.6	3.2
1995Q1	2.5	3.0
1995Q2	2.7	2.8
1995Q3	2.9	2.6
1995Q4	2.9	2.5
1996Q1	3.1	2.8
1996Q2	3.4	2.9
1996Q3	3.4	2.9
1996Q4	3.6	3.1
1997Q1	3.8	2.8
1997Q2	3.7	2.8
1997Q3	3.8	2.9
1997Q4	4.2	3.3
1998Q1	4.1	3.4
1998Q2	4.3	3.5
1998Q3	4.1	3.8
1998Q4	3.7	3.5
1999Q1	3.6	3.1
1999Q2	3.6	3.2
1999Q3	3.8	3.1
1999Q4	3.7	3.5
2000Q1	3.7	4.6
2000Q2	3.8	4.7
2000Q3	3.8	4.7
2000Q4	4.2	4.5
2001Q1	4.1	4.6
2001Q2	4.0	4.4
2001Q3	3.7	4.5
2001Q4	3.3	4.4
2002Q1	3.0	3.8
2002Q2	2.7	3.9
2002Q3	2.9	3.3
2002Q4	3.1	3.1
2003Q1	3.3	3.6



2003Q2	2.9	3.5
2003Q3	2.6	4.0
2003Q4	2.0	4.0
2004Q1	1.8	3.8
2004Q2	2.1	3.9
2004Q3	2.1	3.8
2004Q4	2.5	3.7
2005Q1	2.6	3.5
2005Q2	2.6	3.1
2005Q3	2.7	2.9
2005Q4	3.0	3.0
2006Q1	3.4	2.7
2006Q2	3.9	2.8
2006Q3	4.1	3.0
2006Q4	4.1	3.1
2007Q1	4.1	3.1
2007Q2	4.0	3.2
2007Q3	4.1	3.0
2007Q4	3.8	3.1
2008Q1	3.8	3.2
2008Q2	3.7	3.1
2008Q3	3.7	2.8
2008Q4	3.9	2.4
2009Q1	3.6	2.0
2009Q2	3.1	1.4
2009Q3	2.7	1.2
2009Q4	2.6	1.2
2010Q1	2.5	1.7
2010Q2	2.5	1.9
2010Q3	2.4	2.0
2010Q4	2.2	2.1
2011Q1	2.2	2.0
2011Q2	2.1	2.2
2011Q3	2.1	2.2
2011Q4	1.8	2.1
2012Q1	1.5	2.1
2012Q2	1.6	1.9
2012Q3	1.4	1.9
2012Q4	1.5	1.9
2013Q1	1.9	1.8
2013Q2	1.9	1.8
2013Q3	2.1	1.9
2013Q4	2.3	2.0
2014Q1	2.3	1.8
2014Q2	2.3	2.1
2014Q3	2.4	2.3
2014Q4	2.0	

Sources: Congressional Budget Office; Bureau of Labor Statistics.

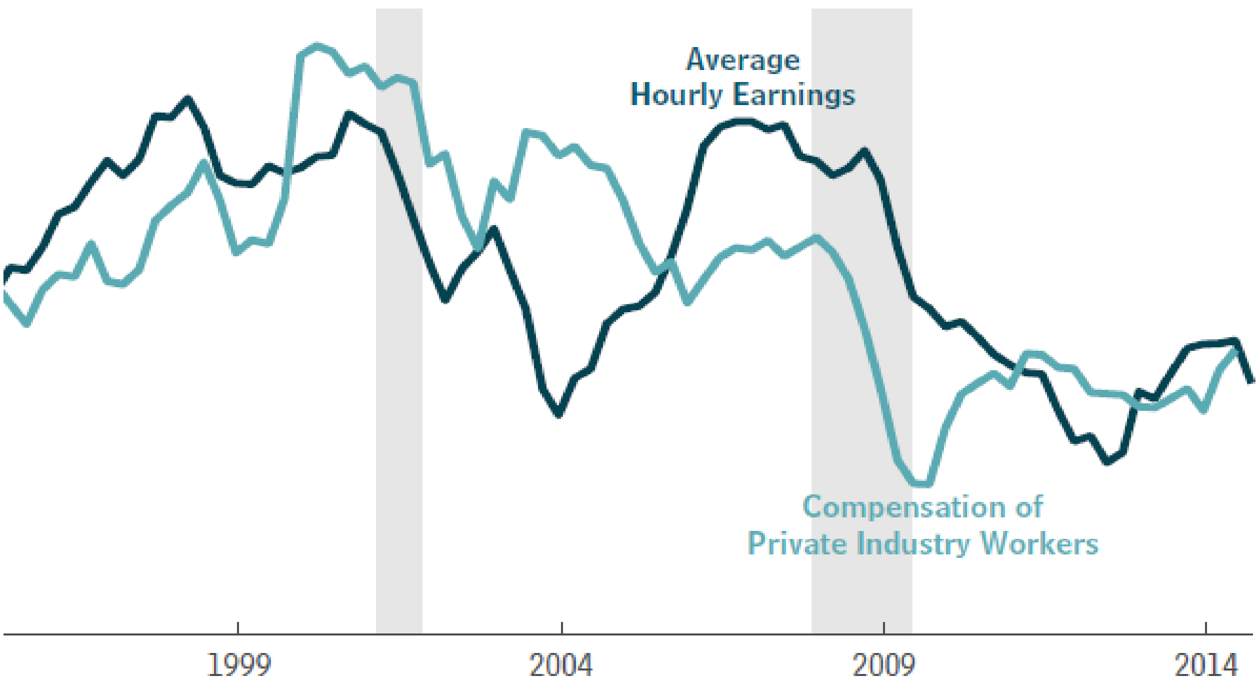
Notes: Average hourly earnings are earnings of production and nonsupervisory workers on private nonfarm payrolls. Compensation is measured by the employment cost index for workers in private industry.

Data are quarterly. Average hourly earnings are plotted through the fourth quarter of 2014; the employment cost index is plotted through the third quarter of 2014. Percentage changes are measured from the same quarter one year earlier.

2-8.

ures of Compensation Paid to Employees

ge Change



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Congressional Budget Office; Bureau of Labor Statistics.

verage hourly earnings are earnings of production and nonsupervisory workers on private nonf
neasured by the employment cost index for workers in private industry.

ata are quarterly. Average hourly earnings are plotted through the fourth quarter of 2014; the
hrough the third quarter of 2014. Percentage changes are measured from the same quarter on

:n labor is underused—as is currently
case—firms can hire from a relatively
e pool of underemployed workers
thus have less incentive to increase
pensation to attract workers.

ordingly, compensation has been
ving considerably more slowly than
d before the recession.

farm payrolls. Compensation is

employment cost index is plotted
e year earlier.

This file presents data that underly the figures in CBO's January 2015 report *The Budget and Ec*
www.cbo.gov/publication/49892

Figure 2-9.
The Labor Force, Employment, and Unemployment
(Percentage of the population)

Year	Employed	Unemployed
1955	56.6	59.2
1956	57.5	60.0
1957	57.1	59.6
1958	55.4	59.5
1959	56.0	59.3
1960	56.1	59.4
1961	55.4	59.3
1962	55.5	58.8
1963	55.4	58.7
1964	55.7	58.7
1965	56.2	58.8
1966	56.9	59.1
1967	57.3	59.6
1968	57.5	59.6
1969	58.0	60.1
1970	57.4	60.4
1971	56.6	60.2
1972	57.0	60.4
1973	57.8	60.8
1974	57.8	61.3
1975	56.0	61.2
1976	56.8	61.6
1977	57.9	62.2
1978	59.3	63.1
1979	59.9	63.7
1980	59.2	63.8
1981	59.0	63.9
1982	57.8	64.0
1983	57.9	64.0
1984	59.5	64.4
1985	60.1	64.8
1986	60.7	65.3
1987	61.5	65.6
1988	62.3	65.9
1989	62.9	66.4
1990	62.8	66.5
1991	61.7	66.2
1992	61.5	66.4

1993	61.7	66.3
1994	62.5	66.6
1995	62.9	66.6
1996	63.2	66.8
1997	63.8	67.1
1998	64.1	67.1
1999	64.3	67.1
2000	64.4	67.1
2001	63.7	66.8
2002	62.7	66.6
2003	62.3	66.2
2004	62.3	66.0
2005	62.7	66.0
2006	63.1	66.2
2007	63.0	66.0
2008	62.2	66.0
2009	59.3	65.4
2010	58.5	64.7
2011	58.4	64.1
2012	58.6	63.7
2013	58.6	63.2
2014	59.0	62.9
2015	59.4	62.9
2016	59.4	62.8
2017	59.2	62.5
2018	59.0	62.3
2019	58.7	62.1
2020	58.5	61.9
2021	58.3	61.6
2022	58.0	61.4
2023	57.8	61.2
2024	57.7	61.0
2025	57.5	60.8

Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: The labor force consists of people who are employed and people who are unemployed but who are available for work and are actively seeking jobs. Unemployment as a percentage of the population is not the same as the official unemployment rate, which is expressed as a percentage of the labor force. The population is the civilian noninstitutionalized population age 16 or older.

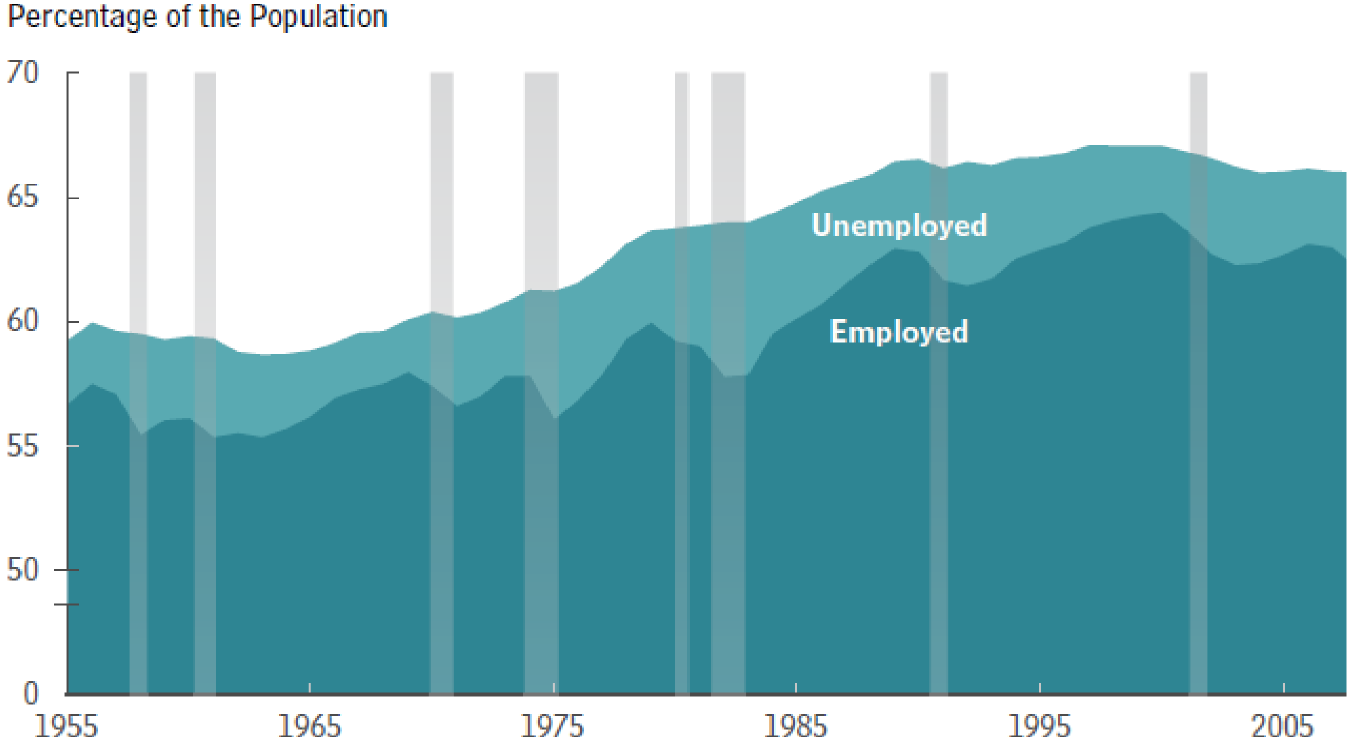
Data are annual. Actual data are plotted through 2014.

onomic Outlook: 2015 to 2025 .

Figure 2-9.

The Labor Force, Employment, and Unemployment

The percentage of the population that is employed is projected to fall over the next 1
in the labor force, mainly by baby boomers as they age and move into retirement.

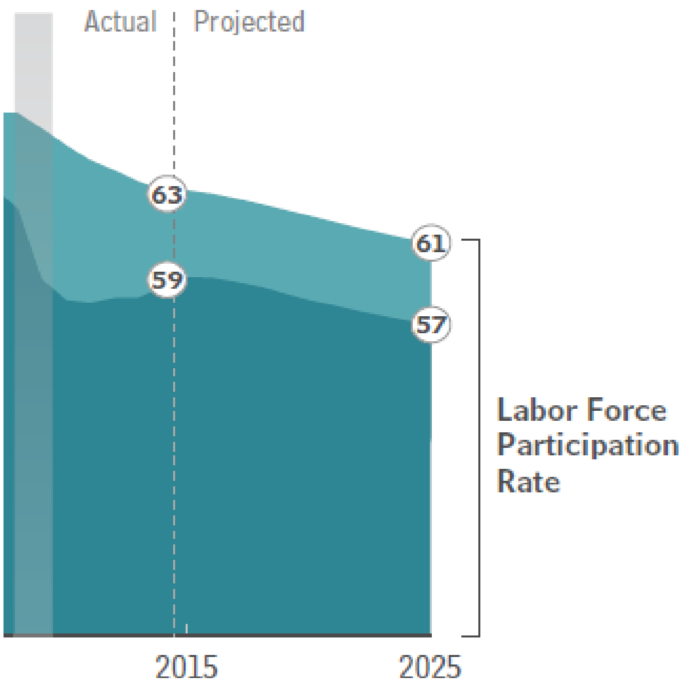


Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: The labor force consists of people who are employed and people who are unemployed
seeking jobs. Unemployment as a percentage of the population is not the same as the
as a percentage of the labor force. The population is the civilian noninstitutionalized p

Data are annual. Actual data are plotted through 2014.

10 years because of declining participation



d but who are available for work and are actively
official unemployment rate, which is expressed
population age 16 or older.

This file presents data that underly the figures in CBO's January 2015 report *The Budget and Econom*
www.cbo.gov/publication/49892

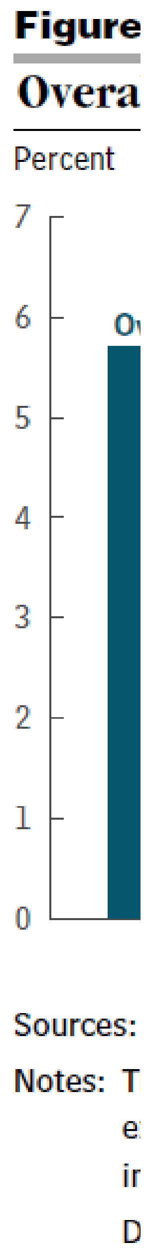
Figure 2-10.
Overall and Natural Rates of Unemployment
(Percentage change)

	Overall	Natural
2014	5.7	5.4
2015	5.5	5.4
2016	5.4	5.3
2017	5.3	5.3

Sources: Congressional Budget Office; Bureau of Labor Statistics.

Notes: The overall unemployment rate is a measure of the number of jobless people who are available for work and are actively seeking jobs, expressed as a percentage of the labor force. The natural rate is CBO’s estimate of the rate arising from all sources except fluctuations in the overall demand for goods and services.

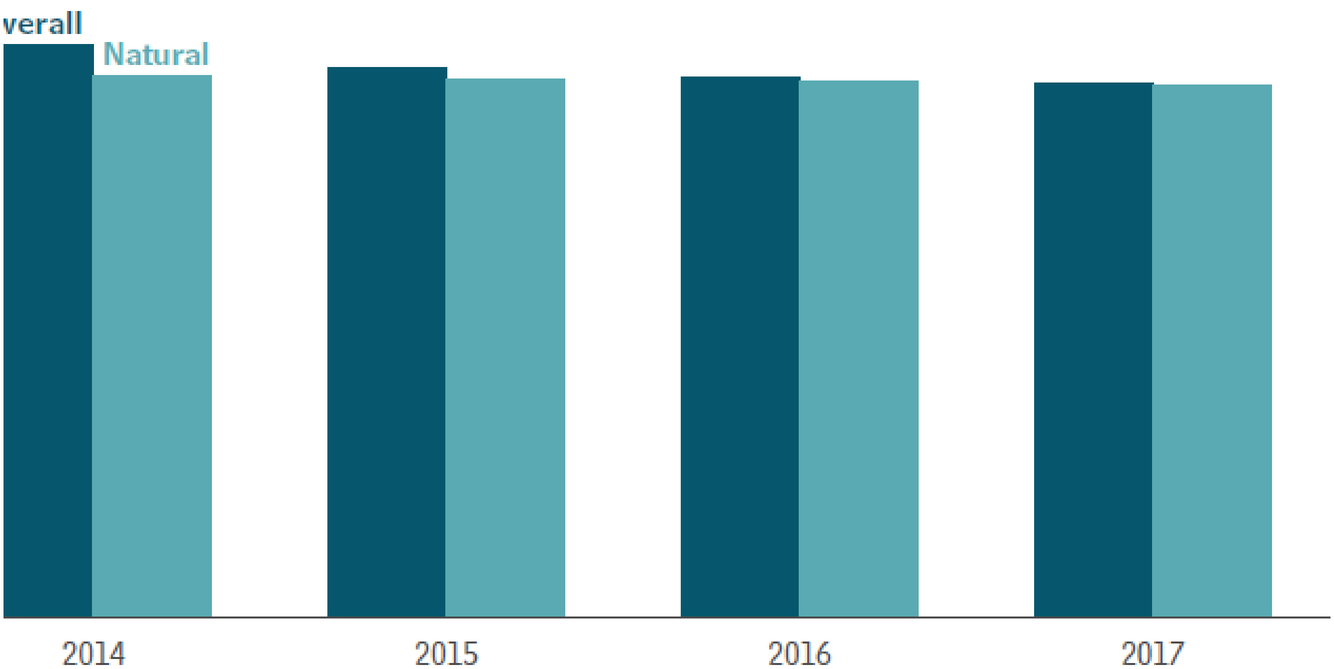
Data are fourth-quarter values. The value for the overall rate in 2014 is actual; values in other years are projected.



ic Outlook: 2015 to 2025 .

· 2-10.

ll and Natural Rates of Unemployment



Congressional Budget Office; Bureau of Labor Statistics.

'he overall unemployment rate is a measure of the number of jobless people who are available
xpressed as a percentage of the labor force. The natural rate is CBO's estimate of the rate arisir
ı the overall demand for goods and services.

)ata are fourth-quarter values. The value for the overall rate in 2014 is actual; values in other y

Stronger demand for labor will close the gap between the overall rate of unemployment and CBO's estimate of the natural rate.

CBO also expects the natural rate to fall, as the effects of stigma and erosion of skills among the long-term unemployed fade.

for work and are actively seeking jobs,
ıg from all sources except fluctuations

ears are projected.

This file presents data that underly the figures in CBO's January 2015 report *The Budget and Econ*
www.cbo.gov/publication/49892

Figure 2-11.
Inflation
(Percentage change in prices)

Year	Overall	Core	
2000	2.5	1.8	
2001	1.3	1.8	
2002	1.9	1.8	
2003	1.8	1.4	
2004	2.9	2.1	
2005	3.1	2.3	
2006	1.8	2.2	
2007	3.3	2.3	
2008	1.5	1.6	
2009	1.2	1.4	
2010	1.3	1.0	
2011	2.7	1.9	
2012	1.6	1.7	
2013	1.0	1.3	
2014	1.3	1.5	1.4
2015	1.4	1.8	1.9
2016	1.9	1.9	2.0
2017	2.0	1.9	2.0
2018	2.0	2.0	2.0
2019	2.0	2.0	2.0
2020	2.0	2.0	2.0
2021	2.0	2.0	2.0
2022	2.0	2.0	2.0
2023	2.0	2.0	2.0
2024	2.0	2.0	2.0
2025	2.0	2.0	1.9

Sources: Congressional Budget Office; Bureau of Economic Analysis.

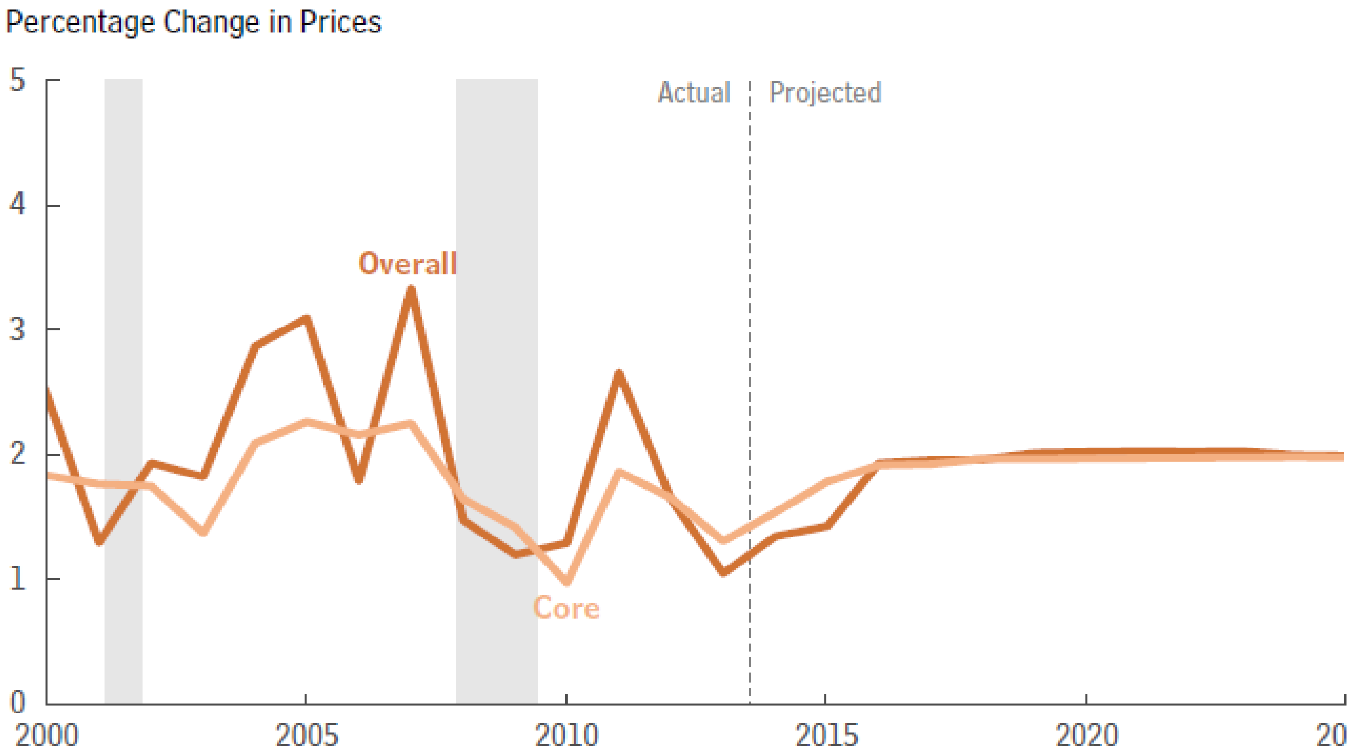
Notes: The overall inflation rate is based on the price index for personal consumption expenditures; the core rate excludes prices for food and energy.

Data are annual. Percentage changes are measured from the fourth quarter of one calendar year to the fourth quarter of the next. Actual data are plotted through 2013; the values for 2014 are CBO’s estimates and do not incorporate data released by the Bureau of Economic Analysis since early December 2014.

omic Outlook: 2015 to 2025 .

Figure 2-11.

Inflation



Sources: Congressional Budget Office; Bureau of Economic Analysis.

Notes: The overall inflation rate is based on the price index for personal consumption expendi energy.

Data are annual. Percentage changes are measured from the fourth quarter of one cal Actual data are plotted through 2013; the values for 2014 are CBO's estimates and do Economic Analysis since early December 2014.

CBO anticipates that prices will rise modestly over the next several years, reflecting the remaining slack in the economy and widely held expectations for low and stable inflation.

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tures; the core rate excludes prices for food and

endar year to the fourth quarter of the next.
not incorporate data released by the Bureau of

This file presents data that underly the figures in CBO's January 2015 report *The Budget and E*
www.cbo.gov/publication/49892

Figure 2-12.
GDP and Potential GDP
(Trillions of 2009 dollars)

Year	GDP[a]	Potential GDP
2000	12.6	12.2
2001	12.7	12.7
2002	12.9	13.1
2003	13.3	13.5
2004	13.8	13.9
2005	14.2	14.2
2006	14.6	14.6
2007	14.9	15.0
2008	14.8	15.3
2009	14.4	15.5
2010	14.8	15.7
2011	15.0	15.8
2012	15.4	16.0
2013	15.7	16.3
2014	16.1	16.5
2015	16.5	16.8
2016	17.0	17.1
2017	17.5	17.5
2018	17.9	17.9
2019	18.2	18.3
2020	18.6	18.7
2021	19.0	19.1
2022	19.4	19.5
2023	19.9	20.0
2024	20.3	20.4
2025	20.7	20.8

Sources: Congressional Budget Office; Bureau of Economic Analysis.

Notes: Potential gross domestic product is CBO’s estimate of the maximum sustainable output of the economy.

Data are annual. Actual data are plotted through 2013; projections are plotted through 2025 and are based on data available through early December 2014.

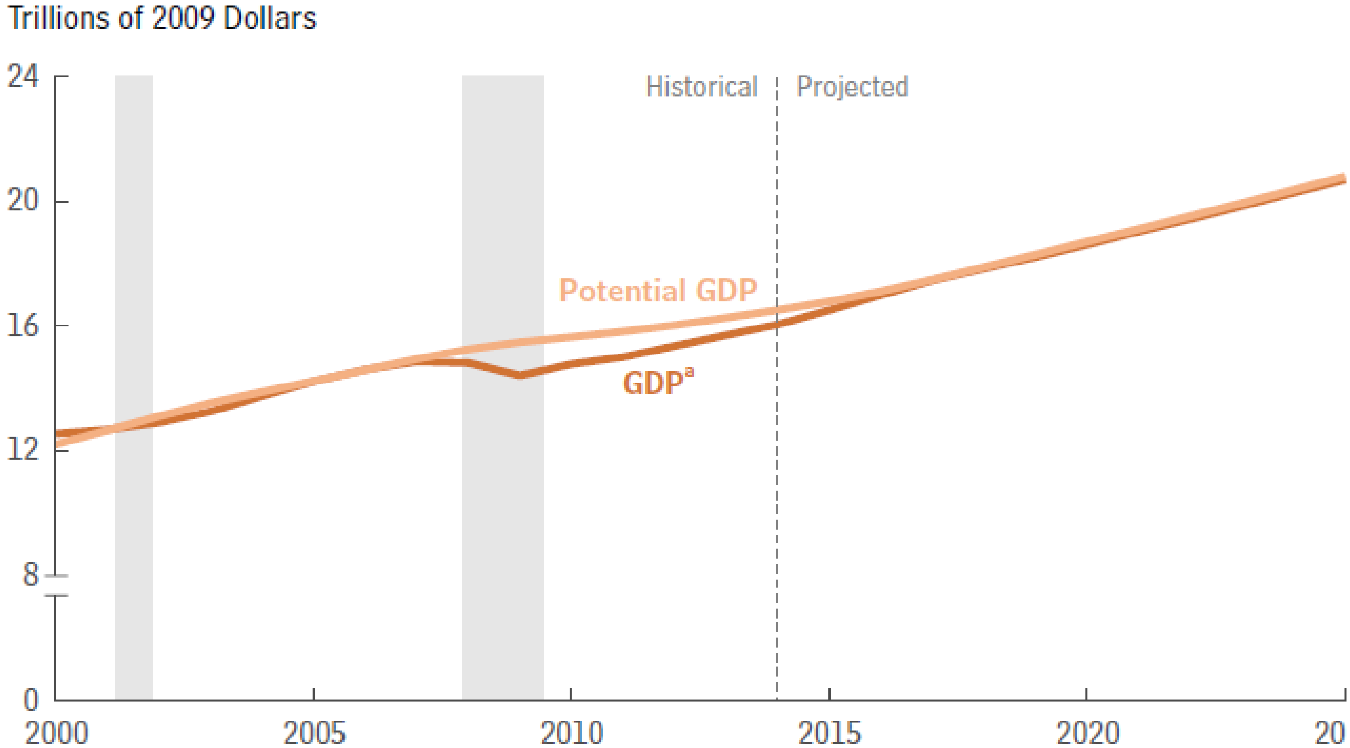
GDP = gross domestic product.

a. From 2020 to 2025, the projection for actual GDP falls short of that for potential GDP by one-half of one percent of potential GDP.

conomic Outlook: 2015 to 2025 .

Figure 2-12.

GDP and Potential GDP



Sources: Congressional Budget Office; Bureau of Economic Analysis.

Notes: Potential gross domestic product is CBO's estimate of the maximum sustainable outpu

Data are annual. Actual data are plotted through 2013; projections are plotted throug early December 2014.

GDP = gross domestic product.

a. From 2020 to 2025, the projection for actual GDP falls short of that for potential GDP by

The gap between GDP and potential GDP—a measure of underused resources, or slack—will essentially be eliminated by the end of 2017, CBO expects.

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ut of the economy.

h 2025 and are based on data available through

one-half of one percent of potential GDP.

This file presents data that underly the figures in CBO's January 2015 report *The Budget and Economic*
www.cbo.gov/publication/49892

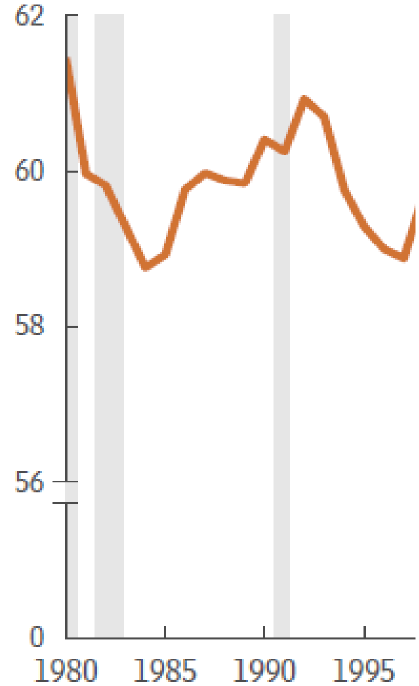
Figure 2-13.
Labor Income
(Percentage of gross domestic income)

Year	(Data)
1980	61.5
1981	60.0
1982	59.8
1983	59.3
1984	58.8
1985	58.9
1986	59.8
1987	60.0
1988	59.9
1989	59.8
1990	60.4
1991	60.2
1992	60.9
1993	60.7
1994	59.7
1995	59.3
1996	59.0
1997	58.9
1998	59.7
1999	60.1
2000	60.8
2001	61.1
2002	60.3
2003	59.9
2004	59.5
2005	58.3
2006	57.6
2007	58.6
2008	59.4
2009	58.2
2010	57.4
2011	57.4
2012	56.9
2013	56.5
2014	56.8
2015	57.0
2016	57.2
2017	57.3

Figure 2-13.

Labor Income

Percentage of Gross Domestic



Sources: Congressional Buc
Analysis.

Notes: Labor income is defi
compensation and C
proprietors' income
domestic income is
of gross domestic pr
labor share of incom
How CBO Projects Ir
publication/44433.

Data are annual. Act
value for 2014 is CB
data released by the
December 2014.

2018	57.4
2019	57.6
2020	57.7
2021	57.8
2022	58.0
2023	58.1
2024	58.2
2025	58.3

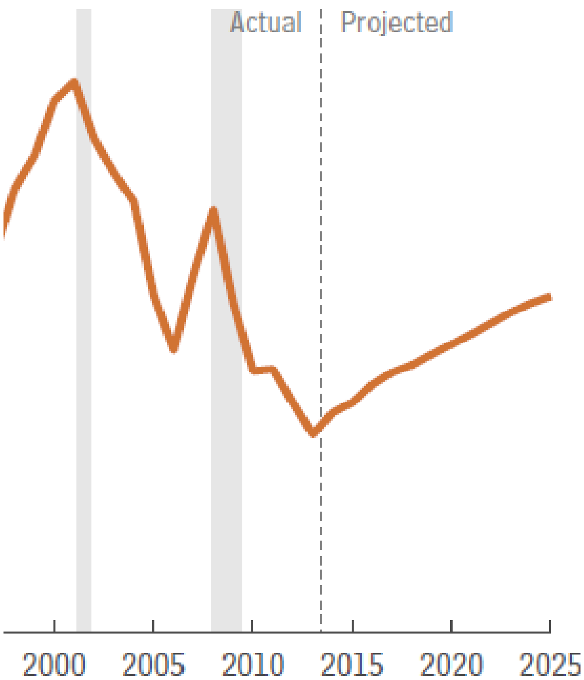
Congressional Budget Office; Bureau of Economic Analysis.

Notes: Labor income is defined as the sum of employees' compensation and CBO's estimate of the share of proprietors' income that is attributable to labor. Gross domestic income is all income earned in the production of gross domestic product. For further discussion of the labor share of income, see Congressional Budget Office, How CBO Projects Income (July 2013), www.cbo.gov/publication/44433.

Data are annual. Actual data are plotted through 2013; the value for 2014 is CBO's estimate and does not incorporate data released by the Bureau of Economic Analysis since early December 2014.

Outlook: 2015 to 2025 .

Income



dget Office; Bureau of Economic

ned as the sum of employees'
BO's estimate of the share of
that is attributable to labor. Gross
all income earned in the production
roduct. For further discussion of the
ie, see Congressional Budget Office,
ncome (July 2013), www.cbo.gov/

ual data are plotted through 2013; the
O's estimate and does not incorporate
Bureau of Economic Analysis since early

This file presents data that underly the figures in CBO's January 2015 report *The Budget and Eco*
www.cbo.gov/publication/49892

Figure 2-14.
Comparison of Economic Projections by CBO and the *Blue Chip* Consensus

	2015	2016
	Growth of Real GDP	
CBO	2.9	2.9
Blue Chip	2.9	2.8
	Consumer Price Index Inflation[a]	
CBO	1.5	2.3
Blue Chip	1.4	2.3
	GDP Price Index Inflation	
CBO	1.3	1.7
Blue Chip	1.7	2.1
	Unemployment Rate[b]	
CBO	5.5	5.4
Blue Chip	5.3	5.0
	Interest Rate on Three-Month Treasury Bills[b]	
CBO	0.5	1.7
Blue Chip	0.8	2.2
	Interest Rate on Ten-Year Treasury Notes[b]	
CBO	3.0	3.6
Blue Chip	3.0	3.7

Sources: Congressional Budget Office; Aspen Publishers, *Blue Chip Economic Indicators* (January 10, 2015).

Notes: The *Blue Chip* consensus is the average of about 50 forecasts by private-sector economists.

Real gross domestic product is the output of the economy adjusted to remove the effects of inflation.

Growth of real GDP and inflation rates are measured from the fourth quarter of one calendar year to the fourth quarter of the next year.

The unemployment rate is a measure of the number of jobless people who are available for work and are actively seeking jobs, expressed as a percentage of the labor force.

GDP = gross domestic product.

a. The consumer price index for all urban consumers.

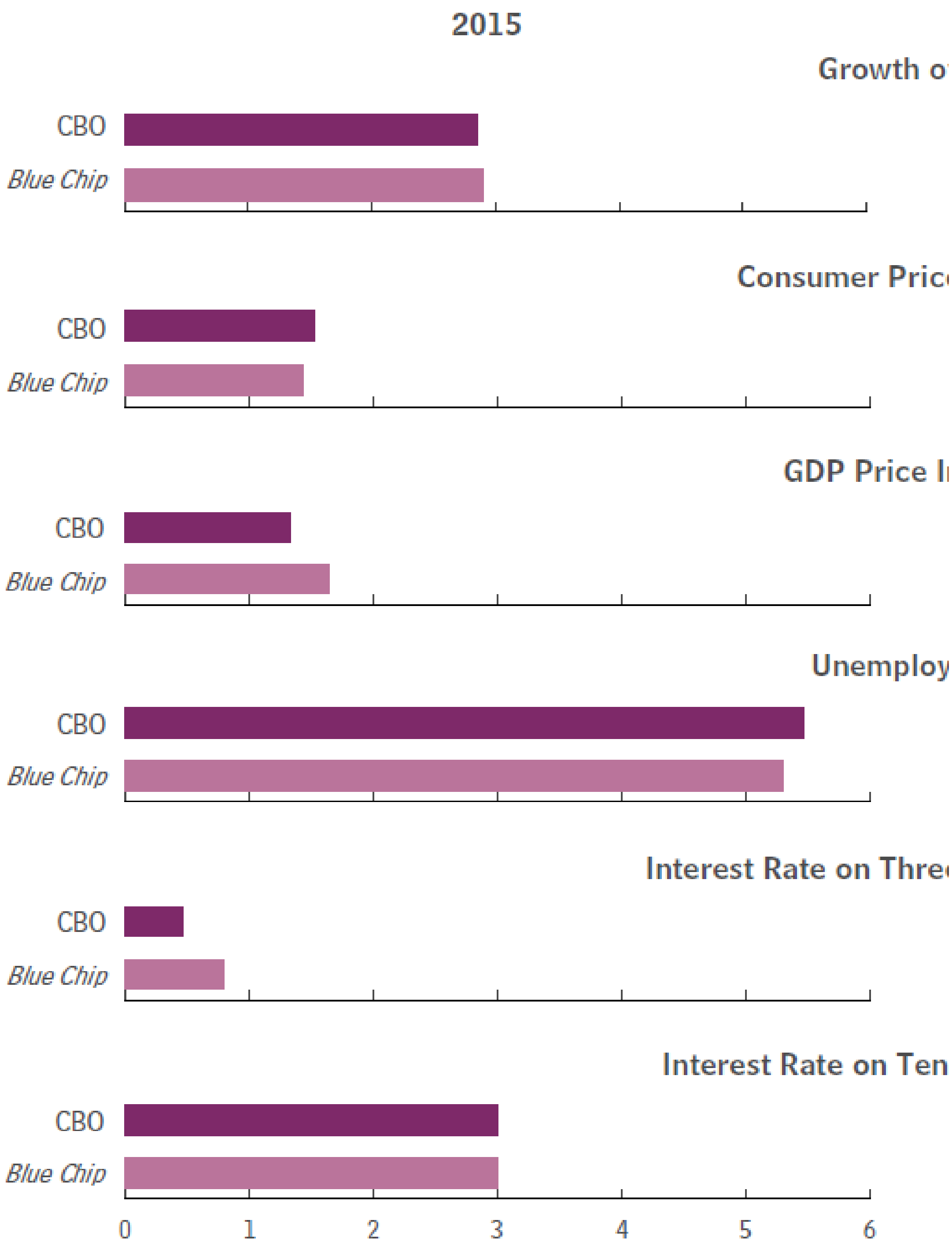
b. Rate in the fourth quarter.

nomic Outlook: 2015 to 2025 .

Figure 2-14.

Comparison of Economic Projections by CBO and t

Percent



Sources: Congressional Budget Office; Aspen Publishers, *Blue Chip Econo*

Sources: Congressional Budget Office; Aspen Publishers, Blue Chip Econo

Notes: The *Blue Chip* consensus is the average of about 50 forecasts by pri

Real gross domestic product is the output of the economy adjusted

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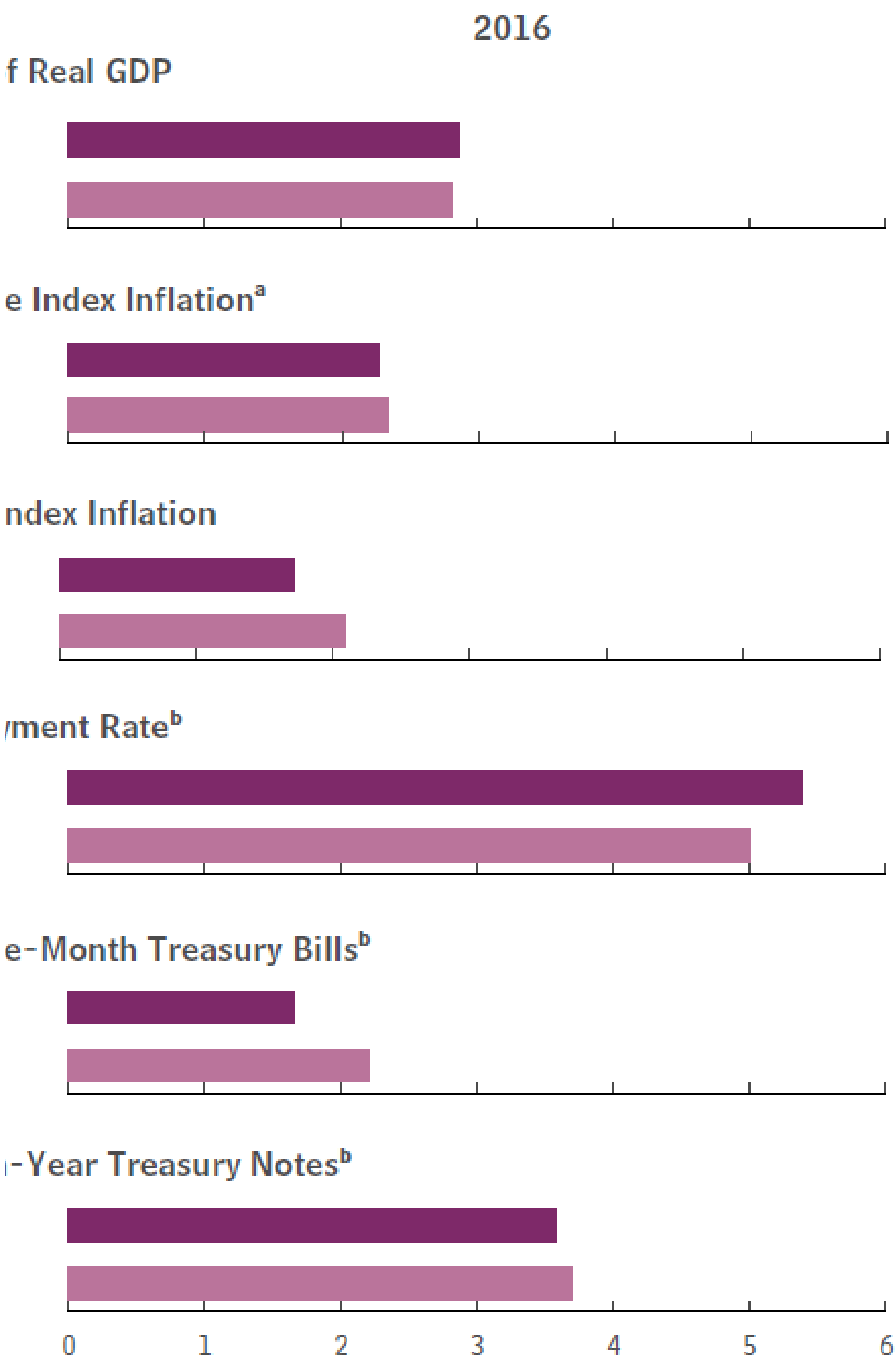
a. The consumer price index for all urban consumers.

b. Rate in the fourth quarter.

he *Blue Chip* Consensus



mic Indicators (January 10, 2015).

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l to remove the effects of inflation.

:h quarter of one calendar year to the fourth quarter of the

ple who are available for work and are actively seeking jobs,

This file presents data that underly the figures in CBO's January 2015 report *The Budget and*
www.cbo.gov/publication/49892

Figure 2-15.
Comparison of Economic Projections by CBO and the Federal Reserve

	Real GDP (Percentage Change)					
	CBO	Central Tendency (Low)	Central Tendency (High)	Range (Low)	Range (High)	CBO
2015	2.9	2.6	3.0	2.1	3.2	5.5
2016	2.9	2.5	3.0	2.1	3.0	5.4
2017	2.5	2.3	2.5	2.0	2.7	5.3
Longer Run	2.1	2.0	2.3	1.8	2.7	5.4

Sources: Congressional Budget Office; Board of Governors of the Federal Reserve System, '

Notes: The range of estimates from the Federal Reserve reflects the projections of each men

For CBO, longer-run projections are values for 2025. For the Federal Reserve, longer-run pro

Real gross domestic product is the output of the economy adjusted to remove the effects of i

The unemployment rate is a measure of the number of jobless people who are available for w

The core PCE price index excludes prices for food and energy.

Data are annual.

GDP = gross domestic product; PCE = personal consumption expenditures.

' Economic Outlook: 2015 to 2025 .

Unemployment Rate (Percent)				PCE Price Index (Percentage Change in Prices)			
Central Tendency (Low)	Central Tendency (High)	Range (Low)	Range (High)	CBO	Central Tendency (Low)	Central Tendency (High)	Range (Low)
5.2	5.3	5.0	5.5	1.4	1.0	1.6	1.0
5.0	5.2	4.9	5.4	1.9	1.7	2.0	1.6
4.9	5.3	4.7	5.7	2.0	1.8	2.0	1.8
5.2	5.5	5.0	5.8	2.0	2.0	2.0	2.0

"Economic Projections of Federal Reserve Board Members and Federal Reserve Bank Presidents, Dece

nber of the Board of Governors and the president of each Federal Reserve Bank. The central tendency i

ɔjections are described as the value at which each variable would settle under appropriate monetary polic

nflation.

vork and are actively seeking jobs, expressed as a percentage of the labor force.

Range (High)		CBO	Central Tendency (Low)	Central Tendency (High)	Range (Low)	Range (High)
		Core PCE Price Index (Percentage Change in Prices)				
2.2		1.8	1.5	1.8	1.5	2.2
2.1		1.9	1.7	2	1.6	2.1
2.2		1.9	1.8	2	1.8	2.2
2.0		2.0				

ːmber 2014" (December 17, 2014).

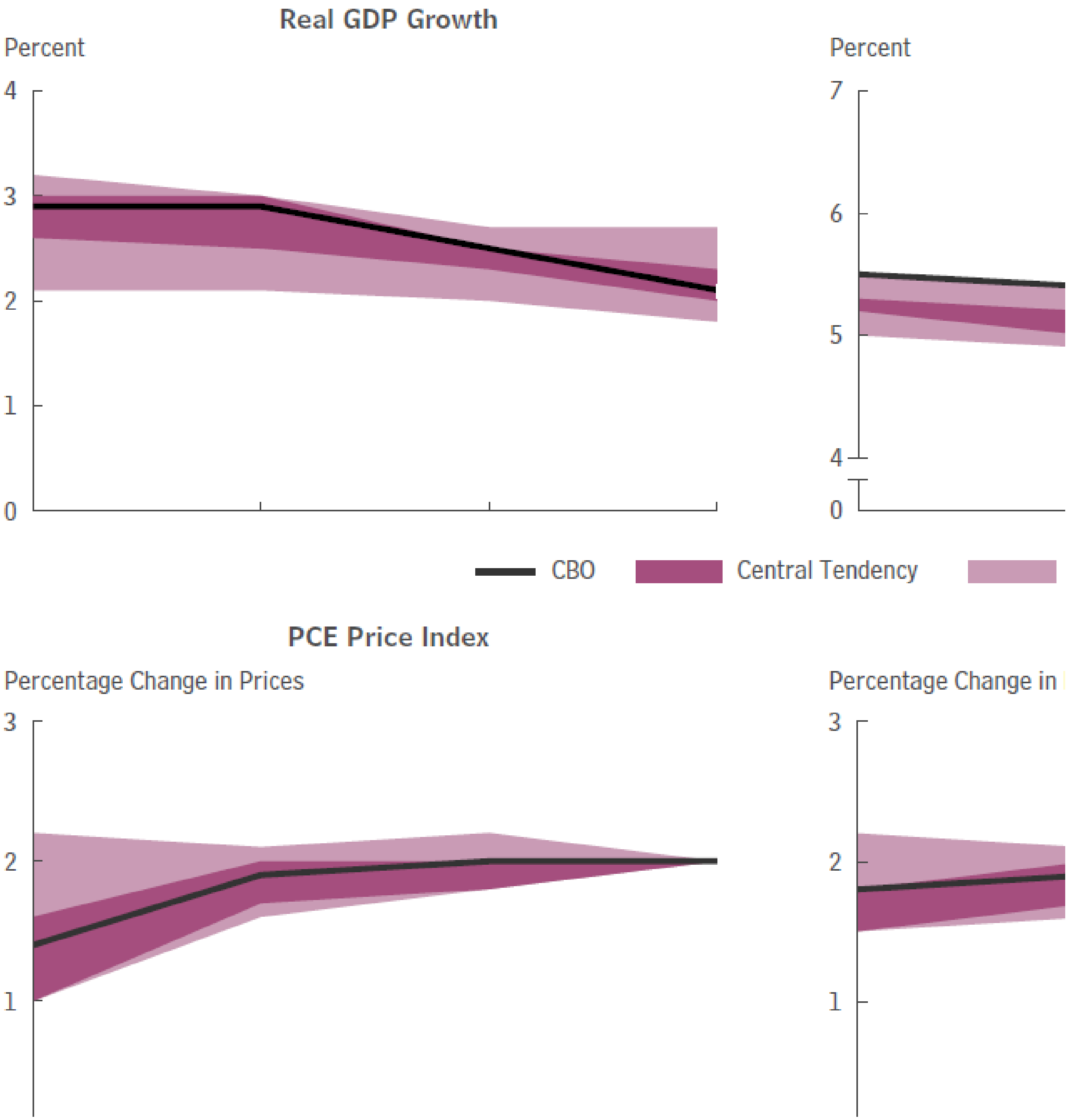
s that range without the three highest and three lowest projections.

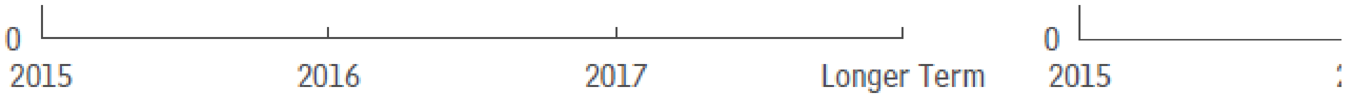
cy and in the absence of further shocks to the economy.

Figure 2-15.

Comparison of Economic Projections by CBO and the Federal R

CBO's projections of the growth of real GDP and of inflation are within the Federal R
projections of the unemployment rate are at the high end of or slightly above the ce





Sources: Congressional Budget Office; Board of Governors of the Federal Reserve System, "E
Members and Federal Reserve Bank Presidents, December 2014" (December 17, 20

Notes: The range of estimates from the Federal Reserve reflects the projections of each meml
of each Federal Reserve Bank. The central tendency is that range without the three hig

For CBO, longer-run projections are values for 2025. For the Federal Reserve, longer-r
which each variable would settle under appropriate monetary policy and in the absenc

Real gross domestic product is the output of the economy adjusted to remove the effe

The unemployment rate is a measure of the number of jobless people who are availab
expressed as a percentage of the labor force.

The core PCE price index excludes prices for food and energy.

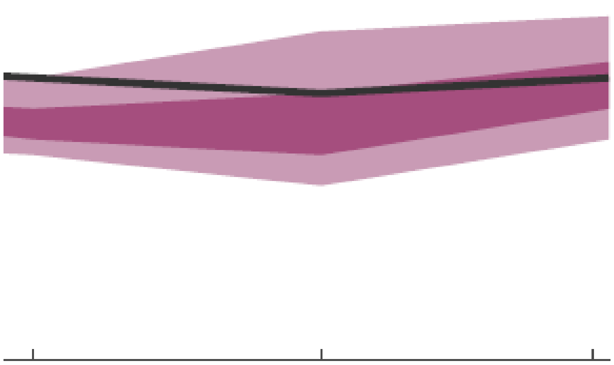
Data are annual.

GDP = gross domestic product; PCE = personal consumption expenditures.

:eserve

:eserve's central tendencies, and CBO's
:ntral tendencies.

Unemployment Rate



Range

Core PCE Price Index

Prices

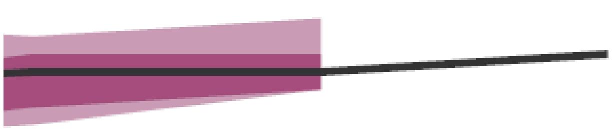


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Table D-1.
Deficit or Surplus With and Without CBO’s Estimate of Automatic Stabilizers, and Related Esti

	Deficit (-) or Surplus With Automatic Stabilizers	– Automatic = Stabilizers	Deficit (-) or Surplus Without Automatic Stabilizers	Revenues and Outlays Without Automatic Stabilizers	
				Revenues	Outlays
1965	-1	4	-5	114	119
1966	-4	11	-15	122	137
1967	-9	12	-20	141	161
1968	-25	11	-36	146	182
1969	3	13	-10	178	188
1970	-3	6	-9	191	200
1971	-23	-4	-19	192	211
1972	-23	-2	-21	210	231
1973	-15	11	-26	222	248
1974	-6	10	-16	257	273
1975	-53	-20	-33	297	330
1976	-74	-26	-48	317	365
1977	-54	-15	-39	366	404
1978	-59	-1	-59	400	458
1979	-41	7	-48	458	506
1980	-74	-21	-53	536	589
1981	-79	-33	-46	624	670
1982	-128	-78	-50	677	727
1983	-208	-104	-104	673	777
1984	-185	-34	-151	689	841
1985	-212	-12	-200	740	940
1986	-221	-9	-212	772	985
1987	-150	-14	-136	866	1001
1988	-155	4	-159	907	1066
1989	-153	19	-172	976	1148
1990	-221	9	-230	1026	1256
1991	-269	-57	-212	1107	1319
1992	-290	-73	-217	1152	1369
1993	-255	-67	-188	1209	1397
1994	-203	-51	-153	1301	1454

1995	-164	-40	-124	1389	1513
1996	-107	-40	-68	1490	1558
1997	-22	-3	-19	1588	1606
1998	69	25	44	1702	1658
1999	126	72	54	1764	1710
2000	236	116	121	1923	1802
2001	128	58	71	1944	1874
2002	-158	-44	-114	1890	2004
2003	-378	-94	-284	1862	2146
2004	-413	-55	-358	1923	2281
2005	-318	-15	-303	2164	2467
2006	-248	11	-259	2399	2658
2007	-161	-7	-154	2583	2737
2008	-459	-70	-389	2592	2980
2009	-1413	-320	-1093	2365	3458
2010	-1294	-373	-921	2443	3364
2011	-1300	-336	-964	2550	3514
2012	-1087	-272	-815	2650	3465
2013	-680	-247	-432	2968	3400
2014	-483	-193	-291	3183	3474
2015	-468	-125	-343	3303	3646
2016	-467	-61	-406	3518	3923
2017	-489	-19	-470	3606	4076
2018	-540	-13	-527	3727	4254
2019	-652	-33	-620	3893	4513
2020	-739	-44	-696	4062	4758
2021	-814	-46	-768	4242	5010
2022	-948	-47	-901	4428	5329
2023	-953	-49	-904	4631	5536
2024	-951	-51	-900	4846	5746
2025	-1088	-53	-1034	5073	6108

Sources: Congressional Budget Office; Office of Management and Budget.

Notes: Automatic stabilizers are automatic changes in revenues and outlays that are attributable to cy
adjusted) output and unemployment.

Amounts shaded in grey are actual deficits or surpluses. Projected values are shaded blue.

GDP = gross domestic product.

a. The GDP gap equals actual or projected GDP minus CBO’s estimate of potential GDP (the maximu economy).

b. The unemployment gap equals the actual or projected rate of unemployment minus the underlying s of automatic stabilizers on the federal budget in Appendix D. Table D-1 is reproduced here in E

mates, in Billions of Dollars

GDP Gap[a]	Unemployment Gap (Percent)[b]
10	-0.8
35	-1.7
34	-2.0
31	-2.0
36	-2.4
12	-1.9
-10	-0.2
-2	-0.1
39	-0.9
24	-1.2
-63	1.2
-60	1.8
-37	1.1
-7	*
9	-0.4
-68	0.6
-74	1.2
-210	3.0
-249	4.1
-92	1.8
-47	1.2
-34	1.1
-50	0.5
5	-0.3
47	-0.7
16	-0.5
-177	0.8
-185	1.7
-174	1.5
-130	0.9

-122	0.3
-114	0.3
-16	*
63	-0.5
191	-0.7
295	-1.0
101	-0.7
-139	0.7
-266	1.0
-132	0.6
-30	0.2
19	-0.3
-58	-0.5
-249	0.3
-1013	3.5
-944	4.6
-857	3.9
-713	3.0
-662	2.1
-522	1.0
-353	0.2
-164	0.1
-49	*
-40	*
-91	0.2
-108	0.3
-113	0.3
-117	0.3
-122	0.3
-127	0.3
-132	0.3

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long-term rate of unemployment.

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In its January 2015 report The Budget and Economic Outlook: 2015 to 2025, CBO presents the e
www.cbo.gov/publication/498

Table D-2.
Deficit or Surplus With and Without CBO's Estimate of Automatic Stabilizers, and Related
of Potential Gross Domestic Product

	Deficit (-) or Surplus With Automatic Stabilizers	– Automatic = Stabilizers	Deficit (-) or Surplus Without Automatic Stabilizers	Revenues and Outlays Without Automatic Stabilizers	
				Revenues	Outlays
1965	-0.2	0.5	-0.7	16.3	17.0
1966	-0.5	1.5	-2.0	16.4	18.3
1967	-1.1	1.4	-2.5	17.5	20.0
1968	-2.9	1.2	-4.1	16.8	20.9
1969	0.3	1.4	-1.1	18.8	19.9
1970	-0.3	0.6	-0.8	18.4	19.3
1971	-2.0	-0.3	-1.7	17.0	18.7
1972	-1.9	-0.2	-1.7	17.2	18.9
1973	-1.1	0.9	-2.0	16.8	18.8
1974	-0.4	0.7	-1.1	17.6	18.7
1975	-3.2	-1.2	-2.0	17.7	19.7
1976	-4.0	-1.4	-2.6	17.1	19.7
1977	-2.6	-0.7	-1.9	17.7	19.6
1978	-2.6	*	-2.6	17.5	20.1
1979	-1.6	0.3	-1.9	17.9	19.8
1980	-2.6	-0.7	-1.9	18.7	20.6
1981	-2.5	-1.0	-1.4	19.4	20.9
1982	-3.6	-2.2	-1.4	19.2	20.6
1983	-5.5	-2.8	-2.7	17.8	20.5
1984	-4.6	-0.8	-3.7	17.0	20.8
1985	-4.9	-0.3	-4.6	17.1	21.8
1986	-4.8	-0.2	-4.7	16.9	21.6
1987	-3.1	-0.3	-2.8	17.9	20.7
1988	-3.0	0.1	-3.1	17.6	20.7
1989	-2.8	0.3	-3.1	17.7	20.8
1990	-3.8	0.2	-3.9	17.4	21.3
1991	-4.3	-0.9	-3.4	17.6	21.0
1992	-4.4	-1.1	-3.3	17.4	20.7
1993	-3.7	-1.0	-2.7	17.4	20.0
1994	-2.8	-0.7	-2.1	17.8	19.8

1995	-2.1	-0.5	-1.6	18.0	19.6
1996	-1.3	-0.5	-0.8	18.4	19.3
1997	-0.3	*	-0.2	18.7	18.9
1998	0.8	0.3	0.5	19.1	18.6
1999	1.4	0.8	0.6	18.9	18.4
2000	2.4	1.2	1.2	19.5	18.3
2001	1.2	0.6	0.7	18.6	17.9
2002	-1.4	-0.4	-1.0	17.2	18.2
2003	-3.3	-0.8	-2.5	16.1	18.5
2004	-3.4	-0.5	-2.9	15.7	18.7
2005	-2.5	-0.1	-2.3	16.8	19.1
2006	-1.8	0.1	-1.9	17.6	19.5
2007	-1.1	*	-1.1	18.0	19.0
2008	-3.1	-0.5	-2.6	17.3	19.9
2009	-9.2	-2.1	-7.1	15.3	22.4
2010	-8.2	-2.4	-5.9	15.5	21.4
2011	-8.0	-2.1	-5.9	15.7	21.6
2012	-6.5	-1.6	-4.9	15.8	20.7
2013	-3.9	-1.4	-2.5	17.2	19.7
2014	-2.7	-1.1	-1.6	17.9	19.6
2015	-2.6	-0.7	-1.9	18.0	19.9
2016	-2.5	-0.3	-2.1	18.5	20.7
2017	-2.5	-0.1	-2.4	18.3	20.6
2018	-2.6	-0.1	-2.6	18.1	20.7
2019	-3.0	-0.2	-2.9	18.1	21.0
2020	-3.3	-0.2	-3.1	18.1	21.2
2021	-3.5	-0.2	-3.3	18.1	21.4
2022	-3.9	-0.2	-3.7	18.2	21.9
2023	-3.8	-0.2	-3.6	18.2	21.8
2024	-3.6	-0.2	-3.4	18.3	21.7
2025	-3.9	-0.2	-3.8	18.4	22.1

Sources: Congressional Budget Office; Office of Management and Budget.

Notes: Automatic stabilizers are automatic changes in revenues and outlays that are attributable (inflation-adjusted) output and unemployment.

Amounts shaded in grey are actual deficits or surpluses. Projected values are shaded blue.

GDP = gross domestic product.

a. The GDP gap equals the difference between actual or projected GDP and CBO's estimate of p
sustainable output of the economy, expressed as a percentage of potential GDP).

b. The unemployment gap equals the actual or projected rate of unemployment minus the underl
unemployment.

effects of automatic stabilizers on the federal budget in Appendix D. Table D-2 is reproduced he

Estimates, as a Percentage

GDP Gap[a]	Unemployment Gap (Percent)[b]
1.5	-0.8
4.7	-1.7
4.3	-2.0
3.6	-2.0
3.8	-2.4
1.2	-1.9
-0.9	-0.2
-0.2	-0.1
2.9	-0.9
1.6	-1.2
-3.8	1.2
-3.2	1.8
-1.8	1.1
-0.3	*
0.3	-0.4
-2.4	0.6
-2.3	1.2
-6.0	3.0
-6.6	4.1
-2.3	1.8
-1.1	1.2
-0.7	1.1
-1.0	0.5
0.1	-0.3
0.9	-0.7
0.3	-0.5
-2.8	0.8
-2.8	1.7
-2.5	1.5
-1.8	0.9

-1.6	0.3
-1.4	0.3
-0.2	*
0.7	-0.5
2.1	-0.7
3.0	-1.0
1.0	-0.7
-1.3	0.7
-2.3	1.0
-1.1	0.6
-0.2	0.2
0.1	-0.3
-0.4	-0.5
-1.7	0.3
-6.6	3.5
-6.0	4.6
-5.3	3.9
-4.3	3.0
-3.8	2.1
-2.9	1.0
-1.9	0.2
-0.9	0.1
-0.3	*
-0.2	*
-0.4	0.2
-0.5	0.3
-0.5	0.3
-0.5	0.3
-0.5	0.3
-0.5	0.3
-0.5	0.3

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This file presents data that supplements information in CBO's January 2015 report *The Budget and Ec*
www.cbo.gov/publication/49892

CONGRESSIONAL BUDGET OFFICE

Introduction to Quarterly Estimates of the Federal Budget Deficit or Surplus With and Without Automatic Stabilizers

January 2015

The Congressional Budget Office (CBO) routinely publishes fiscal year estimates of the federal budget deficit that would occur under current law if the influences of the business cycle on the budget—the automatic stabilizers—were removed.[1] Those estimates are based on the accounting framework of the *Budget of the United States Government*, which is prepared by the Office of Management and Budget and generally used by executive branch agencies and the Congress and reported in the press. The accounting framework focuses on the cash receipts and outlays of the federal government.

To supplement CBO's estimates of the federal budget deficit without automatic stabilizers, the spreadsheet accompanying this introduction provides quarterly estimates of net federal government saving without automatic stabilizers based on the national income and product accounts (NIPAs), which are maintained by the Department of Commerce's Bureau of Economic Analysis. The NIPA measure of net federal government saving (which is akin to but not the same as the federal budget deficit or surplus) translates the cash flows of the official budget into measures that are better suited for national saving in the NIPA framework.[2] Estimates of net federal saving, without automatic stabilizers, that are based on the NIPAs tend to be more useful for researchers, especially for statistical analysis related to economic issues such as the effect of fiscal policy on economic growth and national saving.[3] By comparison, estimates of the with and without automatic stabilizers th tied to the federal budget tend to be mor for policymakers.

CBO makes the quarterly estimates of n federal government saving without autor stabilizers by relating quarterly NIPA da federal receipts and expenditures to ecor conditions.[4] Those results produce estim the effect of the business cycle on net fe government saving, which are then conv fiscal years and used to adjust the officia bers of the federal budget.

Users of the quarterly numbers for net fe government saving without stabilizers sl note that the underlying historical NIPA are subject to significant revision; histor budget data, by contrast, are rarely revis icantly. Every year (usually in July), the of Economic Analysis issues revisions f ous years. When the revisions are large, changes in the NIPA measure of net fed government saving can change from pos negative or vice versa. Thus, a particula that had been viewed as temporarily stin to short-term growth (shown by a decrea federal government saving) could, after revisions, appear restrictive, or vice vers

[1] See Congressional Budget Office, *The Budget and Economic Outlook: 2015 to 2025*, Appendix D (January), www.cbo.gov/publication/49892.

[2] Because of many conceptual and accounting differences between those two presentations of the federal deficit or surplus, the average of the four fiscal year quarters of the NIPA numbers (for example, 2008Q4 through 2009Q3) does not match the corresponding fiscal year number in the federal budget. For a discussion of differences between the official budget of the United States and the federal budget as measured in the nation-

[3] An important difference between the official budg and the NIPA measure of net federal government sa the latter excludes such purely financial transaction of government assets, and most transactions under t Asset Relief Program, because those transactions d measure current production and income.

[4] For a discussion of a methodology similar to that u by CBO, see Darrel Cohen and Glenn Follette, "Th Fiscal Stabilizers: Quietly Doing Their Thing," *Eco Policy Review*, Federal Reserve Bank of New York, no. 1 (April 2000), pp. 35–68, http://ideas.repec.org fednep/y2000iaprp35-67nv.6no.1.html. See also Gl and Byron Lutz, *Fiscal Policy in the United States:*

al income and product accounts, see Congressional Budget Office, *CBO's Projections of Federal Receipts and Expenditures in the Framework of the National Income and Product Accounts* (May 2013), www.cbo.gov/publication/ 44140.

Stabilizers, Discretionary Fiscal Policy Actions, an *Economy*, Finance and Economic Discussion Series (Federal Reserve Board, June 2010), http://ideas.re p/fip/fedgfe/2010-43.html.

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Quarterly Estimates of Net Federal Government Saving With and Without Automatic Stabilizer:
National Income and Product Accounts

	In Billions of Dollars, Annualized			As a Percentage of Potent	
	Net Federal Government Saving With Automatic Stabilizers	Automatic Stabilizers	Net Federal Government Saving Without Automatic Stabilizers	Net Federal Government Saving With Automatic Stabilizers	Automatic Stabilizers
1965Q1	-1	5	-5	-0.1	0.6
1965Q2	-2	5	-7	-0.3	0.8
1965Q3	-9	7	-16	-1.3	1.0
1965Q4	-10	10	-20	-1.3	1.4
1966Q1	-4	13	-17	-0.6	1.8
1966Q2	-6	13	-18	-0.7	1.7
1966Q3	-8	12	-20	-1.0	1.6
1966Q4	-10	13	-23	-1.3	1.6
1967Q1	-19	12	-31	-2.4	1.4
1967Q2	-21	9	-30	-2.5	1.1
1967Q3	-19	9	-28	-2.2	1.1
1967Q4	-19	9	-28	-2.3	1.0
1968Q1	-17	11	-28	-1.9	1.3
1968Q2	-19	13	-32	-2.1	1.5
1968Q3	-10	13	-23	-1.1	1.4
1968Q4	-9	13	-22	-1.0	1.3
1969Q1	2	15	-13	0.2	1.5
1969Q2	-2	13	-14	-0.2	1.3
1969Q3	-9	11	-20	-0.9	1.1
1969Q4	-13	8	-20	-1.2	0.8
1970Q1	-22	4	-26	-2.1	0.4
1970Q2	-33	1	-33	-3.0	0.0
1970Q3	-40	-1	-39	-3.6	-0.1
1970Q4	-45	-8	-37	-4.0	-0.7
1971Q1	-46	-3	-42	-4.0	-0.3
1971Q2	-52	-4	-49	-4.5	-0.3
1971Q3	-52	-5	-47	-4.4	-0.4
1971Q4	-54	-5	-49	-4.5	-0.4

1972Q1	-46	-2	-43	-3.7	-0.2
1972Q2	-51	3	-55	-4.1	0.3
1972Q3	-41	4	-45	-3.2	0.3
1972Q4	-58	8	-66	-4.4	0.7
1973Q1	-40	16	-56	-3.0	1.2
1973Q2	-41	17	-58	-3.0	1.2
1973Q3	-37	13	-49	-2.6	0.9
1973Q4	-33	15	-48	-2.3	1.0
1974Q1	-35	7	-43	-2.4	0.5
1974Q2	-38	4	-42	-2.5	0.3
1974Q3	-36	-6	-30	-2.3	-0.4
1974Q4	-53	-16	-38	-3.2	-0.9
1975Q1	-75	-30	-46	-4.4	-1.7
1975Q2	-132	-31	-101	-7.6	-1.8
1975Q3	-90	-32	-58	-5.0	-1.8
1975Q4	-91	-30	-61	-4.9	-1.6
1976Q1	-81	-22	-59	-4.3	-1.2
1976Q2	-76	-20	-56	-4.0	-1.0
1976Q3	-80	-21	-58	-4.1	-1.1
1976Q4	-83	-21	-62	-4.2	-1.1
1977Q1	-72	-19	-53	-3.5	-0.9
1977Q2	-66	-13	-54	-3.2	-0.6
1977Q3	-73	-7	-66	-3.4	-0.3
1977Q4	-76	-8	-68	-3.5	-0.4
1978Q1	-78	-11	-67	-3.5	-0.5
1978Q2	-59	7	-66	-2.5	0.3
1978Q3	-53	9	-62	-2.2	0.4
1978Q4	-49	11	-61	-2.0	0.5
1979Q1	-40	9	-49	-1.6	0.4
1979Q2	-39	5	-44	-1.5	0.2
1979Q3	-45	4	-49	-1.7	0.2
1979Q4	-54	0	-54	-2.0	0.0
1980Q1	-64	-7	-57	-2.3	-0.3
1980Q2	-87	-32	-56	-3.0	-1.1
1980Q3	-100	-44	-56	-3.4	-1.5
1980Q4	-94	-35	-58	-3.0	-1.2
1981Q1	-72	-26	-46	-2.3	-0.8

1981Q2	-76	-37	-39	-2.3	-1.1
1981Q3	-83	-34	-48	-2.5	-1.0
1981Q4	-113	-50	-63	-3.3	-1.5
1982Q1	-133	-76	-57	-3.8	-2.2
1982Q2	-139	-86	-53	-3.9	-2.4
1982Q3	-176	-100	-76	-4.8	-2.8
1982Q4	-210	-116	-94	-5.7	-3.1
1983Q1	-207	-115	-93	-5.5	-3.0
1983Q2	-201	-102	-99	-5.3	-2.7
1983Q3	-217	-84	-134	-5.6	-2.2
1983Q4	-195	-65	-130	-5.0	-1.6
1984Q1	-180	-35	-145	-4.5	-0.9
1984Q2	-189	-21	-169	-4.6	-0.5
1984Q3	-195	-17	-179	-4.7	-0.4
1984Q4	-205	-15	-191	-4.9	-0.4
1985Q1	-168	-15	-153	-3.9	-0.3
1985Q2	-217	-12	-205	-5.0	-0.3
1985Q3	-196	-7	-189	-4.4	-0.2
1985Q4	-202	-7	-195	-4.5	-0.1
1986Q1	-202	-7	-195	-4.4	-0.1
1986Q2	-224	-11	-213	-4.9	-0.2
1986Q3	-230	-11	-219	-4.9	-0.2
1986Q4	-195	-15	-180	-4.1	-0.3
1987Q1	-195	-17	-177	-4.1	-0.4
1987Q2	-142	-13	-128	-2.9	-0.3
1987Q3	-153	-11	-143	-3.1	-0.2
1987Q4	-163	2	-165	-3.3	0.0
1988Q1	-164	0	-164	-3.2	0.0
1988Q2	-156	8	-163	-3.0	0.2
1988Q3	-151	7	-158	-2.9	0.1
1988Q4	-159	13	-172	-3.0	0.2
1989Q1	-136	21	-158	-2.5	0.4
1989Q2	-158	21	-179	-2.8	0.4
1989Q3	-164	21	-184	-2.9	0.4
1989Q4	-169	13	-181	-2.9	0.2
					0.0
1990Q1	-195	17	-212	-3.3	0.3
1990Q2	-202	12	-214	-3.4	0.2
1990Q3	-197	-5	-192	-3.3	-0.1

1990Q4	-210	-35	-175	-3.4	-0.6
1991Q1	-184	-60	-125	-3.0	-1.0
1991Q2	-244	-63	-181	-3.9	-1.0
1991Q3	-269	-71	-198	-4.2	-1.1
1991Q4	-287	-81	-206	-4.4	-1.3
1992Q1	-325	-75	-250	-4.9	-1.1
1992Q2	-331	-70	-262	-5.0	-1.1
1992Q3	-344	-67	-277	-5.1	-1.0
1992Q4	-331	-60	-270	-4.8	-0.9
1993Q1	-341	-67	-274	-4.9	-1.0
1993Q2	-306	-71	-235	-4.4	-1.0
1993Q3	-317	-72	-245	-4.5	-1.0
1993Q4	-284	-62	-221	-3.9	-0.9
1994Q1	-267	-57	-210	-3.7	-0.8
1994Q2	-237	-43	-194	-3.2	-0.6
1994Q3	-255	-40	-215	-3.4	-0.5
1994Q4	-257	-30	-227	-3.4	-0.4
1995Q1	-254	-36	-218	-3.3	-0.5
1995Q2	-242	-48	-194	-3.1	-0.6
1995Q3	-245	-46	-199	-3.1	-0.6
1995Q4	-222	-47	-175	-2.8	-0.6
1996Q1	-223	-51	-172	-2.8	-0.6
1996Q2	-180	-32	-148	-2.2	-0.4
1996Q3	-170	-29	-140	-2.1	-0.4
1996Q4	-141	-1	-140	-1.7	0.0
1997Q1	-121	-19	-102	-1.4	-0.2
1997Q2	-103	-4	-98	-1.2	-0.1
1997Q3	-69	12	-81	-0.8	0.1
1997Q4	-73	13	-86	-0.8	0.2
1998Q1	-23	20	-43	-0.3	0.2
1998Q2	-9	27	-36	-0.1	0.3
1998Q3	22	40	-18	0.2	0.4
1998Q4	21	64	-44	0.2	0.7
1999Q1	48	70	-22	0.5	0.8
1999Q2	63	69	-7	0.7	0.7
1999Q3	72	84	-13	0.8	0.9
1999Q4	85	113	-28	0.9	1.2

2000Q1	176	101	75	1.8	1.0
2000Q2	146	132	14	1.5	1.3
2000Q3	154	116	38	1.5	1.2
2000Q4	150	103	47	1.5	1.0
2001Q1	130	70	60	1.3	0.7
2001Q2	93	52	41	0.9	0.5
2001Q3	-130	5	-136	-1.2	0.1
2001Q4	-35	-27	-8	-0.3	-0.2
2002Q1	-228	-34	-194	-2.1	-0.3
2002Q2	-267	-49	-217	-2.4	-0.5
2002Q3	-277	-66	-211	-2.5	-0.6
2002Q4	-311	-90	-221	-2.7	-0.8
2003Q1	-333	-104	-230	-2.9	-0.9
2003Q2	-402	-105	-297	-3.4	-0.9
2003Q3	-473	-77	-395	-4.0	-0.7
2003Q4	-404	-64	-340	-3.4	-0.5
2004Q1	-441	-61	-380	-3.6	-0.5
2004Q2	-402	-54	-348	-3.3	-0.4
2004Q3	-373	-42	-331	-3.0	-0.3
2004Q4	-381	-32	-349	-3.0	-0.3
2005Q1	-313	-16	-297	-2.4	-0.1
2005Q2	-310	-13	-297	-2.4	-0.1
2005Q3	-308	-2	-306	-2.3	0.0
2005Q4	-288	1	-289	-2.2	0.0
2006Q1	-243	25	-268	-1.8	0.2
2006Q2	-244	19	-264	-1.8	0.1
2006Q3	-234	-1	-233	-1.7	0.0
2006Q4	-187	8	-195	-1.3	0.1
2007Q1	-214	-13	-201	-1.5	-0.1
2007Q2	-252	-12	-240	-1.7	-0.1
2007Q3	-287	-9	-278	-2.0	-0.1
2007Q4	-310	-21	-289	-2.1	-0.1
2008Q1	-409	-70	-339	-2.7	-0.5
2008Q2	-781	-71	-710	-5.2	-0.5
2008Q3	-664	-117	-546	-4.4	-0.8
2008Q4	-683	-232	-451	-4.5	-1.5
2009Q1	-1040	-311	-729	-6.7	-2.0
2009Q2	-1335	-356	-979	-8.6	-2.3

2009Q3	-1341	-382	-959	-8.7	-2.5
2009Q4	-1280	-387	-893	-8.2	-2.5
2010Q1	-1352	-389	-963	-8.6	-2.5
2010Q2	-1338	-368	-971	-8.5	-2.3
2010Q3	-1319	-349	-970	-8.3	-2.2
2010Q4	-1305	-333	-972	-8.1	-2.1
2011Q1	-1236	-351	-886	-7.7	-2.2
2011Q2	-1313	-331	-982	-8.1	-2.0
2011Q3	-1231	-328	-903	-7.5	-2.0
2011Q4	-1196	-294	-901	-7.2	-1.8
2012Q1	-1073	-273	-800	-6.4	-1.6
2012Q2	-1098	-266	-832	-6.5	-1.6
2012Q3	-1102	-254	-848	-6.5	-1.5
2012Q4	-1043	-256	-788	-6.1	-1.5
2013Q1	-746	-260	-486	-4.3	-1.5
2013Q2	-561	-253	-308	-3.2	-1.5
2013Q3	-750	-221	-529	-4.3	-1.3
2013Q4	-539	-195	-345	-3.1	-1.1
2014Q1	-560	-230	-330	-3.2	-1.3
2014Q2	-599	-191	-407	-3.4	-1.1
2014Q3	-621	-154	-467	-3.5	-0.9
2014Q4	-698	-145	-553	-3.8	-0.8

Sources: Congressional Budget Office; Office of Management and Budget.

Notes: Automatic stabilizers are automatic changes in revenues and outlays that are attributable to cy
movements in real (inflation-adjusted) output and unemployment.

a. Potential gross domestic product is CBO's estimate of the maximum sustainable output of the ecor

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Net Federal Government Saving Without Automatic Stabilizers
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In its January 2015 report *The Budget and Economic Outlook: 2015 to 2025*, CBO presents the key inputs unc
www.cbo.gov/publication/49892

Table 2-2.
Key Inputs in CBO's Projection of Potential GDP
(By calendar year, in percent)

	Average Annual Growth						
	1950-1973	1974-1981	1982-1990	1991-2001	2002-2007	2008-2014	Total, 1950-2014
				Overall Economy			
Potential GDP	4.0	3.3	3.2	3.2	2.8	1.4	3.3
Potential Labor Force	1.6	2.5	1.6	1.3	0.9	0.5	1.5
Potential Labor Force Productivity[a]	2.4	0.8	1.6	1.9	1.9	0.9	1.8
				Nonfarm Business Sector			
Potential Output	4.1	3.7	3.3	3.6	3.2	1.6	3.5
Potential Hours Worked	1.4	2.4	1.6	1.2	0.7	0.2	1.3
Capital Services	3.9	4.1	4.0	4.3	3.0	2.1	3.7
Potential TFP	1.9	0.8	1.0	1.4	1.8	0.9	1.4
Potential TFP excluding adjustments	1.9	0.8	1.0	1.3	1.3	0.9	1.4
Adjustments to TFP (Percentage points)[b]	0.0	0.0	0.0	0.1	0.5	*	0.1
Contributions to the Growth of Potential Output (Percentage points)							
Potential hours worked	1.0	1.7	1.1	0.9	0.5	0.1	0.9
Capital input	1.2	1.2	1.2	1.3	0.9	0.6	1.1
Potential TFP	1.9	0.8	1.0	1.4	1.8	0.9	1.4
Total Contributions	4.0	3.6	3.3	3.6	3.1	1.6	3.5
Potential Labor Productivity[c]	2.7	1.3	1.7	2.3	2.5	1.5	2.2

Source: Congressional Budget Office.

Notes: Potential GDP is CBO's estimate of the maximum sustainable output of the economy.

GDP = gross domestic product; TFP = total factor productivity; * = between -0.05 percent and zero.

a. The ratio of potential GDP to the potential labor force.

b. The adjustments reflect CBO’s estimate of the unusually rapid growth of TFP between 2001 and 2003, and
level of education and experience of the labor force.

c. The ratio of potential GDP to potential hours worked in the nonfarm business sector.

derlying its projection of potential GDP in Table 2-2. That table is reproduced here.

Projected Average Annual Growth		
2015-2019	2020-2025	Total, 2015-2025
2.1	2.2	2.1
0.5	0.6	0.5
1.6	1.6	1.6
2.5	2.6	2.6
0.5	0.7	0.6
3.1	2.8	2.9
1.2	1.3	1.3
1.2	1.3	1.3
*	*	*
0.3	0.5	0.4
0.9	0.8	0.9
1.2	1.3	1.3
2.5	2.6	2.5
2.0	1.9	2.0

l changes in the average

In Table 2-2 of its January 2015 report *The Budget and Economic Outlook: 2015 to 2025*, CBO presents the key inputs in its projection of potential GDP. This spreadsheet provides the annual data underlying that projection, consistent with economic assumptions in the January 2015 report.
www.cbo.gov/publication/49892

For details about the construction of the potential series, see CBO's *Method for Estimating Potential Output: An Update* (August 2001).
www.cbo.gov/doc.cfm?index=3020

Annual Data Underlying the Projection of Potential GDP

	Overall Economy			Nonfarm Business Sector								
							Potential Total Factor Productivity Index: 2000 = 100		Total Factor Productivity Adjustments Index: 2000 = 100			
Calendar Year	Potential GDP (Billions of chained 2009 dollars)	Potential Labor Force (Millions of people)	Potential Labor Force Productivity (Ratio of potential GDP to the potential labor force)	Potential GDP (Billions of chained 2009 dollars)	Potential Hours Worked (Billions of hours)	Index of Capital Services (Index: 2009 = 100) Lagged One Year	Including Adjustments	Excluding Adjustments	Total Effect	Recession Effect	Temporarily Faster Growth	Potential Labor Productivity (Ratio of potential GDP to potential hours worked)
1949	2062	61	33.6	1349	86.1	10.0	47.9	47.9	100.0	100.0	100.0	15.7
1950	2156	62	34.9	1406	86.9	10.2	49.3	49.3	100.0	100.0	100.0	16.2
1951	2263	62	36.5	1468	87.4	10.6	50.6	50.6	100.0	100.0	100.0	16.8
1952	2375	62	38.2	1528	87.8	11.0	52.0	52.0	100.0	100.0	100.0	17.4
1953	2477	63	39.5	1587	88.7	11.3	53.1	53.1	100.0	100.0	100.0	17.9
1954	2563	64	40.1	1644	90.6	11.7	53.8	53.8	100.0	100.0	100.0	18.2
1955	2644	65	40.7	1702	92.4	12.0	54.4	54.4	100.0	100.0	100.0	18.4
1956	2733	66	41.3	1765	94.2	12.4	55.1	55.1	100.0	100.0	100.0	18.7
1957	2829	67	42.1	1832	95.8	12.9	56.0	56.0	100.0	100.0	100.0	19.1
1958	2929	68	43.3	1901	96.4	13.4	57.2	57.2	100.0	100.0	100.0	19.7
1959	3030	68	44.5	1969	96.9	13.7	58.5	58.5	100.0	100.0	100.0	20.3
1960	3145	69	45.6	2043	97.7	14.1	59.8	59.8	100.0	100.0	100.0	20.9
1961	3273	70	46.7	2126	99.2	14.6	61.1	61.1	100.0	100.0	100.0	21.4
1962	3407	71	47.9	2212	100.6	15.0	62.3	62.3	100.0	100.0	100.0	22.0
1963	3548	72	49.0	2302	102.0	15.6	63.6	63.6	100.0	100.0	100.0	22.6
1964	3695	74	50.2	2397	103.3	16.2	64.9	64.9	100.0	100.0	100.0	23.2
1965	3852	75	51.5	2499	104.5	16.9	66.2	66.2	100.0	100.0	100.0	23.9
1966	4022	76	52.9	2611	105.7	17.8	67.5	67.5	100.0	100.0	100.0	24.7
1967	4202	77	54.4	2733	106.9	19.0	68.9	68.9	100.0	100.0	100.0	25.6
1968	4384	79	55.8	2856	108.1	20.0	70.3	70.3	100.0	100.0	100.0	26.4
1969	4565	80	57.1	2981	109.2	21.0	71.6	71.6	100.0	100.0	100.0	27.3
1970	4738	82	57.8	3110	111.6	22.1	72.6	72.6	100.0	100.0	100.0	27.9
1971	4900	84	58.1	3238	114.1	23.1	73.5	73.5	100.0	100.0	100.0	28.4
1972	5061	87	58.3	3365	116.6	23.9	74.4	74.4	100.0	100.0	100.0	28.9
1973	5238	89	58.7	3503	119.1	25.0	75.2	75.2	100.0	100.0	100.0	29.4
1974	5434	92	59.2	3656	122.1	26.3	76.1	76.1	100.0	100.0	100.0	29.9
1975	5628	94	59.7	3809	125.2	27.4	77.0	77.0	100.0	100.0	100.0	30.4
1976	5812	97	60.1	3953	128.4	28.0	77.9	77.9	100.0	100.0	100.0	30.8
1977	6008	99	60.5	4108	131.6	28.9	78.8	78.8	100.0	100.0	100.0	31.2
1978	6234	102	61.1	4282	134.9	30.2	79.7	79.7	100.0	100.0	100.0	31.7
1979	6460	105	61.6	4453	138.4	31.6	80.4	80.4	100.0	100.0	100.0	32.2
1980	6628	107	62.0	4571	141.2	33.0	80.3	80.3	100.0	100.0	100.0	32.4
1981	6772	109	62.3	4670	143.6	34.4	80.0	80.0	100.0	100.0	100.0	32.5
1982	6963	110	63.1	4810	145.9	35.9	80.5	80.5	100.0	100.0	100.0	33.0
1983	7174	112	63.9	4966	148.3	37.1	81.3	81.3	100.0	100.0	100.0	33.5
1984	7398	114	64.9	5129	150.7	38.3	82.2	82.2	100.0	100.0	100.0	34.0
1985	7649	116	66.0	5315	153.1	40.3	83.0	83.0	100.0	100.0	100.0	34.7
1986	7915	118	67.2	5511	155.5	42.5	83.9	83.9	100.0	100.0	100.0	35.4
1987	8183	120	68.4	5701	157.9	44.3	84.8	84.8	100.0	100.0	100.0	36.1
1988	8446	122	69.5	5885	160.4	45.9	85.6	85.6	100.0	100.0	100.0	36.7
1989	8710	123	70.5	6071	162.9	47.4	86.5	86.5	100.0	100.0	100.0	37.3
1990	8975	125	71.6	6267	165.3	49.1	87.5	87.5	100.0	100.0	100.0	37.9
1991	9233	127	72.7	6468	167.6	50.6	88.6	88.6	100.0	100.0	100.0	38.6
1992	9490	129	73.7	6671	169.9	51.9	89.8	89.8	100.0	100.0	100.0	39.3
1993	9761	130	74.9	6882	172.3	53.4	91.0	91.0	100.0	100.0	100.0	40.0
1994	10046	132	76.1	7104	174.6	55.0	92.2	92.2	100.0	100.0	100.0	40.7
1995	10347	134	77.4	7342	176.9	56.9	93.5	93.5	100.0	100.0	100.0	41.5
1996	10670	135	78.8	7600	179.2	59.3	94.7	94.7	100.0	100.0	100.0	42.4
1997	11016	137	80.3	7878	181.4	62.1	96.0	96.0	100.0	100.0	100.0	43.4
1998	11389	139	81.9	8180	183.6	65.5	97.3	97.3	100.0	100.0	100.0	44.6
1999	11789	141	83.7	8502	185.7	69.5	98.5	98.5	100.0	100.0	100.0	45.8

2000	12215	143	85.7	8851	187.8	73.8	100.0	100.0	100.0	100.0	100.0	47.1
2001	12668	144	87.9	9236	189.4	78.2	102.0	101.3	100.7	100.0	100.7	48.8
2002	13118	145	90.2	9623	190.7	81.2	104.6	102.6	101.9	100.0	101.9	50.5
2003	13538	147	92.3	9978	192.0	83.2	107.1	103.9	103.1	100.0	103.1	52.0
2004	13904	148	93.9	10278	193.3	85.0	109.0	105.4	103.5	100.0	103.5	53.2
2005	14246	149	95.4	10553	194.5	87.4	110.6	106.8	103.5	100.0	103.5	54.3
2006	14597	151	96.8	10842	195.8	90.0	112.0	108.3	103.5	100.0	103.5	55.4
2007	14950	152	98.3	11141	197.0	93.3	113.4	109.6	103.5	100.0	103.5	56.5
2008	15261	153	99.7	11403	197.8	96.9	114.6	110.7	103.5	100.0	103.5	57.6
2009	15491	154	100.7	11596	198.1	99.4	115.5	111.6	103.5	100.0	103.5	58.5
2010	15661	155	101.3	11737	198.2	100.0	116.5	112.6	103.5	100.0	103.5	59.2
2011	15836	155	101.9	11889	198.5	101.3	117.5	113.5	103.5	100.0	103.5	59.9
2012	16042	156	102.7	12069	198.8	103.3	118.4	114.5	103.5	100.0	103.5	60.7
2013	16272	157	103.7	12265	199.0	105.7	119.5	115.4	103.5	100.0	103.5	61.6
2014	16523	158	104.8	12481	199.6	107.8	120.6	116.5	103.5	100.0	103.5	62.5
2015	16800	158	106.2	12731	200.0	110.4	121.9	117.8	103.5	100.0	103.5	63.7
2016	17127	159	107.8	13034	200.9	113.6	123.4	119.3	103.5	100.0	103.5	64.9
2017	17501	160	109.6	13380	201.9	117.5	125.0	120.8	103.5	100.0	103.5	66.3
2018	17898	161	111.4	13747	203.0	121.6	126.6	122.4	103.4	100.0	103.5	67.7
2019	18307	162	113.3	14125	204.3	125.8	128.2	124.0	103.4	99.9	103.5	69.1
2020	18717	162	115.2	14506	205.6	129.8	129.9	125.6	103.4	99.9	103.5	70.6
2021	19129	163	117.1	14891	206.9	133.7	131.6	127.2	103.4	99.9	103.5	72.0
2022	19544	164	119.0	15277	208.2	137.5	133.3	128.9	103.4	99.9	103.5	73.4
2023	19962	165	120.8	15667	209.6	141.1	135.0	130.5	103.4	99.9	103.5	74.8
2024	20384	166	122.6	16060	211.0	144.5	136.7	132.2	103.4	99.9	103.5	76.1
2025	20809	167	124.4	16458	212.4	148.1	138.5	134.0	103.4	99.9	103.5	77.5

Source: Congressional Budget Office.

Note: Projected values are shaded blue.

In Table 2-2 of its January 2015 report *The Budget and Economic Outlook: 2015 to 2025*, CBO presents the key inputs in its projection of potential GDP. This spreadsheet provides the quarterly data underlying CBO's estimates of potential GDP and the natural rate of unemployment.

www.cbo.gov/publication/49892

Source: Congressional Budget Office.

Notes: The quarterly estimates of potential GDP are constructed by interpolating the data in the Annual Data sheet.

The natural rate of unemployment is the rate of unemployment arising from all sources except fluctuations in the overall demand for goods and services. The natural rate incorporates the effects of structural factors that have boosted the natural rate since 2008. (CBO did not make explicit adjustments to the natural rate for structural factors before the recent downturn.) Estimates of potential GDP are based on the underlying long-term rate of unemployment, which includes only long-lasting structural factors.

Potential GDP and Natural Rate of Unemployment

	Potential GDP (Billions of dollars)		Rate of Unemployment (Percent)	
	Real (2009 dollars)	Nominal	Underlying Long-Term	Natural
1949Q1	2,029	279	5.3	5.3
1949Q2	2,051	280	5.3	5.3
1949Q3	2,073	281	5.3	5.3
1949Q4	2,096	284	5.3	5.3
1950Q1	2,119	286	5.3	5.3
1950Q2	2,143	291	5.3	5.3
1950Q3	2,168	300	5.3	5.3
1950Q4	2,194	309	5.3	5.3
1951Q1	2,221	323	5.3	5.3
1951Q2	2,249	329	5.3	5.3
1951Q3	2,277	334	5.3	5.3
1951Q4	2,306	343	5.3	5.3
1952Q1	2,334	347	5.4	5.4
1952Q2	2,362	353	5.4	5.4
1952Q3	2,389	360	5.4	5.4
1952Q4	2,416	365	5.4	5.4
1953Q1	2,442	369	5.4	5.4
1953Q2	2,466	374	5.4	5.4
1953Q3	2,489	379	5.4	5.4
1953Q4	2,511	383	5.4	5.4
1954Q1	2,532	388	5.4	5.4
1954Q2	2,553	392	5.4	5.4
1954Q3	2,573	395	5.4	5.4
1954Q4	2,592	398	5.4	5.4
1955Q1	2,613	403	5.4	5.4
1955Q2	2,633	408	5.4	5.4
1955Q3	2,654	415	5.4	5.4
1955Q4	2,676	421	5.4	5.4
1956Q1	2,698	428	5.4	5.4
1956Q2	2,721	436	5.4	5.4
1956Q3	2,744	445	5.4	5.4
1956Q4	2,768	451	5.4	5.4
1957Q1	2,792	460	5.4	5.4
1957Q2	2,816	468	5.4	5.4
1957Q3	2,841	475	5.4	5.4
1957Q4	2,866	482	5.4	5.4
1958Q1	2,892	491	5.4	5.4
1958Q2	2,917	497	5.4	5.4
1958Q3	2,941	503	5.4	5.4
1958Q4	2,966	507	5.4	5.4
1959Q1	2,991	514	5.4	5.4
1959Q2	3,017	520	5.4	5.4
1959Q3	3,043	527	5.4	5.4
1959Q4	3,070	533	5.5	5.5
1960Q1	3,099	540	5.5	5.5
1960Q2	3,129	547	5.5	5.5
1960Q3	3,160	555	5.5	5.5
1960Q4	3,192	563	5.5	5.5
1961Q1	3,224	569	5.5	5.5
1961Q2	3,256	576	5.5	5.5
1961Q3	3,289	583	5.5	5.5
1961Q4	3,323	590	5.5	5.5
1962Q1	3,356	599	5.5	5.5
1962Q2	3,390	607	5.5	5.5
1962Q3	3,424	615	5.5	5.5
1962Q4	3,459	622	5.5	5.5
1963Q1	3,494	632	5.5	5.5
1963Q2	3,530	639	5.5	5.5
1963Q3	3,566	646	5.6	5.6
1963Q4	3,602	657	5.6	5.6
1964Q1	3,639	666	5.6	5.6
1964Q2	3,676	675	5.6	5.6
1964Q3	3,714	685	5.6	5.6

1964Q4	3,752	695	5.6	5.6
1965Q1	3,791	705	5.6	5.6
1965Q2	3,831	716	5.7	5.7
1965Q3	3,872	727	5.7	5.7
1965Q4	3,913	740	5.7	5.7
1966Q1	3,956	752	5.7	5.7
1966Q2	3,999	767	5.8	5.8
1966Q3	4,044	783	5.8	5.8
1966Q4	4,089	798	5.8	5.8
1967Q1	4,134	810	5.8	5.8
1967Q2	4,179	824	5.8	5.8
1967Q3	4,225	841	5.8	5.8
1967Q4	4,271	859	5.8	5.8
1968Q1	4,316	878	5.8	5.8
1968Q2	4,362	897	5.8	5.8
1968Q3	4,407	915	5.8	5.8
1968Q4	4,453	937	5.8	5.8
1969Q1	4,498	956	5.8	5.8
1969Q2	4,543	979	5.8	5.8
1969Q3	4,588	1,002	5.9	5.9
1969Q4	4,632	1,025	5.9	5.9
1970Q1	4,675	1,048	5.9	5.9
1970Q2	4,718	1,073	5.9	5.9
1970Q3	4,759	1,092	5.9	5.9
1970Q4	4,800	1,115	5.9	5.9
1971Q1	4,841	1,142	5.9	5.9
1971Q2	4,881	1,167	5.9	5.9
1971Q3	4,920	1,188	6.0	6.0
1971Q4	4,960	1,207	6.0	6.0
1972Q1	5,000	1,237	6.0	6.0
1972Q2	5,040	1,255	6.0	6.0
1972Q3	5,081	1,276	6.1	6.1
1972Q4	5,124	1,301	6.1	6.1
1973Q1	5,168	1,329	6.1	6.1
1973Q2	5,214	1,363	6.1	6.1
1973Q3	5,261	1,401	6.1	6.1
1973Q4	5,309	1,438	6.2	6.2
1974Q1	5,358	1,481	6.2	6.2
1974Q2	5,408	1,529	6.2	6.2
1974Q3	5,459	1,590	6.2	6.2
1974Q4	5,509	1,653	6.2	6.2
1975Q1	5,558	1,706	6.2	6.2
1975Q2	5,605	1,745	6.2	6.2
1975Q3	5,652	1,791	6.2	6.2
1975Q4	5,698	1,836	6.2	6.2
1976Q1	5,744	1,870	6.2	6.2
1976Q2	5,789	1,904	6.2	6.2
1976Q3	5,834	1,943	6.2	6.2
1976Q4	5,881	1,992	6.2	6.2
1977Q1	5,930	2,041	6.2	6.2
1977Q2	5,981	2,090	6.2	6.2
1977Q3	6,033	2,138	6.2	6.2
1977Q4	6,088	2,194	6.3	6.3
1978Q1	6,144	2,251	6.3	6.3
1978Q2	6,204	2,316	6.3	6.3
1978Q3	6,264	2,380	6.3	6.3
1978Q4	6,324	2,451	6.3	6.3
1979Q1	6,381	2,519	6.3	6.3
1979Q2	6,436	2,601	6.3	6.3
1979Q3	6,487	2,675	6.3	6.3
1979Q4	6,535	2,747	6.2	6.2
1980Q1	6,576	2,825	6.2	6.2
1980Q2	6,612	2,902	6.2	6.2
1980Q3	6,645	2,984	6.2	6.2
1980Q4	6,677	3,083	6.2	6.2
1981Q1	6,712	3,179	6.2	6.2
1981Q2	6,750	3,254	6.2	6.2
1981Q3	6,791	3,334	6.2	6.2
1981Q4	6,835	3,416	6.2	6.2
1982Q1	6,885	3,487	6.1	6.1
1982Q2	6,936	3,557	6.1	6.1
1982Q3	6,989	3,635	6.1	6.1
1982Q4	7,043	3,702	6.1	6.1
1983Q1	7,095	3,761	6.1	6.1
1983Q2	7,147	3,815	6.1	6.1
1983Q3	7,200	3,883	6.1	6.1
1983Q4	7,254	3,940	6.1	6.1
1984Q1	7,310	4,012	6.1	6.1
1984Q2	7,368	4,080	6.1	6.1
1984Q3	7,427	4,146	6.0	6.0
1984Q4	7,488	4,206	6.0	6.0
1985Q1	7,551	4,292	6.0	6.0
1985Q2	7,615	4,353	6.0	6.0
1985Q3	7,681	4,419	6.0	6.0
1985Q4	7,748	4,481	6.0	6.0

1986Q1	7,814	4,542	6.0	6.0
1986Q2	7,882	4,598	6.0	6.0
1986Q3	7,949	4,659	6.0	6.0
1986Q4	8,017	4,727	6.0	6.0
1987Q1	8,083	4,794	6.0	6.0
1987Q2	8,150	4,865	6.0	6.0
1987Q3	8,216	4,941	6.0	6.0
1987Q4	8,282	5,019	6.0	6.0
1988Q1	8,347	5,098	5.9	5.9
1988Q2	8,413	5,189	5.9	5.9
1988Q3	8,479	5,293	5.9	5.9
1988Q4	8,544	5,380	5.9	5.9
1989Q1	8,610	5,476	5.9	5.9
1989Q2	8,677	5,577	5.9	5.9
1989Q3	8,743	5,661	5.9	5.9
1989Q4	8,810	5,742	5.9	5.9
1990Q1	8,876	5,849	5.9	5.9
1990Q2	8,942	5,954	5.9	5.9
1990Q3	9,008	6,052	5.9	5.9
1990Q4	9,074	6,143	5.8	5.8
1991Q1	9,138	6,248	5.8	5.8
1991Q2	9,202	6,334	5.8	5.8
1991Q3	9,265	6,423	5.8	5.8
1991Q4	9,328	6,501	5.7	5.7
1992Q1	9,392	6,576	5.7	5.7
1992Q2	9,456	6,663	5.7	5.7
1992Q3	9,522	6,740	5.6	5.6
1992Q4	9,588	6,834	5.6	5.6
1993Q1	9,657	6,924	5.6	5.6
1993Q2	9,726	7,016	5.5	5.5
1993Q3	9,796	7,102	5.5	5.5
1993Q4	9,867	7,194	5.5	5.5
1994Q1	9,938	7,284	5.4	5.4
1994Q2	10,009	7,372	5.4	5.4
1994Q3	10,082	7,463	5.4	5.4
1994Q4	10,156	7,560	5.4	5.4
1995Q1	10,230	7,662	5.3	5.3
1995Q2	10,307	7,753	5.3	5.3
1995Q3	10,385	7,845	5.3	5.3
1995Q4	10,464	7,943	5.3	5.3
1996Q1	10,545	8,045	5.2	5.2
1996Q2	10,627	8,139	5.2	5.2
1996Q3	10,711	8,240	5.2	5.2
1996Q4	10,796	8,341	5.2	5.2
1997Q1	10,882	8,449	5.2	5.2
1997Q2	10,970	8,557	5.1	5.1
1997Q3	11,060	8,652	5.1	5.1
1997Q4	11,151	8,753	5.1	5.1
1998Q1	11,244	8,839	5.1	5.1
1998Q2	11,340	8,934	5.1	5.1
1998Q3	11,437	9,043	5.1	5.1
1998Q4	11,535	9,145	5.1	5.1
1999Q1	11,636	9,259	5.0	5.0
1999Q2	11,737	9,379	5.0	5.0
1999Q3	11,839	9,494	5.0	5.0
1999Q4	11,944	9,625	5.0	5.0
2000Q1	12,049	9,782	5.0	5.0
2000Q2	12,159	9,925	5.0	5.0
2000Q3	12,270	10,080	5.0	5.0
2000Q4	12,382	10,226	5.0	5.0
2001Q1	12,496	10,386	5.0	5.0
2001Q2	12,611	10,555	5.0	5.0
2001Q3	12,726	10,686	5.0	5.0
2001Q4	12,840	10,815	5.0	5.0
2002Q1	12,951	10,941	5.0	5.0
2002Q2	13,064	11,082	5.0	5.0
2002Q3	13,174	11,225	5.0	5.0
2002Q4	13,283	11,377	5.0	5.0
2003Q1	13,389	11,539	5.0	5.0
2003Q2	13,491	11,664	5.0	5.0
2003Q3	13,589	11,813	5.0	5.0
2003Q4	13,684	11,955	5.0	5.0
2004Q1	13,775	12,138	5.0	5.0
2004Q2	13,862	12,317	5.0	5.0
2004Q3	13,948	12,474	5.0	5.0
2004Q4	14,032	12,638	5.0	5.0
2005Q1	14,118	12,832	5.0	5.0
2005Q2	14,203	13,003	5.0	5.0
2005Q3	14,289	13,203	5.0	5.0
2005Q4	14,375	13,383	5.0	5.0
2006Q1	14,462	13,568	5.0	5.0
2006Q2	14,552	13,765	5.0	5.0
2006Q3	14,642	13,946	5.0	5.0
2006Q4	14,731	14,082	5.0	5.0
2007Q1	14,820	14,325	5.0	5.0

2007Q2	14,908	14,493	5.0	5.0
2007Q3	14,995	14,626	5.0	5.0
2007Q4	15,078	14,768	5.0	5.0
2008Q1	15,156	14,930	5.0	5.0
2008Q2	15,229	15,068	5.0	5.1
2008Q3	15,298	15,240	5.0	5.1
2008Q4	15,362	15,332	5.0	5.2
2009Q1	15,419	15,426	5.0	5.3
2009Q2	15,470	15,453	5.1	5.4
2009Q3	15,516	15,498	5.1	5.5
2009Q4	15,559	15,588	5.1	5.6
2010Q1	15,601	15,681	5.2	5.8
2010Q2	15,641	15,794	5.2	5.8
2010Q3	15,681	15,907	5.2	5.8
2010Q4	15,721	16,030	5.2	5.9
2011Q1	15,765	16,145	5.2	5.9
2011Q2	15,812	16,313	5.3	6.0
2011Q3	15,859	16,457	5.3	6.0
2011Q4	15,909	16,531	5.3	6.0
2012Q1	15,960	16,672	5.3	6.0
2012Q2	16,014	16,804	5.3	6.0
2012Q3	16,068	16,948	5.4	6.0
2012Q4	16,125	17,063	5.4	6.0
2013Q1	16,182	17,181	5.4	6.0
2013Q2	16,241	17,296	5.5	6.0
2013Q3	16,302	17,434	5.5	5.9
2013Q4	16,364	17,566	5.5	5.8
2014Q1	16,427	17,690	5.5	5.7
2014Q2	16,490	17,852	5.5	5.6
2014Q3	16,554	17,986	5.4	5.5
2014Q4	16,621	18,168	5.4	5.4
2015Q1	16,690	18,298	5.4	5.4
2015Q2	16,761	18,428	5.4	5.4
2015Q3	16,836	18,582	5.4	5.4
2015Q4	16,913	18,734	5.4	5.4
2016Q1	16,995	18,913	5.4	5.4
2016Q2	17,081	19,080	5.4	5.4
2016Q3	17,170	19,256	5.4	5.4
2016Q4	17,262	19,446	5.3	5.3
2017Q1	17,355	19,651	5.3	5.3
2017Q2	17,451	19,849	5.3	5.3
2017Q3	17,548	20,054	5.3	5.3
2017Q4	17,647	20,265	5.3	5.3
2018Q1	17,746	20,492	5.3	5.3
2018Q2	17,847	20,708	5.3	5.3
2018Q3	17,949	20,926	5.3	5.3
2018Q4	18,051	21,148	5.3	5.3
2019Q1	18,153	21,386	5.3	5.3
2019Q2	18,256	21,610	5.3	5.3
2019Q3	18,358	21,837	5.3	5.3
2019Q4	18,461	22,065	5.3	5.3
2020Q1	18,563	22,311	5.3	5.3
2020Q2	18,666	22,541	5.3	5.3
2020Q3	18,768	22,776	5.2	5.2
2020Q4	18,871	23,013	5.2	5.2
2021Q1	18,974	23,267	5.2	5.2
2021Q2	19,078	23,506	5.2	5.2
2021Q3	19,181	23,749	5.2	5.2
2021Q4	19,284	23,995	5.2	5.2
2022Q1	19,388	24,258	5.2	5.2
2022Q2	19,492	24,505	5.2	5.2
2022Q3	19,596	24,757	5.2	5.2
2022Q4	19,700	25,012	5.2	5.2

This file presents data that supplements information in CBO's January 2015 report *The Budget a*
www.cbo.gov/publication/49892

January 1991

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1954Q1	1,402	367	5.1
1954Q2	1,411	371	5.1
1954Q3	1,420	373	5.1
1954Q4	1,429	379	5.1
1955Q1	1,438	386	5.1
1955Q2	1,447	392	5.1
1955Q3	1,456	397	5.1
1955Q4	1,466	402	5.1
1956Q1	1,475	408	5.1
1956Q2	1,484	414	5.1
1956Q3	1,494	421	5.1
1956Q4	1,503	428	5.1
1957Q1	1,513	436	5.1
1957Q2	1,522	441	5.1
1957Q3	1,534	449	5.1
1957Q4	1,546	454	5.0
1958Q1	1,558	459	5.0
1958Q2	1,570	464	5.0
1958Q3	1,582	471	5.0
1958Q4	1,595	477	5.0
1959Q1	1,607	485	5.1
1959Q2	1,620	492	5.1
1959Q3	1,632	499	5.1
1959Q4	1,645	503	5.2
1960Q1	1,657	512	5.2
1960Q2	1,673	516	5.2
1960Q3	1,688	524	5.2
1960Q4	1,703	528	5.2
1961Q1	1,719	532	5.2
1961Q2	1,734	541	5.2
1961Q3	1,750	549	5.2
1961Q4	1,766	555	5.2
1962Q1	1,782	566	5.3
1962Q2	1,798	573	5.3
1962Q3	1,815	580	5.3

1962Q4	1,831	590	5.4
1963Q1	1,848	596	5.4
1963Q2	1,865	602	5.4
1963Q3	1,882	610	5.4
1963Q4	1,899	620	5.4
1964Q1	1,916	626	5.5
1964Q2	1,934	635	5.5
1964Q3	1,951	645	5.5
1964Q4	1,969	652	5.6
1965Q1	1,987	666	5.6
1965Q2	2,005	674	5.6
1965Q3	2,023	685	5.6
1965Q4	2,042	696	5.6
1966Q1	2,060	710	5.6
1966Q2	2,079	724	5.6
1966Q3	2,098	735	5.6
1966Q4	2,117	751	5.6
1967Q1	2,136	762	5.6
1967Q2	2,156	770	5.6
1967Q3	2,175	782	5.6
1967Q4	2,195	799	5.6
1968Q1	2,215	821	5.6
1968Q2	2,235	837	5.6
1968Q3	2,256	854	5.6
1968Q4	2,276	876	5.6
1969Q1	2,297	895	5.6
1969Q2	2,318	915	5.6
1969Q3	2,339	938	5.6
1969Q4	2,357	957	5.6
1970Q1	2,375	981	5.6
1970Q2	2,394	1,004	5.6
1970Q3	2,413	1,018	5.6
1970Q4	2,432	1,039	5.7
1971Q1	2,450	1,063	5.8
1971Q2	2,470	1,090	5.8
1971Q3	2,489	1,113	5.8
1971Q4	2,508	1,135	5.8
1972Q1	2,528	1,158	5.8
1972Q2	2,548	1,175	5.8
1972Q3	2,567	1,198	5.8
1972Q4	2,587	1,224	5.8
1973Q1	2,608	1,251	5.8
1973Q2	2,628	1,287	5.8
1973Q3	2,649	1,324	5.8

1973Q4	2,668	1,365	5.8
1974Q1	2,688	1,395	5.9
1974Q2	2,708	1,434	5.9
1974Q3	2,728	1,494	5.9
1974Q4	2,748	1,546	6.0
1975Q1	2,769	1,597	6.0
1975Q2	2,789	1,633	6.0
1975Q3	2,810	1,684	6.0
1975Q4	2,831	1,725	6.0
1976Q1	2,852	1,760	5.9
1976Q2	2,873	1,797	5.9
1976Q3	2,894	1,836	5.9
1976Q4	2,915	1,881	6.0
1977Q1	2,937	1,926	6.0
1977Q2	2,959	1,979	6.0
1977Q3	2,981	2,017	6.0
1977Q4	3,003	2,068	6.0
1978Q1	3,025	2,114	5.9
1978Q2	3,048	2,181	5.9
1978Q3	3,070	2,237	5.9
1978Q4	3,093	2,302	5.9
1979Q1	3,116	2,370	5.9
1979Q2	3,139	2,444	5.9
1979Q3	3,162	2,510	5.9
1979Q4	3,186	2,579	5.9
1980Q1	3,202	2,647	5.9
1980Q2	3,218	2,724	5.9
1980Q3	3,235	2,799	5.9
1980Q4	3,251	2,895	6.0
1981Q1	3,268	2,985	6.0
1981Q2	3,284	3,049	6.0
1981Q3	3,307	3,139	5.9
1981Q4	3,329	3,220	5.9
1982Q1	3,351	3,290	5.9
1982Q2	3,374	3,352	5.9
1982Q3	3,396	3,423	5.9
1982Q4	3,419	3,477	5.8
1983Q1	3,442	3,527	5.8
1983Q2	3,465	3,581	5.8
1983Q3	3,488	3,633	5.8
1983Q4	3,512	3,700	5.8
1984Q1	3,535	3,764	5.7
1984Q2	3,559	3,819	5.7
1984Q3	3,583	3,875	5.7

1984Q4	3,607	3,930	5.7
1985Q1	3,631	3,985	5.7
1985Q2	3,655	4,041	5.7
1985Q3	3,680	4,096	5.7
1985Q4	3,705	4,156	5.6
1986Q1	3,730	4,191	5.6
1986Q2	3,755	4,252	5.6
1986Q3	3,780	4,331	5.6
1986Q4	3,805	4,380	5.6
1987Q1	3,831	4,450	5.6
1987Q2	3,856	4,514	5.6
1987Q3	3,882	4,580	5.6
1987Q4	3,908	4,634	5.5
1988Q1	3,934	4,694	5.5
1988Q2	3,961	4,778	5.5
1988Q3	3,987	4,864	5.5
1988Q4	4,014	4,955	5.5
1989Q1	4,038	5,030	5.5
1989Q2	4,065	5,115	5.5
1989Q3	4,092	5,191	5.5
1989Q4	4,119	5,272	5.5
1990Q1	4,147	5,371	5.4
1990Q2	4,174	5,469	5.4
1990Q3	4,202	5,552	5.4
1990Q4	4,224	5,640	5.4
1991Q1	4,247	5,736	5.4
1991Q2	4,269	5,828	5.4
1991Q3	4,292	5,913	5.4
1991Q4	4,315	5,998	5.4
1992Q1	4,338	6,087	5.4
1992Q2	4,361	6,172	5.4
1992Q3	4,384	6,259	5.3
1992Q4	4,407	6,346	5.3
1993Q1	4,430	6,440	5.3
1993Q2	4,454	6,528	5.3
1993Q3	4,477	6,618	5.3
1993Q4	4,501	6,709	5.3
1994Q1	4,525	6,808	5.3
1994Q2	4,549	6,901	5.3
1994Q3	4,573	6,996	5.3
1994Q4	4,597	7,092	5.3
1995Q1	4,622	7,196	5.3
1995Q2	4,646	7,295	5.3
1995Q3	4,671	7,396	5.3

1995Q4	4,696	7,497	5.3
1996Q1	4,720	7,607	5.3
1996Q2	4,745	7,712	5.3
1996Q3	4,771	7,818	5.3
1996Q4	4,796	7,925	5.3

Source: Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1992 to 1996* , January 1991, www.cbo.gov/publication/18225.

Note: Real potential GDP is expressed in real 1982 dollars.

ınd Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget a*
www.cbo.gov/publication/49892

January 1992

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1953Q1	n.a.	n.a.	n.a.
1953Q2	n.a.	n.a.	5.1
1953Q3	n.a.	n.a.	5.1
1953Q4	n.a.	n.a.	5.1
1954Q1	n.a.	n.a.	5.1
1954Q2	n.a.	n.a.	5.1
1954Q3	n.a.	n.a.	5.1
1954Q4	n.a.	n.a.	5.1
1955Q1	n.a.	n.a.	5.1
1955Q2	n.a.	n.a.	5.1
1955Q3	n.a.	n.a.	5.1
1955Q4	n.a.	n.a.	5.1
1956Q1	n.a.	n.a.	5.1
1956Q2	n.a.	n.a.	5.1
1956Q3	n.a.	n.a.	5.1
1956Q4	n.a.	n.a.	5.1
1957Q1	n.a.	n.a.	5.1
1957Q2	n.a.	n.a.	5.1
1957Q3	n.a.	n.a.	5.1
1957Q4	n.a.	n.a.	5.0
1958Q1	n.a.	n.a.	5.0
1958Q2	n.a.	n.a.	5.0
1958Q3	n.a.	n.a.	5.0
1958Q4	n.a.	n.a.	5.0
1959Q1	1,926	488	5.1
1959Q2	1,931	494	5.1
1959Q3	1,944	500	5.1
1959Q4	1,955	504	5.2
1960Q1	1,973	513	5.2
1960Q2	1,995	518	5.2
1960Q3	2,016	526	5.2
1960Q4	2,042	531	5.2
1961Q1	2,056	535	5.2
1961Q2	2,078	544	5.2
1961Q3	2,095	552	5.2

1961Q4	2,107	557	5.2
1962Q1	2,125	567	5.3
1962Q2	2,144	574	5.3
1962Q3	2,158	580	5.3
1962Q4	2,180	589	5.4
1963Q1	2,200	595	5.4
1963Q2	2,217	600	5.4
1963Q3	2,231	607	5.4
1963Q4	2,249	616	5.4
1964Q1	2,274	624	5.5
1964Q2	2,290	632	5.5
1964Q3	2,313	641	5.5
1964Q4	2,330	650	5.6
1965Q1	2,352	663	5.6
1965Q2	2,377	673	5.6
1965Q3	2,408	686	5.6
1965Q4	2,442	699	5.6
1966Q1	2,472	716	5.6
1966Q2	2,499	731	5.6
1966Q3	2,527	744	5.6
1966Q4	2,552	760	5.6
1967Q1	2,576	772	5.6
1967Q2	2,594	780	5.6
1967Q3	2,610	792	5.6
1967Q4	2,632	808	5.6
1968Q1	2,658	829	5.6
1968Q2	2,677	844	5.6
1968Q3	2,693	860	5.6
1968Q4	2,722	880	5.6
1969Q1	2,745	897	5.6
1969Q2	2,768	917	5.6
1969Q3	2,792	938	5.6
1969Q4	2,820	958	5.6
1970Q1	2,855	984	5.6
1970Q2	2,872	1,008	5.6
1970Q3	2,899	1,023	5.6
1970Q4	2,929	1,045	5.7
1971Q1	2,952	1,071	5.8
1971Q2	2,984	1,099	5.8
1971Q3	3,007	1,121	5.8
1971Q4	3,042	1,143	5.8
1972Q1	3,048	1,163	5.8
1972Q2	3,057	1,179	5.8
1972Q3	3,083	1,201	5.8

1972Q4	3,097	1,226	5.8
1973Q1	3,133	1,256	5.8
1973Q2	3,170	1,294	5.8
1973Q3	3,203	1,332	5.8
1973Q4	3,222	1,372	5.8
1974Q1	3,241	1,403	5.9
1974Q2	3,264	1,442	5.9
1974Q3	3,301	1,502	5.9
1974Q4	3,337	1,556	6.0
1975Q1	3,352	1,608	6.0
1975Q2	3,380	1,643	6.0
1975Q3	3,408	1,692	6.0
1975Q4	3,429	1,731	6.0
1976Q1	3,445	1,762	5.9
1976Q2	3,463	1,794	5.9
1976Q3	3,480	1,831	5.9
1976Q4	3,502	1,874	6.0
1977Q1	3,531	1,917	6.0
1977Q2	3,558	1,971	6.0
1977Q3	3,563	2,009	6.0
1977Q4	3,590	2,060	6.0
1978Q1	3,621	2,107	5.9
1978Q2	3,648	2,179	5.9
1978Q3	3,684	2,243	5.9
1978Q4	3,724	2,317	5.9
1979Q1	3,766	2,390	5.9
1979Q2	3,813	2,472	5.9
1979Q3	3,843	2,547	5.9
1979Q4	3,887	2,628	5.9
1980Q1	3,888	2,690	5.9
1980Q2	3,898	2,761	5.9
1980Q3	3,913	2,835	5.9
1980Q4	3,953	2,940	6.0
1981Q1	3,954	3,025	6.0
1981Q2	3,969	3,090	6.0
1981Q3	3,997	3,185	6.0
1981Q4	4,019	3,272	6.0
1982Q1	4,047	3,333	5.9
1982Q2	4,078	3,402	5.9
1982Q3	4,112	3,466	5.9
1982Q4	4,126	3,507	5.9
1983Q1	4,134	3,557	5.9
1983Q2	4,170	3,613	5.9
1983Q3	4,199	3,674	5.9

1983Q4	4,223	3,734	5.9
1984Q1	4,224	3,787	5.8
1984Q2	4,251	3,851	5.8
1984Q3	4,280	3,922	5.8
1984Q4	4,318	3,983	5.8
1985Q1	4,319	4,031	5.8
1985Q2	4,357	4,094	5.8
1985Q3	4,397	4,160	5.8
1985Q4	4,426	4,229	5.8
1986Q1	4,445	4,268	5.7
1986Q2	4,484	4,325	5.7
1986Q3	4,532	4,406	5.7
1986Q4	4,539	4,446	5.7
1987Q1	4,538	4,485	5.7
1987Q2	4,566	4,545	5.7
1987Q3	4,588	4,603	5.7
1987Q4	4,606	4,663	5.7
1988Q1	4,607	4,703	5.7
1988Q2	4,636	4,786	5.7
1988Q3	4,668	4,878	5.7
1988Q4	4,723	4,984	5.6
1989Q1	4,754	5,080	5.6
1989Q2	4,793	5,176	5.6
1989Q3	4,829	5,259	5.6
1989Q4	4,881	5,364	5.6
1990Q1	4,916	5,462	5.6
1990Q2	4,957	5,569	5.6
1990Q3	4,988	5,667	5.6
1990Q4	5,003	5,726	5.6
1991Q1	5,046	5,846	5.6
1991Q2	5,091	5,945	5.6
1991Q3	5,108	5,997	5.6
1991Q4	5,127	6,058	5.5
1992Q1	5,136	6,117	5.5
1992Q2	5,151	6,181	5.5
1992Q3	5,168	6,247	5.5
1992Q4	5,186	6,315	5.5
1993Q1	5,208	6,396	5.5
1993Q2	5,229	6,472	5.5
1993Q3	5,252	6,550	5.5
1993Q4	5,276	6,630	5.5
1994Q1	5,302	6,719	5.5
1994Q2	5,328	6,804	5.5
1994Q3	5,355	6,891	5.5

1994Q4	5,382	6,979	5.5
1995Q1	5,410	7,074	5.5
1995Q2	5,438	7,166	5.5
1995Q3	5,467	7,259	5.5
1995Q4	5,496	7,354	5.4
1996Q1	5,525	7,455	5.4
1996Q2	5,554	7,552	5.4
1996Q3	5,584	7,651	5.4
1996Q4	5,613	7,750	5.4
1997Q1	5,644	7,858	5.4
1997Q2	5,672	7,957	5.4
1997Q3	5,699	8,057	5.4
1997Q4	5,725	8,157	5.4

Source: Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1993 to 1997* , January 1992, www.cbo.gov/publication/19995.

Notes: Real potential GDP is expressed in real 1987 dollars.

n.a. = not available.

nd Economic Outlook: 2015 to 2025.

This file presents data that supplements information in CBO's January 2015 report *The Budget and Ec*
www.cbo.gov/publication/49892

January 1993

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1959Q1	n.a.	n.a.	5.1
1959Q2	n.a.	n.a.	5.1
1959Q3	n.a.	n.a.	5.1
1959Q4	n.a.	n.a.	5.2
1960Q1	1,986	516	5.2
1960Q2	2,001	521	5.2
1960Q3	2,018	527	5.2
1960Q4	2,036	530	5.2
1961Q1	2,054	535	5.2
1961Q2	2,073	543	5.2
1961Q3	2,091	551	5.2
1961Q4	2,110	558	5.2
1962Q1	2,128	568	5.3
1962Q2	2,145	575	5.3
1962Q3	2,162	582	5.3
1962Q4	2,179	590	5.4
1963Q1	2,195	595	5.4
1963Q2	2,213	600	5.4
1963Q3	2,231	608	5.4
1963Q4	2,250	617	5.4
1964Q1	2,271	624	5.5
1964Q2	2,291	633	5.5
1964Q3	2,311	641	5.5
1964Q4	2,331	651	5.6
1965Q1	2,350	663	5.6
1965Q2	2,372	672	5.6
1965Q3	2,396	683	5.6
1965Q4	2,422	696	5.6
1966Q1	2,452	711	5.6
1966Q2	2,479	726	5.6
1966Q3	2,504	739	5.6
1966Q4	2,529	755	5.6
1967Q1	2,551	766	5.6
1967Q2	2,574	775	5.6
1967Q3	2,598	790	5.6

1967Q4	2,621	806	5.6
1968Q1	2,646	826	5.6
1968Q2	2,669	843	5.6
1968Q3	2,692	860	5.6
1968Q4	2,715	879	5.6
1969Q1	2,736	895	5.6
1969Q2	2,760	915	5.6
1969Q3	2,785	937	5.6
1969Q4	2,810	957	5.6
1970Q1	2,838	979	5.6
1970Q2	2,865	1,006	5.6
1970Q3	2,891	1,022	5.6
1970Q4	2,918	1,042	5.7
1971Q1	2,945	1,072	5.8
1971Q2	2,970	1,098	5.8
1971Q3	2,994	1,120	5.8
1971Q4	3,017	1,137	5.8
1972Q1	3,038	1,161	5.8
1972Q2	3,060	1,181	5.8
1972Q3	3,083	1,201	5.8
1972Q4	3,106	1,230	5.8
1973Q1	3,130	1,255	5.8
1973Q2	3,156	1,289	5.8
1973Q3	3,184	1,325	5.8
1973Q4	3,213	1,369	5.8
1974Q1	3,244	1,404	5.9
1974Q2	3,274	1,447	5.9
1974Q3	3,303	1,504	5.9
1974Q4	3,331	1,554	6.0
1975Q1	3,358	1,612	6.0
1975Q2	3,385	1,647	6.0
1975Q3	3,410	1,694	6.0
1975Q4	3,435	1,735	6.0
1976Q1	3,458	1,770	5.9
1976Q2	3,481	1,804	5.9
1976Q3	3,504	1,844	5.9
1976Q4	3,526	1,888	6.0
1977Q1	3,549	1,926	6.0
1977Q2	3,571	1,978	6.0
1977Q3	3,594	2,026	6.0
1977Q4	3,617	2,076	6.0
1978Q1	3,639	2,118	5.9
1978Q2	3,666	2,189	5.9
1978Q3	3,694	2,250	5.9

1978Q4	3,725	2,318	5.9
1979Q1	3,761	2,387	5.9
1979Q2	3,793	2,459	5.9
1979Q3	3,825	2,535	5.9
1979Q4	3,855	2,606	5.9
1980Q1	3,884	2,687	5.9
1980Q2	3,912	2,771	5.9
1980Q3	3,937	2,853	5.9
1980Q4	3,961	2,947	6.0
1981Q1	3,984	3,048	6.0
1981Q2	4,005	3,118	6.0
1981Q3	4,025	3,207	6.0
1981Q4	4,044	3,292	6.0
1982Q1	4,059	3,342	5.9
1982Q2	4,080	3,404	5.9
1982Q3	4,103	3,458	5.9
1982Q4	4,128	3,509	5.9
1983Q1	4,162	3,581	5.9
1983Q2	4,187	3,627	5.9
1983Q3	4,208	3,682	5.9
1983Q4	4,227	3,737	5.9
1984Q1	4,237	3,799	5.8
1984Q2	4,255	3,855	5.8
1984Q3	4,276	3,919	5.8
1984Q4	4,300	3,967	5.8
1985Q1	4,329	4,040	5.8
1985Q2	4,359	4,095	5.8
1985Q3	4,390	4,154	5.8
1985Q4	4,423	4,226	5.8
1986Q1	4,461	4,283	5.7
1986Q2	4,491	4,331	5.7
1986Q3	4,517	4,391	5.7
1986Q4	4,539	4,446	5.7
1987Q1	4,553	4,500	5.7
1987Q2	4,572	4,552	5.7
1987Q3	4,593	4,607	5.7
1987Q4	4,616	4,673	5.7
1988Q1	4,640	4,736	5.7
1988Q2	4,667	4,818	5.7
1988Q3	4,697	4,908	5.7
1988Q4	4,730	4,992	5.6
1989Q1	4,769	5,098	5.6
1989Q2	4,801	5,189	5.6
1989Q3	4,832	5,272	5.6

1989Q4	4,861	5,349	5.6
1990Q1	4,883	5,437	5.6
1990Q2	4,910	5,531	5.6
1990Q3	4,938	5,622	5.6
1990Q4	4,966	5,713	5.6
1991Q1	4,998	5,820	5.6
1991Q2	5,025	5,902	5.6
1991Q3	5,052	5,973	5.6
1991Q4	5,077	6,037	5.5
1992Q1	5,101	6,112	5.5
1992Q2	5,123	6,181	5.5
1992Q3	5,145	6,231	5.5
1992Q4	5,166	6,289	5.5
1993Q1	5,185	6,362	5.5
1993Q2	5,207	6,425	5.5
1993Q3	5,229	6,491	5.5
1993Q4	5,254	6,557	5.5
1994Q1	5,280	6,633	5.5
1994Q2	5,307	6,705	5.5
1994Q3	5,335	6,779	5.5
1994Q4	5,365	6,855	5.5
1995Q1	5,395	6,937	5.5
1995Q2	5,425	7,015	5.5
1995Q3	5,456	7,093	5.5
1995Q4	5,487	7,173	5.4
1996Q1	5,518	7,258	5.4
1996Q2	5,549	7,337	5.4
1996Q3	5,579	7,416	5.4
1996Q4	5,608	7,494	5.4
1997Q1	5,637	7,579	5.4
1997Q2	5,665	7,657	5.4
1997Q3	5,691	7,733	5.4
1997Q4	5,717	7,809	5.4
1998Q1	5,740	7,889	5.4
1998Q2	5,765	7,964	5.4
1998Q3	5,788	8,040	5.4
1998Q4	5,812	8,116	5.4

Source: Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1994 to 1998* , January 1993, www.cbo.gov/publication/18085.

Notes: Real potential GDP is expressed in real 1987 dollars.

n.a. = not available.

onomic Outlook: 2015 to 2025.

This file presents data that supplements information in CBO's January 2015 report *The Budget a*
www.cbo.gov/publication/49892

January 1994

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	1,328	266	5.0
1949Q2	1,335	265	5.0
1949Q3	1,347	267	5.0
1949Q4	1,362	270	5.0
1950Q1	1,379	274	5.0
1950Q2	1,399	279	5.0
1950Q3	1,419	290	5.0
1950Q4	1,440	298	5.0
1951Q1	1,462	313	5.0
1951Q2	1,483	315	5.0
1951Q3	1,503	318	5.0
1951Q4	1,523	325	5.1
1952Q1	1,541	329	5.1
1952Q2	1,560	333	5.1
1952Q3	1,579	340	5.1
1952Q4	1,598	349	5.1
1953Q1	1,619	354	5.1
1953Q2	1,635	359	5.1
1953Q3	1,650	364	5.1
1953Q4	1,663	365	5.1
1954Q1	1,673	369	5.1
1954Q2	1,684	372	5.1
1954Q3	1,694	375	5.1
1954Q4	1,704	381	5.1
1955Q1	1,716	386	5.1
1955Q2	1,725	393	5.1
1955Q3	1,733	399	5.1
1955Q4	1,741	403	5.1
1956Q1	1,746	408	5.1
1956Q2	1,756	413	5.1
1956Q3	1,767	420	5.1
1956Q4	1,781	426	5.1
1957Q1	1,799	436	5.1
1957Q2	1,816	442	5.1
1957Q3	1,833	450	5.1

1957Q4	1,851	454	5.0
1958Q1	1,869	461	5.0
1958Q2	1,885	466	5.0
1958Q3	1,900	474	5.0
1958Q4	1,914	481	5.0
1959Q1	1,926	489	5.1
1959Q2	1,939	497	5.1
1959Q3	1,952	502	5.1
1959Q4	1,966	507	5.2
1960Q1	1,981	515	5.2
1960Q2	1,996	519	5.2
1960Q3	2,013	526	5.2
1960Q4	2,031	529	5.2
1961Q1	2,050	534	5.2
1961Q2	2,069	542	5.2
1961Q3	2,088	550	5.2
1961Q4	2,106	557	5.2
1962Q1	2,125	568	5.3
1962Q2	2,143	574	5.3
1962Q3	2,160	581	5.3
1962Q4	2,178	589	5.4
1963Q1	2,194	594	5.4
1963Q2	2,212	600	5.4
1963Q3	2,230	607	5.4
1963Q4	2,250	617	5.4
1964Q1	2,271	624	5.5
1964Q2	2,292	633	5.5
1964Q3	2,312	642	5.5
1964Q4	2,333	651	5.6
1965Q1	2,351	663	5.6
1965Q2	2,374	673	5.6
1965Q3	2,399	684	5.6
1965Q4	2,425	697	5.6
1966Q1	2,455	712	5.6
1966Q2	2,482	727	5.6
1966Q3	2,509	741	5.6
1966Q4	2,534	757	5.6
1967Q1	2,556	767	5.6
1967Q2	2,580	777	5.6
1967Q3	2,604	792	5.6
1967Q4	2,628	809	5.6
1968Q1	2,653	829	5.6
1968Q2	2,677	846	5.6
1968Q3	2,700	863	5.6

1968Q4	2,724	882	5.6
1969Q1	2,746	899	5.6
1969Q2	2,770	919	5.6
1969Q3	2,795	941	5.6
1969Q4	2,820	960	5.6
1970Q1	2,847	982	5.6
1970Q2	2,873	1,008	5.6
1970Q3	2,899	1,024	5.6
1970Q4	2,924	1,045	5.7
1971Q1	2,951	1,074	5.8
1971Q2	2,975	1,099	5.8
1971Q3	2,998	1,122	5.8
1971Q4	3,020	1,138	5.8
1972Q1	3,039	1,162	5.8
1972Q2	3,061	1,181	5.8
1972Q3	3,082	1,201	5.8
1972Q4	3,105	1,229	5.8
1973Q1	3,128	1,254	5.8
1973Q2	3,153	1,288	5.8
1973Q3	3,180	1,323	5.8
1973Q4	3,208	1,367	5.8
1974Q1	3,240	1,402	5.9
1974Q2	3,269	1,445	5.9
1974Q3	3,298	1,502	5.9
1974Q4	3,327	1,552	6.0
1975Q1	3,354	1,610	6.0
1975Q2	3,380	1,645	6.0
1975Q3	3,406	1,692	6.0
1975Q4	3,430	1,733	6.0
1976Q1	3,454	1,768	5.9
1976Q2	3,477	1,802	5.9
1976Q3	3,500	1,842	5.9
1976Q4	3,522	1,886	6.0
1977Q1	3,545	1,924	6.0
1977Q2	3,568	1,977	6.0
1977Q3	3,590	2,024	6.0
1977Q4	3,614	2,074	6.0
1978Q1	3,636	2,116	5.9
1978Q2	3,662	2,187	5.9
1978Q3	3,692	2,248	5.9
1978Q4	3,723	2,317	5.9
1979Q1	3,760	2,386	5.9
1979Q2	3,792	2,458	5.9
1979Q3	3,822	2,533	5.9

1979Q4	3,850	2,603	5.9
1980Q1	3,875	2,681	5.9
1980Q2	3,898	2,761	5.9
1980Q3	3,919	2,840	5.9
1980Q4	3,938	2,929	6.0
1981Q1	3,954	3,025	6.0
1981Q2	3,972	3,092	6.0
1981Q3	3,990	3,179	6.0
1981Q4	4,009	3,264	6.0
1982Q1	4,027	3,316	6.0
1982Q2	4,049	3,378	5.9
1982Q3	4,074	3,434	5.9
1982Q4	4,102	3,486	5.9
1983Q1	4,136	3,559	5.9
1983Q2	4,163	3,606	5.9
1983Q3	4,186	3,662	5.9
1983Q4	4,206	3,719	5.9
1984Q1	4,217	3,782	5.9
1984Q2	4,238	3,839	5.9
1984Q3	4,260	3,904	5.8
1984Q4	4,286	3,954	5.8
1985Q1	4,316	4,028	5.8
1985Q2	4,347	4,085	5.8
1985Q3	4,381	4,145	5.8
1985Q4	4,415	4,218	5.8
1986Q1	4,455	4,278	5.8
1986Q2	4,487	4,327	5.8
1986Q3	4,514	4,389	5.7
1986Q4	4,539	4,446	5.7
1987Q1	4,554	4,502	5.7
1987Q2	4,576	4,555	5.7
1987Q3	4,599	4,613	5.7
1987Q4	4,623	4,680	5.7
1988Q1	4,649	4,746	5.7
1988Q2	4,679	4,830	5.7
1988Q3	4,711	4,923	5.7
1988Q4	4,745	5,008	5.6
1989Q1	4,786	5,116	5.6
1989Q2	4,821	5,210	5.6
1989Q3	4,854	5,296	5.6
1989Q4	4,886	5,377	5.6
1990Q1	4,913	5,479	5.6
1990Q2	4,942	5,569	5.6
1990Q3	4,970	5,656	5.6

1990Q4	4,998	5,748	5.6
1991Q1	5,025	5,850	5.6
1991Q2	5,052	5,929	5.6
1991Q3	5,080	6,003	5.5
1991Q4	5,107	6,074	5.5
1992Q1	5,136	6,166	5.5
1992Q2	5,162	6,240	5.5
1992Q3	5,186	6,287	5.5
1992Q4	5,208	6,366	5.5
1993Q1	5,227	6,446	5.5
1993Q2	5,250	6,511	5.5
1993Q3	5,274	6,566	5.5
1993Q4	5,299	6,640	5.5
1994Q1	5,326	6,726	5.5
1994Q2	5,354	6,809	5.5
1994Q3	5,384	6,893	5.5
1994Q4	5,415	6,977	5.5
1995Q1	5,447	7,068	5.5
1995Q2	5,479	7,156	5.5
1995Q3	5,512	7,244	5.4
1995Q4	5,546	7,335	5.4
1996Q1	5,580	7,432	5.4
1996Q2	5,614	7,523	5.4
1996Q3	5,648	7,615	5.4
1996Q4	5,683	7,710	5.4
1997Q1	5,717	7,809	5.4
1997Q2	5,752	7,903	5.4
1997Q3	5,787	7,999	5.4
1997Q4	5,822	8,096	5.4
1998Q1	5,857	8,199	5.4
1998Q2	5,891	8,297	5.4
1998Q3	5,926	8,396	5.4
1998Q4	5,961	8,496	5.4
1999Q1	5,996	8,602	5.4
1999Q2	6,031	8,703	5.4
1999Q3	6,066	8,805	5.4
1999Q4	6,100	8,909	5.4

Source: Concgressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1995 to 1999* , January 1994, www.cbo.gov/publication/15106.

Note: Real potential GDP is expressed in real 1987 dollars.

nd Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget*
www.cbo.gov/publication/49892

January 1995

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	1,311	263	5.3
1949Q2	1,328	263	5.3
1949Q3	1,339	265	5.3
1949Q4	1,354	268	5.3
1950Q1	1,372	272	5.3
1950Q2	1,391	277	5.3
1950Q3	1,411	288	5.3
1950Q4	1,432	296	5.4
1951Q1	1,454	311	5.4
1951Q2	1,475	313	5.4
1951Q3	1,495	317	5.4
1951Q4	1,515	323	5.4
1952Q1	1,534	327	5.4
1952Q2	1,553	331	5.4
1952Q3	1,572	339	5.5
1952Q4	1,591	348	5.5
1953Q1	1,610	352	5.5
1953Q2	1,627	357	5.5
1953Q3	1,642	362	5.4
1953Q4	1,654	363	5.4
1954Q1	1,665	367	5.5
1954Q2	1,675	370	5.5
1954Q3	1,685	373	5.5
1954Q4	1,695	379	5.5
1955Q1	1,705	384	5.4
1955Q2	1,714	391	5.5
1955Q3	1,722	396	5.5
1955Q4	1,729	400	5.5
1956Q1	1,736	406	5.5
1956Q2	1,744	410	5.5
1956Q3	1,756	417	5.5
1956Q4	1,770	423	5.5
1957Q1	1,786	433	5.5
1957Q2	1,803	439	5.5
1957Q3	1,820	446	5.5

1957Q4	1,837	451	5.5
1958Q1	1,854	457	5.5
1958Q2	1,871	462	5.5
1958Q3	1,886	470	5.5
1958Q4	1,900	477	5.5
1959Q1	1,913	486	5.5
1959Q2	1,926	493	5.5
1959Q3	1,939	499	5.5
1959Q4	1,954	504	5.5
1960Q1	1,968	512	5.6
1960Q2	1,984	516	5.6
1960Q3	2,001	523	5.6
1960Q4	2,019	526	5.6
1961Q1	2,038	531	5.6
1961Q2	2,057	539	5.6
1961Q3	2,076	547	5.6
1961Q4	2,094	554	5.6
1962Q1	2,113	564	5.6
1962Q2	2,131	571	5.6
1962Q3	2,149	578	5.6
1962Q4	2,166	586	5.6
1963Q1	2,183	591	5.6
1963Q2	2,201	597	5.6
1963Q3	2,220	605	5.6
1963Q4	2,240	614	5.6
1964Q1	2,260	621	5.6
1964Q2	2,281	630	5.7
1964Q3	2,302	639	5.7
1964Q4	2,322	648	5.7
1965Q1	2,343	661	5.7
1965Q2	2,365	670	5.7
1965Q3	2,390	681	5.8
1965Q4	2,417	694	5.8
1966Q1	2,445	709	5.8
1966Q2	2,473	725	5.8
1966Q3	2,500	738	5.8
1966Q4	2,524	754	5.8
1967Q1	2,548	765	5.8
1967Q2	2,572	775	5.8
1967Q3	2,596	789	5.8
1967Q4	2,621	806	5.8
1968Q1	2,645	826	5.8
1968Q2	2,669	843	5.8
1968Q3	2,693	861	5.9

1968Q4	2,717	880	5.9
1969Q1	2,740	897	5.9
1969Q2	2,764	917	5.9
1969Q3	2,789	938	5.9
1969Q4	2,814	958	5.9
1970Q1	2,839	980	5.9
1970Q2	2,865	1,006	5.9
1970Q3	2,890	1,021	6.0
1970Q4	2,915	1,041	6.0
1971Q1	2,939	1,070	6.0
1971Q2	2,963	1,095	6.0
1971Q3	2,985	1,117	6.0
1971Q4	3,006	1,133	6.0
1972Q1	3,026	1,157	6.1
1972Q2	3,046	1,176	6.1
1972Q3	3,067	1,195	6.1
1972Q4	3,089	1,222	6.1
1973Q1	3,111	1,247	6.2
1973Q2	3,135	1,280	6.2
1973Q3	3,161	1,316	6.2
1973Q4	3,190	1,359	6.2
1974Q1	3,219	1,394	6.2
1974Q2	3,249	1,436	6.2
1974Q3	3,278	1,492	6.2
1974Q4	3,306	1,542	6.2
1975Q1	3,333	1,599	6.2
1975Q2	3,359	1,634	6.2
1975Q3	3,384	1,681	6.2
1975Q4	3,408	1,722	6.2
1976Q1	3,431	1,756	6.2
1976Q2	3,454	1,790	6.2
1976Q3	3,477	1,830	6.3
1976Q4	3,499	1,874	6.3
1977Q1	3,521	1,912	6.3
1977Q2	3,544	1,963	6.3
1977Q3	3,566	2,011	6.3
1977Q4	3,589	2,059	6.3
1978Q1	3,612	2,102	6.3
1978Q2	3,638	2,172	6.3
1978Q3	3,666	2,233	6.3
1978Q4	3,699	2,302	6.3
1979Q1	3,732	2,368	6.3
1979Q2	3,764	2,440	6.3
1979Q3	3,794	2,514	6.3

1979Q4	3,821	2,583	6.3
1980Q1	3,845	2,660	6.3
1980Q2	3,868	2,740	6.3
1980Q3	3,888	2,817	6.3
1980Q4	3,906	2,905	6.3
1981Q1	3,923	3,001	6.2
1981Q2	3,939	3,067	6.2
1981Q3	3,957	3,154	6.2
1981Q4	3,976	3,237	6.2
1982Q1	3,996	3,290	6.2
1982Q2	4,018	3,352	6.2
1982Q3	4,043	3,408	6.2
1982Q4	4,073	3,461	6.2
1983Q1	4,102	3,529	6.1
1983Q2	4,131	3,579	6.1
1983Q3	4,154	3,635	6.1
1983Q4	4,173	3,690	6.1
1984Q1	4,191	3,758	6.1
1984Q2	4,209	3,813	6.1
1984Q3	4,232	3,878	6.1
1984Q4	4,259	3,929	6.1
1985Q1	4,288	4,002	6.1
1985Q2	4,320	4,059	6.1
1985Q3	4,353	4,119	6.1
1985Q4	4,389	4,194	6.1
1986Q1	4,425	4,249	6.1
1986Q2	4,459	4,300	6.1
1986Q3	4,487	4,362	6.1
1986Q4	4,510	4,418	6.0
1987Q1	4,531	4,478	6.0
1987Q2	4,551	4,530	6.0
1987Q3	4,574	4,589	6.0
1987Q4	4,599	4,656	6.0
1988Q1	4,626	4,723	6.0
1988Q2	4,656	4,807	6.0
1988Q3	4,688	4,899	6.0
1988Q4	4,724	4,986	6.0
1989Q1	4,762	5,090	6.0
1989Q2	4,798	5,186	6.0
1989Q3	4,832	5,272	6.0
1989Q4	4,864	5,353	5.9
1990Q1	4,894	5,457	5.9
1990Q2	4,923	5,547	5.9
1990Q3	4,951	5,634	5.9

1990Q4	4,977	5,724	5.9
1991Q1	5,003	5,825	5.8
1991Q2	5,029	5,895	5.8
1991Q3	5,055	5,967	5.8
1991Q4	5,082	6,035	5.8
1992Q1	5,109	6,125	5.8
1992Q2	5,135	6,198	5.8
1992Q3	5,161	6,250	5.8
1992Q4	5,187	6,323	5.8
1993Q1	5,212	6,404	5.8
1993Q2	5,238	6,464	5.8
1993Q3	5,264	6,514	5.8
1993Q4	5,290	6,568	5.8
1994Q1	5,318	6,645	5.8
1994Q2	5,346	6,731	5.8
1994Q3	5,378	6,803	5.8
1994Q4	5,409	6,883	5.8
1995Q1	5,441	6,973	5.8
1995Q2	5,472	7,060	5.7
1995Q3	5,504	7,149	5.7
1995Q4	5,536	7,240	5.7
1996Q1	5,568	7,335	5.7
1996Q2	5,601	7,428	5.7
1996Q3	5,633	7,522	5.7
1996Q4	5,666	7,617	5.7
1997Q1	5,699	7,718	5.7
1997Q2	5,732	7,815	5.7
1997Q3	5,766	7,914	5.7
1997Q4	5,799	8,014	5.7
1998Q1	5,833	8,120	5.7
1998Q2	5,867	8,223	5.7
1998Q3	5,901	8,327	5.7
1998Q4	5,936	8,432	5.7
1999Q1	5,970	8,544	5.7
1999Q2	6,005	8,652	5.7
1999Q3	6,040	8,761	5.7
1999Q4	6,075	8,872	5.7
2000Q1	6,111	8,990	5.7
2000Q2	6,146	9,104	5.7
2000Q3	6,182	9,219	5.7
2000Q4	6,218	9,335	5.7

Source: Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1996 to 2000* , January 1995, www.cbo.gov/publication/15689.

Note: Real potential GDP is expressed in real 1987 dollars.

and Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget and E*
www.cbo.gov/publication/49892

January 1996

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	n.a.	n.a.	5.3
1949Q2	n.a.	n.a.	5.3
1949Q3	n.a.	n.a.	5.3
1949Q4	n.a.	n.a.	5.3
1950Q1	n.a.	n.a.	5.3
1950Q2	n.a.	n.a.	5.3
1950Q3	n.a.	n.a.	5.3
1950Q4	n.a.	n.a.	5.4
1951Q1	n.a.	n.a.	5.4
1951Q2	n.a.	n.a.	5.4
1951Q3	n.a.	n.a.	5.4
1951Q4	n.a.	n.a.	5.4
1952Q1	n.a.	n.a.	5.4
1952Q2	n.a.	n.a.	5.4
1952Q3	n.a.	n.a.	5.5
1952Q4	n.a.	n.a.	5.5
1953Q1	n.a.	n.a.	5.5
1953Q2	n.a.	n.a.	5.5
1953Q3	n.a.	n.a.	5.4
1953Q4	n.a.	n.a.	5.4
1954Q1	n.a.	n.a.	5.5
1954Q2	n.a.	n.a.	5.5
1954Q3	n.a.	n.a.	5.5
1954Q4	n.a.	n.a.	5.5
1955Q1	n.a.	n.a.	5.4
1955Q2	n.a.	n.a.	5.5
1955Q3	n.a.	n.a.	5.5
1955Q4	n.a.	n.a.	5.5
1956Q1	n.a.	n.a.	5.5
1956Q2	n.a.	n.a.	5.5
1956Q3	n.a.	n.a.	5.5
1956Q4	n.a.	n.a.	5.5
1957Q1	n.a.	n.a.	5.5
1957Q2	n.a.	n.a.	5.5
1957Q3	n.a.	n.a.	5.5

1957Q4	n.a.	n.a.	5.5
1958Q1	n.a.	n.a.	5.5
1958Q2	n.a.	n.a.	5.5
1958Q3	n.a.	n.a.	5.5
1958Q4	n.a.	n.a.	5.5
1959Q1	n.a.	n.a.	5.5
1959Q2	n.a.	n.a.	5.5
1959Q3	n.a.	n.a.	5.5
1959Q4	n.a.	n.a.	5.5
1960Q1	2,246	521	5.6
1960Q2	2,271	529	5.6
1960Q3	2,293	537	5.6
1960Q4	2,316	544	5.6
1961Q1	2,338	552	5.6
1961Q2	2,359	557	5.6
1961Q3	2,381	562	5.6
1961Q4	2,402	569	5.6
1962Q1	2,425	577	5.6
1962Q2	2,447	585	5.6
1962Q3	2,471	591	5.6
1962Q4	2,495	601	5.6
1963Q1	2,519	607	5.6
1963Q2	2,544	616	5.6
1963Q3	2,569	622	5.6
1963Q4	2,595	631	5.6
1964Q1	2,620	639	5.6
1964Q2	2,646	648	5.7
1964Q3	2,673	658	5.7
1964Q4	2,700	667	5.7
1965Q1	2,728	676	5.7
1965Q2	2,756	689	5.7
1965Q3	2,785	699	5.8
1965Q4	2,815	709	5.8
1966Q1	2,845	723	5.8
1966Q2	2,877	736	5.8
1966Q3	2,909	753	5.8
1966Q4	2,942	768	5.8
1967Q1	2,975	780	5.8
1967Q2	3,009	794	5.8
1967Q3	3,042	812	5.8
1967Q4	3,076	830	5.8
1968Q1	3,109	849	5.8
1968Q2	3,143	867	5.8
1968Q3	3,177	883	5.9

1968Q4	3,212	906	5.9
1969Q1	3,247	925	5.9
1969Q2	3,280	945	5.9
1969Q3	3,312	967	5.9
1969Q4	3,343	990	5.9
1970Q1	3,372	1,012	5.9
1970Q2	3,401	1,034	5.9
1970Q3	3,428	1,053	6.0
1970Q4	3,456	1,075	6.0
1971Q1	3,484	1,101	6.0
1971Q2	3,511	1,124	6.0
1971Q3	3,539	1,143	6.0
1971Q4	3,567	1,163	6.0
1972Q1	3,596	1,190	6.1
1972Q2	3,624	1,207	6.1
1972Q3	3,653	1,228	6.1
1972Q4	3,683	1,252	6.1
1973Q1	3,713	1,281	6.2
1973Q2	3,745	1,311	6.2
1973Q3	3,778	1,349	6.2
1973Q4	3,813	1,384	6.2
1974Q1	3,849	1,424	6.2
1974Q2	3,886	1,473	6.2
1974Q3	3,922	1,529	6.2
1974Q4	3,956	1,590	6.2
1975Q1	3,990	1,640	6.2
1975Q2	4,023	1,678	6.2
1975Q3	4,055	1,723	6.2
1975Q4	4,086	1,769	6.2
1976Q1	4,116	1,803	6.2
1976Q2	4,146	1,833	6.2
1976Q3	4,177	1,875	6.3
1976Q4	4,208	1,919	6.3
1977Q1	4,240	1,967	6.3
1977Q2	4,273	2,013	6.3
1977Q3	4,307	2,059	6.3
1977Q4	4,344	2,111	6.3
1978Q1	4,381	2,164	6.3
1978Q2	4,420	2,232	6.3
1978Q3	4,461	2,293	6.3
1978Q4	4,502	2,359	6.3
1979Q1	4,543	2,431	6.3
1979Q2	4,584	2,507	6.3
1979Q3	4,623	2,585	6.3

1979Q4	4,661	2,657	6.3
1980Q1	4,695	2,737	6.3
1980Q2	4,727	2,817	6.3
1980Q3	4,755	2,900	6.3
1980Q4	4,780	2,993	6.3
1981Q1	4,805	3,085	6.2
1981Q2	4,830	3,159	6.2
1981Q3	4,856	3,239	6.2
1981Q4	4,886	3,317	6.2
1982Q1	4,916	3,387	6.2
1982Q2	4,946	3,447	6.2
1982Q3	4,975	3,518	6.2
1982Q4	5,003	3,577	6.2
1983Q1	5,030	3,626	6.1
1983Q2	5,056	3,686	6.1
1983Q3	5,083	3,736	6.1
1983Q4	5,112	3,793	6.1
1984Q1	5,143	3,857	6.1
1984Q2	5,176	3,913	6.1
1984Q3	5,213	3,977	6.1
1984Q4	5,253	4,034	6.1
1985Q1	5,295	4,114	6.1
1985Q2	5,338	4,180	6.1
1985Q3	5,381	4,241	6.1
1985Q4	5,424	4,312	6.1
1986Q1	5,467	4,362	6.1
1986Q2	5,509	4,423	6.1
1986Q3	5,550	4,485	6.1
1986Q4	5,591	4,557	6.0
1987Q1	5,632	4,624	6.0
1987Q2	5,673	4,692	6.0
1987Q3	5,714	4,765	6.0
1987Q4	5,754	4,839	6.0
1988Q1	5,795	4,908	6.0
1988Q2	5,836	4,996	6.0
1988Q3	5,877	5,095	6.0
1988Q4	5,919	5,179	6.0
1989Q1	5,961	5,269	6.0
1989Q2	6,003	5,366	6.0
1989Q3	6,045	5,446	6.0
1989Q4	6,086	5,532	5.9
1990Q1	6,126	5,636	5.9
1990Q2	6,164	5,745	5.9
1990Q3	6,199	5,840	5.9

1990Q4	6,232	5,926	5.9
1991Q1	6,262	6,030	5.8
1991Q2	6,290	6,102	5.8
1991Q3	6,318	6,173	5.8
1991Q4	6,345	6,237	5.8
1992Q1	6,371	6,314	5.8
1992Q2	6,396	6,383	5.8
1992Q3	6,419	6,432	5.8
1992Q4	6,441	6,499	5.8
1993Q1	6,464	6,580	5.8
1993Q2	6,487	6,643	5.8
1993Q3	6,513	6,695	5.8
1993Q4	6,541	6,763	5.8
1994Q1	6,571	6,840	5.9
1994Q2	6,602	6,906	5.9
1994Q3	6,634	6,979	5.9
1994Q4	6,666	7,053	5.9
1995Q1	6,699	7,148	5.9
1995Q2	6,732	7,223	5.8
1995Q3	6,765	7,306	5.8
1995Q4	6,798	7,381	5.8
1996Q1	6,833	7,469	5.8
1996Q2	6,867	7,557	5.8
1996Q3	6,902	7,647	5.8
1996Q4	6,936	7,738	5.8
1997Q1	6,972	7,834	5.8
1997Q2	7,009	7,928	5.8
1997Q3	7,046	8,022	5.8
1997Q4	7,083	8,117	5.8
1998Q1	7,121	8,218	5.8
1998Q2	7,158	8,315	5.8
1998Q3	7,196	8,414	5.8
1998Q4	7,234	8,514	5.8
1999Q1	7,272	8,619	5.8
1999Q2	7,311	8,722	5.8
1999Q3	7,349	8,825	5.8
1999Q4	7,388	8,930	5.8
2000Q1	7,427	9,041	5.8
2000Q2	7,466	9,148	5.8
2000Q3	7,506	9,257	5.8
2000Q4	7,546	9,367	5.8
2001Q1	7,585	9,482	5.8
2001Q2	7,626	9,595	5.8
2001Q3	7,666	9,709	5.8

2001Q4	7,706	9,825	5.8
2002Q1	7,747	9,946	5.8
2002Q2	7,788	10,064	5.8
2002Q3	7,829	10,183	5.8
2002Q4	7,870	10,304	5.8
2003Q1	7,912	10,431	5.8
2003Q2	7,954	10,555	5.8
2003Q3	7,996	10,681	5.8
2003Q4	8,038	10,808	5.8
2004Q1	8,081	10,941	5.8
2004Q2	8,123	11,071	5.8
2004Q3	8,166	11,202	5.8
2004Q4	8,209	11,336	5.8
2005Q1	8,253	11,475	5.8
2005Q2	8,296	11,611	5.8
2005Q3	8,340	11,749	5.8
2005Q4	8,384	11,889	5.8
2006Q1	8,428	12,035	5.8
2006Q2	8,473	12,178	5.8
2006Q3	8,518	12,323	5.8
2006Q4	8,563	12,469	5.8

Source: Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1997 to 2006* , May 1996, www.cbo.gov/publication/14949.

Notes: Real potential GDP is expressed in real 1992 dollars.

n.a. = not available.

conomic Outlook: 2015 to 2025.

This file presents data that supplements information in CBO's January 2015 report *The Budget a*
www.cbo.gov/publication/49892

January 1997

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	n.a.	n.a.	5.3
1949Q2	n.a.	n.a.	5.3
1949Q3	n.a.	n.a.	5.3
1949Q4	n.a.	n.a.	5.3
1950Q1	n.a.	n.a.	5.3
1950Q2	n.a.	n.a.	5.3
1950Q3	n.a.	n.a.	5.3
1950Q4	n.a.	n.a.	5.3
1951Q1	n.a.	n.a.	5.4
1951Q2	n.a.	n.a.	5.4
1951Q3	n.a.	n.a.	5.4
1951Q4	n.a.	n.a.	5.4
1952Q1	n.a.	n.a.	5.4
1952Q2	n.a.	n.a.	5.4
1952Q3	n.a.	n.a.	5.4
1952Q4	n.a.	n.a.	5.4
1953Q1	n.a.	n.a.	5.4
1953Q2	n.a.	n.a.	5.4
1953Q3	n.a.	n.a.	5.4
1953Q4	n.a.	n.a.	5.4
1954Q1	n.a.	n.a.	5.4
1954Q2	n.a.	n.a.	5.4
1954Q3	n.a.	n.a.	5.4
1954Q4	n.a.	n.a.	5.4
1955Q1	n.a.	n.a.	5.4
1955Q2	n.a.	n.a.	5.4
1955Q3	n.a.	n.a.	5.4
1955Q4	n.a.	n.a.	5.5
1956Q1	n.a.	n.a.	5.5
1956Q2	n.a.	n.a.	5.5
1956Q3	n.a.	n.a.	5.5
1956Q4	n.a.	n.a.	5.5
1957Q1	n.a.	n.a.	5.5
1957Q2	n.a.	n.a.	5.5
1957Q3	n.a.	n.a.	5.5

1957Q4	n.a.	n.a.	5.5
1958Q1	n.a.	n.a.	5.5
1958Q2	n.a.	n.a.	5.5
1958Q3	n.a.	n.a.	5.5
1958Q4	n.a.	n.a.	5.5
1959Q1	n.a.	n.a.	5.5
1959Q2	n.a.	n.a.	5.5
1959Q3	n.a.	n.a.	5.5
1959Q4	n.a.	n.a.	5.5
1960Q1	2,243	518	5.5
1960Q2	2,268	526	5.6
1960Q3	2,291	535	5.6
1960Q4	2,314	544	5.6
1961Q1	2,337	550	5.6
1961Q2	2,360	556	5.6
1961Q3	2,383	562	5.6
1961Q4	2,406	569	5.6
1962Q1	2,429	577	5.6
1962Q2	2,452	586	5.6
1962Q3	2,476	592	5.6
1962Q4	2,500	600	5.6
1963Q1	2,524	607	5.6
1963Q2	2,548	615	5.6
1963Q3	2,573	622	5.6
1963Q4	2,597	632	5.6
1964Q1	2,622	640	5.6
1964Q2	2,647	647	5.6
1964Q3	2,672	657	5.7
1964Q4	2,699	667	5.7
1965Q1	2,726	677	5.7
1965Q2	2,754	686	5.7
1965Q3	2,783	698	5.7
1965Q4	2,813	709	5.8
1966Q1	2,845	722	5.8
1966Q2	2,877	737	5.8
1966Q3	2,911	753	5.8
1966Q4	2,946	769	5.8
1967Q1	2,981	781	5.8
1967Q2	3,016	795	5.8
1967Q3	3,049	813	5.8
1967Q4	3,082	832	5.8
1968Q1	3,115	849	5.8
1968Q2	3,147	866	5.8
1968Q3	3,180	883	5.8

1968Q4	3,214	906	5.9
1969Q1	3,247	923	5.9
1969Q2	3,280	944	5.9
1969Q3	3,313	967	5.9
1969Q4	3,344	990	5.9
1970Q1	3,374	1,013	5.9
1970Q2	3,404	1,036	5.9
1970Q3	3,432	1,053	5.9
1970Q4	3,461	1,078	6.0
1971Q1	3,489	1,102	6.0
1971Q2	3,517	1,125	6.0
1971Q3	3,544	1,147	6.0
1971Q4	3,573	1,167	6.0
1972Q1	3,601	1,192	6.0
1972Q2	3,629	1,208	6.1
1972Q3	3,658	1,229	6.1
1972Q4	3,686	1,257	6.1
1973Q1	3,716	1,282	6.1
1973Q2	3,747	1,313	6.2
1973Q3	3,781	1,350	6.2
1973Q4	3,816	1,391	6.2
1974Q1	3,852	1,428	6.2
1974Q2	3,888	1,468	6.2
1974Q3	3,924	1,529	6.2
1974Q4	3,959	1,593	6.2
1975Q1	3,993	1,641	6.2
1975Q2	4,025	1,680	6.2
1975Q3	4,055	1,725	6.2
1975Q4	4,085	1,770	6.2
1976Q1	4,114	1,800	6.2
1976Q2	4,143	1,830	6.2
1976Q3	4,172	1,868	6.2
1976Q4	4,204	1,915	6.2
1977Q1	4,236	1,959	6.2
1977Q2	4,270	2,006	6.3
1977Q3	4,305	2,053	6.3
1977Q4	4,342	2,107	6.3
1978Q1	4,380	2,164	6.3
1978Q2	4,420	2,234	6.3
1978Q3	4,462	2,295	6.3
1978Q4	4,505	2,366	6.3
1979Q1	4,549	2,439	6.3
1979Q2	4,591	2,513	6.3
1979Q3	4,631	2,588	6.3

1979Q4	4,668	2,660	6.3
1980Q1	4,703	2,739	6.3
1980Q2	4,734	2,821	6.3
1980Q3	4,761	2,906	6.2
1980Q4	4,786	2,996	6.2
1981Q1	4,810	3,087	6.2
1981Q2	4,835	3,160	6.2
1981Q3	4,862	3,232	6.2
1981Q4	4,891	3,315	6.2
1982Q1	4,922	3,388	6.2
1982Q2	4,953	3,455	6.2
1982Q3	4,982	3,517	6.1
1982Q4	5,009	3,571	6.1
1983Q1	5,036	3,623	6.1
1983Q2	5,063	3,681	6.1
1983Q3	5,090	3,736	6.1
1983Q4	5,119	3,795	6.1
1984Q1	5,150	3,865	6.1
1984Q2	5,183	3,920	6.1
1984Q3	5,220	3,983	6.1
1984Q4	5,259	4,037	6.1
1985Q1	5,299	4,110	6.1
1985Q2	5,341	4,175	6.1
1985Q3	5,383	4,234	6.1
1985Q4	5,424	4,305	6.1
1986Q1	5,464	4,357	6.0
1986Q2	5,504	4,415	6.0
1986Q3	5,544	4,480	6.0
1986Q4	5,584	4,548	6.0
1987Q1	5,624	4,617	6.0
1987Q2	5,664	4,684	6.0
1987Q3	5,704	4,754	6.0
1987Q4	5,743	4,831	6.0
1988Q1	5,783	4,899	6.0
1988Q2	5,823	4,984	6.0
1988Q3	5,863	5,083	6.0
1988Q4	5,903	5,163	6.0
1989Q1	5,943	5,259	6.0
1989Q2	5,983	5,350	6.0
1989Q3	6,022	5,429	5.9
1989Q4	6,061	5,509	5.9
1990Q1	6,099	5,610	6.0
1990Q2	6,135	5,714	6.0
1990Q3	6,168	5,804	5.9

1990Q4	6,199	5,894	5.9
1991Q1	6,229	5,996	5.9
1991Q2	6,257	6,070	5.9
1991Q3	6,285	6,141	5.9
1991Q4	6,312	6,207	5.9
1992Q1	6,339	6,284	5.9
1992Q2	6,365	6,352	5.9
1992Q3	6,390	6,401	5.9
1992Q4	6,413	6,470	5.9
1993Q1	6,437	6,555	5.9
1993Q2	6,462	6,614	5.9
1993Q3	6,489	6,672	5.9
1993Q4	6,518	6,739	5.9
1994Q1	6,549	6,819	5.9
1994Q2	6,582	6,885	5.9
1994Q3	6,615	6,962	5.9
1994Q4	6,649	7,035	5.9
1995Q1	6,683	7,131	5.8
1995Q2	6,719	7,211	5.8
1995Q3	6,755	7,287	5.8
1995Q4	6,793	7,364	5.8
1996Q1	6,831	7,445	5.8
1996Q2	6,870	7,520	5.8
1996Q3	6,910	7,594	5.8
1996Q4	6,950	7,681	5.8
1997Q1	6,991	7,773	5.8
1997Q2	7,032	7,863	5.8
1997Q3	7,074	7,957	5.8
1997Q4	7,116	8,052	5.8
1998Q1	7,157	8,150	5.8
1998Q2	7,198	8,248	5.8
1998Q3	7,239	8,348	5.8
1998Q4	7,279	8,448	5.8
1999Q1	7,319	8,551	5.8
1999Q2	7,359	8,653	5.8
1999Q3	7,398	8,755	5.8
1999Q4	7,438	8,859	5.8
2000Q1	7,477	8,965	5.8
2000Q2	7,517	9,070	5.8
2000Q3	7,556	9,177	5.8
2000Q4	7,596	9,284	5.8
2001Q1	7,636	9,395	5.8
2001Q2	7,676	9,505	5.8
2001Q3	7,716	9,615	5.8

2001Q4	7,755	9,727	5.8
2002Q1	7,795	9,842	5.8
2002Q2	7,835	9,956	5.8
2002Q3	7,876	10,072	5.8
2002Q4	7,916	10,188	5.8
2003Q1	7,955	10,306	5.8
2003Q2	7,994	10,424	5.8
2003Q3	8,034	10,543	5.8
2003Q4	8,073	10,663	5.8
2004Q1	8,113	10,786	5.8
2004Q2	8,153	10,908	5.8
2004Q3	8,192	11,032	5.8
2004Q4	8,232	11,157	5.8
2005Q1	8,272	11,285	5.8
2005Q2	8,312	11,412	5.8
2005Q3	8,352	11,541	5.8
2005Q4	8,392	11,671	5.8
2006Q1	8,433	11,804	5.8
2006Q2	8,473	11,937	5.8
2006Q3	8,514	12,071	5.8
2006Q4	8,555	12,207	5.8
2007Q1	8,595	12,346	5.8
2007Q2	8,637	12,485	5.8
2007Q3	8,678	12,625	5.8
2007Q4	8,719	12,767	5.8

Source: Con gressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1998 to 2007* , January 1997, www.cbo.gov/publication/10330.

Notes: Real potential GDP is expressed in chained 1992 dollars.

n.a. = not available.

ınd Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budge*
www.cbo.gov/publication/49892

January 1998

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	1,503	275	5.3
1949Q2	1,519	275	5.3
1949Q3	1,535	276	5.3
1949Q4	1,552	280	5.3
1950Q1	1,570	282	5.3
1950Q2	1,587	286	5.3
1950Q3	1,605	296	5.3
1950Q4	1,624	304	5.3
1951Q1	1,643	320	5.4
1951Q2	1,662	325	5.4
1951Q3	1,682	329	5.4
1951Q4	1,701	337	5.4
1952Q1	1,721	340	5.4
1952Q2	1,740	345	5.4
1952Q3	1,759	352	5.4
1952Q4	1,777	358	5.4
1953Q1	1,795	361	5.4
1953Q2	1,812	365	5.4
1953Q3	1,829	370	5.4
1953Q4	1,845	374	5.4
1954Q1	1,860	378	5.4
1954Q2	1,875	382	5.4
1954Q3	1,889	386	5.4
1954Q4	1,903	390	5.4
1955Q1	1,917	394	5.4
1955Q2	1,932	398	5.4
1955Q3	1,946	404	5.4
1955Q4	1,960	412	5.5
1956Q1	1,975	419	5.5
1956Q2	1,990	425	5.5
1956Q3	2,006	434	5.5
1956Q4	2,022	439	5.5
1957Q1	2,039	449	5.5
1957Q2	2,056	456	5.5
1957Q3	2,073	462	5.5

1957Q4	2,091	466	5.5
1958Q1	2,109	476	5.5
1958Q2	2,127	481	5.5
1958Q3	2,145	488	5.5
1958Q4	2,164	495	5.5
1959Q1	2,184	501	5.5
1959Q2	2,203	505	5.5
1959Q3	2,224	510	5.5
1959Q4	2,244	517	5.5
1960Q1	2,264	524	5.5
1960Q2	2,285	531	5.6
1960Q3	2,307	538	5.6
1960Q4	2,329	545	5.6
1961Q1	2,351	552	5.6
1961Q2	2,374	558	5.6
1961Q3	2,398	565	5.6
1961Q4	2,421	572	5.6
1962Q1	2,445	581	5.6
1962Q2	2,469	588	5.6
1962Q3	2,494	595	5.6
1962Q4	2,518	603	5.6
1963Q1	2,543	610	5.6
1963Q2	2,568	618	5.6
1963Q3	2,593	625	5.6
1963Q4	2,619	636	5.6
1964Q1	2,645	644	5.6
1964Q2	2,671	652	5.6
1964Q3	2,698	662	5.7
1964Q4	2,725	672	5.7
1965Q1	2,753	682	5.7
1965Q2	2,782	692	5.7
1965Q3	2,811	703	5.7
1965Q4	2,841	715	5.8
1966Q1	2,872	727	5.8
1966Q2	2,903	741	5.8
1966Q3	2,934	757	5.8
1966Q4	2,966	772	5.8
1967Q1	2,998	784	5.8
1967Q2	3,030	797	5.8
1967Q3	3,063	815	5.8
1967Q4	3,096	833	5.8
1968Q1	3,128	851	5.8
1968Q2	3,161	869	5.8
1968Q3	3,193	886	5.8

1968Q4	3,225	907	5.9
1969Q1	3,257	925	5.9
1969Q2	3,289	945	5.9
1969Q3	3,320	967	5.9
1969Q4	3,351	989	5.9
1970Q1	3,382	1,012	5.9
1970Q2	3,412	1,036	5.9
1970Q3	3,442	1,054	5.9
1970Q4	3,472	1,077	6.0
1971Q1	3,502	1,103	6.0
1971Q2	3,532	1,128	6.0
1971Q3	3,561	1,149	6.0
1971Q4	3,591	1,168	6.0
1972Q1	3,621	1,196	6.0
1972Q2	3,651	1,212	6.1
1972Q3	3,682	1,233	6.1
1972Q4	3,713	1,261	6.1
1973Q1	3,745	1,287	6.1
1973Q2	3,778	1,320	6.2
1973Q3	3,810	1,357	6.2
1973Q4	3,843	1,394	6.2
1974Q1	3,875	1,434	6.2
1974Q2	3,908	1,477	6.2
1974Q3	3,940	1,535	6.2
1974Q4	3,973	1,594	6.2
1975Q1	4,005	1,644	6.2
1975Q2	4,036	1,682	6.2
1975Q3	4,068	1,725	6.2
1975Q4	4,100	1,771	6.2
1976Q1	4,131	1,805	6.2
1976Q2	4,163	1,838	6.2
1976Q3	4,194	1,878	6.2
1976Q4	4,227	1,926	6.2
1977Q1	4,260	1,973	6.2
1977Q2	4,294	2,021	6.3
1977Q3	4,329	2,063	6.3
1977Q4	4,365	2,123	6.3
1978Q1	4,402	2,176	6.3
1978Q2	4,440	2,238	6.3
1978Q3	4,478	2,296	6.3
1978Q4	4,516	2,364	6.3
1979Q1	4,554	2,437	6.3
1979Q2	4,591	2,509	6.3
1979Q3	4,627	2,583	6.3

1979Q4	4,662	2,654	6.3
1980Q1	4,697	2,733	6.3
1980Q2	4,731	2,817	6.3
1980Q3	4,764	2,906	6.2
1980Q4	4,795	3,002	6.2
1981Q1	4,826	3,096	6.2
1981Q2	4,856	3,174	6.2
1981Q3	4,884	3,255	6.2
1981Q4	4,912	3,334	6.2
1982Q1	4,939	3,401	6.2
1982Q2	4,966	3,463	6.2
1982Q3	4,994	3,529	6.1
1982Q4	5,021	3,587	6.1
1983Q1	5,050	3,640	6.1
1983Q2	5,079	3,699	6.1
1983Q3	5,110	3,755	6.1
1983Q4	5,140	3,814	6.1
1984Q1	5,172	3,880	6.1
1984Q2	5,204	3,934	6.1
1984Q3	5,238	3,994	6.1
1984Q4	5,272	4,050	6.1
1985Q1	5,308	4,121	6.1
1985Q2	5,345	4,183	6.1
1985Q3	5,382	4,239	6.1
1985Q4	5,420	4,306	6.1
1986Q1	5,459	4,357	6.0
1986Q2	5,498	4,410	6.0
1986Q3	5,537	4,476	6.0
1986Q4	5,576	4,542	6.0
1987Q1	5,615	4,609	6.0
1987Q2	5,653	4,674	6.0
1987Q3	5,692	4,743	6.0
1987Q4	5,731	4,819	6.0
1988Q1	5,770	4,885	6.0
1988Q2	5,809	4,970	6.0
1988Q3	5,847	5,067	6.0
1988Q4	5,886	5,147	6.0
1989Q1	5,924	5,240	6.0
1989Q2	5,962	5,329	6.0
1989Q3	5,999	5,406	5.9
1989Q4	6,035	5,485	5.9
1990Q1	6,071	5,585	6.0
1990Q2	6,106	5,689	6.0
1990Q3	6,140	5,780	5.9

1990Q4	6,174	5,872	5.9
1991Q1	6,206	5,975	5.9
1991Q2	6,238	6,051	5.9
1991Q3	6,268	6,124	5.9
1991Q4	6,298	6,191	5.9
1992Q1	6,327	6,271	5.9
1992Q2	6,355	6,342	5.9
1992Q3	6,385	6,396	5.9
1992Q4	6,414	6,471	5.9
1993Q1	6,444	6,563	5.9
1993Q2	6,475	6,627	5.9
1993Q3	6,506	6,690	5.9
1993Q4	6,537	6,766	5.9
1994Q1	6,568	6,840	5.9
1994Q2	6,601	6,912	5.9
1994Q3	6,634	6,991	5.9
1994Q4	6,669	7,075	5.9
1995Q1	6,705	7,170	5.8
1995Q2	6,742	7,245	5.8
1995Q3	6,779	7,323	5.8
1995Q4	6,817	7,404	5.8
1996Q1	6,855	7,498	5.8
1996Q2	6,893	7,572	5.8
1996Q3	6,933	7,664	5.8
1996Q4	6,973	7,744	5.8
1997Q1	7,014	7,835	5.8
1997Q2	7,055	7,917	5.8
1997Q3	7,097	7,993	5.8
1997Q4	7,140	8,079	5.8
1998Q1	7,183	8,170	5.8
1998Q2	7,227	8,260	5.8
1998Q3	7,271	8,354	5.8
1998Q4	7,315	8,452	5.8
1999Q1	7,360	8,553	5.8
1999Q2	7,407	8,649	5.8
1999Q3	7,454	8,751	5.8
1999Q4	7,501	8,855	5.8
2000Q1	7,548	8,965	5.8
2000Q2	7,595	9,073	5.8
2000Q3	7,643	9,183	5.8
2000Q4	7,690	9,295	5.8
2001Q1	7,738	9,413	5.8
2001Q2	7,785	9,527	5.8
2001Q3	7,833	9,642	5.8

2001Q4	7,881	9,759	5.8
2002Q1	7,928	9,880	5.8
2002Q2	7,976	9,998	5.8
2002Q3	8,023	10,117	5.8
2002Q4	8,071	10,237	5.8
2003Q1	8,118	10,364	5.8
2003Q2	8,166	10,487	5.8
2003Q3	8,213	10,611	5.8
2003Q4	8,260	10,738	5.8
2004Q1	8,308	10,868	5.8
2004Q2	8,355	10,994	5.8
2004Q3	8,402	11,123	5.8
2004Q4	8,449	11,252	5.8
2005Q1	8,496	11,388	5.8
2005Q2	8,543	11,520	5.8
2005Q3	8,591	11,653	5.8
2005Q4	8,638	11,788	5.8
2006Q1	8,685	11,928	5.8
2006Q2	8,732	12,066	5.8
2006Q3	8,779	12,205	5.8
2006Q4	8,826	12,345	5.8
2007Q1	8,873	12,492	5.8
2007Q2	8,920	12,635	5.8
2007Q3	8,968	12,780	5.8
2007Q4	9,015	12,927	5.8
2008Q1	9,062	13,080	5.8
2008Q2	9,110	13,229	5.8
2008Q3	9,158	13,381	5.8
2008Q4	9,205	13,535	5.8

Source: Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1999 to 2008* , January 1998, www.cbo.gov/publication/10607.

Note: Real potential GDP is expressed in chained 1992 dollars.

t and Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget*
www.cbo.gov/publication/49892

January 1999

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	1,505	275	5.3
1949Q2	1,521	275	5.3
1949Q3	1,538	277	5.3
1949Q4	1,555	280	5.3
1950Q1	1,573	282	5.3
1950Q2	1,591	286	5.3
1950Q3	1,609	296	5.3
1950Q4	1,628	305	5.3
1951Q1	1,648	321	5.3
1951Q2	1,668	326	5.3
1951Q3	1,687	330	5.3
1951Q4	1,707	338	5.3
1952Q1	1,727	341	5.4
1952Q2	1,747	346	5.4
1952Q3	1,766	354	5.4
1952Q4	1,785	359	5.4
1953Q1	1,803	362	5.4
1953Q2	1,820	366	5.4
1953Q3	1,836	371	5.4
1953Q4	1,852	375	5.4
1954Q1	1,867	380	5.4
1954Q2	1,882	384	5.4
1954Q3	1,896	387	5.4
1954Q4	1,910	391	5.4
1955Q1	1,924	396	5.4
1955Q2	1,938	400	5.4
1955Q3	1,952	406	5.4
1955Q4	1,966	413	5.4
1956Q1	1,980	420	5.4
1956Q2	1,995	426	5.4
1956Q3	2,011	435	5.4
1956Q4	2,027	440	5.4
1957Q1	2,043	450	5.4
1957Q2	2,060	456	5.4
1957Q3	2,077	463	5.4

1957Q4	2,094	467	5.4
1958Q1	2,111	476	5.4
1958Q2	2,128	482	5.4
1958Q3	2,146	489	5.4
1958Q4	2,165	495	5.4
1959Q1	2,184	501	5.4
1959Q2	2,203	505	5.4
1959Q3	2,223	510	5.4
1959Q4	2,243	517	5.5
1960Q1	2,264	524	5.5
1960Q2	2,285	531	5.5
1960Q3	2,306	538	5.5
1960Q4	2,328	545	5.5
1961Q1	2,351	551	5.5
1961Q2	2,374	558	5.5
1961Q3	2,397	565	5.5
1961Q4	2,421	572	5.5
1962Q1	2,445	581	5.5
1962Q2	2,470	588	5.5
1962Q3	2,494	595	5.5
1962Q4	2,519	603	5.5
1963Q1	2,544	611	5.5
1963Q2	2,570	619	5.5
1963Q3	2,595	626	5.6
1963Q4	2,622	637	5.6
1964Q1	2,648	645	5.6
1964Q2	2,675	653	5.6
1964Q3	2,703	663	5.6
1964Q4	2,731	673	5.6
1965Q1	2,760	683	5.6
1965Q2	2,789	694	5.7
1965Q3	2,819	705	5.7
1965Q4	2,849	717	5.7
1966Q1	2,880	729	5.7
1966Q2	2,912	743	5.8
1966Q3	2,944	759	5.8
1966Q4	2,976	774	5.8
1967Q1	3,008	786	5.8
1967Q2	3,041	800	5.8
1967Q3	3,074	818	5.8
1967Q4	3,107	836	5.8
1968Q1	3,140	854	5.8
1968Q2	3,173	872	5.8
1968Q3	3,206	890	5.8

1968Q4	3,239	911	5.8
1969Q1	3,271	928	5.8
1969Q2	3,303	949	5.8
1969Q3	3,334	971	5.9
1969Q4	3,365	993	5.9
1970Q1	3,395	1,016	5.9
1970Q2	3,425	1,040	5.9
1970Q3	3,454	1,057	5.9
1970Q4	3,484	1,080	5.9
1971Q1	3,512	1,107	5.9
1971Q2	3,541	1,130	5.9
1971Q3	3,569	1,152	6.0
1971Q4	3,598	1,171	6.0
1972Q1	3,626	1,197	6.0
1972Q2	3,655	1,214	6.0
1972Q3	3,685	1,234	6.1
1972Q4	3,715	1,261	6.1
1973Q1	3,746	1,287	6.1
1973Q2	3,777	1,320	6.1
1973Q3	3,809	1,356	6.1
1973Q4	3,841	1,394	6.2
1974Q1	3,874	1,434	6.2
1974Q2	3,906	1,476	6.2
1974Q3	3,938	1,534	6.2
1974Q4	3,971	1,594	6.2
1975Q1	4,003	1,643	6.2
1975Q2	4,035	1,681	6.2
1975Q3	4,067	1,725	6.2
1975Q4	4,099	1,771	6.2
1976Q1	4,131	1,805	6.2
1976Q2	4,163	1,838	6.2
1976Q3	4,195	1,878	6.2
1976Q4	4,228	1,926	6.2
1977Q1	4,261	1,974	6.2
1977Q2	4,295	2,021	6.2
1977Q3	4,330	2,064	6.2
1977Q4	4,367	2,123	6.3
1978Q1	4,404	2,177	6.3
1978Q2	4,442	2,239	6.3
1978Q3	4,479	2,296	6.3
1978Q4	4,516	2,364	6.3
1979Q1	4,552	2,436	6.3
1979Q2	4,588	2,507	6.3
1979Q3	4,621	2,580	6.3

1979Q4	4,654	2,649	6.2
1980Q1	4,686	2,726	6.2
1980Q2	4,717	2,809	6.2
1980Q3	4,747	2,896	6.2
1980Q4	4,776	2,990	6.2
1981Q1	4,805	3,082	6.2
1981Q2	4,833	3,159	6.2
1981Q3	4,860	3,239	6.2
1981Q4	4,887	3,316	6.2
1982Q1	4,914	3,384	6.1
1982Q2	4,941	3,445	6.1
1982Q3	4,969	3,511	6.1
1982Q4	4,998	3,570	6.1
1983Q1	5,027	3,624	6.1
1983Q2	5,058	3,684	6.1
1983Q3	5,090	3,740	6.1
1983Q4	5,122	3,800	6.1
1984Q1	5,154	3,867	6.1
1984Q2	5,188	3,921	6.1
1984Q3	5,222	3,982	6.0
1984Q4	5,258	4,038	6.0
1985Q1	5,294	4,110	6.0
1985Q2	5,332	4,172	6.0
1985Q3	5,370	4,230	6.0
1985Q4	5,409	4,298	6.0
1986Q1	5,449	4,349	6.0
1986Q2	5,489	4,403	6.0
1986Q3	5,529	4,470	6.0
1986Q4	5,569	4,536	6.0
1987Q1	5,609	4,605	6.0
1987Q2	5,649	4,671	6.0
1987Q3	5,689	4,740	6.0
1987Q4	5,728	4,817	6.0
1988Q1	5,768	4,883	5.9
1988Q2	5,807	4,969	5.9
1988Q3	5,847	5,067	5.9
1988Q4	5,886	5,147	5.9
1989Q1	5,925	5,241	5.9
1989Q2	5,964	5,331	5.9
1989Q3	6,002	5,410	5.9
1989Q4	6,040	5,489	5.9
1990Q1	6,077	5,590	5.9
1990Q2	6,113	5,696	5.9
1990Q3	6,148	5,787	5.9

1990Q4	6,182	5,879	5.9
1991Q1	6,215	5,983	5.9
1991Q2	6,247	6,059	5.9
1991Q3	6,279	6,134	5.9
1991Q4	6,310	6,202	5.8
1992Q1	6,340	6,284	5.8
1992Q2	6,370	6,356	5.8
1992Q3	6,400	6,410	5.8
1992Q4	6,430	6,486	5.8
1993Q1	6,461	6,579	5.8
1993Q2	6,492	6,643	5.8
1993Q3	6,523	6,707	5.8
1993Q4	6,556	6,785	5.8
1994Q1	6,589	6,860	5.8
1994Q2	6,623	6,934	5.8
1994Q3	6,658	7,015	5.8
1994Q4	6,693	7,100	5.8
1995Q1	6,732	7,185	5.7
1995Q2	6,773	7,262	5.7
1995Q3	6,814	7,341	5.7
1995Q4	6,856	7,424	5.7
1996Q1	6,899	7,514	5.7
1996Q2	6,942	7,584	5.7
1996Q3	6,988	7,669	5.7
1996Q4	7,034	7,755	5.7
1997Q1	7,082	7,862	5.7
1997Q2	7,130	7,947	5.7
1997Q3	7,179	8,025	5.7
1997Q4	7,229	8,105	5.7
1998Q1	7,280	8,180	5.6
1998Q2	7,331	8,256	5.6
1998Q3	7,383	8,332	5.6
1998Q4	7,436	8,417	5.6
1999Q1	7,490	8,523	5.6
1999Q2	7,543	8,626	5.6
1999Q3	7,597	8,733	5.6
1999Q4	7,651	8,841	5.6
2000Q1	7,706	8,949	5.6
2000Q2	7,760	9,055	5.6
2000Q3	7,814	9,161	5.6
2000Q4	7,868	9,271	5.6
2001Q1	7,921	9,388	5.6
2001Q2	7,975	9,501	5.6
2001Q3	8,028	9,615	5.6

2001Q4	8,081	9,729	5.6
2002Q1	8,133	9,847	5.6
2002Q2	8,186	9,962	5.6
2002Q3	8,239	10,077	5.6
2002Q4	8,291	10,192	5.6
2003Q1	8,344	10,314	5.6
2003Q2	8,396	10,433	5.6
2003Q3	8,448	10,552	5.6
2003Q4	8,501	10,672	5.6
2004Q1	8,553	10,797	5.6
2004Q2	8,606	10,920	5.6
2004Q3	8,658	11,044	5.6
2004Q4	8,710	11,169	5.6
2005Q1	8,763	11,298	5.6
2005Q2	8,815	11,425	5.6
2005Q3	8,867	11,553	5.6
2005Q4	8,920	11,681	5.6
2006Q1	8,972	11,815	5.6
2006Q2	9,025	11,947	5.6
2006Q3	9,077	12,078	5.6
2006Q4	9,130	12,211	5.6
2007Q1	9,183	12,350	5.6
2007Q2	9,235	12,486	5.6
2007Q3	9,288	12,623	5.6
2007Q4	9,341	12,760	5.6
2008Q1	9,394	12,904	5.6
2008Q2	9,447	13,045	5.6
2008Q3	9,500	13,187	5.6
2008Q4	9,554	13,330	5.6
2009Q1	9,607	13,476	5.6
2009Q2	9,661	13,623	5.6
2009Q3	9,714	13,771	5.6
2009Q4	9,768	13,921	5.6

Source: Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 2000 to 2009* , January 1999, =www.cbo.gov/publication/11329.

Note: Real potential GDP is expressed in chained 1992 dollars.

and Economic Outlook: 2015 to 2025.

This file presents data that supplements information in CBO's January 2015 report *The Budge*
www.cbo.gov/publication/49892

January 2000

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	1,565	n.a.	5.3
1949Q2	1,582	n.a.	5.3
1949Q3	1,598	n.a.	5.3
1949Q4	1,615	n.a.	5.3
1950Q1	1,633	n.a.	5.3
1950Q2	1,651	n.a.	5.3
1950Q3	1,670	n.a.	5.3
1950Q4	1,689	n.a.	5.3
1951Q1	1,709	n.a.	5.3
1951Q2	1,729	n.a.	5.3
1951Q3	1,749	n.a.	5.3
1951Q4	1,770	n.a.	5.3
1952Q1	1,790	n.a.	5.4
1952Q2	1,810	n.a.	5.4
1952Q3	1,830	n.a.	5.4
1952Q4	1,849	n.a.	5.4
1953Q1	1,868	n.a.	5.4
1953Q2	1,885	n.a.	5.4
1953Q3	1,903	n.a.	5.4
1953Q4	1,919	n.a.	5.4
1954Q1	1,935	n.a.	5.4
1954Q2	1,950	n.a.	5.4
1954Q3	1,965	n.a.	5.4
1954Q4	1,980	n.a.	5.4
1955Q1	1,995	n.a.	5.4
1955Q2	2,010	n.a.	5.4
1955Q3	2,025	n.a.	5.4
1955Q4	2,040	n.a.	5.4
1956Q1	2,056	n.a.	5.4
1956Q2	2,072	n.a.	5.4
1956Q3	2,089	n.a.	5.4
1956Q4	2,106	n.a.	5.4
1957Q1	2,124	n.a.	5.4
1957Q2	2,141	n.a.	5.4
1957Q3	2,159	n.a.	5.4

1957Q4	2,178	n.a.	5.4
1958Q1	2,196	n.a.	5.4
1958Q2	2,215	n.a.	5.4
1958Q3	2,234	n.a.	5.4
1958Q4	2,254	n.a.	5.4
1959Q1	2,274	500	5.4
1959Q2	2,295	505	5.4
1959Q3	2,316	511	5.4
1959Q4	2,337	518	5.5
1960Q1	2,359	525	5.5
1960Q2	2,381	532	5.5
1960Q3	2,403	539	5.5
1960Q4	2,426	545	5.5
1961Q1	2,449	552	5.5
1961Q2	2,473	558	5.5
1961Q3	2,498	566	5.5
1961Q4	2,522	573	5.5
1962Q1	2,547	582	5.5
1962Q2	2,572	589	5.5
1962Q3	2,598	596	5.5
1962Q4	2,623	604	5.5
1963Q1	2,649	612	5.5
1963Q2	2,675	619	5.5
1963Q3	2,702	626	5.6
1963Q4	2,729	637	5.6
1964Q1	2,757	646	5.6
1964Q2	2,785	654	5.6
1964Q3	2,813	663	5.6
1964Q4	2,842	673	5.6
1965Q1	2,872	684	5.6
1965Q2	2,902	694	5.7
1965Q3	2,933	704	5.7
1965Q4	2,965	717	5.7
1966Q1	2,997	729	5.7
1966Q2	3,029	743	5.8
1966Q3	3,062	759	5.8
1966Q4	3,096	774	5.8
1967Q1	3,130	786	5.8
1967Q2	3,164	799	5.8
1967Q3	3,198	817	5.8
1967Q4	3,233	835	5.8
1968Q1	3,268	853	5.8
1968Q2	3,302	871	5.8
1968Q3	3,337	888	5.8

1968Q4	3,370	910	5.8
1969Q1	3,404	928	5.8
1969Q2	3,437	949	5.8
1969Q3	3,469	972	5.9
1969Q4	3,501	993	5.9
1970Q1	3,533	1,016	5.9
1970Q2	3,564	1,040	5.9
1970Q3	3,595	1,057	5.9
1970Q4	3,625	1,081	5.9
1971Q1	3,655	1,107	5.9
1971Q2	3,684	1,131	5.9
1971Q3	3,714	1,153	6.0
1971Q4	3,744	1,172	6.0
1972Q1	3,774	1,198	6.0
1972Q2	3,804	1,216	6.0
1972Q3	3,835	1,238	6.1
1972Q4	3,867	1,265	6.1
1973Q1	3,900	1,292	6.1
1973Q2	3,933	1,324	6.1
1973Q3	3,967	1,360	6.1
1973Q4	4,001	1,400	6.2
1974Q1	4,036	1,435	6.2
1974Q2	4,071	1,480	6.2
1974Q3	4,106	1,536	6.2
1974Q4	4,141	1,595	6.2
1975Q1	4,176	1,645	6.2
1975Q2	4,211	1,682	6.2
1975Q3	4,246	1,727	6.2
1975Q4	4,281	1,773	6.2
1976Q1	4,316	1,810	6.2
1976Q2	4,351	1,844	6.2
1976Q3	4,386	1,887	6.2
1976Q4	4,422	1,937	6.2
1977Q1	4,458	1,985	6.2
1977Q2	4,495	2,034	6.2
1977Q3	4,533	2,076	6.2
1977Q4	4,573	2,137	6.3
1978Q1	4,613	2,187	6.3
1978Q2	4,654	2,248	6.3
1978Q3	4,695	2,306	6.3
1978Q4	4,736	2,372	6.3
1979Q1	4,776	2,438	6.3
1979Q2	4,816	2,513	6.3
1979Q3	4,854	2,585	6.3

1979Q4	4,892	2,657	6.2
1980Q1	4,929	2,734	6.2
1980Q2	4,966	2,814	6.2
1980Q3	5,002	2,897	6.2
1980Q4	5,038	2,995	6.2
1981Q1	5,072	3,095	6.2
1981Q2	5,107	3,172	6.2
1981Q3	5,141	3,253	6.2
1981Q4	5,174	3,333	6.2
1982Q1	5,208	3,398	6.1
1982Q2	5,241	3,463	6.1
1982Q3	5,276	3,535	6.1
1982Q4	5,311	3,596	6.1
1983Q1	5,347	3,651	6.1
1983Q2	5,384	3,710	6.1
1983Q3	5,422	3,770	6.1
1983Q4	5,460	3,831	6.1
1984Q1	5,499	3,902	6.1
1984Q2	5,539	3,962	6.1
1984Q3	5,580	4,023	6.0
1984Q4	5,622	4,082	6.0
1985Q1	5,666	4,156	6.0
1985Q2	5,710	4,217	6.0
1985Q3	5,756	4,271	6.0
1985Q4	5,802	4,337	6.0
1986Q1	5,849	4,389	6.0
1986Q2	5,897	4,446	6.0
1986Q3	5,945	4,509	6.0
1986Q4	5,994	4,575	6.0
1987Q1	6,042	4,652	6.0
1987Q2	6,090	4,722	6.0
1987Q3	6,138	4,794	6.0
1987Q4	6,187	4,869	6.0
1988Q1	6,236	4,940	5.9
1988Q2	6,284	5,029	5.9
1988Q3	6,334	5,128	5.9
1988Q4	6,383	5,208	5.9
1989Q1	6,432	5,305	5.9
1989Q2	6,481	5,399	5.9
1989Q3	6,530	5,480	5.9
1989Q4	6,579	5,563	5.9
1990Q1	6,627	5,667	5.9
1990Q2	6,674	5,773	5.9
1990Q3	6,721	5,867	5.9

1990Q4	6,767	5,956	5.8
1991Q1	6,812	6,061	5.8
1991Q2	6,857	6,140	5.8
1991Q3	6,901	6,215	5.8
1991Q4	6,945	6,282	5.7
1992Q1	6,988	6,361	5.7
1992Q2	7,031	6,434	5.7
1992Q3	7,074	6,494	5.6
1992Q4	7,118	6,578	5.6
1993Q1	7,162	6,685	5.6
1993Q2	7,207	6,768	5.5
1993Q3	7,253	6,846	5.5
1993Q4	7,299	6,933	5.5
1994Q1	7,347	7,010	5.4
1994Q2	7,395	7,088	5.4
1994Q3	7,444	7,177	5.4
1994Q4	7,495	7,259	5.4
1995Q1	7,547	7,362	5.3
1995Q2	7,600	7,444	5.3
1995Q3	7,654	7,530	5.3
1995Q4	7,710	7,622	5.3
1996Q1	7,768	7,725	5.2
1996Q2	7,826	7,808	5.2
1996Q3	7,885	7,900	5.2
1996Q4	7,944	7,988	5.2
1997Q1	8,005	8,097	5.2
1997Q2	8,066	8,190	5.2
1997Q3	8,129	8,277	5.2
1997Q4	8,193	8,367	5.2
1998Q1	8,257	8,452	5.2
1998Q2	8,323	8,546	5.2
1998Q3	8,390	8,647	5.2
1998Q4	8,458	8,739	5.2
1999Q1	8,527	8,853	5.2
1999Q2	8,594	8,954	5.2
1999Q3	8,664	9,051	5.2
1999Q4	8,735	9,151	5.2
2000Q1	8,807	9,274	5.2
2000Q2	8,881	9,390	5.2
2000Q3	8,955	9,506	5.2
2000Q4	9,030	9,622	5.2
2001Q1	9,105	9,744	5.2
2001Q2	9,180	9,864	5.2
2001Q3	9,255	9,985	5.2

2001Q4	9,330	10,106	5.2
2002Q1	9,404	10,232	5.2
2002Q2	9,479	10,355	5.2
2002Q3	9,553	10,478	5.2
2002Q4	9,628	10,602	5.2
2003Q1	9,702	10,732	5.2
2003Q2	9,776	10,857	5.2
2003Q3	9,849	10,983	5.2
2003Q4	9,923	11,110	5.2
2004Q1	9,998	11,243	5.2
2004Q2	10,072	11,373	5.2
2004Q3	10,147	11,504	5.2
2004Q4	10,222	11,637	5.2
2005Q1	10,298	11,775	5.2
2005Q2	10,374	11,911	5.2
2005Q3	10,450	12,048	5.2
2005Q4	10,527	12,187	5.2
2006Q1	10,604	12,331	5.2
2006Q2	10,682	12,473	5.2
2006Q3	10,760	12,615	5.2
2006Q4	10,838	12,759	5.2
2007Q1	10,917	12,910	5.2
2007Q2	10,996	13,057	5.2
2007Q3	11,076	13,205	5.2
2007Q4	11,156	13,355	5.2
2008Q1	11,236	13,511	5.2
2008Q2	11,317	13,663	5.2
2008Q3	11,398	13,817	5.2
2008Q4	11,479	13,971	5.2
2009Q1	11,561	14,132	5.2
2009Q2	11,643	14,289	5.2
2009Q3	11,726	14,449	5.2
2009Q4	11,808	14,609	5.2
2010Q1	11,892	14,779	5.2
2010Q2	11,976	14,943	5.2
2010Q3	12,060	15,110	5.2
2010Q4	12,146	15,278	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2001 to 2010* , January 2000, www.cbo.gov/publication/12069.

Notes: Real potential GDP is expressed in chained 1996 dollars.

n.a. = not available.

et and Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget a*
www.cbo.gov/publication/49892

January 2001

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	1,570	274	5.3
1949Q2	1,585	274	5.3
1949Q3	1,602	275	5.3
1949Q4	1,619	278	5.3
1950Q1	1,636	280	5.3
1950Q2	1,655	284	5.3
1950Q3	1,673	294	5.3
1950Q4	1,693	303	5.3
1951Q1	1,712	318	5.3
1951Q2	1,732	324	5.3
1951Q3	1,753	327	5.3
1951Q4	1,773	335	5.3
1952Q1	1,794	338	5.4
1952Q2	1,814	343	5.4
1952Q3	1,834	350	5.4
1952Q4	1,854	355	5.4
1953Q1	1,873	359	5.4
1953Q2	1,891	363	5.4
1953Q3	1,908	368	5.4
1953Q4	1,925	372	5.4
1954Q1	1,941	377	5.4
1954Q2	1,957	380	5.4
1954Q3	1,972	384	5.4
1954Q4	1,988	388	5.4
1955Q1	2,003	392	5.4
1955Q2	2,018	397	5.4
1955Q3	2,034	403	5.4
1955Q4	2,049	410	5.4
1956Q1	2,065	418	5.4
1956Q2	2,082	423	5.4
1956Q3	2,099	432	5.4
1956Q4	2,117	437	5.4
1957Q1	2,134	447	5.4
1957Q2	2,153	454	5.4
1957Q3	2,171	461	5.4

1957Q4	2,189	465	5.4
1958Q1	2,207	474	5.4
1958Q2	2,226	480	5.4
1958Q3	2,245	487	5.4
1958Q4	2,265	494	5.4
1959Q1	2,285	499	5.4
1959Q2	2,305	503	5.4
1959Q3	2,326	509	5.4
1959Q4	2,347	516	5.5
1960Q1	2,369	523	5.5
1960Q2	2,391	530	5.5
1960Q3	2,413	536	5.5
1960Q4	2,436	543	5.5
1961Q1	2,460	550	5.5
1961Q2	2,484	556	5.5
1961Q3	2,509	563	5.5
1961Q4	2,534	571	5.5
1962Q1	2,559	580	5.5
1962Q2	2,585	587	5.5
1962Q3	2,610	594	5.5
1962Q4	2,636	602	5.5
1963Q1	2,662	610	5.5
1963Q2	2,689	617	5.5
1963Q3	2,715	624	5.6
1963Q4	2,743	635	5.6
1964Q1	2,770	643	5.6
1964Q2	2,798	651	5.6
1964Q3	2,827	661	5.6
1964Q4	2,855	671	5.6
1965Q1	2,885	681	5.6
1965Q2	2,915	691	5.7
1965Q3	2,946	701	5.7
1965Q4	2,978	714	5.7
1966Q1	3,010	726	5.7
1966Q2	3,043	740	5.8
1966Q3	3,076	756	5.8
1966Q4	3,110	771	5.8
1967Q1	3,143	782	5.8
1967Q2	3,178	796	5.8
1967Q3	3,212	813	5.8
1967Q4	3,247	831	5.8
1968Q1	3,281	849	5.8
1968Q2	3,316	867	5.8
1968Q3	3,350	884	5.8

1968Q4	3,384	906	5.8
1969Q1	3,418	924	5.8
1969Q2	3,451	945	5.8
1969Q3	3,484	968	5.9
1969Q4	3,516	990	5.9
1970Q1	3,548	1,013	5.9
1970Q2	3,580	1,036	5.9
1970Q3	3,611	1,054	5.9
1970Q4	3,642	1,077	5.9
1971Q1	3,673	1,102	5.9
1971Q2	3,704	1,126	5.9
1971Q3	3,735	1,147	6.0
1971Q4	3,766	1,166	6.0
1972Q1	3,798	1,193	6.0
1972Q2	3,830	1,210	6.0
1972Q3	3,862	1,233	6.1
1972Q4	3,895	1,259	6.1
1973Q1	3,930	1,285	6.1
1973Q2	3,964	1,318	6.1
1973Q3	4,000	1,354	6.1
1973Q4	4,035	1,395	6.2
1974Q1	4,071	1,433	6.2
1974Q2	4,108	1,479	6.2
1974Q3	4,143	1,537	6.2
1974Q4	4,179	1,596	6.2
1975Q1	4,215	1,647	6.2
1975Q2	4,250	1,684	6.2
1975Q3	4,285	1,728	6.2
1975Q4	4,320	1,773	6.2
1976Q1	4,356	1,807	6.2
1976Q2	4,391	1,841	6.2
1976Q3	4,426	1,881	6.2
1976Q4	4,461	1,930	6.2
1977Q1	4,497	1,977	6.2
1977Q2	4,534	2,027	6.2
1977Q3	4,573	2,068	6.2
1977Q4	4,612	2,129	6.3
1978Q1	4,652	2,180	6.3
1978Q2	4,693	2,242	6.3
1978Q3	4,733	2,300	6.3
1978Q4	4,773	2,367	6.3
1979Q1	4,812	2,432	6.3
1979Q2	4,850	2,508	6.3
1979Q3	4,886	2,580	6.3

1979Q4	4,921	2,652	6.2
1980Q1	4,956	2,731	6.2
1980Q2	4,989	2,811	6.2
1980Q3	5,023	2,893	6.2
1980Q4	5,056	2,990	6.2
1981Q1	5,089	3,087	6.2
1981Q2	5,121	3,163	6.2
1981Q3	5,153	3,244	6.2
1981Q4	5,186	3,324	6.2
1982Q1	5,218	3,391	6.1
1982Q2	5,252	3,457	6.1
1982Q3	5,286	3,528	6.1
1982Q4	5,322	3,590	6.1
1983Q1	5,359	3,641	6.1
1983Q2	5,398	3,701	6.1
1983Q3	5,437	3,760	6.1
1983Q4	5,477	3,821	6.1
1984Q1	5,517	3,894	6.1
1984Q2	5,559	3,955	6.1
1984Q3	5,601	4,017	6.0
1984Q4	5,644	4,078	6.0
1985Q1	5,689	4,153	6.0
1985Q2	5,735	4,215	6.0
1985Q3	5,781	4,270	6.0
1985Q4	5,829	4,336	6.0
1986Q1	5,877	4,389	6.0
1986Q2	5,926	4,447	6.0
1986Q3	5,974	4,511	6.0
1986Q4	6,023	4,578	6.0
1987Q1	6,071	4,657	6.0
1987Q2	6,119	4,728	6.0
1987Q3	6,168	4,801	6.0
1987Q4	6,216	4,877	6.0
1988Q1	6,264	4,948	5.9
1988Q2	6,313	5,037	5.9
1988Q3	6,361	5,135	5.9
1988Q4	6,410	5,213	5.9
1989Q1	6,459	5,309	5.9
1989Q2	6,507	5,402	5.9
1989Q3	6,555	5,481	5.9
1989Q4	6,603	5,562	5.9
1990Q1	6,650	5,664	5.9
1990Q2	6,696	5,769	5.9
1990Q3	6,742	5,864	5.9

1990Q4	6,787	5,955	5.8
1991Q1	6,832	6,064	5.8
1991Q2	6,876	6,147	5.8
1991Q3	6,919	6,227	5.8
1991Q4	6,962	6,299	5.7
1992Q1	7,004	6,385	5.7
1992Q2	7,047	6,460	5.7
1992Q3	7,090	6,520	5.6
1992Q4	7,133	6,601	5.6
1993Q1	7,177	6,697	5.6
1993Q2	7,222	6,775	5.5
1993Q3	7,267	6,849	5.5
1993Q4	7,314	6,933	5.5
1994Q1	7,361	7,013	5.4
1994Q2	7,409	7,091	5.4
1994Q3	7,459	7,181	5.4
1994Q4	7,509	7,264	5.4
1995Q1	7,560	7,367	5.3
1995Q2	7,613	7,450	5.3
1995Q3	7,667	7,537	5.3
1995Q4	7,723	7,630	5.3
1996Q1	7,782	7,734	5.2
1996Q2	7,842	7,822	5.2
1996Q3	7,904	7,922	5.2
1996Q4	7,968	8,018	5.2
1997Q1	8,033	8,141	5.2
1997Q2	8,099	8,246	5.2
1997Q3	8,167	8,341	5.2
1997Q4	8,237	8,442	5.2
1998Q1	8,309	8,536	5.2
1998Q2	8,381	8,635	5.2
1998Q3	8,456	8,744	5.2
1998Q4	8,531	8,847	5.2
1999Q1	8,608	8,977	5.2
1999Q2	8,685	9,089	5.2
1999Q3	8,763	9,191	5.2
1999Q4	8,842	9,305	5.2
2000Q1	8,923	9,468	5.2
2000Q2	9,005	9,611	5.2
2000Q3	9,088	9,746	5.2
2000Q4	9,171	9,880	5.2
2001Q1	9,255	10,038	5.2
2001Q2	9,339	10,186	5.2
2001Q3	9,423	10,337	5.2

2001Q4	9,507	10,482	5.2
2002Q1	9,592	10,635	5.2
2002Q2	9,677	10,783	5.2
2002Q3	9,762	10,932	5.2
2002Q4	9,847	11,083	5.2
2003Q1	9,931	11,239	5.2
2003Q2	10,016	11,390	5.2
2003Q3	10,101	11,540	5.2
2003Q4	10,185	11,690	5.2
2004Q1	10,270	11,848	5.2
2004Q2	10,355	12,001	5.2
2004Q3	10,440	12,155	5.2
2004Q4	10,526	12,310	5.2
2005Q1	10,611	12,474	5.2
2005Q2	10,697	12,632	5.2
2005Q3	10,783	12,792	5.2
2005Q4	10,870	12,953	5.2
2006Q1	10,956	13,122	5.2
2006Q2	11,043	13,287	5.2
2006Q3	11,131	13,453	5.2
2006Q4	11,219	13,621	5.2
2007Q1	11,308	13,798	5.2
2007Q2	11,397	13,970	5.2
2007Q3	11,486	14,144	5.2
2007Q4	11,576	14,320	5.2
2008Q1	11,667	14,504	5.2
2008Q2	11,758	14,684	5.2
2008Q3	11,850	14,866	5.2
2008Q4	11,942	15,050	5.2
2009Q1	12,035	15,243	5.2
2009Q2	12,129	15,430	5.2
2009Q3	12,223	15,618	5.2
2009Q4	12,318	15,809	5.2
2010Q1	12,413	16,011	5.2
2010Q2	12,509	16,208	5.2
2010Q3	12,606	16,407	5.2
2010Q4	12,704	16,608	5.2
2011Q1	12,802	16,819	5.2
2011Q2	12,901	17,026	5.2
2011Q3	13,001	17,235	5.2
2011Q4	13,101	17,446	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook:*

Fiscal Years 2002 to 2011 , January 2001, www.cbo.gov/publication/12958.

Note: Real potential GDP is expressed in chained 1996 dollars.

nd Economic Outlook: 2015 to 2025.

This file presents data that supplements information in CBO's January 2015 report *The Budget and E*
www.cbo.gov/publication/49892

January 2002

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	1,567	273	5.3
1949Q2	1,583	273	5.3
1949Q3	1,600	274	5.3
1949Q4	1,618	278	5.3
1950Q1	1,636	280	5.3
1950Q2	1,654	284	5.3
1950Q3	1,674	294	5.3
1950Q4	1,694	303	5.3
1951Q1	1,714	318	5.3
1951Q2	1,734	324	5.3
1951Q3	1,755	328	5.3
1951Q4	1,776	335	5.3
1952Q1	1,796	339	5.4
1952Q2	1,817	343	5.4
1952Q3	1,837	351	5.4
1952Q4	1,856	356	5.4
1953Q1	1,875	360	5.4
1953Q2	1,893	364	5.4
1953Q3	1,911	368	5.4
1953Q4	1,927	373	5.4
1954Q1	1,943	377	5.4
1954Q2	1,958	380	5.4
1954Q3	1,974	384	5.4
1954Q4	1,989	388	5.4
1955Q1	2,004	393	5.4
1955Q2	2,020	397	5.4
1955Q3	2,035	403	5.4
1955Q4	2,051	411	5.4
1956Q1	2,067	418	5.4
1956Q2	2,084	424	5.4
1956Q3	2,101	433	5.4
1956Q4	2,119	438	5.4
1957Q1	2,137	448	5.4
1957Q2	2,155	455	5.4
1957Q3	2,173	461	5.4

1957Q4	2,191	465	5.4
1958Q1	2,210	474	5.4
1958Q2	2,228	480	5.4
1958Q3	2,248	488	5.4
1958Q4	2,267	495	5.4
1959Q1	2,287	499	5.4
1959Q2	2,308	504	5.4
1959Q3	2,329	510	5.4
1959Q4	2,350	517	5.5
1960Q1	2,371	524	5.5
1960Q2	2,393	530	5.5
1960Q3	2,415	537	5.5
1960Q4	2,438	544	5.5
1961Q1	2,461	550	5.5
1961Q2	2,485	556	5.5
1961Q3	2,509	563	5.5
1961Q4	2,533	571	5.5
1962Q1	2,557	580	5.5
1962Q2	2,582	586	5.5
1962Q3	2,607	593	5.5
1962Q4	2,632	601	5.5
1963Q1	2,657	609	5.5
1963Q2	2,683	615	5.5
1963Q3	2,709	623	5.6
1963Q4	2,736	634	5.6
1964Q1	2,763	642	5.6
1964Q2	2,791	650	5.6
1964Q3	2,819	659	5.6
1964Q4	2,848	669	5.6
1965Q1	2,878	680	5.6
1965Q2	2,909	690	5.7
1965Q3	2,940	700	5.7
1965Q4	2,973	713	5.7
1966Q1	3,006	725	5.7
1966Q2	3,040	739	5.8
1966Q3	3,074	755	5.8
1966Q4	3,108	770	5.8
1967Q1	3,142	782	5.8
1967Q2	3,177	796	5.8
1967Q3	3,212	813	5.8
1967Q4	3,247	831	5.8
1968Q1	3,282	849	5.8
1968Q2	3,316	867	5.8
1968Q3	3,351	884	5.8

1968Q4	3,385	906	5.8
1969Q1	3,418	924	5.8
1969Q2	3,451	945	5.8
1969Q3	3,483	968	5.9
1969Q4	3,515	989	5.9
1970Q1	3,547	1,013	5.9
1970Q2	3,578	1,036	5.9
1970Q3	3,609	1,053	5.9
1970Q4	3,640	1,076	5.9
1971Q1	3,671	1,101	5.9
1971Q2	3,702	1,125	5.9
1971Q3	3,733	1,147	6.0
1971Q4	3,764	1,166	6.0
1972Q1	3,796	1,192	6.0
1972Q2	3,828	1,210	6.0
1972Q3	3,861	1,232	6.1
1972Q4	3,895	1,259	6.1
1973Q1	3,929	1,285	6.1
1973Q2	3,964	1,318	6.1
1973Q3	3,999	1,354	6.1
1973Q4	4,035	1,395	6.2
1974Q1	4,071	1,433	6.2
1974Q2	4,107	1,479	6.2
1974Q3	4,143	1,536	6.2
1974Q4	4,178	1,596	6.2
1975Q1	4,213	1,647	6.2
1975Q2	4,248	1,684	6.2
1975Q3	4,283	1,728	6.2
1975Q4	4,318	1,773	6.2
1976Q1	4,353	1,807	6.2
1976Q2	4,388	1,840	6.2
1976Q3	4,423	1,880	6.2
1976Q4	4,459	1,929	6.2
1977Q1	4,495	1,976	6.2
1977Q2	4,532	2,026	6.2
1977Q3	4,570	2,067	6.2
1977Q4	4,610	2,128	6.3
1978Q1	4,650	2,179	6.3
1978Q2	4,691	2,241	6.3
1978Q3	4,732	2,300	6.3
1978Q4	4,772	2,366	6.3
1979Q1	4,811	2,432	6.3
1979Q2	4,850	2,508	6.3
1979Q3	4,888	2,581	6.3

1979Q4	4,924	2,654	6.2
1980Q1	4,960	2,734	6.2
1980Q2	4,995	2,814	6.2
1980Q3	5,030	2,897	6.2
1980Q4	5,065	2,995	6.2
1981Q1	5,098	3,093	6.2
1981Q2	5,132	3,169	6.2
1981Q3	5,165	3,251	6.2
1981Q4	5,198	3,332	6.2
1982Q1	5,231	3,400	6.1
1982Q2	5,265	3,466	6.1
1982Q3	5,299	3,537	6.1
1982Q4	5,334	3,598	6.1
1983Q1	5,371	3,649	6.1
1983Q2	5,409	3,708	6.1
1983Q3	5,447	3,768	6.1
1983Q4	5,487	3,828	6.1
1984Q1	5,526	3,901	6.1
1984Q2	5,567	3,962	6.1
1984Q3	5,609	4,023	6.0
1984Q4	5,652	4,083	6.0
1985Q1	5,696	4,158	6.0
1985Q2	5,741	4,220	6.0
1985Q3	5,787	4,274	6.0
1985Q4	5,834	4,340	6.0
1986Q1	5,882	4,393	6.0
1986Q2	5,930	4,450	6.0
1986Q3	5,978	4,514	6.0
1986Q4	6,026	4,580	6.0
1987Q1	6,073	4,658	6.0
1987Q2	6,121	4,729	6.0
1987Q3	6,168	4,801	6.0
1987Q4	6,215	4,877	6.0
1988Q1	6,263	4,947	5.9
1988Q2	6,310	5,035	5.9
1988Q3	6,358	5,132	5.9
1988Q4	6,406	5,210	5.9
1989Q1	6,454	5,305	5.9
1989Q2	6,502	5,397	5.9
1989Q3	6,549	5,476	5.9
1989Q4	6,596	5,557	5.9
1990Q1	6,643	5,659	5.9
1990Q2	6,690	5,764	5.9
1990Q3	6,736	5,859	5.9

1990Q4	6,781	5,950	5.8
1991Q1	6,825	6,058	5.8
1991Q2	6,869	6,142	5.8
1991Q3	6,913	6,221	5.8
1991Q4	6,956	6,293	5.7
1992Q1	6,999	6,380	5.7
1992Q2	7,041	6,455	5.7
1992Q3	7,084	6,515	5.6
1992Q4	7,127	6,596	5.6
1993Q1	7,170	6,691	5.6
1993Q2	7,214	6,768	5.5
1993Q3	7,259	6,841	5.5
1993Q4	7,305	6,925	5.5
1994Q1	7,352	7,004	5.4
1994Q2	7,400	7,082	5.4
1994Q3	7,449	7,172	5.4
1994Q4	7,500	7,255	5.4
1995Q1	7,551	7,359	5.3
1995Q2	7,604	7,441	5.3
1995Q3	7,658	7,528	5.3
1995Q4	7,714	7,620	5.3
1996Q1	7,770	7,723	5.2
1996Q2	7,829	7,808	5.2
1996Q3	7,888	7,906	5.2
1996Q4	7,950	8,000	5.2
1997Q1	8,013	8,121	5.2
1997Q2	8,078	8,225	5.2
1997Q3	8,145	8,318	5.2
1997Q4	8,214	8,418	5.2
1998Q1	8,284	8,512	5.2
1998Q2	8,356	8,607	5.2
1998Q3	8,429	8,713	5.2
1998Q4	8,503	8,814	5.2
1999Q1	8,579	8,933	5.2
1999Q2	8,657	9,042	5.2
1999Q3	8,736	9,156	5.2
1999Q4	8,816	9,277	5.2
2000Q1	8,897	9,450	5.2
2000Q2	8,977	9,588	5.2
2000Q3	9,055	9,717	5.2
2000Q4	9,132	9,843	5.2
2001Q1	9,208	10,004	5.2
2001Q2	9,282	10,138	5.2
2001Q3	9,355	10,272	5.2

2001Q4	9,427	10,351	5.2
2002Q1	9,497	10,469	5.2
2002Q2	9,566	10,583	5.2
2002Q3	9,635	10,704	5.2
2002Q4	9,702	10,828	5.2
2003Q1	9,769	10,965	5.2
2003Q2	9,836	11,097	5.2
2003Q3	9,905	11,229	5.2
2003Q4	9,975	11,365	5.2
2004Q1	10,047	11,509	5.2
2004Q2	10,120	11,650	5.2
2004Q3	10,195	11,793	5.2
2004Q4	10,272	11,939	5.2
2005Q1	10,351	12,095	5.2
2005Q2	10,431	12,248	5.2
2005Q3	10,512	12,402	5.2
2005Q4	10,595	12,558	5.2
2006Q1	10,677	12,722	5.2
2006Q2	10,761	12,884	5.2
2006Q3	10,845	13,047	5.2
2006Q4	10,930	13,210	5.2
2007Q1	11,015	13,383	5.2
2007Q2	11,101	13,553	5.2
2007Q3	11,187	13,723	5.2
2007Q4	11,273	13,895	5.2
2008Q1	11,360	14,077	5.2
2008Q2	11,448	14,255	5.2
2008Q3	11,536	14,433	5.2
2008Q4	11,625	14,614	5.2
2009Q1	11,714	14,804	5.2
2009Q2	11,804	14,990	5.2
2009Q3	11,894	15,178	5.2
2009Q4	11,985	15,367	5.2
2010Q1	12,076	15,566	5.2
2010Q2	12,168	15,762	5.2
2010Q3	12,261	15,959	5.2
2010Q4	12,354	16,157	5.2
2011Q1	12,448	16,366	5.2
2011Q2	12,542	16,571	5.2
2011Q3	12,637	16,777	5.2
2011Q4	12,732	16,985	5.2
2012Q1	12,828	17,207	5.2
2012Q2	12,924	17,422	5.2
2012Q3	13,020	17,638	5.2

2012Q4	13,116	17,855	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2003 to 2012* , January 2002, www.cbo.gov/publication/13504.

Note: Real potential GDP is expressed in chained 1996 dollars.

conomic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget and Ec*
www.cbo.gov/publication/49892

January 2003

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	1,570	274	5.3
1949Q2	1,586	274	5.3
1949Q3	1,603	275	5.3
1949Q4	1,620	278	5.3
1950Q1	1,640	281	5.3
1950Q2	1,658	285	5.3
1950Q3	1,678	294	5.3
1950Q4	1,698	304	5.3
1951Q1	1,718	319	5.3
1951Q2	1,739	324	5.3
1951Q3	1,759	328	5.3
1951Q4	1,780	336	5.3
1952Q1	1,801	339	5.4
1952Q2	1,821	344	5.4
1952Q3	1,841	351	5.4
1952Q4	1,860	356	5.4
1953Q1	1,879	360	5.4
1953Q2	1,896	364	5.4
1953Q3	1,913	369	5.4
1953Q4	1,929	373	5.4
1954Q1	1,945	377	5.4
1954Q2	1,960	380	5.4
1954Q3	1,975	384	5.4
1954Q4	1,990	388	5.4
1955Q1	2,006	392	5.4
1955Q2	2,021	397	5.4
1955Q3	2,036	403	5.4
1955Q4	2,052	410	5.4
1956Q1	2,068	418	5.4
1956Q2	2,085	424	5.4
1956Q3	2,102	432	5.4
1956Q4	2,120	438	5.4
1957Q1	2,138	448	5.4
1957Q2	2,157	455	5.4
1957Q3	2,175	461	5.4

1957Q4	2,193	465	5.4
1958Q1	2,212	474	5.4
1958Q2	2,231	480	5.4
1958Q3	2,250	488	5.4
1958Q4	2,270	495	5.4
1959Q1	2,291	499	5.4
1959Q2	2,311	504	5.4
1959Q3	2,332	510	5.4
1959Q4	2,354	517	5.5
1960Q1	2,375	524	5.5
1960Q2	2,397	530	5.5
1960Q3	2,419	537	5.5
1960Q4	2,442	544	5.5
1961Q1	2,465	550	5.5
1961Q2	2,489	557	5.5
1961Q3	2,512	564	5.5
1961Q4	2,537	571	5.5
1962Q1	2,561	580	5.5
1962Q2	2,585	586	5.5
1962Q3	2,610	593	5.5
1962Q4	2,635	601	5.5
1963Q1	2,660	609	5.5
1963Q2	2,686	615	5.5
1963Q3	2,712	622	5.6
1963Q4	2,739	633	5.6
1964Q1	2,766	642	5.6
1964Q2	2,794	650	5.6
1964Q3	2,822	659	5.6
1964Q4	2,851	669	5.6
1965Q1	2,881	679	5.6
1965Q2	2,912	690	5.7
1965Q3	2,944	700	5.7
1965Q4	2,976	713	5.7
1966Q1	3,009	725	5.7
1966Q2	3,043	739	5.8
1966Q3	3,077	756	5.8
1966Q4	3,112	771	5.8
1967Q1	3,147	782	5.8
1967Q2	3,182	796	5.8
1967Q3	3,217	813	5.8
1967Q4	3,252	831	5.8
1968Q1	3,287	850	5.8
1968Q2	3,322	868	5.8
1968Q3	3,357	885	5.8

1968Q4	3,391	907	5.8
1969Q1	3,424	925	5.8
1969Q2	3,457	946	5.8
1969Q3	3,490	969	5.9
1969Q4	3,522	990	5.9
1970Q1	3,553	1,013	5.9
1970Q2	3,585	1,036	5.9
1970Q3	3,616	1,054	5.9
1970Q4	3,646	1,077	5.9
1971Q1	3,677	1,102	5.9
1971Q2	3,708	1,126	5.9
1971Q3	3,739	1,147	6.0
1971Q4	3,770	1,166	6.0
1972Q1	3,801	1,193	6.0
1972Q2	3,833	1,210	6.0
1972Q3	3,865	1,233	6.1
1972Q4	3,898	1,259	6.1
1973Q1	3,932	1,285	6.1
1973Q2	3,967	1,318	6.1
1973Q3	4,002	1,354	6.1
1973Q4	4,038	1,395	6.2
1974Q1	4,074	1,433	6.2
1974Q2	4,110	1,479	6.2
1974Q3	4,146	1,536	6.2
1974Q4	4,181	1,596	6.2
1975Q1	4,217	1,647	6.2
1975Q2	4,252	1,684	6.2
1975Q3	4,287	1,728	6.2
1975Q4	4,322	1,773	6.2
1976Q1	4,357	1,807	6.2
1976Q2	4,392	1,840	6.2
1976Q3	4,428	1,881	6.2
1976Q4	4,463	1,930	6.2
1977Q1	4,499	1,977	6.2
1977Q2	4,536	2,026	6.2
1977Q3	4,574	2,068	6.2
1977Q4	4,614	2,128	6.3
1978Q1	4,654	2,179	6.3
1978Q2	4,694	2,241	6.3
1978Q3	4,735	2,299	6.3
1978Q4	4,775	2,366	6.3
1979Q1	4,814	2,432	6.3
1979Q2	4,853	2,508	6.3
1979Q3	4,891	2,581	6.3

1979Q4	4,927	2,654	6.2
1980Q1	4,963	2,734	6.2
1980Q2	4,999	2,814	6.2
1980Q3	5,034	2,898	6.2
1980Q4	5,069	2,995	6.2
1981Q1	5,103	3,093	6.2
1981Q2	5,137	3,170	6.2
1981Q3	5,170	3,253	6.2
1981Q4	5,203	3,333	6.2
1982Q1	5,237	3,401	6.1
1982Q2	5,270	3,467	6.1
1982Q3	5,305	3,538	6.1
1982Q4	5,340	3,600	6.1
1983Q1	5,377	3,651	6.1
1983Q2	5,415	3,710	6.1
1983Q3	5,453	3,769	6.1
1983Q4	5,492	3,830	6.1
1984Q1	5,532	3,902	6.1
1984Q2	5,573	3,963	6.1
1984Q3	5,614	4,024	6.0
1984Q4	5,657	4,084	6.0
1985Q1	5,701	4,159	6.0
1985Q2	5,746	4,221	6.0
1985Q3	5,792	4,275	6.0
1985Q4	5,839	4,341	6.0
1986Q1	5,886	4,393	6.0
1986Q2	5,934	4,450	6.0
1986Q3	5,982	4,514	6.0
1986Q4	6,029	4,580	6.0
1987Q1	6,077	4,658	6.0
1987Q2	6,124	4,729	6.0
1987Q3	6,171	4,801	6.0
1987Q4	6,218	4,876	6.0
1988Q1	6,265	4,946	5.9
1988Q2	6,313	5,034	5.9
1988Q3	6,360	5,130	5.9
1988Q4	6,408	5,208	5.9
1989Q1	6,456	5,303	5.9
1989Q2	6,503	5,395	5.9
1989Q3	6,550	5,474	5.9
1989Q4	6,598	5,554	5.9
1990Q1	6,644	5,656	5.9
1990Q2	6,690	5,760	5.9
1990Q3	6,736	5,855	5.9

1990Q4	6,781	5,945	5.8
1991Q1	6,825	6,054	5.8
1991Q2	6,868	6,136	5.8
1991Q3	6,911	6,215	5.8
1991Q4	6,954	6,287	5.7
1992Q1	6,996	6,372	5.7
1992Q2	7,037	6,447	5.7
1992Q3	7,079	6,506	5.6
1992Q4	7,121	6,586	5.6
1993Q1	7,164	6,680	5.6
1993Q2	7,208	6,757	5.5
1993Q3	7,252	6,829	5.5
1993Q4	7,296	6,911	5.5
1994Q1	7,342	6,989	5.4
1994Q2	7,389	7,066	5.4
1994Q3	7,438	7,155	5.4
1994Q4	7,487	7,237	5.4
1995Q1	7,538	7,339	5.3
1995Q2	7,590	7,421	5.3
1995Q3	7,643	7,506	5.3
1995Q4	7,698	7,597	5.3
1996Q1	7,754	7,699	5.2
1996Q2	7,811	7,784	5.2
1996Q3	7,870	7,880	5.2
1996Q4	7,931	7,973	5.2
1997Q1	7,993	8,093	5.2
1997Q2	8,057	8,196	5.2
1997Q3	8,123	8,287	5.2
1997Q4	8,191	8,386	5.2
1998Q1	8,260	8,479	5.2
1998Q2	8,330	8,572	5.2
1998Q3	8,402	8,676	5.2
1998Q4	8,474	8,775	5.2
1999Q1	8,548	8,891	5.2
1999Q2	8,623	9,003	5.2
1999Q3	8,699	9,111	5.2
1999Q4	8,776	9,230	5.2
2000Q1	8,853	9,382	5.2
2000Q2	8,929	9,518	5.2
2000Q3	9,004	9,637	5.2
2000Q4	9,077	9,767	5.2
2001Q1	9,150	9,933	5.2
2001Q2	9,221	10,073	5.2
2001Q3	9,292	10,205	5.2

2001Q4	9,362	10,268	5.2
2002Q1	9,431	10,378	5.2
2002Q2	9,499	10,484	5.2
2002Q3	9,567	10,583	5.2
2002Q4	9,634	10,724	5.2
2003Q1	9,700	10,848	5.2
2003Q2	9,767	10,967	5.2
2003Q3	9,835	11,083	5.2
2003Q4	9,905	11,204	5.2
2004Q1	9,976	11,339	5.2
2004Q2	10,048	11,472	5.2
2004Q3	10,122	11,610	5.2
2004Q4	10,197	11,750	5.2
2005Q1	10,273	11,902	5.2
2005Q2	10,350	12,052	5.2
2005Q3	10,429	12,204	5.2
2005Q4	10,508	12,359	5.2
2006Q1	10,589	12,524	5.2
2006Q2	10,670	12,684	5.2
2006Q3	10,752	12,847	5.2
2006Q4	10,835	13,012	5.2
2007Q1	10,918	13,188	5.2
2007Q2	11,001	13,358	5.2
2007Q3	11,085	13,530	5.2
2007Q4	11,170	13,704	5.2
2008Q1	11,254	13,888	5.2
2008Q2	11,340	14,066	5.2
2008Q3	11,425	14,247	5.2
2008Q4	11,511	14,429	5.2
2009Q1	11,596	14,621	5.2
2009Q2	11,682	14,808	5.2
2009Q3	11,769	14,996	5.2
2009Q4	11,855	15,186	5.2
2010Q1	11,941	15,385	5.2
2010Q2	12,027	15,579	5.2
2010Q3	12,113	15,774	5.2
2010Q4	12,199	15,971	5.2
2011Q1	12,273	16,160	5.2
2011Q2	12,346	16,343	5.2
2011Q3	12,419	16,528	5.2
2011Q4	12,492	16,713	5.2
2012Q1	12,565	16,908	5.2
2012Q2	12,650	17,113	5.2
2012Q3	12,735	17,319	5.2

2012Q4	12,820	17,528	5.2
2013Q1	12,905	17,747	5.2
2013Q2	12,989	17,959	5.2
2013Q3	13,073	18,172	5.2
2013Q4	13,157	18,387	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2004 to 2013* , January 2003, www.cbo.gov/publication/14254.

Note: Real potential GDP is expressed in chained 1996 dollars.

conomic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budge*
www.cbo.gov/publication/49892

January 2004

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1950Q1	1,640	281	5.3
1950Q2	1,659	285	5.3
1950Q3	1,678	295	5.3
1950Q4	1,698	304	5.3
1951Q1	1,718	319	5.3
1951Q2	1,739	325	5.3
1951Q3	1,760	329	5.3
1951Q4	1,780	336	5.3
1952Q1	1,801	340	5.4
1952Q2	1,821	344	5.4
1952Q3	1,841	352	5.4
1952Q4	1,861	357	5.4
1953Q1	1,879	360	5.4
1953Q2	1,897	364	5.4
1953Q3	1,914	369	5.4
1953Q4	1,930	373	5.4
1954Q1	1,945	377	5.4
1954Q2	1,960	380	5.4
1954Q3	1,976	384	5.4
1954Q4	1,991	388	5.4
1955Q1	2,006	393	5.4
1955Q2	2,021	398	5.4
1955Q3	2,037	404	5.4
1955Q4	2,053	411	5.4
1956Q1	2,069	418	5.4
1956Q2	2,085	424	5.4
1956Q3	2,102	433	5.4
1956Q4	2,120	438	5.4
1957Q1	2,138	448	5.4
1957Q2	2,157	455	5.4
1957Q3	2,175	462	5.4
1957Q4	2,193	466	5.4
1958Q1	2,212	475	5.4
1958Q2	2,231	481	5.4
1958Q3	2,250	488	5.4

1958Q4	2,270	495	5.4
1959Q1	2,290	500	5.4
1959Q2	2,311	505	5.4
1959Q3	2,332	510	5.4
1959Q4	2,353	517	5.5
1960Q1	2,375	524	5.5
1960Q2	2,396	531	5.5
1960Q3	2,419	538	5.5
1960Q4	2,441	544	5.5
1961Q1	2,465	551	5.5
1961Q2	2,488	557	5.5
1961Q3	2,512	564	5.5
1961Q4	2,536	571	5.5
1962Q1	2,561	581	5.5
1962Q2	2,585	587	5.5
1962Q3	2,610	594	5.5
1962Q4	2,635	602	5.5
1963Q1	2,660	609	5.5
1963Q2	2,686	616	5.5
1963Q3	2,712	623	5.6
1963Q4	2,739	634	5.6
1964Q1	2,766	642	5.6
1964Q2	2,794	650	5.6
1964Q3	2,822	660	5.6
1964Q4	2,852	670	5.6
1965Q1	2,882	680	5.6
1965Q2	2,912	691	5.7
1965Q3	2,944	701	5.7
1965Q4	2,977	713	5.7
1966Q1	3,010	726	5.7
1966Q2	3,044	740	5.8
1966Q3	3,078	757	5.8
1966Q4	3,113	772	5.8
1967Q1	3,148	783	5.8
1967Q2	3,183	797	5.8
1967Q3	3,218	815	5.8
1967Q4	3,253	833	5.8
1968Q1	3,289	851	5.8
1968Q2	3,323	869	5.8
1968Q3	3,358	886	5.8
1968Q4	3,392	908	5.8
1969Q1	3,426	926	5.8
1969Q2	3,459	947	5.8
1969Q3	3,491	970	5.9

1969Q4	3,523	992	5.9
1970Q1	3,555	1,015	5.9
1970Q2	3,586	1,038	5.9
1970Q3	3,617	1,055	5.9
1970Q4	3,648	1,078	5.9
1971Q1	3,678	1,104	5.9
1971Q2	3,709	1,127	5.9
1971Q3	3,739	1,148	6.0
1971Q4	3,770	1,167	6.0
1972Q1	3,801	1,194	6.0
1972Q2	3,833	1,211	6.0
1972Q3	3,865	1,234	6.1
1972Q4	3,898	1,260	6.1
1973Q1	3,932	1,286	6.1
1973Q2	3,967	1,319	6.1
1973Q3	4,002	1,355	6.1
1973Q4	4,038	1,396	6.2
1974Q1	4,074	1,434	6.2
1974Q2	4,110	1,480	6.2
1974Q3	4,145	1,537	6.2
1974Q4	4,181	1,597	6.2
1975Q1	4,216	1,648	6.2
1975Q2	4,251	1,685	6.2
1975Q3	4,286	1,729	6.2
1975Q4	4,322	1,774	6.2
1976Q1	4,357	1,808	6.2
1976Q2	4,392	1,841	6.2
1976Q3	4,427	1,882	6.2
1976Q4	4,462	1,931	6.2
1977Q1	4,498	1,978	6.2
1977Q2	4,535	2,027	6.2
1977Q3	4,574	2,069	6.2
1977Q4	4,613	2,129	6.3
1978Q1	4,653	2,180	6.3
1978Q2	4,693	2,242	6.3
1978Q3	4,734	2,301	6.3
1978Q4	4,774	2,368	6.3
1979Q1	4,814	2,433	6.3
1979Q2	4,853	2,509	6.3
1979Q3	4,890	2,583	6.3
1979Q4	4,927	2,656	6.2
1980Q1	4,964	2,735	6.2
1980Q2	4,999	2,817	6.2
1980Q3	5,035	2,900	6.2

1980Q4	5,070	2,998	6.2
1981Q1	5,104	3,096	6.2
1981Q2	5,138	3,173	6.2
1981Q3	5,171	3,255	6.2
1981Q4	5,204	3,336	6.2
1982Q1	5,238	3,404	6.1
1982Q2	5,271	3,470	6.1
1982Q3	5,306	3,541	6.1
1982Q4	5,341	3,603	6.1
1983Q1	5,377	3,654	6.1
1983Q2	5,415	3,712	6.1
1983Q3	5,453	3,772	6.1
1983Q4	5,492	3,832	6.1
1984Q1	5,532	3,905	6.1
1984Q2	5,572	3,965	6.1
1984Q3	5,613	4,026	6.0
1984Q4	5,656	4,086	6.0
1985Q1	5,700	4,161	6.0
1985Q2	5,744	4,222	6.0
1985Q3	5,790	4,276	6.0
1985Q4	5,837	4,342	6.0
1986Q1	5,884	4,394	6.0
1986Q2	5,931	4,451	6.0
1986Q3	5,979	4,514	6.0
1986Q4	6,026	4,580	6.0
1987Q1	6,073	4,658	6.0
1987Q2	6,120	4,729	6.0
1987Q3	6,167	4,800	6.0
1987Q4	6,214	4,875	6.0
1988Q1	6,260	4,945	5.9
1988Q2	6,307	5,033	5.9
1988Q3	6,355	5,129	5.9
1988Q4	6,402	5,207	5.9
1989Q1	6,449	5,301	5.9
1989Q2	6,497	5,393	5.9
1989Q3	6,544	5,472	5.9
1989Q4	6,591	5,552	5.9
1990Q1	6,637	5,653	5.9
1990Q2	6,683	5,758	5.9
1990Q3	6,729	5,853	5.9
1990Q4	6,773	5,943	5.8
1991Q1	6,818	6,052	5.8
1991Q2	6,861	6,134	5.8
1991Q3	6,905	6,214	5.8

1991Q4	6,947	6,285	5.7
1992Q1	6,989	6,371	5.7
1992Q2	7,031	6,446	5.7
1992Q3	7,073	6,505	5.6
1992Q4	7,116	6,585	5.6
1993Q1	7,159	6,680	5.6
1993Q2	7,202	6,757	5.5
1993Q3	7,247	6,829	5.5
1993Q4	7,292	6,912	5.5
1994Q1	7,338	6,991	5.4
1994Q2	7,386	7,069	5.4
1994Q3	7,435	7,158	5.4
1994Q4	7,485	7,241	5.4
1995Q1	7,537	7,344	5.3
1995Q2	7,589	7,427	5.3
1995Q3	7,643	7,513	5.3
1995Q4	7,699	7,605	5.3
1996Q1	7,756	7,708	5.2
1996Q2	7,814	7,794	5.2
1996Q3	7,874	7,891	5.2
1996Q4	7,935	7,986	5.2
1997Q1	7,999	8,106	5.2
1997Q2	8,064	8,210	5.2
1997Q3	8,130	8,303	5.2
1997Q4	8,198	8,402	5.2
1998Q1	8,268	8,496	5.2
1998Q2	8,338	8,589	5.2
1998Q3	8,409	8,693	5.2
1998Q4	8,482	8,792	5.2
1999Q1	8,556	8,908	5.2
1999Q2	8,631	9,020	5.2
1999Q3	8,708	9,129	5.2
1999Q4	8,786	9,249	5.2
2000Q1	8,864	9,402	5.2
2000Q2	8,943	9,541	5.2
2000Q3	9,022	9,664	5.2
2000Q4	9,099	9,798	5.2
2001Q1	9,178	9,972	5.2
2001Q2	9,256	10,119	5.2
2001Q3	9,336	10,262	5.2
2001Q4	9,415	10,335	5.2
2002Q1	9,496	10,459	5.2
2002Q2	9,578	10,582	5.2
2002Q3	9,661	10,700	5.2

2002Q4	9,743	10,839	5.2
2003Q1	9,826	10,995	5.2
2003Q2	9,909	11,117	5.2
2003Q3	9,993	11,256	5.2
2003Q4	10,076	11,368	5.2
2004Q1	10,160	11,496	5.2
2004Q2	10,243	11,617	5.2
2004Q3	10,324	11,746	5.2
2004Q4	10,404	11,871	5.2
2005Q1	10,483	11,981	5.2
2005Q2	10,563	12,112	5.2
2005Q3	10,643	12,238	5.2
2005Q4	10,723	12,370	5.2
2006Q1	10,804	12,514	5.2
2006Q2	10,885	12,656	5.2
2006Q3	10,967	12,801	5.2
2006Q4	11,048	12,950	5.2
2007Q1	11,130	13,108	5.2
2007Q2	11,211	13,262	5.2
2007Q3	11,293	13,421	5.2
2007Q4	11,375	13,580	5.2
2008Q1	11,458	13,748	5.2
2008Q2	11,540	13,912	5.2
2008Q3	11,623	14,075	5.2
2008Q4	11,706	14,240	5.2
2009Q1	11,789	14,414	5.2
2009Q2	11,871	14,580	5.2
2009Q3	11,952	14,747	5.2
2009Q4	12,032	14,913	5.2
2010Q1	12,111	15,087	5.2
2010Q2	12,189	15,251	5.2
2010Q3	12,267	15,418	5.2
2010Q4	12,344	15,584	5.2
2011Q1	12,421	15,762	5.2
2011Q2	12,499	15,932	5.2
2011Q3	12,576	16,102	5.2
2011Q4	12,654	16,276	5.2
2012Q1	12,733	16,461	5.2
2012Q2	12,813	16,640	5.2
2012Q3	12,893	16,821	5.2
2012Q4	12,975	17,005	5.2
2013Q1	13,057	17,200	5.2
2013Q2	13,139	17,388	5.2
2013Q3	13,221	17,578	5.2

2013Q4	13,303	17,768	5.2
2014Q1	13,386	17,972	5.2
2014Q2	13,468	18,166	5.2
2014Q3	13,551	18,362	5.2
2014Q4	13,633	18,559	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2005 to 2014* , January 2004, www.cbo.gov/publication/15179.

Note: Real potential GDP is expressed in chained 1996 dollars.

et and Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget*
www.cbo.gov/publication/49892

January 2005

	Potential GDP (Billions of dollars)		NAIRU
	Real	Nominal	(Percent)
1949Q1	1,662	275	5.3
1949Q2	1,678	274	5.3
1949Q3	1,696	276	5.3
1949Q4	1,714	279	5.3
1950Q1	1,733	281	5.3
1950Q2	1,752	285	5.3
1950Q3	1,771	295	5.3
1950Q4	1,791	304	5.3
1951Q1	1,812	319	5.3
1951Q2	1,832	324	5.3
1951Q3	1,853	328	5.3
1951Q4	1,874	335	5.3
1952Q1	1,895	339	5.4
1952Q2	1,916	343	5.4
1952Q3	1,936	351	5.4
1952Q4	1,956	356	5.4
1953Q1	1,976	359	5.4
1953Q2	1,995	363	5.4
1953Q3	2,013	368	5.4
1953Q4	2,030	372	5.4
1954Q1	2,047	376	5.4
1954Q2	2,064	380	5.4
1954Q3	2,080	383	5.4
1954Q4	2,096	387	5.4
1955Q1	2,113	392	5.4
1955Q2	2,129	397	5.4
1955Q3	2,146	403	5.4
1955Q4	2,162	410	5.4
1956Q1	2,180	418	5.4
1956Q2	2,197	423	5.4
1956Q3	2,215	433	5.4
1956Q4	2,234	438	5.4
1957Q1	2,253	448	5.4
1957Q2	2,272	455	5.4
1957Q3	2,291	461	5.4

1957Q4	2,311	465	5.4
1958Q1	2,330	474	5.4
1958Q2	2,350	480	5.4
1958Q3	2,371	487	5.4
1958Q4	2,392	494	5.4
1959Q1	2,413	500	5.4
1959Q2	2,435	504	5.4
1959Q3	2,456	510	5.4
1959Q4	2,479	517	5.5
1960Q1	2,501	523	5.5
1960Q2	2,524	530	5.5
1960Q3	2,547	537	5.5
1960Q4	2,570	544	5.5
1961Q1	2,595	550	5.5
1961Q2	2,619	556	5.5
1961Q3	2,644	563	5.5
1961Q4	2,670	571	5.5
1962Q1	2,695	579	5.5
1962Q2	2,721	586	5.5
1962Q3	2,748	593	5.5
1962Q4	2,774	601	5.5
1963Q1	2,801	608	5.5
1963Q2	2,829	615	5.5
1963Q3	2,857	623	5.6
1963Q4	2,886	634	5.6
1964Q1	2,915	642	5.6
1964Q2	2,945	650	5.6
1964Q3	2,976	660	5.6
1964Q4	3,007	670	5.6
1965Q1	3,039	680	5.6
1965Q2	3,072	691	5.7
1965Q3	3,106	701	5.7
1965Q4	3,140	713	5.7
1966Q1	3,176	726	5.7
1966Q2	3,211	740	5.8
1966Q3	3,247	756	5.8
1966Q4	3,284	772	5.8
1967Q1	3,320	784	5.8
1967Q2	3,357	797	5.8
1967Q3	3,395	814	5.8
1967Q4	3,432	832	5.8
1968Q1	3,469	850	5.8
1968Q2	3,506	868	5.8
1968Q3	3,542	886	5.8

1968Q4	3,578	907	5.8
1969Q1	3,614	926	5.8
1969Q2	3,649	947	5.8
1969Q3	3,683	970	5.9
1969Q4	3,717	991	5.9
1970Q1	3,751	1,015	5.9
1970Q2	3,784	1,038	5.9
1970Q3	3,816	1,055	5.9
1970Q4	3,849	1,078	5.9
1971Q1	3,881	1,103	5.9
1971Q2	3,913	1,127	5.9
1971Q3	3,945	1,148	6.0
1971Q4	3,977	1,166	6.0
1972Q1	4,010	1,194	6.0
1972Q2	4,043	1,211	6.0
1972Q3	4,077	1,233	6.1
1972Q4	4,111	1,260	6.1
1973Q1	4,146	1,286	6.1
1973Q2	4,182	1,318	6.1
1973Q3	4,219	1,355	6.1
1973Q4	4,256	1,394	6.2
1974Q1	4,294	1,433	6.2
1974Q2	4,332	1,480	6.2
1974Q3	4,369	1,536	6.2
1974Q4	4,406	1,596	6.2
1975Q1	4,443	1,646	6.2
1975Q2	4,481	1,685	6.2
1975Q3	4,518	1,731	6.2
1975Q4	4,555	1,776	6.2
1976Q1	4,592	1,810	6.2
1976Q2	4,629	1,844	6.2
1976Q3	4,666	1,884	6.2
1976Q4	4,703	1,934	6.2
1977Q1	4,741	1,982	6.2
1977Q2	4,780	2,027	6.2
1977Q3	4,820	2,069	6.2
1977Q4	4,861	2,132	6.3
1978Q1	4,903	2,182	6.3
1978Q2	4,946	2,241	6.3
1978Q3	4,988	2,298	6.3
1978Q4	5,031	2,367	6.3
1979Q1	5,072	2,429	6.3
1979Q2	5,114	2,509	6.3
1979Q3	5,154	2,583	6.3

1979Q4	5,193	2,655	6.2
1980Q1	5,232	2,731	6.2
1980Q2	5,270	2,812	6.2
1980Q3	5,309	2,896	6.2
1980Q4	5,346	2,998	6.2
1981Q1	5,384	3,096	6.2
1981Q2	5,420	3,176	6.2
1981Q3	5,456	3,254	6.2
1981Q4	5,493	3,336	6.2
1982Q1	5,529	3,403	6.1
1982Q2	5,565	3,467	6.1
1982Q3	5,602	3,540	6.1
1982Q4	5,640	3,602	6.1
1983Q1	5,679	3,657	6.1
1983Q2	5,720	3,709	6.1
1983Q3	5,761	3,774	6.1
1983Q4	5,802	3,830	6.1
1984Q1	5,845	3,907	6.1
1984Q2	5,888	3,969	6.1
1984Q3	5,932	4,031	6.0
1984Q4	5,978	4,088	6.0
1985Q1	6,024	4,166	6.0
1985Q2	6,072	4,223	6.0
1985Q3	6,121	4,275	6.0
1985Q4	6,170	4,337	6.0
1986Q1	6,221	4,395	6.0
1986Q2	6,272	4,454	6.0
1986Q3	6,323	4,516	6.0
1986Q4	6,374	4,582	6.0
1987Q1	6,425	4,657	6.0
1987Q2	6,476	4,720	6.0
1987Q3	6,527	4,792	6.0
1987Q4	6,578	4,865	6.0
1988Q1	6,628	4,944	5.9
1988Q2	6,679	5,030	5.9
1988Q3	6,730	5,125	5.9
1988Q4	6,782	5,202	5.9
1989Q1	6,833	5,301	5.9
1989Q2	6,884	5,392	5.9
1989Q3	6,935	5,470	5.9
1989Q4	6,985	5,548	5.9
1990Q1	7,035	5,655	5.9
1990Q2	7,085	5,761	5.9
1990Q3	7,135	5,853	5.9

1990Q4	7,184	5,937	5.8
1991Q1	7,233	6,049	5.8
1991Q2	7,281	6,128	5.8
1991Q3	7,329	6,212	5.8
1991Q4	7,376	6,285	5.7
1992Q1	7,423	6,363	5.7
1992Q2	7,469	6,438	5.7
1992Q3	7,516	6,508	5.6
1992Q4	7,564	6,582	5.6
1993Q1	7,611	6,676	5.6
1993Q2	7,660	6,756	5.5
1993Q3	7,710	6,828	5.5
1993Q4	7,760	6,909	5.5
1994Q1	7,812	6,998	5.4
1994Q2	7,864	7,074	5.4
1994Q3	7,919	7,169	5.4
1994Q4	7,975	7,253	5.4
1995Q1	8,032	7,352	5.3
1995Q2	8,091	7,432	5.3
1995Q3	8,150	7,522	5.3
1995Q4	8,211	7,615	5.3
1996Q1	8,274	7,722	5.2
1996Q2	8,337	7,809	5.2
1996Q3	8,403	7,895	5.2
1996Q4	8,470	8,000	5.2
1997Q1	8,539	8,117	5.2
1997Q2	8,610	8,197	5.2
1997Q3	8,682	8,295	5.2
1997Q4	8,757	8,393	5.2
1998Q1	8,832	8,487	5.2
1998Q2	8,910	8,576	5.2
1998Q3	8,989	8,683	5.2
1998Q4	9,070	8,791	5.2
1999Q1	9,152	8,908	5.2
1999Q2	9,237	9,022	5.2
1999Q3	9,323	9,138	5.2
1999Q4	9,411	9,264	5.2
2000Q1	9,500	9,435	5.2
2000Q2	9,589	9,565	5.2
2000Q3	9,679	9,704	5.2
2000Q4	9,768	9,833	5.2
2001Q1	9,857	10,003	5.2
2001Q2	9,946	10,170	5.2
2001Q3	10,035	10,304	5.2

2001Q4	10,124	10,447	5.2
2002Q1	10,212	10,565	5.2
2002Q2	10,299	10,702	5.2
2002Q3	10,385	10,826	5.2
2002Q4	10,469	10,967	5.2
2003Q1	10,553	11,133	5.2
2003Q2	10,635	11,252	5.2
2003Q3	10,718	11,377	5.2
2003Q4	10,802	11,507	5.2
2004Q1	10,886	11,675	5.2
2004Q2	10,972	11,860	5.2
2004Q3	11,058	11,993	5.2
2004Q4	11,145	12,144	5.2
2005Q1	11,232	12,310	5.2
2005Q2	11,321	12,443	5.2
2005Q3	11,411	12,600	5.2
2005Q4	11,503	12,744	5.2
2006Q1	11,597	12,908	5.2
2006Q2	11,691	13,058	5.2
2006Q3	11,787	13,204	5.2
2006Q4	11,883	13,366	5.2
2007Q1	11,980	13,542	5.2
2007Q2	12,077	13,705	5.2
2007Q3	12,175	13,873	5.2
2007Q4	12,273	14,045	5.2
2008Q1	12,372	14,229	5.2
2008Q2	12,470	14,403	5.2
2008Q3	12,569	14,579	5.2
2008Q4	12,667	14,757	5.2
2009Q1	12,765	14,944	5.2
2009Q2	12,863	15,123	5.2
2009Q3	12,959	15,303	5.2
2009Q4	13,054	15,481	5.2
2010Q1	13,148	15,670	5.2
2010Q2	13,243	15,850	5.2
2010Q3	13,336	16,032	5.2
2010Q4	13,430	16,214	5.2
2011Q1	13,523	16,406	5.2
2011Q2	13,616	16,588	5.2
2011Q3	13,709	16,771	5.2
2011Q4	13,801	16,956	5.2
2012Q1	13,893	17,152	5.2
2012Q2	13,985	17,341	5.2
2012Q3	14,077	17,531	5.2

2012Q4	14,170	17,723	5.2
2013Q1	14,263	17,927	5.2
2013Q2	14,357	18,122	5.2
2013Q3	14,451	18,319	5.2
2013Q4	14,544	18,518	5.2
2014Q1	14,638	18,728	5.2
2014Q2	14,732	18,929	5.2
2014Q3	14,825	19,132	5.2
2014Q4	14,919	19,336	5.2
2015Q1	15,013	19,552	5.2
2015Q2	15,107	19,757	5.2
2015Q3	15,201	19,964	5.2
2015Q4	15,295	20,172	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2006 to 2015* , January 2005, www.cbo.gov/publication/16221.

Note: Real potential GDP is expressed in chained 2000 dollars.

and Economic Outlook: 2015 to 2025.

This file presents data that supplements information in CBO's January 2015 report *The Budget and*
www.cbo.gov/publication/49892

January 2006

	Potential GDP (Billions of dollars)		Natural Rate of Unemployment (Percent)
	Real	Nominal	
1949Q1	1,661	275	5.3
1949Q2	1,678	274	5.3
1949Q3	1,696	276	5.3
1949Q4	1,714	279	5.3
1950Q1	1,733	281	5.3
1950Q2	1,752	285	5.3
1950Q3	1,772	295	5.3
1950Q4	1,792	304	5.3
1951Q1	1,812	319	5.3
1951Q2	1,833	324	5.3
1951Q3	1,854	328	5.3
1951Q4	1,875	336	5.3
1952Q1	1,896	339	5.4
1952Q2	1,917	343	5.4
1952Q3	1,938	351	5.4
1952Q4	1,958	356	5.4
1953Q1	1,977	359	5.4
1953Q2	1,996	363	5.4
1953Q3	2,014	368	5.4
1953Q4	2,032	372	5.4
1954Q1	2,049	377	5.4
1954Q2	2,066	380	5.4
1954Q3	2,082	384	5.4
1954Q4	2,099	388	5.4
1955Q1	2,115	393	5.4
1955Q2	2,132	397	5.4
1955Q3	2,148	404	5.4
1955Q4	2,165	411	5.4
1956Q1	2,182	418	5.4
1956Q2	2,200	424	5.4
1956Q3	2,218	433	5.4
1956Q4	2,236	438	5.4
1957Q1	2,255	448	5.4
1957Q2	2,275	455	5.4
1957Q3	2,294	462	5.4

1957Q4	2,313	466	5.4
1958Q1	2,333	475	5.4
1958Q2	2,353	480	5.4
1958Q3	2,373	488	5.4
1958Q4	2,394	495	5.4
1959Q1	2,415	500	5.4
1959Q2	2,437	504	5.4
1959Q3	2,459	510	5.4
1959Q4	2,481	517	5.5
1960Q1	2,503	524	5.5
1960Q2	2,526	530	5.5
1960Q3	2,549	537	5.5
1960Q4	2,572	544	5.5
1961Q1	2,597	550	5.5
1961Q2	2,621	557	5.5
1961Q3	2,646	564	5.5
1961Q4	2,671	571	5.5
1962Q1	2,697	580	5.5
1962Q2	2,723	586	5.5
1962Q3	2,749	593	5.5
1962Q4	2,776	601	5.5
1963Q1	2,803	608	5.5
1963Q2	2,830	615	5.5
1963Q3	2,858	623	5.6
1963Q4	2,887	634	5.6
1964Q1	2,916	642	5.6
1964Q2	2,946	650	5.6
1964Q3	2,977	660	5.6
1964Q4	3,008	670	5.6
1965Q1	3,040	680	5.6
1965Q2	3,073	691	5.7
1965Q3	3,107	701	5.7
1965Q4	3,141	713	5.7
1966Q1	3,176	726	5.7
1966Q2	3,212	740	5.8
1966Q3	3,247	756	5.8
1966Q4	3,284	772	5.8
1967Q1	3,320	784	5.8
1967Q2	3,357	797	5.8
1967Q3	3,394	814	5.8
1967Q4	3,431	832	5.8
1968Q1	3,468	850	5.8
1968Q2	3,504	868	5.8
1968Q3	3,541	885	5.8

1968Q4	3,577	907	5.8
1969Q1	3,612	926	5.8
1969Q2	3,647	947	5.8
1969Q3	3,681	969	5.9
1969Q4	3,715	991	5.9
1970Q1	3,749	1,014	5.9
1970Q2	3,782	1,037	5.9
1970Q3	3,815	1,055	5.9
1970Q4	3,847	1,077	5.9
1971Q1	3,879	1,103	5.9
1971Q2	3,912	1,127	5.9
1971Q3	3,944	1,147	6.0
1971Q4	3,977	1,166	6.0
1972Q1	4,010	1,194	6.0
1972Q2	4,043	1,211	6.0
1972Q3	4,077	1,233	6.1
1972Q4	4,111	1,260	6.1
1973Q1	4,147	1,286	6.1
1973Q2	4,183	1,318	6.1
1973Q3	4,220	1,355	6.1
1973Q4	4,257	1,394	6.2
1974Q1	4,295	1,433	6.2
1974Q2	4,332	1,480	6.2
1974Q3	4,369	1,537	6.2
1974Q4	4,407	1,596	6.2
1975Q1	4,444	1,646	6.2
1975Q2	4,481	1,685	6.2
1975Q3	4,518	1,731	6.2
1975Q4	4,555	1,776	6.2
1976Q1	4,592	1,810	6.2
1976Q2	4,629	1,844	6.2
1976Q3	4,666	1,884	6.2
1976Q4	4,703	1,934	6.2
1977Q1	4,741	1,982	6.2
1977Q2	4,780	2,027	6.2
1977Q3	4,820	2,069	6.2
1977Q4	4,862	2,132	6.3
1978Q1	4,904	2,182	6.3
1978Q2	4,946	2,242	6.3
1978Q3	4,989	2,298	6.3
1978Q4	5,031	2,367	6.3
1979Q1	5,073	2,429	6.3
1979Q2	5,114	2,509	6.3
1979Q3	5,154	2,583	6.3

1979Q4	5,194	2,655	6.2
1980Q1	5,233	2,731	6.2
1980Q2	5,271	2,812	6.2
1980Q3	5,309	2,897	6.2
1980Q4	5,347	2,998	6.2
1981Q1	5,384	3,097	6.2
1981Q2	5,421	3,177	6.2
1981Q3	5,457	3,255	6.2
1981Q4	5,493	3,336	6.2
1982Q1	5,529	3,404	6.1
1982Q2	5,566	3,468	6.1
1982Q3	5,603	3,540	6.1
1982Q4	5,641	3,603	6.1
1983Q1	5,681	3,658	6.1
1983Q2	5,721	3,710	6.1
1983Q3	5,763	3,775	6.1
1983Q4	5,804	3,832	6.1
1984Q1	5,847	3,908	6.1
1984Q2	5,890	3,971	6.1
1984Q3	5,935	4,033	6.0
1984Q4	5,980	4,089	6.0
1985Q1	6,027	4,168	6.0
1985Q2	6,075	4,225	6.0
1985Q3	6,123	4,276	6.0
1985Q4	6,173	4,339	6.0
1986Q1	6,224	4,397	6.0
1986Q2	6,275	4,456	6.0
1986Q3	6,327	4,519	6.0
1986Q4	6,378	4,585	6.0
1987Q1	6,429	4,660	6.0
1987Q2	6,480	4,723	6.0
1987Q3	6,531	4,796	6.0
1987Q4	6,582	4,868	6.0
1988Q1	6,634	4,948	5.9
1988Q2	6,685	5,034	5.9
1988Q3	6,736	5,129	5.9
1988Q4	6,787	5,207	5.9
1989Q1	6,838	5,305	5.9
1989Q2	6,889	5,396	5.9
1989Q3	6,940	5,474	5.9
1989Q4	6,990	5,552	5.9
1990Q1	7,040	5,659	5.9
1990Q2	7,090	5,765	5.9
1990Q3	7,139	5,856	5.9

1990Q4	7,187	5,940	5.8
1991Q1	7,235	6,051	5.8
1991Q2	7,283	6,130	5.8
1991Q3	7,330	6,213	5.8
1991Q4	7,377	6,286	5.7
1992Q1	7,424	6,364	5.7
1992Q2	7,470	6,439	5.7
1992Q3	7,517	6,508	5.6
1992Q4	7,564	6,583	5.6
1993Q1	7,612	6,676	5.6
1993Q2	7,661	6,756	5.5
1993Q3	7,710	6,829	5.5
1993Q4	7,760	6,910	5.5
1994Q1	7,812	6,998	5.4
1994Q2	7,865	7,075	5.4
1994Q3	7,919	7,169	5.4
1994Q4	7,975	7,253	5.4
1995Q1	8,031	7,351	5.3
1995Q2	8,089	7,431	5.3
1995Q3	8,148	7,520	5.3
1995Q4	8,208	7,612	5.3
1996Q1	8,270	7,718	5.2
1996Q2	8,333	7,804	5.2
1996Q3	8,397	7,889	5.2
1996Q4	8,464	7,994	5.2
1997Q1	8,532	8,110	5.2
1997Q2	8,601	8,189	5.2
1997Q3	8,673	8,285	5.2
1997Q4	8,746	8,382	5.2
1998Q1	8,820	8,475	5.2
1998Q2	8,897	8,563	5.2
1998Q3	8,975	8,669	5.2
1998Q4	9,054	8,776	5.2
1999Q1	9,136	8,891	5.2
1999Q2	9,219	9,004	5.2
1999Q3	9,304	9,119	5.2
1999Q4	9,391	9,243	5.2
2000Q1	9,478	9,413	5.2
2000Q2	9,566	9,541	5.2
2000Q3	9,653	9,678	5.2
2000Q4	9,741	9,806	5.2
2001Q1	9,828	9,973	5.2
2001Q2	9,915	10,138	5.2
2001Q3	10,002	10,269	5.2

2001Q4	10,088	10,410	5.2
2002Q1	10,174	10,537	5.2
2002Q2	10,259	10,663	5.2
2002Q3	10,342	10,789	5.2
2002Q4	10,423	10,934	5.2
2003Q1	10,503	11,102	5.2
2003Q2	10,582	11,218	5.2
2003Q3	10,661	11,354	5.2
2003Q4	10,740	11,490	5.2
2004Q1	10,820	11,681	5.2
2004Q2	10,900	11,880	5.2
2004Q3	10,982	12,008	5.2
2004Q4	11,063	12,178	5.2
2005Q1	11,146	12,362	5.2
2005Q2	11,231	12,536	5.2
2005Q3	11,316	12,725	5.2
2005Q4	11,404	12,921	5.2
2006Q1	11,493	13,110	5.2
2006Q2	11,584	13,270	5.2
2006Q3	11,676	13,428	5.2
2006Q4	11,769	13,597	5.2
2007Q1	11,863	13,774	5.2
2007Q2	11,959	13,941	5.2
2007Q3	12,054	14,115	5.2
2007Q4	12,151	14,289	5.2
2008Q1	12,247	14,479	5.2
2008Q2	12,343	14,653	5.2
2008Q3	12,440	14,831	5.2
2008Q4	12,536	15,014	5.2
2009Q1	12,632	15,202	5.2
2009Q2	12,727	15,383	5.2
2009Q3	12,821	15,564	5.2
2009Q4	12,914	15,746	5.2
2010Q1	13,007	15,937	5.2
2010Q2	13,099	16,119	5.2
2010Q3	13,190	16,303	5.2
2010Q4	13,282	16,487	5.2
2011Q1	13,373	16,680	5.2
2011Q2	13,463	16,864	5.2
2011Q3	13,553	17,048	5.2
2011Q4	13,643	17,233	5.2
2012Q1	13,733	17,432	5.2
2012Q2	13,823	17,623	5.2
2012Q3	13,913	17,816	5.2

2012Q4	14,004	18,011	5.2
2013Q1	14,096	18,217	5.2
2013Q2	14,187	18,415	5.2
2013Q3	14,279	18,611	5.2
2013Q4	14,371	18,813	5.2
2014Q1	14,463	19,024	5.2
2014Q2	14,555	19,227	5.2
2014Q3	14,648	19,432	5.2
2014Q4	14,741	19,642	5.2
2015Q1	14,834	19,861	5.2
2015Q2	14,928	20,073	5.2
2015Q3	15,022	20,286	5.2
2015Q4	15,116	20,502	5.2
2016Q1	15,211	20,732	5.2
2016Q2	15,306	20,954	5.2
2016Q3	15,401	21,178	5.2
2016Q4	15,497	21,403	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2007 to 2016* , January 2006, www.cbo.gov/publication/17601.

Note: Real potential GDP is expressed in chained 2000 dollars.

Economic Outlook: 2015 to 2025.

This file presents data that supplements information in CBO's January 2015 report *The Budget anc*
www.cbo.gov/publication/49892

January 2007

	Potential GDP (Billions of dollars)		Natural Rate of Unemployment (Percent)
	Real	Nominal	
1949Q1	1,667	276	5.2
1949Q2	1,683	275	5.3
1949Q3	1,699	276	5.3
1949Q4	1,715	279	5.3
1950Q1	1,732	281	5.3
1950Q2	1,749	285	5.3
1950Q3	1,768	294	5.3
1950Q4	1,787	303	5.3
1951Q1	1,807	318	5.3
1951Q2	1,828	323	5.3
1951Q3	1,850	328	5.3
1951Q4	1,872	335	5.3
1952Q1	1,894	339	5.4
1952Q2	1,916	343	5.4
1952Q3	1,937	351	5.4
1952Q4	1,958	356	5.4
1953Q1	1,977	359	5.4
1953Q2	1,996	363	5.4
1953Q3	2,014	368	5.4
1953Q4	2,032	372	5.4
1954Q1	2,049	376	5.4
1954Q2	2,065	380	5.4
1954Q3	2,081	383	5.4
1954Q4	2,097	387	5.4
1955Q1	2,112	392	5.4
1955Q2	2,129	397	5.4
1955Q3	2,145	403	5.4
1955Q4	2,162	410	5.4
1956Q1	2,180	418	5.4
1956Q2	2,198	424	5.4
1956Q3	2,217	433	5.4
1956Q4	2,236	438	5.4
1957Q1	2,255	448	5.4
1957Q2	2,275	455	5.4
1957Q3	2,296	462	5.4

1957Q4	2,316	466	5.4
1958Q1	2,337	476	5.4
1958Q2	2,357	481	5.4
1958Q3	2,377	489	5.4
1958Q4	2,397	495	5.4
1959Q1	2,418	500	5.4
1959Q2	2,438	505	5.4
1959Q3	2,460	510	5.4
1959Q4	2,481	517	5.4
1960Q1	2,504	524	5.5
1960Q2	2,528	531	5.5
1960Q3	2,552	538	5.5
1960Q4	2,576	545	5.5
1961Q1	2,600	551	5.5
1961Q2	2,624	557	5.5
1961Q3	2,649	564	5.5
1961Q4	2,673	571	5.5
1962Q1	2,698	580	5.5
1962Q2	2,724	587	5.5
1962Q3	2,750	594	5.5
1962Q4	2,776	601	5.5
1963Q1	2,804	608	5.5
1963Q2	2,831	616	5.5
1963Q3	2,859	623	5.6
1963Q4	2,888	634	5.6
1964Q1	2,916	642	5.6
1964Q2	2,946	650	5.6
1964Q3	2,975	659	5.6
1964Q4	3,006	669	5.6
1965Q1	3,037	680	5.6
1965Q2	3,069	690	5.7
1965Q3	3,102	700	5.7
1965Q4	3,135	712	5.7
1966Q1	3,170	725	5.7
1966Q2	3,206	739	5.8
1966Q3	3,243	755	5.8
1966Q4	3,280	771	5.8
1967Q1	3,318	783	5.8
1967Q2	3,355	797	5.8
1967Q3	3,393	813	5.8
1967Q4	3,430	831	5.8
1968Q1	3,466	849	5.8
1968Q2	3,502	867	5.8
1968Q3	3,539	885	5.8

1968Q4	3,575	907	5.8
1969Q1	3,611	925	5.8
1969Q2	3,647	947	5.8
1969Q3	3,683	970	5.9
1969Q4	3,718	992	5.9
1970Q1	3,752	1,015	5.9
1970Q2	3,786	1,038	5.9
1970Q3	3,818	1,056	5.9
1970Q4	3,851	1,078	5.9
1971Q1	3,882	1,103	5.9
1971Q2	3,913	1,127	5.9
1971Q3	3,945	1,147	5.9
1971Q4	3,976	1,166	6.0
1972Q1	4,008	1,194	6.0
1972Q2	4,041	1,211	6.0
1972Q3	4,074	1,232	6.0
1972Q4	4,108	1,259	6.1
1973Q1	4,144	1,285	6.1
1973Q2	4,180	1,317	6.1
1973Q3	4,217	1,354	6.1
1973Q4	4,256	1,394	6.1
1974Q1	4,295	1,434	6.2
1974Q2	4,335	1,481	6.2
1974Q3	4,376	1,539	6.2
1974Q4	4,416	1,599	6.2
1975Q1	4,455	1,650	6.2
1975Q2	4,492	1,690	6.2
1975Q3	4,529	1,735	6.2
1975Q4	4,565	1,780	6.2
1976Q1	4,600	1,813	6.2
1976Q2	4,636	1,847	6.2
1976Q3	4,672	1,887	6.2
1976Q4	4,708	1,936	6.2
1977Q1	4,746	1,984	6.2
1977Q2	4,785	2,029	6.2
1977Q3	4,825	2,071	6.2
1977Q4	4,867	2,134	6.2
1978Q1	4,910	2,185	6.3
1978Q2	4,955	2,246	6.3
1978Q3	5,001	2,304	6.3
1978Q4	5,048	2,375	6.3
1979Q1	5,094	2,439	6.3
1979Q2	5,138	2,520	6.3
1979Q3	5,179	2,596	6.2

1979Q4	5,217	2,667	6.2
1980Q1	5,250	2,740	6.2
1980Q2	5,279	2,816	6.2
1980Q3	5,305	2,894	6.2
1980Q4	5,330	2,989	6.2
1981Q1	5,357	3,081	6.2
1981Q2	5,388	3,157	6.2
1981Q3	5,421	3,233	6.2
1981Q4	5,458	3,314	6.1
1982Q1	5,498	3,384	6.1
1982Q2	5,540	3,451	6.1
1982Q3	5,583	3,527	6.1
1982Q4	5,626	3,593	6.1
1983Q1	5,667	3,649	6.1
1983Q2	5,707	3,701	6.1
1983Q3	5,748	3,766	6.1
1983Q4	5,790	3,822	6.1
1984Q1	5,833	3,899	6.1
1984Q2	5,879	3,963	6.0
1984Q3	5,927	4,027	6.0
1984Q4	5,976	4,086	6.0
1985Q1	6,026	4,168	6.0
1985Q2	6,078	4,227	6.0
1985Q3	6,130	4,281	6.0
1985Q4	6,182	4,345	6.0
1986Q1	6,233	4,404	6.0
1986Q2	6,284	4,463	6.0
1986Q3	6,334	4,524	6.0
1986Q4	6,384	4,590	6.0
1987Q1	6,434	4,664	6.0
1987Q2	6,484	4,726	6.0
1987Q3	6,534	4,797	6.0
1987Q4	6,584	4,869	6.0
1988Q1	6,634	4,948	5.9
1988Q2	6,684	5,033	5.9
1988Q3	6,735	5,128	5.9
1988Q4	6,785	5,205	5.9
1989Q1	6,837	5,304	5.9
1989Q2	6,888	5,395	5.9
1989Q3	6,939	5,474	5.9
1989Q4	6,991	5,553	5.9
1990Q1	7,042	5,660	5.9
1990Q2	7,093	5,768	5.9
1990Q3	7,143	5,860	5.9

1990Q4	7,193	5,944	5.8
1991Q1	7,241	6,055	5.8
1991Q2	7,287	6,133	5.8
1991Q3	7,333	6,216	5.8
1991Q4	7,378	6,287	5.7
1992Q1	7,423	6,363	5.7
1992Q2	7,468	6,437	5.7
1992Q3	7,513	6,505	5.6
1992Q4	7,559	6,579	5.6
1993Q1	7,607	6,671	5.6
1993Q2	7,655	6,751	5.5
1993Q3	7,705	6,824	5.5
1993Q4	7,756	6,906	5.5
1994Q1	7,808	6,994	5.4
1994Q2	7,861	7,071	5.4
1994Q3	7,916	7,166	5.4
1994Q4	7,972	7,250	5.4
1995Q1	8,029	7,349	5.3
1995Q2	8,087	7,428	5.3
1995Q3	8,146	7,518	5.3
1995Q4	8,206	7,610	5.2
1996Q1	8,268	7,716	5.2
1996Q2	8,330	7,802	5.2
1996Q3	8,394	7,886	5.2
1996Q4	8,459	7,990	5.2
1997Q1	8,526	8,104	5.1
1997Q2	8,595	8,183	5.1
1997Q3	8,665	8,278	5.1
1997Q4	8,737	8,374	5.1
1998Q1	8,812	8,467	5.1
1998Q2	8,888	8,554	5.1
1998Q3	8,966	8,661	5.1
1998Q4	9,045	8,768	5.0
1999Q1	9,126	8,882	5.0
1999Q2	9,208	8,993	5.0
1999Q3	9,291	9,106	5.0
1999Q4	9,376	9,229	5.0
2000Q1	9,462	9,397	5.0
2000Q2	9,550	9,526	5.0
2000Q3	9,639	9,664	5.0
2000Q4	9,728	9,792	5.0
2001Q1	9,816	9,961	5.0
2001Q2	9,902	10,125	5.0
2001Q3	9,986	10,253	5.0

2001Q4	10,068	10,389	5.0
2002Q1	10,147	10,509	5.0
2002Q2	10,223	10,626	5.0
2002Q3	10,298	10,744	5.0
2002Q4	10,372	10,880	5.0
2003Q1	10,445	11,042	5.0
2003Q2	10,517	11,154	5.0
2003Q3	10,588	11,288	5.0
2003Q4	10,660	11,426	5.0
2004Q1	10,732	11,610	5.0
2004Q2	10,804	11,794	5.0
2004Q3	10,876	11,934	5.0
2004Q4	10,950	12,110	5.0
2005Q1	11,024	12,296	5.0
2005Q2	11,098	12,455	5.0
2005Q3	11,174	12,640	5.0
2005Q4	11,250	12,829	5.0
2006Q1	11,326	13,020	5.0
2006Q2	11,403	13,215	5.0
2006Q3	11,481	13,363	5.0
2006Q4	11,560	13,490	5.0
2007Q1	11,639	13,663	5.0
2007Q2	11,720	13,824	5.0
2007Q3	11,802	13,983	5.0
2007Q4	11,885	14,149	5.0
2008Q1	11,969	14,316	5.0
2008Q2	12,053	14,473	5.0
2008Q3	12,138	14,640	5.0
2008Q4	12,224	14,809	5.0
2009Q1	12,310	14,987	5.0
2009Q2	12,396	15,155	5.0
2009Q3	12,482	15,326	5.0
2009Q4	12,568	15,497	5.0
2010Q1	12,654	15,680	5.0
2010Q2	12,739	15,851	5.0
2010Q3	12,825	16,024	5.0
2010Q4	12,910	16,199	5.0
2011Q1	12,995	16,385	5.0
2011Q2	13,081	16,562	5.0
2011Q3	13,167	16,742	5.0
2011Q4	13,253	16,923	5.0
2012Q1	13,341	17,117	5.0
2012Q2	13,429	17,304	5.0
2012Q3	13,516	17,492	5.0

2012Q4	13,604	17,681	5.0
2013Q1	13,692	17,881	5.0
2013Q2	13,780	18,073	5.0
2013Q3	13,868	18,267	5.0
2013Q4	13,956	18,461	5.0
2014Q1	14,043	18,668	5.0
2014Q2	14,131	18,867	5.0
2014Q3	14,219	19,067	5.0
2014Q4	14,307	19,268	5.0
2015Q1	14,396	19,482	5.0
2015Q2	14,484	19,688	5.0
2015Q3	14,573	19,895	5.0
2015Q4	14,662	20,104	5.0
2016Q1	14,752	20,324	5.0
2016Q2	14,841	20,534	5.0
2016Q3	14,931	20,746	5.0
2016Q4	15,022	20,960	5.0
2017Q1	15,113	21,188	5.0
2017Q2	15,205	21,408	5.0
2017Q3	15,297	21,630	5.0
2017Q4	15,390	21,854	5.0

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2008 to 2017* , January 2007, www.cbo.gov/publication/18291.

Note: Real potential GDP is expressed in chained 2000 dollars.

d Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget and*
www.cbo.gov/publication/49892

January 2008

	Potential GDP (Billions of dollars)		Natural Rate of Unemployment (Percent)
	Real	Nominal	
1949Q1	1,667	276	5.2
1949Q2	1,683	275	5.3
1949Q3	1,699	276	5.3
1949Q4	1,715	279	5.3
1950Q1	1,732	281	5.3
1950Q2	1,749	285	5.3
1950Q3	1,768	294	5.3
1950Q4	1,787	303	5.3
1951Q1	1,807	318	5.3
1951Q2	1,828	323	5.3
1951Q3	1,850	327	5.3
1951Q4	1,872	335	5.3
1952Q1	1,894	339	5.4
1952Q2	1,916	343	5.4
1952Q3	1,937	351	5.4
1952Q4	1,957	356	5.4
1953Q1	1,977	359	5.4
1953Q2	1,996	363	5.4
1953Q3	2,014	368	5.4
1953Q4	2,032	372	5.4
1954Q1	2,049	376	5.4
1954Q2	2,065	380	5.4
1954Q3	2,081	383	5.4
1954Q4	2,097	387	5.4
1955Q1	2,112	392	5.4
1955Q2	2,128	397	5.4
1955Q3	2,145	403	5.4
1955Q4	2,162	410	5.4
1956Q1	2,180	418	5.4
1956Q2	2,198	424	5.4
1956Q3	2,217	433	5.4
1956Q4	2,236	438	5.4
1957Q1	2,255	448	5.4
1957Q2	2,275	455	5.4
1957Q3	2,296	462	5.4

1957Q4	2,316	466	5.4
1958Q1	2,337	476	5.4
1958Q2	2,357	481	5.4
1958Q3	2,377	489	5.4
1958Q4	2,397	495	5.4
1959Q1	2,418	501	5.4
1959Q2	2,438	505	5.4
1959Q3	2,460	510	5.4
1959Q4	2,482	517	5.4
1960Q1	2,505	524	5.5
1960Q2	2,528	531	5.5
1960Q3	2,552	538	5.5
1960Q4	2,576	545	5.5
1961Q1	2,600	551	5.5
1961Q2	2,624	557	5.5
1961Q3	2,649	564	5.5
1961Q4	2,673	571	5.5
1962Q1	2,698	580	5.5
1962Q2	2,724	586	5.5
1962Q3	2,750	594	5.5
1962Q4	2,776	601	5.5
1963Q1	2,803	608	5.5
1963Q2	2,831	616	5.5
1963Q3	2,859	623	5.6
1963Q4	2,887	634	5.6
1964Q1	2,916	642	5.6
1964Q2	2,945	650	5.6
1964Q3	2,975	659	5.6
1964Q4	3,005	669	5.6
1965Q1	3,036	680	5.6
1965Q2	3,068	690	5.7
1965Q3	3,101	700	5.7
1965Q4	3,135	712	5.7
1966Q1	3,170	725	5.7
1966Q2	3,206	739	5.8
1966Q3	3,243	755	5.8
1966Q4	3,280	771	5.8
1967Q1	3,318	783	5.8
1967Q2	3,355	797	5.8
1967Q3	3,392	813	5.8
1967Q4	3,429	831	5.8
1968Q1	3,466	849	5.8
1968Q2	3,502	867	5.8
1968Q3	3,538	885	5.8

1968Q4	3,574	906	5.8
1969Q1	3,610	925	5.8
1969Q2	3,647	947	5.8
1969Q3	3,682	970	5.9
1969Q4	3,718	992	5.9
1970Q1	3,752	1,015	5.9
1970Q2	3,786	1,038	5.9
1970Q3	3,818	1,056	5.9
1970Q4	3,850	1,078	5.9
1971Q1	3,882	1,103	5.9
1971Q2	3,913	1,127	5.9
1971Q3	3,945	1,147	5.9
1971Q4	3,976	1,166	6.0
1972Q1	4,008	1,194	6.0
1972Q2	4,041	1,211	6.0
1972Q3	4,074	1,233	6.0
1972Q4	4,109	1,259	6.1
1973Q1	4,144	1,285	6.1
1973Q2	4,180	1,317	6.1
1973Q3	4,218	1,355	6.1
1973Q4	4,256	1,394	6.1
1974Q1	4,295	1,434	6.2
1974Q2	4,336	1,481	6.2
1974Q3	4,376	1,539	6.2
1974Q4	4,416	1,599	6.2
1975Q1	4,455	1,650	6.2
1975Q2	4,492	1,690	6.2
1975Q3	4,529	1,735	6.2
1975Q4	4,565	1,780	6.2
1976Q1	4,600	1,813	6.2
1976Q2	4,635	1,847	6.2
1976Q3	4,671	1,886	6.2
1976Q4	4,707	1,936	6.2
1977Q1	4,745	1,983	6.2
1977Q2	4,784	2,028	6.2
1977Q3	4,824	2,070	6.2
1977Q4	4,865	2,133	6.2
1978Q1	4,908	2,184	6.3
1978Q2	4,953	2,245	6.3
1978Q3	4,999	2,303	6.3
1978Q4	5,046	2,374	6.3
1979Q1	5,091	2,438	6.3
1979Q2	5,136	2,519	6.3
1979Q3	5,177	2,594	6.2

1979Q4	5,215	2,666	6.2
1980Q1	5,249	2,739	6.2
1980Q2	5,277	2,815	6.2
1980Q3	5,304	2,894	6.2
1980Q4	5,330	2,989	6.2
1981Q1	5,358	3,081	6.2
1981Q2	5,389	3,158	6.2
1981Q3	5,422	3,234	6.2
1981Q4	5,459	3,315	6.1
1982Q1	5,500	3,385	6.1
1982Q2	5,542	3,452	6.1
1982Q3	5,585	3,528	6.1
1982Q4	5,628	3,594	6.1
1983Q1	5,669	3,650	6.1
1983Q2	5,709	3,703	6.1
1983Q3	5,750	3,767	6.1
1983Q4	5,792	3,823	6.1
1984Q1	5,836	3,900	6.1
1984Q2	5,882	3,965	6.0
1984Q3	5,929	4,029	6.0
1984Q4	5,978	4,088	6.0
1985Q1	6,029	4,170	6.0
1985Q2	6,081	4,229	6.0
1985Q3	6,133	4,283	6.0
1985Q4	6,185	4,348	6.0
1986Q1	6,237	4,406	6.0
1986Q2	6,287	4,465	6.0
1986Q3	6,338	4,527	6.0
1986Q4	6,388	4,593	6.0
1987Q1	6,438	4,667	6.0
1987Q2	6,488	4,729	6.0
1987Q3	6,538	4,800	6.0
1987Q4	6,588	4,872	6.0
1988Q1	6,638	4,951	5.9
1988Q2	6,688	5,036	5.9
1988Q3	6,739	5,131	5.9
1988Q4	6,790	5,209	5.9
1989Q1	6,841	5,308	5.9
1989Q2	6,893	5,399	5.9
1989Q3	6,944	5,478	5.9
1989Q4	6,996	5,557	5.9
1990Q1	7,047	5,665	5.9
1990Q2	7,098	5,772	5.9
1990Q3	7,149	5,864	5.9

1990Q4	7,198	5,949	5.8
1991Q1	7,246	6,060	5.8
1991Q2	7,293	6,138	5.8
1991Q3	7,339	6,221	5.8
1991Q4	7,384	6,292	5.7
1992Q1	7,429	6,368	5.7
1992Q2	7,474	6,442	5.7
1992Q3	7,519	6,510	5.6
1992Q4	7,565	6,584	5.6
1993Q1	7,612	6,676	5.6
1993Q2	7,661	6,756	5.5
1993Q3	7,710	6,829	5.5
1993Q4	7,761	6,910	5.5
1994Q1	7,813	6,999	5.4
1994Q2	7,866	7,076	5.4
1994Q3	7,920	7,170	5.4
1994Q4	7,976	7,254	5.3
1995Q1	8,032	7,352	5.3
1995Q2	8,089	7,431	5.3
1995Q3	8,148	7,520	5.3
1995Q4	8,208	7,612	5.2
1996Q1	8,269	7,718	5.2
1996Q2	8,332	7,803	5.2
1996Q3	8,395	7,887	5.1
1996Q4	8,461	7,991	5.1
1997Q1	8,527	8,105	5.1
1997Q2	8,596	8,183	5.1
1997Q3	8,666	8,278	5.0
1997Q4	8,738	8,374	5.0
1998Q1	8,812	8,467	5.0
1998Q2	8,887	8,554	5.0
1998Q3	8,965	8,660	5.0
1998Q4	9,044	8,766	4.9
1999Q1	9,124	8,880	4.9
1999Q2	9,206	8,991	4.9
1999Q3	9,289	9,104	4.9
1999Q4	9,373	9,226	4.9
2000Q1	9,459	9,394	4.9
2000Q2	9,546	9,521	4.8
2000Q3	9,633	9,658	4.8
2000Q4	9,720	9,784	4.8
2001Q1	9,805	9,949	4.8
2001Q2	9,888	10,110	4.8
2001Q3	9,969	10,234	4.8

2001Q4	10,047	10,366	4.8
2002Q1	10,121	10,480	4.8
2002Q2	10,193	10,592	4.8
2002Q3	10,263	10,705	4.8
2002Q4	10,331	10,836	4.8
2003Q1	10,400	10,992	4.8
2003Q2	10,468	11,099	4.8
2003Q3	10,535	11,228	4.8
2003Q4	10,603	11,362	4.8
2004Q1	10,672	11,540	4.8
2004Q2	10,742	11,723	4.8
2004Q3	10,812	11,867	4.8
2004Q4	10,883	12,040	4.8
2005Q1	10,956	12,236	4.8
2005Q2	11,030	12,398	4.8
2005Q3	11,104	12,588	4.8
2005Q4	11,180	12,784	4.8
2006Q1	11,256	12,980	4.8
2006Q2	11,333	13,181	4.8
2006Q3	11,411	13,349	4.8
2006Q4	11,489	13,497	4.8
2007Q1	11,568	13,731	4.8
2007Q2	11,647	13,915	4.8
2007Q3	11,727	14,042	4.8
2007Q4	11,807	14,178	4.8
2008Q1	11,888	14,370	4.8
2008Q2	11,969	14,543	4.8
2008Q3	12,050	14,707	4.8
2008Q4	12,130	14,873	4.8
2009Q1	12,211	15,047	4.8
2009Q2	12,292	15,208	4.8
2009Q3	12,373	15,371	4.8
2009Q4	12,454	15,540	4.8
2010Q1	12,535	15,725	4.8
2010Q2	12,616	15,899	4.8
2010Q3	12,697	16,069	4.8
2010Q4	12,779	16,242	4.8
2011Q1	12,862	16,429	4.8
2011Q2	12,945	16,608	4.8
2011Q3	13,028	16,787	4.8
2011Q4	13,113	16,969	4.8
2012Q1	13,198	17,168	4.8
2012Q2	13,284	17,360	4.8
2012Q3	13,371	17,554	4.8

2012Q4	13,458	17,747	4.8
2013Q1	13,545	17,952	4.8
2013Q2	13,631	18,149	4.8
2013Q3	13,718	18,346	4.8
2013Q4	13,805	18,545	4.8
2014Q1	13,892	18,755	4.8
2014Q2	13,978	18,958	4.8
2014Q3	14,065	19,162	4.8
2014Q4	14,152	19,367	4.8
2015Q1	14,238	19,584	4.8
2015Q2	14,325	19,792	4.8
2015Q3	14,411	20,001	4.8
2015Q4	14,498	20,212	4.8
2016Q1	14,585	20,437	4.8
2016Q2	14,673	20,652	4.8
2016Q3	14,761	20,868	4.8
2016Q4	14,849	21,087	4.8
2017Q1	14,938	21,320	4.8
2017Q2	15,027	21,543	4.8
2017Q3	15,117	21,768	4.8
2017Q4	15,208	21,996	4.8
2018Q1	15,299	22,243	4.8
2018Q2	15,391	22,478	4.8
2018Q3	15,483	22,714	4.8
2018Q4	15,575	22,951	4.8

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2008 to 2018* , January 2008, www.cbo.gov/publication/41661.

Note: Real potential GDP is expressed in chained 2000 dollars.

d Economic Outlook: 2015 to 2025.

This file presents data that supplements information in CBO's January 2015 report *The Budget anc*
www.cbo.gov/publication/49892

January 2009

	Potential GDP (Billions of dollars)		Natural Rate of Unemployment
	Real	Nominal	(Percent)
1949Q1	1,656	274	5.3
1949Q2	1,673	274	5.3
1949Q3	1,691	275	5.3
1949Q4	1,709	278	5.3
1950Q1	1,727	280	5.3
1950Q2	1,746	285	5.3
1950Q3	1,767	294	5.3
1950Q4	1,788	303	5.3
1951Q1	1,810	318	5.3
1951Q2	1,833	324	5.3
1951Q3	1,857	329	5.3
1951Q4	1,881	337	5.3
1952Q1	1,905	341	5.4
1952Q2	1,929	346	5.4
1952Q3	1,952	354	5.4
1952Q4	1,974	359	5.4
1953Q1	1,995	363	5.4
1953Q2	2,014	367	5.4
1953Q3	2,032	371	5.4
1953Q4	2,048	375	5.4
1954Q1	2,064	379	5.4
1954Q2	2,079	382	5.4
1954Q3	2,093	386	5.4
1954Q4	2,107	389	5.4
1955Q1	2,121	394	5.4
1955Q2	2,135	398	5.4
1955Q3	2,150	404	5.4
1955Q4	2,166	411	5.4
1956Q1	2,182	418	5.4
1956Q2	2,199	424	5.4
1956Q3	2,216	433	5.4
1956Q4	2,234	438	5.4
1957Q1	2,252	448	5.4
1957Q2	2,271	455	5.4
1957Q3	2,291	461	5.4

1957Q4	2,310	465	5.4
1958Q1	2,330	474	5.4
1958Q2	2,350	480	5.4
1958Q3	2,369	487	5.4
1958Q4	2,389	493	5.4
1959Q1	2,408	499	5.4
1959Q2	2,428	503	5.4
1959Q3	2,449	508	5.4
1959Q4	2,470	515	5.5
1960Q1	2,493	522	5.5
1960Q2	2,517	529	5.5
1960Q3	2,541	536	5.5
1960Q4	2,566	543	5.5
1961Q1	2,592	549	5.5
1961Q2	2,617	556	5.5
1961Q3	2,643	563	5.5
1961Q4	2,669	571	5.5
1962Q1	2,695	580	5.5
1962Q2	2,722	586	5.5
1962Q3	2,749	593	5.5
1962Q4	2,776	601	5.5
1963Q1	2,804	609	5.5
1963Q2	2,833	616	5.5
1963Q3	2,862	624	5.6
1963Q4	2,891	635	5.6
1964Q1	2,920	643	5.6
1964Q2	2,950	651	5.6
1964Q3	2,980	661	5.6
1964Q4	3,011	671	5.6
1965Q1	3,043	681	5.6
1965Q2	3,075	691	5.7
1965Q3	3,108	701	5.7
1965Q4	3,142	714	5.7
1966Q1	3,177	726	5.7
1966Q2	3,214	741	5.8
1966Q3	3,251	757	5.8
1966Q4	3,288	773	5.8
1967Q1	3,327	785	5.8
1967Q2	3,365	799	5.8
1967Q3	3,403	816	5.8
1967Q4	3,440	834	5.8
1968Q1	3,477	852	5.8
1968Q2	3,515	870	5.8
1968Q3	3,551	888	5.8

1968Q4	3,588	910	5.8
1969Q1	3,625	929	5.8
1969Q2	3,661	950	5.8
1969Q3	3,696	973	5.9
1969Q4	3,731	995	5.9
1970Q1	3,764	1,019	5.9
1970Q2	3,797	1,041	5.9
1970Q3	3,828	1,058	5.9
1970Q4	3,859	1,081	5.9
1971Q1	3,889	1,105	5.9
1971Q2	3,918	1,128	5.9
1971Q3	3,948	1,148	6.0
1971Q4	3,978	1,166	6.0
1972Q1	4,008	1,194	6.0
1972Q2	4,039	1,210	6.0
1972Q3	4,071	1,231	6.1
1972Q4	4,103	1,258	6.1
1973Q1	4,137	1,283	6.1
1973Q2	4,172	1,314	6.1
1973Q3	4,209	1,352	6.1
1973Q4	4,247	1,391	6.2
1974Q1	4,287	1,431	6.2
1974Q2	4,327	1,478	6.2
1974Q3	4,368	1,536	6.2
1974Q4	4,408	1,597	6.2
1975Q1	4,448	1,648	6.2
1975Q2	4,486	1,687	6.2
1975Q3	4,523	1,733	6.2
1975Q4	4,560	1,778	6.2
1976Q1	4,595	1,811	6.2
1976Q2	4,631	1,845	6.2
1976Q3	4,667	1,885	6.2
1976Q4	4,703	1,934	6.2
1977Q1	4,741	1,982	6.2
1977Q2	4,780	2,027	6.2
1977Q3	4,820	2,068	6.2
1977Q4	4,861	2,132	6.3
1978Q1	4,903	2,182	6.3
1978Q2	4,948	2,243	6.3
1978Q3	4,994	2,301	6.3
1978Q4	5,040	2,371	6.3
1979Q1	5,086	2,435	6.3
1979Q2	5,130	2,517	6.3
1979Q3	5,171	2,591	6.3

1979Q4	5,208	2,662	6.2
1980Q1	5,241	2,736	6.2
1980Q2	5,269	2,811	6.2
1980Q3	5,295	2,889	6.2
1980Q4	5,320	2,983	6.2
1981Q1	5,347	3,075	6.2
1981Q2	5,378	3,151	6.2
1981Q3	5,412	3,228	6.2
1981Q4	5,449	3,309	6.2
1982Q1	5,490	3,380	6.1
1982Q2	5,533	3,447	6.1
1982Q3	5,577	3,524	6.1
1982Q4	5,621	3,590	6.1
1983Q1	5,663	3,647	6.1
1983Q2	5,705	3,700	6.1
1983Q3	5,747	3,765	6.1
1983Q4	5,789	3,822	6.1
1984Q1	5,834	3,899	6.1
1984Q2	5,881	3,965	6.1
1984Q3	5,929	4,029	6.0
1984Q4	5,980	4,089	6.0
1985Q1	6,032	4,171	6.0
1985Q2	6,084	4,232	6.0
1985Q3	6,138	4,286	6.0
1985Q4	6,191	4,352	6.0
1986Q1	6,243	4,411	6.0
1986Q2	6,296	4,471	6.0
1986Q3	6,347	4,534	6.0
1986Q4	6,399	4,600	6.0
1987Q1	6,450	4,675	6.0
1987Q2	6,501	4,738	6.0
1987Q3	6,553	4,811	6.0
1987Q4	6,604	4,884	6.0
1988Q1	6,656	4,965	5.9
1988Q2	6,709	5,052	5.9
1988Q3	6,761	5,148	5.9
1988Q4	6,814	5,227	5.9
1989Q1	6,867	5,328	5.9
1989Q2	6,921	5,421	5.9
1989Q3	6,974	5,501	5.9
1989Q4	7,028	5,582	5.9
1990Q1	7,080	5,691	5.9
1990Q2	7,131	5,798	5.9
1990Q3	7,180	5,890	5.9

1990Q4	7,228	5,974	5.8
1991Q1	7,274	6,083	5.8
1991Q2	7,318	6,159	5.8
1991Q3	7,360	6,239	5.8
1991Q4	7,402	6,307	5.7
1992Q1	7,444	6,381	5.7
1992Q2	7,486	6,452	5.7
1992Q3	7,529	6,518	5.6
1992Q4	7,572	6,590	5.6
1993Q1	7,616	6,680	5.6
1993Q2	7,662	6,757	5.5
1993Q3	7,709	6,828	5.5
1993Q4	7,757	6,906	5.5
1994Q1	7,805	6,992	5.4
1994Q2	7,855	7,066	5.4
1994Q3	7,906	7,157	5.4
1994Q4	7,959	7,239	5.4
1995Q1	8,012	7,333	5.3
1995Q2	8,066	7,409	5.3
1995Q3	8,121	7,495	5.3
1995Q4	8,177	7,583	5.2
1996Q1	8,234	7,685	5.2
1996Q2	8,293	7,767	5.2
1996Q3	8,352	7,847	5.1
1996Q4	8,413	7,946	5.1
1997Q1	8,475	8,056	5.1
1997Q2	8,539	8,130	5.1
1997Q3	8,604	8,220	5.0
1997Q4	8,671	8,311	5.0
1998Q1	8,740	8,398	5.0
1998Q2	8,811	8,480	5.0
1998Q3	8,883	8,581	5.0
1998Q4	8,956	8,681	4.9
1999Q1	9,030	8,788	4.9
1999Q2	9,104	8,892	4.9
1999Q3	9,180	8,998	4.9
1999Q4	9,258	9,113	4.9
2000Q1	9,338	9,274	4.9
2000Q2	9,421	9,397	4.8
2000Q3	9,506	9,531	4.8
2000Q4	9,593	9,657	4.8
2001Q1	9,683	9,826	4.8
2001Q2	9,773	9,993	4.8
2001Q3	9,862	10,126	4.8

2001Q4	9,951	10,269	4.8
2002Q1	10,038	10,396	4.8
2002Q2	10,123	10,522	4.8
2002Q3	10,207	10,649	4.8
2002Q4	10,289	10,793	4.8
2003Q1	10,369	10,962	4.8
2003Q2	10,447	11,080	4.8
2003Q3	10,522	11,218	4.8
2003Q4	10,596	11,358	4.8
2004Q1	10,667	11,539	4.8
2004Q2	10,737	11,722	4.8
2004Q3	10,806	11,864	4.8
2004Q4	10,874	12,034	4.8
2005Q1	10,942	12,229	4.8
2005Q2	11,011	12,370	4.8
2005Q3	11,081	12,573	4.8
2005Q4	11,151	12,770	4.8
2006Q1	11,222	12,965	4.8
2006Q2	11,294	13,136	4.8
2006Q3	11,367	13,311	4.8
2006Q4	11,441	13,469	4.8
2007Q1	11,515	13,697	4.8
2007Q2	11,589	13,854	4.8
2007Q3	11,664	13,996	4.8
2007Q4	11,739	14,173	4.8
2008Q1	11,814	14,355	4.8
2008Q2	11,891	14,492	4.8
2008Q3	11,966	14,732	4.8
2008Q4	12,040	14,925	4.8
2009Q1	12,113	15,051	4.8
2009Q2	12,182	15,194	4.8
2009Q3	12,249	15,318	4.8
2009Q4	12,312	15,431	4.8
2010Q1	12,372	15,553	4.8
2010Q2	12,429	15,642	4.8
2010Q3	12,484	15,740	4.8
2010Q4	12,539	15,843	4.8
2011Q1	12,596	15,955	4.8
2011Q2	12,654	16,074	4.8
2011Q3	12,716	16,200	4.8
2011Q4	12,781	16,344	4.8
2012Q1	12,849	16,522	4.8
2012Q2	12,920	16,687	4.8
2012Q3	12,994	16,856	4.8

2012Q4	13,070	17,033	4.8
2013Q1	13,148	17,226	4.8
2013Q2	13,229	17,402	4.8
2013Q3	13,311	17,584	4.8
2013Q4	13,394	17,765	4.8
2014Q1	13,480	17,969	4.8
2014Q2	13,566	18,163	4.8
2014Q3	13,654	18,361	4.8
2014Q4	13,742	18,559	4.8
2015Q1	13,829	18,777	4.8
2015Q2	13,917	18,978	4.8
2015Q3	14,003	19,182	4.8
2015Q4	14,090	19,386	4.8
2016Q1	14,175	19,609	4.8
2016Q2	14,259	19,809	4.8
2016Q3	14,342	20,008	4.8
2016Q4	14,425	20,210	4.8
2017Q1	14,507	20,439	4.8
2017Q2	14,589	20,646	4.8
2017Q3	14,671	20,852	4.8
2017Q4	14,752	21,060	4.8
2018Q1	14,833	21,296	4.8
2018Q2	14,915	21,510	4.8
2018Q3	14,996	21,724	4.8
2018Q4	15,078	21,939	4.8
2019Q1	15,160	22,173	4.8
2019Q2	15,241	22,390	4.8
2019Q3	15,324	22,609	4.8
2019Q4	15,408	22,829	4.8

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2009 to 2019* , January 2009, www.cbo.gov/publication/20445.

Note: Real potential GDP is expressed in chained 2000 dollars.

d Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget and*
www.cbo.gov/publication/49892

January 2010

	Potential GDP (Billions of dollars)		Natural Rate of Unemployment
	Real	Nominal	(Percent)
1949Q1	1,864	273	5.3
1949Q2	1,885	274	5.3
1949Q3	1,906	275	5.3
1949Q4	1,927	278	5.3
1950Q1	1,949	280	5.3
1950Q2	1,971	284	5.3
1950Q3	1,995	294	5.3
1950Q4	2,019	302	5.3
1951Q1	2,045	317	5.3
1951Q2	2,072	323	5.3
1951Q3	2,100	328	5.3
1951Q4	2,127	337	5.3
1952Q1	2,155	341	5.4
1952Q2	2,182	347	5.4
1952Q3	2,209	354	5.4
1952Q4	2,234	359	5.4
1953Q1	2,257	363	5.4
1953Q2	2,279	368	5.4
1953Q3	2,299	372	5.4
1953Q4	2,318	376	5.4
1954Q1	2,335	381	5.4
1954Q2	2,352	384	5.4
1954Q3	2,368	387	5.4
1954Q4	2,383	390	5.4
1955Q1	2,399	394	5.4
1955Q2	2,415	399	5.4
1955Q3	2,432	404	5.4
1955Q4	2,450	410	5.4
1956Q1	2,468	417	5.4
1956Q2	2,487	424	5.4
1956Q3	2,507	432	5.4
1956Q4	2,527	438	5.4
1957Q1	2,547	447	5.4
1957Q2	2,569	454	5.4
1957Q3	2,590	461	5.4
1957Q4	2,612	468	5.4
1958Q1	2,634	476	5.4
1958Q2	2,656	482	5.4

1958Q3	2,677	487	5.4
1958Q4	2,699	491	5.4
1959Q1	2,720	497	5.4
1959Q2	2,742	502	5.4
1959Q3	2,765	508	5.4
1959Q4	2,789	514	5.5
1960Q1	2,814	520	5.5
1960Q2	2,841	527	5.5
1960Q3	2,869	535	5.5
1960Q4	2,898	543	5.5
1961Q1	2,928	549	5.5
1961Q2	2,957	556	5.5
1961Q3	2,987	563	5.5
1961Q4	3,018	570	5.5
1962Q1	3,048	579	5.5
1962Q2	3,079	586	5.5
1962Q3	3,110	594	5.5
1962Q4	3,142	602	5.5
1963Q1	3,175	610	5.5
1963Q2	3,207	617	5.5
1963Q3	3,240	624	5.6
1963Q4	3,274	635	5.6
1964Q1	3,308	643	5.6
1964Q2	3,342	652	5.6
1964Q3	3,377	662	5.6
1964Q4	3,412	672	5.6
1965Q1	3,448	682	5.6
1965Q2	3,485	693	5.7
1965Q3	3,523	703	5.7
1965Q4	3,562	715	5.7
1966Q1	3,602	728	5.7
1966Q2	3,643	743	5.8
1966Q3	3,685	759	5.8
1966Q4	3,729	775	5.8
1967Q1	3,772	787	5.8
1967Q2	3,816	801	5.8
1967Q3	3,859	818	5.8
1967Q4	3,902	836	5.8
1968Q1	3,944	854	5.8
1968Q2	3,986	873	5.8
1968Q3	4,028	891	5.8
1968Q4	4,070	912	5.8
1969Q1	4,111	931	5.8
1969Q2	4,152	953	5.8
1969Q3	4,192	976	5.9
1969Q4	4,231	997	5.9
1970Q1	4,269	1,020	5.9

1970Q2	4,305	1,044	5.9
1970Q3	4,340	1,060	5.9
1970Q4	4,374	1,082	5.9
1971Q1	4,408	1,107	5.9
1971Q2	4,441	1,130	5.9
1971Q3	4,474	1,150	6.0
1971Q4	4,507	1,168	6.0
1972Q1	4,541	1,196	6.0
1972Q2	4,575	1,212	6.0
1972Q3	4,610	1,232	6.1
1972Q4	4,646	1,256	6.1
1973Q1	4,683	1,283	6.1
1973Q2	4,722	1,315	6.1
1973Q3	4,763	1,352	6.1
1973Q4	4,806	1,387	6.2
1974Q1	4,850	1,429	6.2
1974Q2	4,896	1,475	6.2
1974Q3	4,941	1,535	6.2
1974Q4	4,987	1,597	6.2
1975Q1	5,032	1,648	6.2
1975Q2	5,075	1,687	6.2
1975Q3	5,116	1,732	6.2
1975Q4	5,157	1,777	6.2
1976Q1	5,197	1,811	6.2
1976Q2	5,238	1,844	6.2
1976Q3	5,278	1,883	6.2
1976Q4	5,319	1,930	6.2
1977Q1	5,362	1,979	6.2
1977Q2	5,405	2,026	6.2
1977Q3	5,450	2,071	6.2
1977Q4	5,496	2,124	6.3
1978Q1	5,544	2,178	6.3
1978Q2	5,594	2,240	6.3
1978Q3	5,646	2,300	6.3
1978Q4	5,697	2,368	6.3
1979Q1	5,748	2,434	6.3
1979Q2	5,798	2,514	6.3
1979Q3	5,844	2,587	6.3
1979Q4	5,886	2,657	6.2
1980Q1	5,924	2,732	6.2
1980Q2	5,956	2,808	6.2
1980Q3	5,985	2,887	6.2
1980Q4	6,014	2,982	6.2
1981Q1	6,045	3,076	6.2
1981Q2	6,079	3,149	6.2
1981Q3	6,117	3,227	6.2
1981Q4	6,159	3,305	6.2

1982Q1	6,205	3,377	6.1
1982Q2	6,252	3,445	6.1
1982Q3	6,301	3,520	6.1
1982Q4	6,350	3,585	6.1
1983Q1	6,396	3,642	6.1
1983Q2	6,442	3,695	6.1
1983Q3	6,488	3,760	6.1
1983Q4	6,535	3,814	6.1
1984Q1	6,584	3,891	6.1
1984Q2	6,636	3,956	6.1
1984Q3	6,689	4,021	6.0
1984Q4	6,745	4,078	6.0
1985Q1	6,802	4,160	6.0
1985Q2	6,860	4,217	6.0
1985Q3	6,918	4,273	6.0
1985Q4	6,977	4,335	6.0
1986Q1	7,034	4,393	6.0
1986Q2	7,091	4,451	6.0
1986Q3	7,148	4,515	6.0
1986Q4	7,204	4,583	6.0
1987Q1	7,261	4,656	6.0
1987Q2	7,317	4,718	6.0
1987Q3	7,373	4,792	6.0
1987Q4	7,430	4,863	6.0
1988Q1	7,487	4,940	5.9
1988Q2	7,544	5,026	5.9
1988Q3	7,601	5,124	5.9
1988Q4	7,659	5,205	5.9
1989Q1	7,718	5,299	5.9
1989Q2	7,777	5,393	5.9
1989Q3	7,836	5,471	5.9
1989Q4	7,895	5,547	5.9
1990Q1	7,954	5,656	5.9
1990Q2	8,013	5,764	5.9
1990Q3	8,071	5,860	5.9
1990Q4	8,128	5,950	5.8
1991Q1	8,184	6,055	5.8
1991Q2	8,238	6,138	5.8
1991Q3	8,292	6,224	5.8
1991Q4	8,345	6,300	5.7
1992Q1	8,398	6,376	5.7
1992Q2	8,451	6,454	5.7
1992Q3	8,505	6,524	5.6
1992Q4	8,560	6,604	5.6
1993Q1	8,616	6,688	5.6
1993Q2	8,674	6,769	5.5
1993Q3	8,733	6,847	5.5

1993Q4	8,793	6,930	5.5
1994Q1	8,854	7,017	5.4
1994Q2	8,916	7,100	5.4
1994Q3	8,980	7,191	5.4
1994Q4	9,044	7,281	5.4
1995Q1	9,110	7,377	5.3
1995Q2	9,176	7,464	5.3
1995Q3	9,244	7,552	5.3
1995Q4	9,313	7,647	5.3
1996Q1	9,384	7,747	5.2
1996Q2	9,455	7,834	5.2
1996Q3	9,528	7,934	5.2
1996Q4	9,602	8,032	5.2
1997Q1	9,677	8,136	5.1
1997Q2	9,755	8,238	5.1
1997Q3	9,834	8,327	5.1
1997Q4	9,914	8,428	5.1
1998Q1	9,997	8,511	5.1
1998Q2	10,082	8,604	5.1
1998Q3	10,168	8,710	5.1
1998Q4	10,255	8,808	5.1
1999Q1	10,344	8,922	5.0
1999Q2	10,433	9,037	5.0
1999Q3	10,524	9,147	5.0
1999Q4	10,616	9,265	5.0
2000Q1	10,711	9,419	5.0
2000Q2	10,809	9,553	5.0
2000Q3	10,908	9,698	5.0
2000Q4	11,010	9,838	5.0
2001Q1	11,112	9,998	5.0
2001Q2	11,215	10,160	5.0
2001Q3	11,316	10,285	5.0
2001Q4	11,416	10,405	5.0
2002Q1	11,514	10,531	5.0
2002Q2	11,610	10,666	5.0
2002Q3	11,705	10,800	5.0
2002Q4	11,797	10,950	5.0
2003Q1	11,887	11,113	5.0
2003Q2	11,974	11,228	5.0
2003Q3	12,059	11,371	5.0
2003Q4	12,140	11,510	5.0
2004Q1	12,219	11,684	5.0
2004Q2	12,296	11,858	5.0
2004Q3	12,371	12,018	5.0
2004Q4	12,446	12,180	5.0
2005Q1	12,521	12,367	5.0
2005Q2	12,595	12,525	5.0

2005Q3	12,671	12,731	5.0
2005Q4	12,747	12,915	5.0
2006Q1	12,825	13,091	5.0
2006Q2	12,904	13,290	5.0
2006Q3	12,985	13,475	5.0
2006Q4	13,067	13,622	5.0
2007Q1	13,151	13,853	5.0
2007Q2	13,235	14,034	5.0
2007Q3	13,319	14,181	5.0
2007Q4	13,403	14,353	5.0
2008Q1	13,486	14,511	5.0
2008Q2	13,570	14,666	5.0
2008Q3	13,652	14,901	5.0
2008Q4	13,731	14,991	5.0
2009Q1	13,807	15,144	5.0
2009Q2	13,877	15,221	5.0
2009Q3	13,943	15,314	5.0
2009Q4	14,005	15,425	5.0
2010Q1	14,061	15,542	5.0
2010Q2	14,114	15,624	5.0
2010Q3	14,167	15,721	5.0
2010Q4	14,220	15,813	5.0
2011Q1	14,276	15,916	5.0
2011Q2	14,336	16,007	5.0
2011Q3	14,400	16,111	5.0
2011Q4	14,467	16,229	5.0
2012Q1	14,540	16,364	5.0
2012Q2	14,616	16,489	5.0
2012Q3	14,695	16,622	5.0
2012Q4	14,779	16,755	5.0
2013Q1	14,865	16,902	5.0
2013Q2	14,954	17,050	5.0
2013Q3	15,046	17,203	5.0
2013Q4	15,142	17,364	5.0
2014Q1	15,240	17,537	5.0
2014Q2	15,341	17,715	5.0
2014Q3	15,444	17,898	5.0
2014Q4	15,548	18,087	5.0
2015Q1	15,652	18,286	5.0
2015Q2	15,756	18,481	5.0
2015Q3	15,859	18,677	5.0
2015Q4	15,962	18,877	5.0
2016Q1	16,063	19,085	5.0
2016Q2	16,163	19,284	5.0
2016Q3	16,263	19,485	5.0
2016Q4	16,361	19,687	5.0
2017Q1	16,459	19,900	5.0

2017Q2	16,556	20,102	5.0
2017Q3	16,652	20,303	5.0
2017Q4	16,748	20,506	5.0
2018Q1	16,844	20,722	5.0
2018Q2	16,939	20,926	5.0
2018Q3	17,034	21,132	5.0
2018Q4	17,129	21,341	5.0
2019Q1	17,224	21,562	5.0
2019Q2	17,319	21,771	5.0
2019Q3	17,415	21,984	5.0
2019Q4	17,511	22,200	5.0
2020Q1	17,609	22,431	5.0
2020Q2	17,707	22,653	5.0
2020Q3	17,806	22,876	5.0
2020Q4	17,905	23,102	5.0

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2010 to 2020* , January 2010, www.cbo.gov/publication/41880.

Note: Real potential GDP is expressed in chained 2005 dollars.

d Economic Outlook: 2015 to 2025 .

This file presents data that supplements information in CBO's January 2015 report *The Budget an*
www.cbo.gov/publication/49892

January 2011

	Potential GDP (Billions of dollars)		Natural Rate of (Perc
	Real	Nominal	Long-Term
1949Q1	1,865	273	5.3
1949Q2	1,885	274	5.3
1949Q3	1,906	275	5.3
1949Q4	1,927	278	5.3
1950Q1	1,949	280	5.3
1950Q2	1,971	284	5.3
1950Q3	1,994	293	5.3
1950Q4	2,019	302	5.3
1951Q1	2,044	316	5.3
1951Q2	2,071	322	5.3
1951Q3	2,098	328	5.3
1951Q4	2,126	336	5.3
1952Q1	2,154	341	5.4
1952Q2	2,181	347	5.4
1952Q3	2,207	354	5.4
1952Q4	2,232	359	5.4
1953Q1	2,255	363	5.4
1953Q2	2,277	367	5.4
1953Q3	2,297	372	5.4
1953Q4	2,316	376	5.4
1954Q1	2,333	381	5.4
1954Q2	2,350	384	5.4
1954Q3	2,366	386	5.4
1954Q4	2,382	389	5.4
1955Q1	2,397	393	5.4
1955Q2	2,414	398	5.4
1955Q3	2,431	404	5.4
1955Q4	2,449	410	5.4
1956Q1	2,467	417	5.4
1956Q2	2,486	424	5.4
1956Q3	2,506	432	5.4
1956Q4	2,526	438	5.4
1957Q1	2,546	447	5.4
1957Q2	2,568	454	5.4
1957Q3	2,590	461	5.4
1957Q4	2,612	468	5.4
1958Q1	2,634	476	5.4
1958Q2	2,656	482	5.4

1958Q3	2,677	487	5.4
1958Q4	2,699	491	5.4
1959Q1	2,720	497	5.4
1959Q2	2,742	502	5.4
1959Q3	2,765	508	5.4
1959Q4	2,789	514	5.4
1960Q1	2,815	520	5.5
1960Q2	2,842	527	5.5
1960Q3	2,870	535	5.5
1960Q4	2,898	543	5.5
1961Q1	2,928	549	5.5
1961Q2	2,957	556	5.5
1961Q3	2,987	563	5.5
1961Q4	3,018	570	5.5
1962Q1	3,048	579	5.5
1962Q2	3,079	586	5.5
1962Q3	3,110	594	5.5
1962Q4	3,142	602	5.5
1963Q1	3,174	610	5.5
1963Q2	3,207	617	5.5
1963Q3	3,240	624	5.6
1963Q4	3,273	634	5.6
1964Q1	3,307	643	5.6
1964Q2	3,341	652	5.6
1964Q3	3,375	662	5.6
1964Q4	3,411	672	5.6
1965Q1	3,447	682	5.6
1965Q2	3,483	692	5.7
1965Q3	3,521	703	5.7
1965Q4	3,560	715	5.7
1966Q1	3,599	727	5.7
1966Q2	3,641	743	5.8
1966Q3	3,683	758	5.8
1966Q4	3,726	774	5.8
1967Q1	3,769	787	5.8
1967Q2	3,813	801	5.8
1967Q3	3,856	817	5.8
1967Q4	3,898	835	5.8
1968Q1	3,941	853	5.8
1968Q2	3,983	872	5.8
1968Q3	4,024	890	5.8
1968Q4	4,066	911	5.8
1969Q1	4,107	930	5.8
1969Q2	4,148	952	5.8
1969Q3	4,188	975	5.9
1969Q4	4,227	996	5.9
1970Q1	4,265	1,019	5.9

1970Q2	4,302	1,043	5.9
1970Q3	4,337	1,060	5.9
1970Q4	4,372	1,082	5.9
1971Q1	4,406	1,107	5.9
1971Q2	4,439	1,130	5.9
1971Q3	4,473	1,150	5.9
1971Q4	4,506	1,168	6.0
1972Q1	4,540	1,196	6.0
1972Q2	4,575	1,212	6.0
1972Q3	4,610	1,232	6.0
1972Q4	4,647	1,256	6.1
1973Q1	4,684	1,283	6.1
1973Q2	4,724	1,316	6.1
1973Q3	4,765	1,352	6.1
1973Q4	4,808	1,388	6.1
1974Q1	4,852	1,430	6.2
1974Q2	4,897	1,475	6.2
1974Q3	4,942	1,535	6.2
1974Q4	4,988	1,597	6.2
1975Q1	5,032	1,648	6.2
1975Q2	5,074	1,687	6.2
1975Q3	5,116	1,732	6.2
1975Q4	5,156	1,777	6.2
1976Q1	5,196	1,810	6.2
1976Q2	5,236	1,843	6.2
1976Q3	5,276	1,882	6.2
1976Q4	5,317	1,929	6.2
1977Q1	5,359	1,977	6.2
1977Q2	5,402	2,025	6.2
1977Q3	5,446	2,070	6.2
1977Q4	5,492	2,123	6.2
1978Q1	5,539	2,176	6.3
1978Q2	5,589	2,238	6.3
1978Q3	5,640	2,298	6.3
1978Q4	5,691	2,366	6.3
1979Q1	5,742	2,431	6.3
1979Q2	5,792	2,512	6.3
1979Q3	5,839	2,584	6.2
1979Q4	5,883	2,655	6.2
1980Q1	5,922	2,731	6.2
1980Q2	5,956	2,809	6.2
1980Q3	5,988	2,888	6.2
1980Q4	6,020	2,985	6.2
1981Q1	6,053	3,081	6.2
1981Q2	6,089	3,154	6.2
1981Q3	6,129	3,233	6.2
1981Q4	6,171	3,312	6.1

1982Q1	6,217	3,384	6.1
1982Q2	6,265	3,452	6.1
1982Q3	6,313	3,527	6.1
1982Q4	6,361	3,592	6.1
1983Q1	6,408	3,649	6.1
1983Q2	6,453	3,702	6.1
1983Q3	6,499	3,766	6.1
1983Q4	6,545	3,820	6.1
1984Q1	6,594	3,897	6.1
1984Q2	6,645	3,962	6.0
1984Q3	6,698	4,026	6.0
1984Q4	6,753	4,083	6.0
1985Q1	6,810	4,165	6.0
1985Q2	6,867	4,221	6.0
1985Q3	6,926	4,277	6.0
1985Q4	6,984	4,340	6.0
1986Q1	7,041	4,398	6.0
1986Q2	7,098	4,455	6.0
1986Q3	7,154	4,519	6.0
1986Q4	7,210	4,587	6.0
1987Q1	7,266	4,659	6.0
1987Q2	7,321	4,721	6.0
1987Q3	7,377	4,795	6.0
1987Q4	7,434	4,866	6.0
1988Q1	7,490	4,942	5.9
1988Q2	7,547	5,027	5.9
1988Q3	7,604	5,126	5.9
1988Q4	7,661	5,206	5.9
1989Q1	7,719	5,300	5.9
1989Q2	7,777	5,393	5.9
1989Q3	7,836	5,471	5.9
1989Q4	7,895	5,547	5.9
1990Q1	7,954	5,656	5.9
1990Q2	8,012	5,764	5.9
1990Q3	8,070	5,859	5.9
1990Q4	8,127	5,949	5.8
1991Q1	8,183	6,054	5.8
1991Q2	8,238	6,137	5.8
1991Q3	8,292	6,224	5.8
1991Q4	8,345	6,300	5.7
1992Q1	8,399	6,376	5.7
1992Q2	8,452	6,455	5.7
1992Q3	8,506	6,525	5.6
1992Q4	8,562	6,605	5.6
1993Q1	8,618	6,689	5.6
1993Q2	8,676	6,771	5.5
1993Q3	8,735	6,849	5.5

1993Q4	8,795	6,932	5.5
1994Q1	8,857	7,019	5.4
1994Q2	8,920	7,103	5.4
1994Q3	8,983	7,194	5.4
1994Q4	9,048	7,284	5.4
1995Q1	9,114	7,381	5.3
1995Q2	9,182	7,469	5.3
1995Q3	9,250	7,556	5.3
1995Q4	9,320	7,652	5.3
1996Q1	9,391	7,752	5.2
1996Q2	9,463	7,841	5.2
1996Q3	9,536	7,940	5.2
1996Q4	9,611	8,039	5.2
1997Q1	9,687	8,144	5.1
1997Q2	9,765	8,246	5.1
1997Q3	9,845	8,337	5.1
1997Q4	9,926	8,438	5.1
1998Q1	10,010	8,522	5.1
1998Q2	10,095	8,616	5.1
1998Q3	10,183	8,723	5.1
1998Q4	10,271	8,822	5.1
1999Q1	10,361	8,937	5.0
1999Q2	10,452	9,053	5.0
1999Q3	10,544	9,164	5.0
1999Q4	10,637	9,284	5.0
2000Q1	10,733	9,438	5.0
2000Q2	10,831	9,573	5.0
2000Q3	10,930	9,718	5.0
2000Q4	11,030	9,856	5.0
2001Q1	11,131	10,015	5.0
2001Q2	11,230	10,175	5.0
2001Q3	11,328	10,296	5.0
2001Q4	11,424	10,412	5.0
2002Q1	11,517	10,535	5.0
2002Q2	11,609	10,665	5.0
2002Q3	11,698	10,795	5.0
2002Q4	11,785	10,940	5.0
2003Q1	11,871	11,099	5.0
2003Q2	11,953	11,210	5.0
2003Q3	12,033	11,348	5.0
2003Q4	12,111	11,482	5.0
2004Q1	12,185	11,652	5.0
2004Q2	12,257	11,821	5.0
2004Q3	12,328	11,976	5.0
2004Q4	12,398	12,134	5.0
2005Q1	12,469	12,316	5.0
2005Q2	12,540	12,470	5.0

2005Q3	12,612	12,671	5.0
2005Q4	12,685	12,851	5.0
2006Q1	12,759	13,023	5.0
2006Q2	12,835	13,218	5.0
2006Q3	12,913	13,399	5.0
2006Q4	12,992	13,543	5.0
2007Q1	13,072	13,774	5.0
2007Q2	13,153	13,967	5.0
2007Q3	13,234	14,122	5.0
2007Q4	13,314	14,238	5.0
2008Q1	13,393	14,391	5.0
2008Q2	13,471	14,589	5.1
2008Q3	13,547	14,832	5.1
2008Q4	13,620	14,867	5.1
2009Q1	13,689	14,985	5.1
2009Q2	13,753	15,067	5.2
2009Q3	13,814	15,162	5.2
2009Q4	13,872	15,217	5.2
2010Q1	13,928	15,315	5.2
2010Q2	13,986	15,452	5.2
2010Q3	14,045	15,605	5.2
2010Q4	14,110	15,672	5.2
2011Q1	14,178	15,784	5.2
2011Q2	14,247	15,886	5.2
2011Q3	14,317	16,014	5.2
2011Q4	14,387	16,127	5.2
2012Q1	14,455	16,271	5.2
2012Q2	14,525	16,395	5.2
2012Q3	14,596	16,533	5.2
2012Q4	14,669	16,675	5.2
2013Q1	14,747	16,847	5.2
2013Q2	14,829	17,003	5.2
2013Q3	14,913	17,167	5.2
2013Q4	15,000	17,334	5.2
2014Q1	15,090	17,526	5.2
2014Q2	15,181	17,697	5.2
2014Q3	15,275	17,874	5.2
2014Q4	15,369	18,053	5.2
2015Q1	15,465	18,256	5.2
2015Q2	15,561	18,439	5.2
2015Q3	15,659	18,628	5.2
2015Q4	15,756	18,820	5.2
2016Q1	15,855	19,047	5.2
2016Q2	15,954	19,254	5.2
2016Q3	16,054	19,472	5.2
2016Q4	16,155	19,687	5.2
2017Q1	16,255	19,929	5.2

2017Q2	16,355	20,146	5.2
2017Q3	16,455	20,366	5.2
2017Q4	16,554	20,585	5.2
2018Q1	16,652	20,828	5.2
2018Q2	16,751	21,046	5.2
2018Q3	16,849	21,274	5.2
2018Q4	16,947	21,494	5.2
2019Q1	17,047	21,744	5.2
2019Q2	17,147	21,970	5.2
2019Q3	17,248	22,208	5.2
2019Q4	17,349	22,438	5.2
2020Q1	17,450	22,698	5.2
2020Q2	17,552	22,933	5.2
2020Q3	17,654	23,181	5.2
2020Q4	17,756	23,419	5.2
2021Q1	17,859	23,689	5.2
2021Q2	17,962	23,932	5.2
2021Q3	18,066	24,190	5.2
2021Q4	18,171	24,438	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2011 to 2(*
www.cbo.gov/publication/21999.

Note: Real potential GDP is expressed in chained 2005 dollars.

d Economic Outlook: 2015 to 2025 .

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This file presents data that supplements information in CBO's January 2015 report *The Budget an*
www.cbo.gov/publication/49892

January 2012

	Potential GDP (Billions of dollars)		Natural Rate of (Perc
	Real	Nominal	Long-Term
1949Q1	1,863	273	5.3
1949Q2	1,883	274	5.3
1949Q3	1,904	275	5.3
1949Q4	1,925	278	5.3
1950Q1	1,947	280	5.3
1950Q2	1,970	284	5.3
1950Q3	1,993	294	5.3
1950Q4	2,018	302	5.3
1951Q1	2,043	317	5.3
1951Q2	2,070	323	5.3
1951Q3	2,097	328	5.3
1951Q4	2,125	336	5.3
1952Q1	2,152	341	5.4
1952Q2	2,179	347	5.4
1952Q3	2,206	354	5.4
1952Q4	2,231	359	5.4
1953Q1	2,254	363	5.4
1953Q2	2,276	367	5.4
1953Q3	2,296	372	5.4
1953Q4	2,315	376	5.4
1954Q1	2,333	381	5.4
1954Q2	2,349	384	5.4
1954Q3	2,365	386	5.4
1954Q4	2,380	389	5.4
1955Q1	2,396	394	5.4
1955Q2	2,413	398	5.4
1955Q3	2,430	404	5.4
1955Q4	2,447	410	5.4
1956Q1	2,466	417	5.4
1956Q2	2,485	424	5.4
1956Q3	2,504	432	5.4
1956Q4	2,524	438	5.4
1957Q1	2,545	447	5.4
1957Q2	2,566	454	5.4
1957Q3	2,588	461	5.4
1957Q4	2,609	468	5.4
1958Q1	2,632	476	5.4
1958Q2	2,653	482	5.4

1958Q3	2,675	487	5.4
1958Q4	2,696	491	5.4
1959Q1	2,718	497	5.4
1959Q2	2,740	502	5.4
1959Q3	2,763	508	5.4
1959Q4	2,786	514	5.4
1960Q1	2,812	520	5.5
1960Q2	2,839	527	5.5
1960Q3	2,867	535	5.5
1960Q4	2,896	543	5.5
1961Q1	2,925	549	5.5
1961Q2	2,955	556	5.5
1961Q3	2,985	563	5.5
1961Q4	3,015	570	5.5
1962Q1	3,045	579	5.5
1962Q2	3,076	586	5.5
1962Q3	3,108	594	5.5
1962Q4	3,139	602	5.5
1963Q1	3,172	610	5.5
1963Q2	3,204	617	5.5
1963Q3	3,237	624	5.6
1963Q4	3,271	634	5.6
1964Q1	3,304	643	5.6
1964Q2	3,338	652	5.6
1964Q3	3,373	662	5.6
1964Q4	3,408	672	5.6
1965Q1	3,444	682	5.6
1965Q2	3,481	693	5.7
1965Q3	3,519	703	5.7
1965Q4	3,558	715	5.7
1966Q1	3,598	728	5.7
1966Q2	3,639	743	5.8
1966Q3	3,681	759	5.8
1966Q4	3,724	774	5.8
1967Q1	3,768	787	5.8
1967Q2	3,811	801	5.8
1967Q3	3,854	818	5.8
1967Q4	3,897	836	5.8
1968Q1	3,939	854	5.8
1968Q2	3,981	873	5.8
1968Q3	4,023	890	5.8
1968Q4	4,065	912	5.8
1969Q1	4,106	931	5.8
1969Q2	4,147	952	5.8
1969Q3	4,187	975	5.9
1969Q4	4,226	997	5.9
1970Q1	4,263	1,020	5.9

1970Q2	4,299	1,043	5.9
1970Q3	4,335	1,060	5.9
1970Q4	4,369	1,082	5.9
1971Q1	4,403	1,107	5.9
1971Q2	4,436	1,130	5.9
1971Q3	4,469	1,150	5.9
1971Q4	4,502	1,167	6.0
1972Q1	4,536	1,196	6.0
1972Q2	4,570	1,211	6.0
1972Q3	4,605	1,232	6.0
1972Q4	4,641	1,256	6.1
1973Q1	4,679	1,283	6.1
1973Q2	4,719	1,315	6.1
1973Q3	4,760	1,352	6.1
1973Q4	4,802	1,387	6.1
1974Q1	4,846	1,429	6.2
1974Q2	4,891	1,475	6.2
1974Q3	4,937	1,535	6.2
1974Q4	4,983	1,597	6.2
1975Q1	5,027	1,648	6.2
1975Q2	5,070	1,686	6.2
1975Q3	5,112	1,732	6.2
1975Q4	5,153	1,777	6.2
1976Q1	5,193	1,811	6.2
1976Q2	5,233	1,844	6.2
1976Q3	5,274	1,883	6.2
1976Q4	5,314	1,930	6.2
1977Q1	5,357	1,979	6.2
1977Q2	5,401	2,027	6.2
1977Q3	5,446	2,072	6.2
1977Q4	5,492	2,125	6.2
1978Q1	5,539	2,178	6.3
1978Q2	5,590	2,241	6.3
1978Q3	5,641	2,300	6.3
1978Q4	5,693	2,369	6.3
1979Q1	5,744	2,434	6.3
1979Q2	5,792	2,514	6.3
1979Q3	5,839	2,586	6.2
1979Q4	5,882	2,657	6.2
1980Q1	5,921	2,733	6.2
1980Q2	5,953	2,810	6.2
1980Q3	5,984	2,889	6.2
1980Q4	6,015	2,985	6.2
1981Q1	6,047	3,080	6.2
1981Q2	6,083	3,154	6.2
1981Q3	6,121	3,232	6.2
1981Q4	6,161	3,310	6.1

1982Q1	6,207	3,381	6.1
1982Q2	6,254	3,449	6.1
1982Q3	6,301	3,524	6.1
1982Q4	6,350	3,588	6.1
1983Q1	6,395	3,645	6.1
1983Q2	6,441	3,698	6.1
1983Q3	6,486	3,762	6.1
1983Q4	6,533	3,816	6.1
1984Q1	6,581	3,892	6.1
1984Q2	6,633	3,958	6.0
1984Q3	6,685	4,022	6.0
1984Q4	6,739	4,078	6.0
1985Q1	6,795	4,159	6.0
1985Q2	6,853	4,216	6.0
1985Q3	6,910	4,272	6.0
1985Q4	6,968	4,334	6.0
1986Q1	7,025	4,391	6.0
1986Q2	7,081	4,448	6.0
1986Q3	7,137	4,512	6.0
1986Q4	7,193	4,580	6.0
1987Q1	7,248	4,652	6.0
1987Q2	7,303	4,713	6.0
1987Q3	7,359	4,787	6.0
1987Q4	7,415	4,857	6.0
1988Q1	7,471	4,934	5.9
1988Q2	7,527	5,019	5.9
1988Q3	7,584	5,116	5.9
1988Q4	7,641	5,196	5.9
1989Q1	7,698	5,290	5.9
1989Q2	7,756	5,383	5.9
1989Q3	7,814	5,460	5.9
1989Q4	7,873	5,536	5.9
1990Q1	7,932	5,645	5.9
1990Q2	7,990	5,753	5.9
1990Q3	8,049	5,849	5.9
1990Q4	8,107	5,940	5.8
1991Q1	8,164	6,045	5.8
1991Q2	8,220	6,129	5.8
1991Q3	8,275	6,217	5.8
1991Q4	8,330	6,294	5.7
1992Q1	8,385	6,371	5.7
1992Q2	8,440	6,451	5.7
1992Q3	8,496	6,523	5.6
1992Q4	8,552	6,603	5.6
1993Q1	8,610	6,689	5.6
1993Q2	8,669	6,771	5.5
1993Q3	8,730	6,851	5.5

1993Q4	8,791	6,935	5.5
1994Q1	8,854	7,023	5.4
1994Q2	8,919	7,108	5.4
1994Q3	8,984	7,201	5.4
1994Q4	9,051	7,292	5.4
1995Q1	9,118	7,391	5.3
1995Q2	9,187	7,480	5.3
1995Q3	9,257	7,569	5.3
1995Q4	9,329	7,666	5.3
1996Q1	9,402	7,768	5.2
1996Q2	9,475	7,858	5.2
1996Q3	9,550	7,959	5.2
1996Q4	9,627	8,059	5.2
1997Q1	9,704	8,166	5.1
1997Q2	9,784	8,270	5.1
1997Q3	9,865	8,362	5.1
1997Q4	9,948	8,464	5.1
1998Q1	10,033	8,549	5.1
1998Q2	10,120	8,644	5.1
1998Q3	10,209	8,753	5.1
1998Q4	10,299	8,853	5.1
1999Q1	10,390	8,969	5.0
1999Q2	10,483	9,087	5.0
1999Q3	10,576	9,201	5.0
1999Q4	10,671	9,321	5.0
2000Q1	10,767	9,477	5.0
2000Q2	10,864	9,611	5.0
2000Q3	10,962	9,754	5.0
2000Q4	11,059	9,890	5.0
2001Q1	11,154	10,044	5.0
2001Q2	11,246	10,198	5.0
2001Q3	11,336	10,312	5.0
2001Q4	11,423	10,421	5.0
2002Q1	11,507	10,535	5.0
2002Q2	11,588	10,656	5.0
2002Q3	11,666	10,775	5.0
2002Q4	11,744	10,909	5.0
2003Q1	11,821	11,058	5.0
2003Q2	11,897	11,162	5.0
2003Q3	11,973	11,295	5.0
2003Q4	12,047	11,425	5.0
2004Q1	12,122	11,593	5.0
2004Q2	12,195	11,762	5.0
2004Q3	12,267	11,919	5.0
2004Q4	12,339	12,077	5.0
2005Q1	12,410	12,259	5.0
2005Q2	12,480	12,411	5.0

2005Q3	12,551	12,610	5.0
2005Q4	12,622	12,787	5.0
2006Q1	12,695	12,956	5.0
2006Q2	12,770	13,148	5.0
2006Q3	12,846	13,325	5.0
2006Q4	12,923	13,466	5.0
2007Q1	13,001	13,702	5.0
2007Q2	13,080	13,880	5.0
2007Q3	13,158	14,008	5.0
2007Q4	13,237	14,157	5.0
2008Q1	13,313	14,328	5.0
2008Q2	13,388	14,497	5.1
2008Q3	13,462	14,688	5.1
2008Q4	13,532	14,783	5.1
2009Q1	13,597	14,918	5.2
2009Q2	13,656	14,965	5.2
2009Q3	13,711	15,036	5.3
2009Q4	13,763	15,136	5.3
2010Q1	13,813	15,246	5.4
2010Q2	13,864	15,357	5.4
2010Q3	13,914	15,467	5.5
2010Q4	13,966	15,600	5.5
2011Q1	14,024	15,761	5.5
2011Q2	14,083	15,927	5.5
2011Q3	14,144	16,096	5.5
2011Q4	14,207	16,204	5.5
2012Q1	14,270	16,315	5.5
2012Q2	14,333	16,425	5.5
2012Q3	14,397	16,558	5.5
2012Q4	14,463	16,691	5.5
2013Q1	14,530	16,838	5.5
2013Q2	14,599	16,976	5.5
2013Q3	14,670	17,110	5.5
2013Q4	14,743	17,259	5.5
2014Q1	14,820	17,419	5.5
2014Q2	14,900	17,563	5.5
2014Q3	14,982	17,717	5.5
2014Q4	15,066	17,875	5.5
2015Q1	15,153	18,060	5.5
2015Q2	15,243	18,231	5.5
2015Q3	15,335	18,409	5.5
2015Q4	15,429	18,595	5.5
2016Q1	15,526	18,800	5.5
2016Q2	15,625	18,995	5.5
2016Q3	15,727	19,200	5.5
2016Q4	15,829	19,410	5.5
2017Q1	15,933	19,644	5.5

2017Q2	16,038	19,861	5.5
2017Q3	16,143	20,081	5.5
2017Q4	16,249	20,306	5.5
2018Q1	16,354	20,550	5.5
2018Q2	16,461	20,780	5.5
2018Q3	16,568	21,012	5.5
2018Q4	16,675	21,246	5.5
2019Q1	16,783	21,501	5.5
2019Q2	16,891	21,739	5.5
2019Q3	16,999	21,979	5.5
2019Q4	17,107	22,220	5.5
2020Q1	17,213	22,485	5.4
2020Q2	17,319	22,730	5.4
2020Q3	17,425	22,976	5.4
2020Q4	17,530	23,223	5.4
2021Q1	17,635	23,493	5.4
2021Q2	17,740	23,743	5.4
2021Q3	17,845	23,996	5.4
2021Q4	17,951	24,251	5.4
2022Q1	18,057	24,529	5.3
2022Q2	18,164	24,789	5.3
2022Q3	18,271	25,051	5.3
2022Q4	18,378	25,316	5.3

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2012 to 20*
www.cbo.gov/publication/42905.

Note: Real potential GDP is expressed in chained 2005 dollars.

d Economic Outlook: 2015 to 2025 .

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This file presents data that supplements information in CBO's January 2015 report *The Budget an*
www.cbo.gov/publication/49892

February 2013

	Potential GDP (Billions of dollars)		Natural Rate of (Perc
	Real	Nominal	Long-Term
1949Q1	1,867	273	5.3
1949Q2	1,885	274	5.3
1949Q3	1,904	275	5.3
1949Q4	1,923	277	5.3
1950Q1	1,943	279	5.3
1950Q2	1,963	283	5.3
1950Q3	1,984	292	5.3
1950Q4	2,006	300	5.3
1951Q1	2,029	314	5.3
1951Q2	2,053	320	5.3
1951Q3	2,078	325	5.3
1951Q4	2,103	333	5.3
1952Q1	2,128	337	5.4
1952Q2	2,153	343	5.4
1952Q3	2,177	349	5.4
1952Q4	2,201	354	5.4
1953Q1	2,223	358	5.4
1953Q2	2,244	362	5.4
1953Q3	2,265	367	5.4
1953Q4	2,285	371	5.4
1954Q1	2,304	376	5.4
1954Q2	2,322	380	5.4
1954Q3	2,340	382	5.4
1954Q4	2,357	386	5.4
1955Q1	2,375	390	5.4
1955Q2	2,393	395	5.4
1955Q3	2,412	401	5.4
1955Q4	2,431	407	5.4
1956Q1	2,451	414	5.4
1956Q2	2,472	422	5.4
1956Q3	2,493	430	5.4
1956Q4	2,515	437	5.4
1957Q1	2,537	446	5.4
1957Q2	2,560	453	5.4
1957Q3	2,584	461	5.4
1957Q4	2,608	467	5.4
1958Q1	2,632	476	5.4
1958Q2	2,655	482	5.4

1958Q3	2,678	487	5.4
1958Q4	2,702	492	5.4
1959Q1	2,725	498	5.4
1959Q2	2,749	504	5.4
1959Q3	2,773	510	5.4
1959Q4	2,798	517	5.4
1960Q1	2,824	522	5.5
1960Q2	2,851	530	5.5
1960Q3	2,879	537	5.5
1960Q4	2,907	545	5.5
1961Q1	2,935	551	5.5
1961Q2	2,963	557	5.5
1961Q3	2,991	564	5.5
1961Q4	3,020	571	5.5
1962Q1	3,049	580	5.5
1962Q2	3,078	587	5.5
1962Q3	3,108	594	5.5
1962Q4	3,138	602	5.5
1963Q1	3,168	609	5.5
1963Q2	3,199	616	5.5
1963Q3	3,231	623	5.6
1963Q4	3,262	633	5.6
1964Q1	3,294	641	5.6
1964Q2	3,327	650	5.6
1964Q3	3,360	660	5.6
1964Q4	3,393	669	5.6
1965Q1	3,427	679	5.6
1965Q2	3,462	689	5.7
1965Q3	3,498	699	5.7
1965Q4	3,535	711	5.7
1966Q1	3,573	723	5.7
1966Q2	3,612	738	5.8
1966Q3	3,652	753	5.8
1966Q4	3,693	768	5.8
1967Q1	3,734	780	5.8
1967Q2	3,775	794	5.8
1967Q3	3,816	810	5.8
1967Q4	3,857	827	5.8
1968Q1	3,897	845	5.8
1968Q2	3,937	863	5.8
1968Q3	3,976	880	5.8
1968Q4	4,016	901	5.8
1969Q1	4,055	919	5.8
1969Q2	4,096	941	5.8
1969Q3	4,136	964	5.9
1969Q4	4,176	985	5.9
1970Q1	4,215	1,008	5.9

1970Q2	4,254	1,032	5.9
1970Q3	4,293	1,050	5.9
1970Q4	4,331	1,072	5.9
1971Q1	4,368	1,098	5.9
1971Q2	4,405	1,122	5.9
1971Q3	4,442	1,143	5.9
1971Q4	4,479	1,161	6.0
1972Q1	4,516	1,190	6.0
1972Q2	4,555	1,207	6.0
1972Q3	4,593	1,229	6.0
1972Q4	4,633	1,254	6.1
1973Q1	4,674	1,282	6.1
1973Q2	4,717	1,315	6.1
1973Q3	4,761	1,352	6.1
1973Q4	4,806	1,389	6.1
1974Q1	4,851	1,431	6.2
1974Q2	4,898	1,477	6.2
1974Q3	4,945	1,538	6.2
1974Q4	4,992	1,600	6.2
1975Q1	5,038	1,652	6.2
1975Q2	5,082	1,690	6.2
1975Q3	5,125	1,737	6.2
1975Q4	5,167	1,782	6.2
1976Q1	5,209	1,816	6.2
1976Q2	5,250	1,850	6.2
1976Q3	5,291	1,890	6.2
1976Q4	5,334	1,937	6.2
1977Q1	5,378	1,986	6.2
1977Q2	5,423	2,035	6.2
1977Q3	5,469	2,080	6.2
1977Q4	5,516	2,134	6.2
1978Q1	5,565	2,188	6.3
1978Q2	5,617	2,251	6.3
1978Q3	5,670	2,312	6.3
1978Q4	5,722	2,381	6.3
1979Q1	5,774	2,446	6.3
1979Q2	5,824	2,528	6.3
1979Q3	5,871	2,601	6.2
1979Q4	5,915	2,672	6.2
1980Q1	5,954	2,749	6.2
1980Q2	5,987	2,825	6.2
1980Q3	6,017	2,905	6.2
1980Q4	6,048	3,002	6.2
1981Q1	6,079	3,097	6.2
1981Q2	6,115	3,171	6.2
1981Q3	6,153	3,249	6.2
1981Q4	6,193	3,327	6.1

1982Q1	6,239	3,399	6.1
1982Q2	6,286	3,467	6.1
1982Q3	6,333	3,542	6.1
1982Q4	6,382	3,606	6.1
1983Q1	6,427	3,663	6.1
1983Q2	6,473	3,716	6.1
1983Q3	6,518	3,780	6.1
1983Q4	6,565	3,835	6.1
1984Q1	6,613	3,911	6.1
1984Q2	6,665	3,977	6.0
1984Q3	6,717	4,041	6.0
1984Q4	6,771	4,098	6.0
1985Q1	6,828	4,179	6.0
1985Q2	6,885	4,236	6.0
1985Q3	6,943	4,292	6.0
1985Q4	7,000	4,354	6.0
1986Q1	7,057	4,412	6.0
1986Q2	7,113	4,469	6.0
1986Q3	7,169	4,532	6.0
1986Q4	7,225	4,601	6.0
1987Q1	7,281	4,673	6.0
1987Q2	7,336	4,735	6.0
1987Q3	7,392	4,808	6.0
1987Q4	7,447	4,879	6.0
1988Q1	7,504	4,955	5.9
1988Q2	7,560	5,041	5.9
1988Q3	7,617	5,139	5.9
1988Q4	7,674	5,219	5.9
1989Q1	7,731	5,313	5.9
1989Q2	7,789	5,406	5.9
1989Q3	7,848	5,484	5.9
1989Q4	7,906	5,559	5.9
1990Q1	7,965	5,668	5.9
1990Q2	8,023	5,776	5.9
1990Q3	8,081	5,872	5.9
1990Q4	8,139	5,963	5.8
1991Q1	8,195	6,069	5.8
1991Q2	8,250	6,152	5.8
1991Q3	8,305	6,240	5.8
1991Q4	8,359	6,316	5.7
1992Q1	8,413	6,393	5.7
1992Q2	8,467	6,472	5.7
1992Q3	8,522	6,543	5.6
1992Q4	8,577	6,623	5.6
1993Q1	8,634	6,708	5.6
1993Q2	8,693	6,790	5.5
1993Q3	8,752	6,869	5.5

1993Q4	8,813	6,952	5.5
1994Q1	8,875	7,040	5.4
1994Q2	8,939	7,124	5.4
1994Q3	9,003	7,216	5.4
1994Q4	9,069	7,307	5.4
1995Q1	9,135	7,404	5.3
1995Q2	9,203	7,493	5.3
1995Q3	9,272	7,581	5.3
1995Q4	9,343	7,678	5.3
1996Q1	9,414	7,779	5.2
1996Q2	9,487	7,868	5.2
1996Q3	9,561	7,968	5.2
1996Q4	9,636	8,068	5.2
1997Q1	9,713	8,173	5.1
1997Q2	9,792	8,276	5.1
1997Q3	9,872	8,367	5.1
1997Q4	9,954	8,468	5.1
1998Q1	10,037	8,553	5.1
1998Q2	10,123	8,647	5.1
1998Q3	10,210	8,754	5.1
1998Q4	10,299	8,853	5.1
1999Q1	10,389	8,969	5.0
1999Q2	10,480	9,085	5.0
1999Q3	10,573	9,197	5.0
1999Q4	10,666	9,317	5.0
2000Q1	10,762	9,472	5.0
2000Q2	10,860	9,607	5.0
2000Q3	10,959	9,752	5.0
2000Q4	11,058	9,890	5.0
2001Q1	11,158	10,048	5.0
2001Q2	11,257	10,207	5.0
2001Q3	11,354	10,329	5.0
2001Q4	11,449	10,445	5.0
2002Q1	11,541	10,566	5.0
2002Q2	11,632	10,696	5.0
2002Q3	11,720	10,824	5.0
2002Q4	11,805	10,966	5.0
2003Q1	11,888	11,121	5.0
2003Q2	11,967	11,227	5.0
2003Q3	12,043	11,361	5.0
2003Q4	12,116	11,490	5.0
2004Q1	12,187	11,656	5.0
2004Q2	12,256	11,822	5.0
2004Q3	12,324	11,975	5.0
2004Q4	12,392	12,129	5.0
2005Q1	12,463	12,311	5.0
2005Q2	12,533	12,463	5.0

2005Q3	12,604	12,663	5.0
2005Q4	12,677	12,842	5.0
2006Q1	12,750	13,012	5.0
2006Q2	12,826	13,205	5.0
2006Q3	12,902	13,384	5.0
2006Q4	12,980	13,526	5.0
2007Q1	13,058	13,763	5.0
2007Q2	13,138	13,942	5.0
2007Q3	13,218	14,071	5.0
2007Q4	13,296	14,221	5.0
2008Q1	13,373	14,393	5.0
2008Q2	13,449	14,563	5.1
2008Q3	13,523	14,755	5.1
2008Q4	13,594	14,851	5.1
2009Q1	13,660	14,961	5.2
2009Q2	13,719	14,998	5.2
2009Q3	13,775	15,078	5.3
2009Q4	13,827	15,185	5.3
2010Q1	13,877	15,297	5.4
2010Q2	13,926	15,414	5.4
2010Q3	13,974	15,546	5.5
2010Q4	14,024	15,684	5.5
2011Q1	14,079	15,823	5.5
2011Q2	14,136	15,989	5.5
2011Q3	14,195	16,174	5.5
2011Q4	14,256	16,258	5.5
2012Q1	14,317	16,409	5.5
2012Q2	14,379	16,543	5.5
2012Q3	14,442	16,725	5.5
2012Q4	14,505	16,840	5.5
2013Q1	14,569	16,961	5.5
2013Q2	14,633	17,100	5.5
2013Q3	14,699	17,236	5.5
2013Q4	14,766	17,393	5.5
2014Q1	14,835	17,556	5.5
2014Q2	14,907	17,716	5.5
2014Q3	14,980	17,891	5.5
2014Q4	15,056	18,063	5.5
2015Q1	15,134	18,261	5.5
2015Q2	15,213	18,438	5.5
2015Q3	15,295	18,632	5.5
2015Q4	15,378	18,829	5.5
2016Q1	15,464	19,046	5.5
2016Q2	15,553	19,247	5.5
2016Q3	15,645	19,452	5.5
2016Q4	15,738	19,667	5.5
2017Q1	15,834	19,907	5.5

2017Q2	15,931	20,129	5.5
2017Q3	16,030	20,355	5.5
2017Q4	16,129	20,584	5.5
2018Q1	16,228	20,833	5.5
2018Q2	16,327	21,062	5.5
2018Q3	16,426	21,293	5.5
2018Q4	16,524	21,524	5.5
2019Q1	16,622	21,780	5.5
2019Q2	16,720	22,011	5.5
2019Q3	16,816	22,245	5.5
2019Q4	16,913	22,480	5.5
2020Q1	17,008	22,741	5.4
2020Q2	17,103	22,978	5.4
2020Q3	17,198	23,217	5.4
2020Q4	17,293	23,459	5.4
2021Q1	17,387	23,725	5.4
2021Q2	17,482	23,969	5.4
2021Q3	17,577	24,215	5.4
2021Q4	17,672	24,464	5.4
2022Q1	17,768	24,738	5.3
2022Q2	17,864	24,989	5.3
2022Q3	17,960	25,243	5.3
2022Q4	18,057	25,500	5.3
2023Q1	18,155	25,783	5.3
2023Q2	18,254	26,045	5.3
2023Q3	18,355	26,311	5.3
2023Q4	18,455	26,580	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2013 to 2*
www.cbo.gov/publication/43907.

Note: Real potential GDP is expressed in chained 2005 dollars.

d Economic Outlook: 2015 to 2025 .

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This file presents data that supplements information in CBO's January 2015 report *The Budget an*
www.cbo.gov/publication/49892

February 2014

	Potential GDP (Billions of dollars)		Rate of Une (Perc
	Real	Nominal	Underlying Long-Term
1949Q1	2,027	278	5.3
1949Q2	2,049	280	5.3
1949Q3	2,070	280	5.3
1949Q4	2,093	284	5.3
1950Q1	2,116	286	5.3
1950Q2	2,140	290	5.3
1950Q3	2,164	300	5.3
1950Q4	2,190	308	5.3
1951Q1	2,216	322	5.3
1951Q2	2,244	328	5.3
1951Q3	2,272	333	5.3
1951Q4	2,300	342	5.3
1952Q1	2,328	346	5.4
1952Q2	2,356	352	5.4
1952Q3	2,383	359	5.4
1952Q4	2,409	364	5.4
1953Q1	2,435	368	5.4
1953Q2	2,459	373	5.4
1953Q3	2,482	378	5.4
1953Q4	2,504	382	5.4
1954Q1	2,526	387	5.4
1954Q2	2,546	391	5.4
1954Q3	2,566	394	5.4
1954Q4	2,586	397	5.4
1955Q1	2,607	402	5.4
1955Q2	2,628	408	5.4
1955Q3	2,649	414	5.4
1955Q4	2,671	420	5.4
1956Q1	2,694	428	5.4
1956Q2	2,717	435	5.4
1956Q3	2,740	444	5.4
1956Q4	2,764	451	5.4
1957Q1	2,788	460	5.4
1957Q2	2,813	467	5.4
1957Q3	2,838	475	5.4
1957Q4	2,863	482	5.4
1958Q1	2,889	490	5.4
1958Q2	2,914	497	5.4

1958Q3	2,939	502	5.4
1958Q4	2,965	507	5.4
1959Q1	2,990	514	5.4
1959Q2	3,015	520	5.4
1959Q3	3,042	526	5.4
1959Q4	3,069	533	5.4
1960Q1	3,098	539	5.5
1960Q2	3,128	547	5.5
1960Q3	3,159	554	5.5
1960Q4	3,190	562	5.5
1961Q1	3,222	569	5.5
1961Q2	3,255	576	5.5
1961Q3	3,287	583	5.5
1961Q4	3,320	590	5.5
1962Q1	3,353	599	5.5
1962Q2	3,387	607	5.5
1962Q3	3,421	614	5.5
1962Q4	3,455	622	5.5
1963Q1	3,490	631	5.5
1963Q2	3,526	638	5.5
1963Q3	3,561	645	5.6
1963Q4	3,598	656	5.6
1964Q1	3,634	665	5.6
1964Q2	3,671	674	5.6
1964Q3	3,708	684	5.6
1964Q4	3,746	694	5.6
1965Q1	3,785	704	5.6
1965Q2	3,825	715	5.7
1965Q3	3,865	726	5.7
1965Q4	3,906	738	5.7
1966Q1	3,948	751	5.7
1966Q2	3,991	766	5.8
1966Q3	4,035	781	5.8
1966Q4	4,080	796	5.8
1967Q1	4,125	808	5.8
1967Q2	4,170	822	5.8
1967Q3	4,215	838	5.8
1967Q4	4,260	857	5.8
1968Q1	4,305	875	5.8
1968Q2	4,350	894	5.8
1968Q3	4,395	912	5.8
1968Q4	4,440	935	5.8
1969Q1	4,486	954	5.8
1969Q2	4,531	976	5.8
1969Q3	4,575	1,000	5.9
1969Q4	4,620	1,022	5.9
1970Q1	4,663	1,046	5.9

1970Q2	4,706	1,070	5.9
1970Q3	4,748	1,089	5.9
1970Q4	4,789	1,113	5.9
1971Q1	4,831	1,139	5.9
1971Q2	4,871	1,164	5.9
1971Q3	4,911	1,186	5.9
1971Q4	4,951	1,205	6.0
1972Q1	4,992	1,235	6.0
1972Q2	5,033	1,253	6.0
1972Q3	5,075	1,275	6.0
1972Q4	5,118	1,300	6.1
1973Q1	5,162	1,328	6.1
1973Q2	5,209	1,362	6.1
1973Q3	5,256	1,400	6.1
1973Q4	5,305	1,437	6.1
1974Q1	5,354	1,480	6.2
1974Q2	5,405	1,528	6.2
1974Q3	5,455	1,589	6.2
1974Q4	5,505	1,652	6.2
1975Q1	5,554	1,705	6.2
1975Q2	5,601	1,744	6.2
1975Q3	5,648	1,790	6.2
1975Q4	5,694	1,835	6.2
1976Q1	5,740	1,869	6.2
1976Q2	5,785	1,903	6.2
1976Q3	5,830	1,942	6.2
1976Q4	5,877	1,991	6.2
1977Q1	5,926	2,039	6.2
1977Q2	5,977	2,089	6.2
1977Q3	6,029	2,137	6.2
1977Q4	6,084	2,192	6.2
1978Q1	6,140	2,250	6.3
1978Q2	6,200	2,315	6.3
1978Q3	6,260	2,378	6.3
1978Q4	6,320	2,450	6.3
1979Q1	6,377	2,517	6.3
1979Q2	6,432	2,600	6.3
1979Q3	6,484	2,674	6.2
1979Q4	6,533	2,747	6.2
1980Q1	6,576	2,825	6.2
1980Q2	6,613	2,903	6.2
1980Q3	6,648	2,986	6.2
1980Q4	6,682	3,085	6.2
1981Q1	6,718	3,182	6.2
1981Q2	6,758	3,258	6.2
1981Q3	6,800	3,339	6.2
1981Q4	6,844	3,421	6.1

1982Q1	6,894	3,492	6.1
1982Q2	6,945	3,562	6.1
1982Q3	6,997	3,639	6.1
1982Q4	7,051	3,707	6.1
1983Q1	7,102	3,765	6.1
1983Q2	7,154	3,818	6.1
1983Q3	7,206	3,887	6.1
1983Q4	7,260	3,944	6.1
1984Q1	7,315	4,015	6.1
1984Q2	7,372	4,082	6.0
1984Q3	7,431	4,149	6.0
1984Q4	7,491	4,208	6.0
1985Q1	7,553	4,294	6.0
1985Q2	7,617	4,355	6.0
1985Q3	7,683	4,420	6.0
1985Q4	7,749	4,482	6.0
1986Q1	7,815	4,542	6.0
1986Q2	7,881	4,598	6.0
1986Q3	7,948	4,659	6.0
1986Q4	8,015	4,726	6.0
1987Q1	8,081	4,793	6.0
1987Q2	8,147	4,864	6.0
1987Q3	8,213	4,939	6.0
1987Q4	8,278	5,017	6.0
1988Q1	8,343	5,096	5.9
1988Q2	8,408	5,187	5.9
1988Q3	8,473	5,290	5.9
1988Q4	8,538	5,376	5.9
1989Q1	8,604	5,473	5.9
1989Q2	8,669	5,572	5.9
1989Q3	8,735	5,656	5.9
1989Q4	8,801	5,736	5.9
1990Q1	8,867	5,844	5.9
1990Q2	8,932	5,948	5.9
1990Q3	8,998	6,045	5.9
1990Q4	9,063	6,137	5.8
1991Q1	9,128	6,242	5.8
1991Q2	9,192	6,327	5.8
1991Q3	9,255	6,417	5.8
1991Q4	9,319	6,495	5.7
1992Q1	9,382	6,570	5.7
1992Q2	9,447	6,657	5.7
1992Q3	9,513	6,734	5.6
1992Q4	9,580	6,828	5.6
1993Q1	9,648	6,919	5.6
1993Q2	9,718	7,011	5.5
1993Q3	9,788	7,097	5.5

1993Q4	9,859	7,189	5.5
1994Q1	9,930	7,279	5.4
1994Q2	10,002	7,368	5.4
1994Q3	10,075	7,459	5.4
1994Q4	10,149	7,556	5.4
1995Q1	10,224	7,658	5.3
1995Q2	10,301	7,750	5.3
1995Q3	10,379	7,842	5.3
1995Q4	10,459	7,940	5.3
1996Q1	10,540	8,043	5.2
1996Q2	10,623	8,136	5.2
1996Q3	10,707	8,238	5.2
1996Q4	10,792	8,339	5.2
1997Q1	10,879	8,447	5.1
1997Q2	10,967	8,555	5.1
1997Q3	11,057	8,651	5.1
1997Q4	11,149	8,752	5.1
1998Q1	11,243	8,839	5.1
1998Q2	11,339	8,934	5.1
1998Q3	11,436	9,044	5.1
1998Q4	11,535	9,146	5.1
1999Q1	11,636	9,260	5.0
1999Q2	11,738	9,380	5.0
1999Q3	11,841	9,496	5.0
1999Q4	11,946	9,627	5.0
2000Q1	12,052	9,784	5.0
2000Q2	12,161	9,927	5.0
2000Q3	12,271	10,082	5.0
2000Q4	12,383	10,228	5.0
2001Q1	12,496	10,388	5.0
2001Q2	12,609	10,554	5.0
2001Q3	12,721	10,684	5.0
2001Q4	12,833	10,811	5.0
2002Q1	12,943	10,935	5.0
2002Q2	13,053	11,074	5.0
2002Q3	13,161	11,216	5.0
2002Q4	13,267	11,366	5.0
2003Q1	13,371	11,527	5.0
2003Q2	13,471	11,648	5.0
2003Q3	13,567	11,796	5.0
2003Q4	13,660	11,938	5.0
2004Q1	13,748	12,117	5.0
2004Q2	13,833	12,290	5.0
2004Q3	13,917	12,448	5.0
2004Q4	13,999	12,612	5.0
2005Q1	14,083	12,802	5.0
2005Q2	14,166	12,966	5.0

2005Q3	14,249	13,166	5.0
2005Q4	14,333	13,347	5.0
2006Q1	14,418	13,528	5.0
2006Q2	14,505	13,721	5.0
2006Q3	14,592	13,899	5.0
2006Q4	14,680	14,033	5.0
2007Q1	14,768	14,275	5.0
2007Q2	14,859	14,445	5.0
2007Q3	14,949	14,581	5.0
2007Q4	15,039	14,730	5.0
2008Q1	15,126	14,898	5.0
2008Q2	15,210	15,047	5.0
2008Q3	15,290	15,230	5.0
2008Q4	15,367	15,336	5.0
2009Q1	15,437	15,444	5.0
2009Q2	15,500	15,483	5.1
2009Q3	15,559	15,540	5.1
2009Q4	15,615	15,643	5.1
2010Q1	15,668	15,748	5.2
2010Q2	15,721	15,874	5.2
2010Q3	15,773	15,999	5.2
2010Q4	15,826	16,134	5.2
2011Q1	15,883	16,256	5.2
2011Q2	15,941	16,423	5.3
2011Q3	16,001	16,586	5.3
2011Q4	16,063	16,671	5.3
2012Q1	16,126	16,819	5.3
2012Q2	16,192	16,961	5.3
2012Q3	16,258	17,127	5.4
2012Q4	16,325	17,246	5.4
2013Q1	16,393	17,376	5.4
2013Q2	16,461	17,476	5.5
2013Q3	16,530	17,635	5.5
2013Q4	16,600	17,780	5.5
2014Q1	16,671	17,923	5.5
2014Q2	16,742	18,064	5.5
2014Q3	16,816	18,213	5.5
2014Q4	16,892	18,376	5.5
2015Q1	16,971	18,540	5.5
2015Q2	17,053	18,704	5.5
2015Q3	17,138	18,878	5.5
2015Q4	17,226	19,057	5.5
2016Q1	17,317	19,255	5.5
2016Q2	17,412	19,445	5.5
2016Q3	17,511	19,643	5.5
2016Q4	17,612	19,846	5.5
2017Q1	17,715	20,067	5.5

2017Q2	17,820	20,278	5.5
2017Q3	17,927	20,493	5.5
2017Q4	18,033	20,713	5.5
2018Q1	18,139	20,949	5.5
2018Q2	18,245	21,169	5.5
2018Q3	18,350	21,394	5.5
2018Q4	18,456	21,620	5.5
2019Q1	18,560	21,864	5.5
2019Q2	18,665	22,090	5.5
2019Q3	18,768	22,318	5.5
2019Q4	18,872	22,548	5.5
2020Q1	18,976	22,798	5.4
2020Q2	19,078	23,029	5.4
2020Q3	19,181	23,263	5.4
2020Q4	19,284	23,499	5.4
2021Q1	19,387	23,755	5.4
2021Q2	19,490	23,993	5.4
2021Q3	19,593	24,234	5.4
2021Q4	19,697	24,479	5.4
2022Q1	19,801	24,746	5.3
2022Q2	19,906	24,994	5.3
2022Q3	20,011	25,246	5.3
2022Q4	20,115	25,500	5.3
2023Q1	20,220	25,774	5.3
2023Q2	20,326	26,031	5.3
2023Q3	20,432	26,291	5.3
2023Q4	20,537	26,554	5.3
2024Q1	20,642	26,835	5.2
2024Q2	20,744	27,095	5.2
2024Q3	20,846	27,357	5.2
2024Q4	20,948	27,622	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: 2014 to 2024* , Februar
www.cbo.gov/publication/45010.

Note: Real potential GDP is expressed in chained 2009 dollars.

d Economic Outlook: 2015 to 2025 .

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This file presents data that supplements information in CBO's January 2015 report *The Budget an*
www.cbo.gov/publication/49892

January 2015

	Potential GDP (Billions of dollars)		Rate of Une (Perc
	Real	Nominal	Underlying Long-Term
1949Q1	2,029	279	5.3
1949Q2	2,051	280	5.3
1949Q3	2,073	281	5.3
1949Q4	2,096	284	5.3
1950Q1	2,119	286	5.3
1950Q2	2,143	291	5.3
1950Q3	2,168	300	5.3
1950Q4	2,194	309	5.3
1951Q1	2,221	323	5.3
1951Q2	2,249	329	5.3
1951Q3	2,277	334	5.3
1951Q4	2,306	343	5.3
1952Q1	2,334	347	5.4
1952Q2	2,362	353	5.4
1952Q3	2,389	360	5.4
1952Q4	2,416	365	5.4
1953Q1	2,442	369	5.4
1953Q2	2,466	374	5.4
1953Q3	2,489	379	5.4
1953Q4	2,511	383	5.4
1954Q1	2,532	388	5.4
1954Q2	2,553	392	5.4
1954Q3	2,573	395	5.4
1954Q4	2,592	398	5.4
1955Q1	2,613	403	5.4
1955Q2	2,633	408	5.4
1955Q3	2,654	415	5.4
1955Q4	2,676	421	5.4
1956Q1	2,698	428	5.4
1956Q2	2,721	436	5.4
1956Q3	2,744	445	5.4
1956Q4	2,768	451	5.4
1957Q1	2,792	460	5.4
1957Q2	2,816	468	5.4
1957Q3	2,841	475	5.4
1957Q4	2,866	482	5.4
1958Q1	2,892	491	5.4
1958Q2	2,917	497	5.4
1958Q3	2,941	503	5.4

1958Q4	2,966	507	5.4
1959Q1	2,991	514	5.4
1959Q2	3,017	520	5.4
1959Q3	3,043	527	5.4
1959Q4	3,070	533	5.5
1960Q1	3,099	540	5.5
1960Q2	3,129	547	5.5
1960Q3	3,160	555	5.5
1960Q4	3,192	563	5.5
1961Q1	3,224	569	5.5
1961Q2	3,256	576	5.5
1961Q3	3,289	583	5.5
1961Q4	3,323	590	5.5
1962Q1	3,356	599	5.5
1962Q2	3,390	607	5.5
1962Q3	3,424	615	5.5
1962Q4	3,459	622	5.5
1963Q1	3,494	632	5.5
1963Q2	3,530	639	5.5
1963Q3	3,566	646	5.6
1963Q4	3,602	657	5.6
1964Q1	3,639	666	5.6
1964Q2	3,676	675	5.6
1964Q3	3,714	685	5.6
1964Q4	3,752	695	5.6
1965Q1	3,791	705	5.6
1965Q2	3,831	716	5.7
1965Q3	3,872	727	5.7
1965Q4	3,913	740	5.7
1966Q1	3,956	752	5.7
1966Q2	3,999	767	5.8
1966Q3	4,044	783	5.8
1966Q4	4,089	798	5.8
1967Q1	4,134	810	5.8
1967Q2	4,179	824	5.8
1967Q3	4,225	841	5.8
1967Q4	4,271	859	5.8
1968Q1	4,316	878	5.8
1968Q2	4,362	897	5.8
1968Q3	4,407	915	5.8
1968Q4	4,453	937	5.8
1969Q1	4,498	956	5.8
1969Q2	4,543	979	5.8
1969Q3	4,588	1,002	5.9
1969Q4	4,632	1,025	5.9
1970Q1	4,675	1,048	5.9
1970Q2	4,718	1,073	5.9
1970Q3	4,759	1,092	5.9
1970Q4	4,800	1,115	5.9

1971Q1	4,841	1,142	5.9
1971Q2	4,881	1,167	5.9
1971Q3	4,920	1,188	6.0
1971Q4	4,960	1,207	6.0
1972Q1	5,000	1,237	6.0
1972Q2	5,040	1,255	6.0
1972Q3	5,081	1,276	6.1
1972Q4	5,124	1,301	6.1
1973Q1	5,168	1,329	6.1
1973Q2	5,214	1,363	6.1
1973Q3	5,261	1,401	6.1
1973Q4	5,309	1,438	6.2
1974Q1	5,358	1,481	6.2
1974Q2	5,408	1,529	6.2
1974Q3	5,459	1,590	6.2
1974Q4	5,509	1,653	6.2
1975Q1	5,558	1,706	6.2
1975Q2	5,605	1,745	6.2
1975Q3	5,652	1,791	6.2
1975Q4	5,698	1,836	6.2
1976Q1	5,744	1,870	6.2
1976Q2	5,789	1,904	6.2
1976Q3	5,834	1,943	6.2
1976Q4	5,881	1,992	6.2
1977Q1	5,930	2,041	6.2
1977Q2	5,981	2,090	6.2
1977Q3	6,033	2,138	6.2
1977Q4	6,088	2,194	6.3
1978Q1	6,144	2,251	6.3
1978Q2	6,204	2,316	6.3
1978Q3	6,264	2,380	6.3
1978Q4	6,324	2,451	6.3
1979Q1	6,381	2,519	6.3
1979Q2	6,436	2,601	6.3
1979Q3	6,487	2,675	6.3
1979Q4	6,535	2,747	6.2
1980Q1	6,576	2,825	6.2
1980Q2	6,612	2,902	6.2
1980Q3	6,645	2,984	6.2
1980Q4	6,677	3,083	6.2
1981Q1	6,712	3,179	6.2
1981Q2	6,750	3,254	6.2
1981Q3	6,791	3,334	6.2
1981Q4	6,835	3,416	6.2
1982Q1	6,885	3,487	6.1
1982Q2	6,936	3,557	6.1
1982Q3	6,989	3,635	6.1
1982Q4	7,043	3,702	6.1
1983Q1	7,095	3,761	6.1

1983Q2	7,147	3,815	6.1
1983Q3	7,200	3,883	6.1
1983Q4	7,254	3,940	6.1
1984Q1	7,310	4,012	6.1
1984Q2	7,368	4,080	6.1
1984Q3	7,427	4,146	6.0
1984Q4	7,488	4,206	6.0
1985Q1	7,551	4,292	6.0
1985Q2	7,615	4,353	6.0
1985Q3	7,681	4,419	6.0
1985Q4	7,748	4,481	6.0
1986Q1	7,814	4,542	6.0
1986Q2	7,882	4,598	6.0
1986Q3	7,949	4,659	6.0
1986Q4	8,017	4,727	6.0
1987Q1	8,083	4,794	6.0
1987Q2	8,150	4,865	6.0
1987Q3	8,216	4,941	6.0
1987Q4	8,282	5,019	6.0
1988Q1	8,347	5,098	5.9
1988Q2	8,413	5,189	5.9
1988Q3	8,479	5,293	5.9
1988Q4	8,544	5,380	5.9
1989Q1	8,610	5,476	5.9
1989Q2	8,677	5,577	5.9
1989Q3	8,743	5,661	5.9
1989Q4	8,810	5,742	5.9
1990Q1	8,876	5,849	5.9
1990Q2	8,942	5,954	5.9
1990Q3	9,008	6,052	5.9
1990Q4	9,074	6,143	5.8
1991Q1	9,138	6,248	5.8
1991Q2	9,202	6,334	5.8
1991Q3	9,265	6,423	5.8
1991Q4	9,328	6,501	5.7
1992Q1	9,392	6,576	5.7
1992Q2	9,456	6,663	5.7
1992Q3	9,522	6,740	5.6
1992Q4	9,588	6,834	5.6
1993Q1	9,657	6,924	5.6
1993Q2	9,726	7,016	5.5
1993Q3	9,796	7,102	5.5
1993Q4	9,867	7,194	5.5
1994Q1	9,938	7,284	5.4
1994Q2	10,009	7,372	5.4
1994Q3	10,082	7,463	5.4
1994Q4	10,156	7,560	5.4
1995Q1	10,230	7,662	5.3
1995Q2	10,307	7,753	5.3

1995Q3	10,385	7,845	5.3
1995Q4	10,464	7,943	5.3
1996Q1	10,545	8,045	5.2
1996Q2	10,627	8,139	5.2
1996Q3	10,711	8,240	5.2
1996Q4	10,796	8,341	5.2
1997Q1	10,882	8,449	5.2
1997Q2	10,970	8,557	5.1
1997Q3	11,060	8,652	5.1
1997Q4	11,151	8,753	5.1
1998Q1	11,244	8,839	5.1
1998Q2	11,340	8,934	5.1
1998Q3	11,437	9,043	5.1
1998Q4	11,535	9,145	5.1
1999Q1	11,636	9,259	5.0
1999Q2	11,737	9,379	5.0
1999Q3	11,839	9,494	5.0
1999Q4	11,944	9,625	5.0
2000Q1	12,049	9,782	5.0
2000Q2	12,159	9,925	5.0
2000Q3	12,270	10,080	5.0
2000Q4	12,382	10,226	5.0
2001Q1	12,496	10,386	5.0
2001Q2	12,611	10,555	5.0
2001Q3	12,726	10,686	5.0
2001Q4	12,840	10,815	5.0
2002Q1	12,951	10,941	5.0
2002Q2	13,064	11,082	5.0
2002Q3	13,174	11,225	5.0
2002Q4	13,283	11,377	5.0
2003Q1	13,389	11,539	5.0
2003Q2	13,491	11,664	5.0
2003Q3	13,589	11,813	5.0
2003Q4	13,684	11,955	5.0
2004Q1	13,775	12,138	5.0
2004Q2	13,862	12,317	5.0
2004Q3	13,948	12,474	5.0
2004Q4	14,032	12,638	5.0
2005Q1	14,118	12,832	5.0
2005Q2	14,203	13,003	5.0
2005Q3	14,289	13,203	5.0
2005Q4	14,375	13,383	5.0
2006Q1	14,462	13,568	5.0
2006Q2	14,552	13,765	5.0
2006Q3	14,642	13,946	5.0
2006Q4	14,731	14,082	5.0
2007Q1	14,820	14,325	5.0
2007Q2	14,908	14,493	5.0
2007Q3	14,995	14,626	5.0

2007Q4	15,078	14,768	5.0
2008Q1	15,156	14,930	5.0
2008Q2	15,229	15,068	5.0
2008Q3	15,298	15,240	5.0
2008Q4	15,362	15,332	5.0
2009Q1	15,419	15,426	5.0
2009Q2	15,470	15,453	5.1
2009Q3	15,516	15,498	5.1
2009Q4	15,559	15,588	5.1
2010Q1	15,601	15,681	5.2
2010Q2	15,641	15,794	5.2
2010Q3	15,681	15,907	5.2
2010Q4	15,721	16,030	5.2
2011Q1	15,765	16,145	5.2
2011Q2	15,812	16,313	5.3
2011Q3	15,859	16,457	5.3
2011Q4	15,909	16,531	5.3
2012Q1	15,960	16,672	5.3
2012Q2	16,014	16,804	5.3
2012Q3	16,068	16,948	5.4
2012Q4	16,125	17,063	5.4
2013Q1	16,182	17,181	5.4
2013Q2	16,241	17,296	5.5
2013Q3	16,302	17,434	5.5
2013Q4	16,364	17,566	5.5
2014Q1	16,427	17,690	5.5
2014Q2	16,490	17,852	5.5
2014Q3	16,554	17,986	5.4
2014Q4	16,621	18,168	5.4
2015Q1	16,690	18,298	5.4
2015Q2	16,761	18,428	5.4
2015Q3	16,836	18,582	5.4
2015Q4	16,913	18,734	5.4
2016Q1	16,995	18,913	5.4
2016Q2	17,081	19,080	5.4
2016Q3	17,170	19,256	5.4
2016Q4	17,262	19,446	5.3
2017Q1	17,355	19,651	5.3
2017Q2	17,451	19,849	5.3
2017Q3	17,548	20,054	5.3
2017Q4	17,647	20,265	5.3
2018Q1	17,746	20,492	5.3
2018Q2	17,847	20,708	5.3
2018Q3	17,949	20,926	5.3
2018Q4	18,051	21,148	5.3
2019Q1	18,153	21,386	5.3
2019Q2	18,256	21,610	5.3
2019Q3	18,358	21,837	5.3
2019Q4	18,461	22,065	5.3

2020Q1	18,563	22,311	5.3
2020Q2	18,666	22,541	5.3
2020Q3	18,768	22,776	5.2
2020Q4	18,871	23,013	5.2
2021Q1	18,974	23,267	5.2
2021Q2	19,078	23,506	5.2
2021Q3	19,181	23,749	5.2
2021Q4	19,284	23,995	5.2
2022Q1	19,388	24,258	5.2
2022Q2	19,492	24,505	5.2
2022Q3	19,596	24,757	5.2
2022Q4	19,700	25,012	5.2
2023Q1	19,805	25,284	5.2
2023Q2	19,909	25,540	5.2
2023Q3	20,014	25,802	5.2
2023Q4	20,119	26,066	5.2
2024Q1	20,224	26,348	5.2
2024Q2	20,330	26,615	5.2
2024Q3	20,437	26,887	5.2
2024Q4	20543	27162	5.2
2025Q1	20,650	27,454	5.2
2025Q2	20,756	27,728	5.2
2025Q3	20,861	28,007	5.2
2025Q4	20,967	28,289	5.2

Source: Congressional Budget Office, *The Budget and Economic Outlook: 2015 to 2025* , January www.cbo.gov/publication/45066.

Note: Real potential GDP is expressed in chained 2009 dollars.

d Economic Outlook: 2015 to 2025. These data are identical to those in tab 26 of this workbook.

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