18. Refer to Direct Testimony of Dr. J. Randall Woolridge at 47-48 and Exhibit_JRW-11 at 6.

a. Provide a copy of each study listed in the Exhibit on page 6.

b. Explain why it is appropriate to use geometric means in calculating equity risk premiums in the context of this case

c. Explain why averaging geometric and arithmetic means produces a meaningful estimate in the context of this case.

d. State whether the most recent Ibbotson SBBI yearbook contains any discussion of estimating and using the ex ante approaches or a discussion comparing the ex ante and historical approaches to calculating risk premiums. If yes, provide a copy of those sections of the yearbook in which those discussions appear.

RESPONSE:

a. Please see the attached documents.

b. Dr. Woolridge discusses why it is appropriate to use geometric means his testimony at pages 78-9. The use of the geometric mean return is also supported in the following excerpt from Campbell, Diamond, and Shoven (*Estimating the Real Return on Stocks over the Long Term*, Presented to the Social Security Advisory Board August 2001, pp. 3-4). Please see the attached documents.

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.

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.

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 1.08575 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 prospects in this example.

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.

c. The use of arithmetic versus geometric means returns has always been subject to debate. Dr. Woolridge uses both. The justification for using both measures of central tendency comes from Brad Cornell entitled The Equity Risk Premium (John Wiley & Sons, 1999). Please see the attached documents. With respect to the choice of arithmetic versus geometric mean, Cornell makes the following observations (p. 38):

Which average is the more appropriate choice? That depends on the question being asked. Assuming that the returns being averaged are largely independent and that the future is like the past, the best estimate of expected returns over a given future holding period is the arithmetic average of past returns over the same holding period. For instance, if the goal is to estimate future stock-market returns on a year-byyear basis, the appropriate average is the annual arithmetic risk premium. On the other hand, if the goal is to estimate what the average equity risk premium will be over the next 50 years, the geometric average is a better choice. Because the ultimate goal. in this book is to arrive at reasonable forward-looking estimates of

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the equity risk premium, both arithmetic and geometric averages are employed where they are useful.

It is worth reiterating that projection of any past average is based on the implicit assumption that the future will be like the past. If the assumption is not reasonable, both the arithmetic and geometric averages will tend to be misleading.

d. Yes; please see the attached documents.

Stocks, Bonds, Bills, and Inflation®

SBBI Market Report December 2009

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2009 Highlights

Large Company Stocks

The market for U.S. large company stocks is represented here by the total return on the S&P 500 (the total return includes reinvestment of dividends). Large company stocks for the year produced a total return of 26.46 percent, considerably better than the –37.00 percent return of 2008. Nine of the twelve months of 2009 produced positive returns. The month of April produced the highest return at 9.57 percent, while the month of February produced the lowest return at –10.65 percent.

An index of large company stock total returns, initialized at $1.00 on December 31, 1925, closed up from the previous year. The index increased to $2,591.82 by the end of 2009, compared with $2,049.45 a year earlier.

Small Company Stocks

Small company stocks produced a total return of 28.09 percent in 2009. Nine of the twelve months of 2009 produced positive returns. The month of April produced the highest return at 17.39 percent, while the month of February produced the lowest return at –13.11 percent.

The cumulative wealth index, initialized at $1.00 at the end of 1925, increased to $12,230.87 at the end of 2009, compared with $9,548.94 at the end of 2008.

Long-Term Corporate Bonds

Long-term corporate bonds (with maturity near 20 years) posted a total return of 3.02 percent in 2009. Total returns were positive in seven of the twelve months during the year with July having the highest return of 5.65 percent, while January had the lowest return of –9.49.

The bond default premium, or net return from investing in long-term corporate bonds rather than long-term government bonds of equal maturity, was 21.06 percent in 2009, compared with –13.58 percent in 2008. The default premium increased significantly over the course of the year as credit spreads tightened reflecting a preference for corporate bonds, a reversal from the flight to Treasuries seen in 2008. One dollar invested in long-term corporate bonds at year-end 1925 rose to $118.63 by the end of 2009, compared with $115.15 at the end of 2008.

Long-Term Government Bonds

Long-term government bonds (with maturity near 20 years) returned –14.90 percent in 2009. This return was significantly lower than both the 25.87 percent return seen in 2008 and the long-term average return (1926–2009) of 5.42 percent. Six of the months produced positive returns with March having the highest return at 6.41 percent, and January having the lowest with return of –11.24 percent.

A wealth index of long-term government bonds, initialized at $1.00 at year-end 1925, fell to $84.38 by December 2009. The capital appreciation index of long-term government bond returns closed at $1.06 at year's end, down from $1.30 in 2008.This index reached its all-time high of $1.43 in early 1946.

Intermediate-Term government Bonds

The total return on intermediate-term government bonds (with maturity near 5 years) in 2009 was –2.40 percent. This return was lower than both the 13.11 percent return seen in 2008 and the long-term average return (1926–2009) of 5.33 percent. Returns were positive for six months of the year with March having the highest return of 1.86 percent while December had the lowest return of –2.41 percent.

The wealth index of intermediate-term government bonds, initialized at $1.00 at year-end 1925, fell to $78.53 at the end of 2009, down from $80.47 at year-end 2008.

Treasury Bills

An investment in bills with approximately 30 days to maturity had a year-end total return of 0.10 percent, less than the return in 2008 of 1.60 percent and well below the long-term average (1926 to 2009) of 3.66 percent. The cumulative index of Treasury bill total returns ended the year at $20.53, compared with $20.51 a year earlier. Because monthly Treasury bill returns are nearly always positive, each monthly index value typically sets a new all-time high.

Inflation

Consumer prices rose 2.72 percent in 2009, after rising 0.09 percent in 2008. The result is slightly lower than the long-term historical average (1926–2009) of 3.0 percent. Inflation has remained below 5 percent for twenty-seven of the last twenty-eight years (the exception was the 6.11 percent rate seen in 1990).

A cumulative inflation index, initialized at $1.00 at year-end 1925, finished 2009 at $12.05, up from $11.73 at year-end 2008. That is, a "basket" of consumer goods and services that cost $1.00 in 1925 would cost $12.05 today. The two baskets are not identical, but are intended to be comparable.

Graph 1

Wealth Indices of Investments In the U.S. Capital Markets

(Year-end 1925 = $1.00)

December 31, 1925 to December 31, 2009

Graph 2
Wealth Indices of Investments in Various Portfolio Allocations
(Year-end 1925 = $1.00)

December 31, 1925 to December 31, 2009

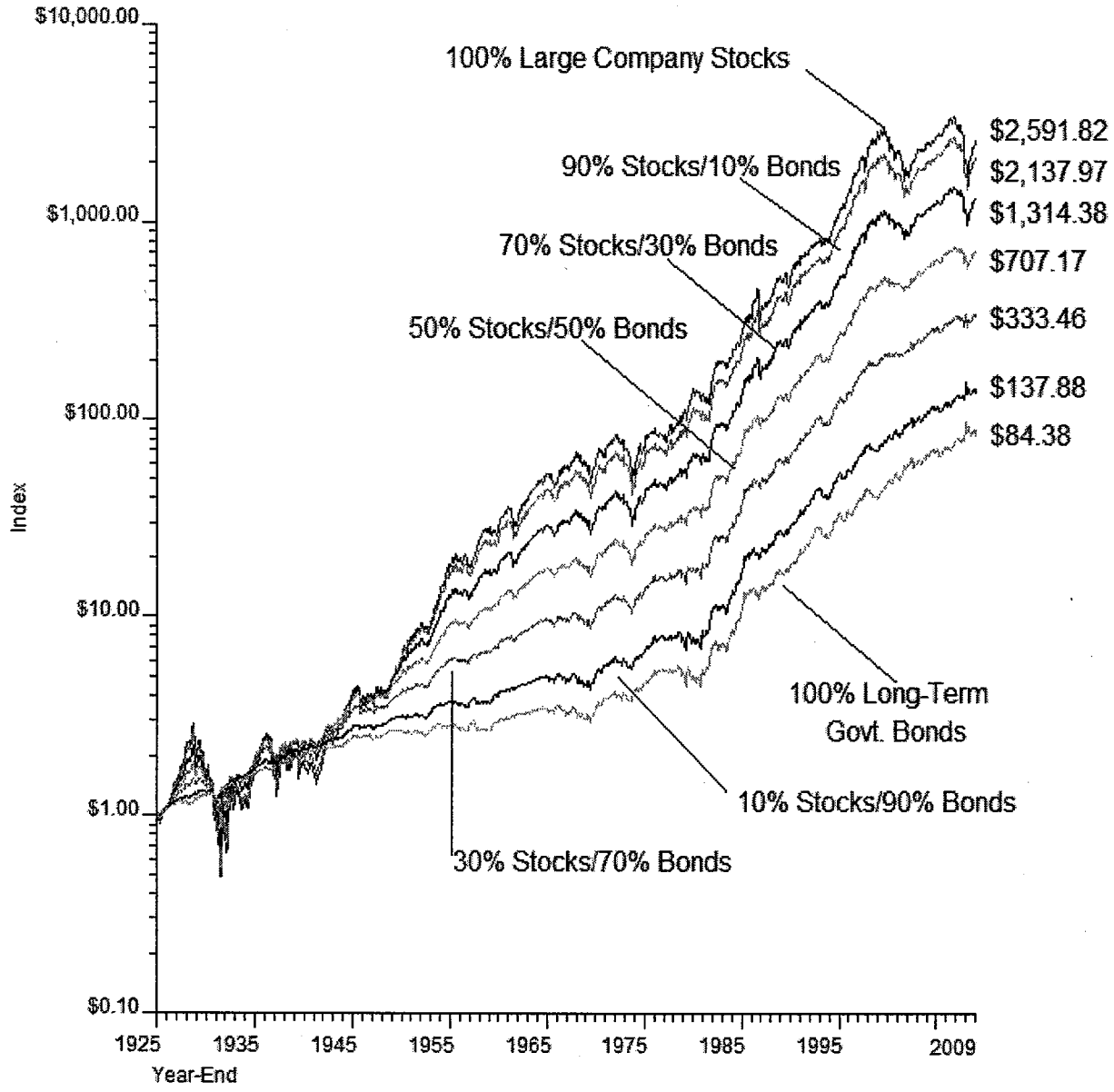

Table 1
Basic Series: Annual Total Returns in Percent

Year	Large Company Stocks	Small Company Stocks	Long-Term Corporate Bonds	Long-Term Government Bonds	Intermediate-Term Government Bonds	U.S. Treasury Bills	Inflation
1998	28.58	-7.31	10.76	13.06	10.21	4.86	1.61
1999	21.04	29.79	-7.45	-8.96	-1.77	4.68	2.68
2000	-9.10	-3.59	12.87	21.48	12.59	5.89	3.39
2001	-11.89	22.77	10.65	3.70	7.62	3.83	1.55
2002	-22.10	-13.28	16.33	17.84	12.93	1.65	2.38
2003	28.68	60.70	5.27	1.45	2.40	1.02	1.88
2004	10.88	18.39	8.72	8.51	2.25	1.20	3.26
2005	4.91	5.69	5.87	7.81	1.36	2.98	3.42
2006	15.79	16.17	3.24	1.19	3.14	4.80	2.54
2007	5.49	-5.22	2.60	9.88	10.05	4.66	4.08
2008	-37.00	-36.72	8.78	25.87	13.11	1.60	0.09
2009	26.46	28.09	3.02	-14.90	-2.40	0.10	2.72

Table 2
Portfolios: Annual Total Returns in Percent

Year	100% Large Company Stocks	90% Stocks 10% Bonds	70% Stocks 30% Bonds	50% Stocks 50% Bonds	30% Stocks 70% Bonds	10% Stocks 90% Bonds	100% Long-Term Govt. Bonds
1998	28.58	27.33	24.60	21.59	18.33	14.86	13.06
1999	21.04	17.75	11.36	5.23	-0.63	-6.25	-8.96
2000	-9.10	-6.30	-0.53	5.46	11.70	18.16	21.48
2001	-11.89	-10.18	-6.85	-3.64	-0.58	2.32	3.70
2002	-22.10	-18.45	-10.90	-3.04	5.12	13.54	17.84
2003	28.68	25.86	20.27	14.77	9.36	4.06	1.45
2004	10.88	10.70	10.29	9.84	9.34	8.80	8.51
2005	4.91	5.28	5.96	6.58	7.12	7.60	7.81
2006	15.79	14.30	11.33	8.40	5.49	2.61	1.19
2007	5.49	6.03	7.03	7.95	8.79	9.54	9.88
2008	-37.00	-32.14	-21.55	-9.72	3.43	18.02	25.87
2009	26.46	21.86	12.97	4.49	-3.58	-11.23	-14.90

Table 3
Basic Series: Monthly and Quarterly Returns in Percent

December 2008 to December 2009

	Large Company Stocks			Small Stocks	Long-Term Corporate Bonds	Long-Term Government Bonds				Intermediate-Term Government Bonds				Treasury Bills	Inflation
Month	Total Return	Income Return	Cap Appr	Total Return	Total Return	Total Return	Income Return	Cap Appr	Yield	Total Return	Income Return	Cap Appr	Yield	Total Return	Rate
12/08	1.06	0.28	0.78	5.66	15.60	9.67	0.33	9.34	3.03	1.60	0.15	1.45	1.26	0.00	-1.03
1/09	-8.43	0.14	-8.57	-11.91	-9.49	-11.24	0.24	-11.49	3.94	-1.63	0.12	-1.75	1.80	0.00	0.44
2/09	-10.65	0.35	-10.99	-13.11	-3.08	-0.56	0.30	-0.86	4.01	-0.82	0.14	-0.96	2.02	0.01	0.50
3/09	8.76	0.22	8.54	9.58	-0.18	6.41	0.35	6.06	3.55	1.86	0.18	1.68	1.68	0.02	0.24
4/09	9.57	0.18	9.39	17.39	-0.30	-6.49	0.29	-6.79	4.10	-1.66	0.14	-1.79	2.06	0.01	0.25
5/09	5.59	0.28	5.31	3.43	4.89	-2.48	0.33	-2.81	4.32	-1.32	0.16	-1.48	2.38	0.00	0.29
6/09	0.20	0.18	0.02	2.76	3.50	0.83	0.38	0.46	4.29	-0.76	0.21	-0.97	2.59	0.01	0.86
7/09	7.56	0.15	7.41	9.82	5.65	0.19	0.36	-0.18	4.30	0.56	0.22	0.34	2.51	0.01	-0.16
8/09	3.61	0.25	3.36	2.73	2.35	2.31	0.36	1.95	4.15	0.97	0.21	0.76	2.34	0.01	0.22
9/09	3.73	0.16	3.57	5.76	2.73	1.76	0.34	1.42	4.03	0.75	0.19	0.56	2.22	0.01	0.06
10/09	-1.86	0.12	-1.98	-7.27	0.16	-1.71	0.33	-2.03	4.20	0.30	0.18	0.12	2.19	0.00	0.10
11/09	6.00	0.26	5.74	1.78	0.44	2.08	0.35	1.73	4.06	1.84	0.18	1.66	1.80	0.00	0.07
12/09	1.93	0.15	1.78	8.69	-2.75	-5.84	0.34	-6.18	4.58	-2.41	0.15	-2.56	2.42	0.01	-0.18
2009	26.46	2.48	23.45	28.09	3.02	-14.90	3.47	-18.25	4.58	-2.40	2.01	-4.42	2.42	0.10	2.72
Quarter															
I-07	0.64	0.46	0.18	1.67	-0.01	0.81	1.20	-0.40	4.93	1.75	1.14	0.60	4.51	1.26	1.76
II-07	6.28	0.48	5.81	4.35	-1.88	-2.06	1.23	-3.28	5.21	-0.45	1.14	-1.59	4.90	1.25	1.46
III-07	2.03	0.46	1.56	-4.03	2.56	5.00	1.26	3.73	4.89	4.22	1.14	3.07	4.13	1.14	0.07
IV-07	-3.33	0.50	-3.82	-6.92	1.96	5.99	1.22	4.76	4.50	4.25	1.00	3.23	3.28	0.94	0.74
I-08	-9.44	0.48	-9.92	-10.27	-1.13	3.40	1.12	2.28	4.32	5.80	0.78	5.00	2.45	0.52	1.66
II-08	-2.73	0.53	-3.23	-3.47	-2.48	-2.37	1.09	-3.48	4.60	-3.03	0.72	-3.75	3.30	0.53	2.48
III-08	-8.37	0.54	-8.88	0.05	-8.54	3.32	1.14	2.16	4.43	2.55	0.79	1.74	2.89	0.43	-0.01
IV-08	-21.94	0.62	-22.56	-26.98	23.36	20.69	1.08	19.48	3.03	7.51	0.60	6.90	1.26	0.11	-3.91
I-09	-11.01	0.63	-11.67	-16.13	-12.42	-6.08	0.81	-6.93	3.55	-0.62	0.43	-1.05	1.68	0.03	1.18
II-09	15.93	0.70	15.22	24.77	8.24	-8.05	0.94	-8.99	4.29	-3.69	0.50	-4.19	2.59	0.02	1.40
III-09	15.61	0.60	14.98	19.32	11.09	4.30	1.06	3.22	4.03	2.29	0.62	1.66	2.22	0.03	0.13
IV-09	6.04	0.54	5.49	2.58	-2.17	-5.52	1.01	-6.50	4.58	-0.31	0.52	-0.82	2.42	0.01	-0.01

Table 4
Portfolio: Monthly and Quarterly Returns in Percent

December 2008 to December 2009

Month	100% Large Company Stocks	90% Stocks 10% Bonds	70% Stocks 30% Bonds	50% Stocks 50% Bonds	30% Stocks 70% Bonds	10% Stocks 90% Bonds	100% Long-Term Govt. Bonds
12/08	1.06	1.92	3.65	5.37	7.09	8.81	9.67
1/09	-8.43	-8.71	-9.27	-9.84	-10.40	-10.96	-11.24
2/09	-10.65	-9.64	-7.62	-5.60	-3.59	-1.57	-0.56
3/09	8.76	8.52	8.05	7.59	7.12	6.65	6.41
4/09	9.57	7.96	4.75	1.54	-1.67	-4.89	-6.49
5/09	5.59	4.79	3.17	1.56	-0.06	-1.67	-2.48
6/09	0.20	0.26	0.39	0.52	0.64	0.77	0.83
7/09	7.56	6.83	5.35	3.88	2.40	0.93	0.19
8/09	3.61	3.48	3.22	2.96	2.70	2.44	2.31
9/09	3.73	3.53	3.14	2.75	2.35	1.96	1.76
10/09	-1.86	-1.84	-1.81	-1.78	-1.75	-1.72	-1.71
11/09	6.00	5.61	4.82	4.04	3.26	2.48	2.08
12/09	1.93	1.15	-0.40	-1.96	-3.51	-5.07	-5.84
2009	26.46	21.86	12.97	4.49	-3.58	-11.23	-14.90
Quarter							
I-07	0.64	0.68	0.73	0.77	0.80	0.81	0.81
II-07	6.28	5.43	3.75	2.08	0.41	-1.24	-2.06
III-07	2.03	2.35	2.97	3.57	4.16	4.73	5.00
IV-07	-3.33	-2.40	-0.54	1.32	3.19	5.06	5.99
I-08	-9.44	-8.20	-5.68	-3.13	-0.55	2.08	3.40
II-08	-2.73	-2.61	-2.43	-2.32	-2.29	-2.33	-2.37
III-08	-8.37	-7.22	-4.90	-2.57	-0.22	2.13	3.32
IV-08	-21.94	-18.19	-10.36	-2.07	6.67	15.89	20.69
I-09	-11.01	-10.48	-9.44	-8.43	-7.47	-6.54	-6.08
II-09	15.93	13.43	8.49	3.65	-1.10	-5.76	-8.05
III-09	15.61	14.45	12.16	9.89	7.64	5.41	4.30
IV-09	6.04	4.86	2.51	0.19	-2.11	-4.39	-5.52

Table 5
Basic Series: Monthly Index Values
December 31, 1925 = $1.00

December 2008 to December 2009

Month	Large Company Stocks		Small Stocks	Long-Term Corporate Bonds	Long-Term Government Bonds		Intermediate-Term Government Bonds		Treasury Bills	Inflation
	Total Return	Capital Appreciation	Total Return	Total Return	Total Return	Capital Appreciation	Total Return	Capital Appreciation	Total Return	
12/08	2049.448	70.788	9548.943	115.154	99.161	1.299	80.466	1.589	20.509	11.728
1/09	1876.707	64.724	8411.664	104.231	88.012	1.150	79.152	1.562	20.509	11.779
2/09	1676.880	57.609	7308.895	101.025	87.518	1.140	78.504	1.547	20.512	11.837
3/09	1823.766	62.529	8009.087	100.847	93.129	1.209	79.966	1.573	20.515	11.866
4/09	1998.318	68.402	9401.867	100.543	87.081	1.127	78.642	1.545	20.518	11.896
5/09	2110.089	72.033	9724.351	105.464	84.921	1.095	77.607	1.522	20.518	11.930
6/09	2114.275	72.048	9992.743	109.157	85.629	1.100	77.014	1.507	20.520	12.032
7/09	2274.193	77.389	10974.031	115.322	85.790	1.098	77.446	1.512	20.522	12.013
8/09	2356.301	79.987	11273.622	118.032	87.769	1.120	78.194	1.523	20.525	12.040
9/09	2444.227	82.843	11922.982	121.259	89.314	1.136	78.778	1.532	20.527	12.048
10/09	2398.820	81.206	11056.181	121.450	87.790	1.113	79.016	1.534	20.527	12.059
11/09	2542.710	85.863	11252.981	121.987	89.620	1.132	80.471	1.559	20.527	12.068
12/09	2591.824	87.390	12230.866	118.628	84.383	1.062	78.532	1.519	20.529	12.047

Table 6
Portfolios: Monthly Index Values
December 31, 1925 = $1.00

December 2008 to December 2009

Month	100% Large Company Stocks	90% Stocks 10% Bonds	70% Stocks 30% Bonds	50% Stocks 50% Bonds	30% Stocks 70% Bonds	10% Stocks 90% Bonds	100% Long-Term Govt. Bonds
12/08	2049.448	1754.418	1163.495	676.786	345.824	155.317	99.161
1/09	1876.707	1601.606	1055.603	610.217	309.862	138.291	88.012
2/09	1676.880	1447.225	975.147	576.018	298.747	136.120	87.518
3/09	1823.766	1570.597	1053.695	619.710	320.004	145.166	93.129
4/09	1998.318	1695.686	1103.760	629.244	314.646	138.071	87.081
5/09	2110.089	1776.839	1138.761	639.036	314.461	135.761	84.921
6/09	2114.275	1781.494	1143.193	642.336	316.485	136.807	85.629
7/09	2274.193	1903.101	1204.365	667.231	324.082	138.073	85.790
8/09	2356.301	1969.329	1243.136	686.971	332.825	141.438	87.769
9/09	2444.227	2038.933	1282.171	705.834	340.651	144.206	89.314
10/09	2398.820	2001.365	1258.937	693.257	334.685	141.724	87.790
11/09	2542.710	2113.582	1319.672	721.276	345.592	145.233	89.620
12/09	2591.824	2137.972	1314.378	707.166	333.457	137.875	84.383

Table 7

Basic Series and Portfolios: Summary Statistics of Annual Total Returns in Percent

Asset Class	1/1/26 to 12/31/2009 Geometric Mean	Arithmetic Mean	Standard Deviation
Large Company Stocks	9.8	11.8	20.5
Small Company Stocks	11.9	16.6	32.8
Long-Term Corporate Bonds	5.9	6.2	8.3
Long-Term Government Bonds	5.4	5.8	9.6
Intermediate-Term Government Bonds	5.3	5.5	5.7
U.S. Treasury Bills	3.7	3.7	3.1
Inflation	3.0	3.1	4.2
90% Stocks/10% Bonds	9.6	11.2	18.5
70% Stocks/30% Bonds	8.9	10.0	14.7
50% Stocks/50% Bonds	8.1	8.7	11.4
30% Stocks/70% Bonds	7.2	7.5	9.3
10% Stocks/90% Bonds	6.0	6.4	8.9

Table 8
Derived Series: Monthly and Quarterly Returns in Percent

December 2008 to December 2009

					Inflation Adjusted Total Returns (%)					
Month	Equity Risk Premia	Small Stock Premia	Bond Default Premia	Bond Horizon Premia	Large Stocks	Small Stocks	LT-Corp Bonds	LT-Govt Bonds	IT-Govt Bonds	T-Bill
12/08	1.06	4.55	5.40	9.67	2.12	6.76	16.81	10.82	2.66	1.05
1/09	-8.43	-3.80	1.98	-11.24	-8.83	-12.29	-9.88	-11.63	-2.06	-0.43
2/09	-10.66	-2.76	-2.53	-0.57	-11.09	-13.54	-3.56	-1.05	-1.31	-0.48
3/09	8.74	0.75	-6.19	6.39	8.50	9.31	-0.42	6.15	1.62	-0.23
4/09	9.56	7.14	6.62	-6.51	9.30	17.10	-0.55	-6.73	-1.90	-0.24
5/09	5.59	-2.05	7.56	-2.48	5.29	3.13	4.59	-2.76	-1.60	-0.29
6/09	0.19	2.56	2.65	0.83	-0.65	1.88	2.62	-0.02	-1.61	-0.84
7/09	7.55	2.10	5.45	0.17	7.73	9.99	5.82	0.35	0.72	0.17
8/09	3.60	-0.85	0.04	2.29	3.38	2.50	2.12	2.08	0.74	-0.21
9/09	3.72	1.96	0.96	1.75	3.67	5.69	2.67	1.70	0.68	-0.05
10/09	-1.86	-5.51	1.90	-1.71	-1.95	-7.36	0.06	-1.80	0.20	-0.09
11/09	6.00	-3.98	-1.61	2.08	5.92	1.71	0.37	2.01	1.77	-0.07
12/09	1.93	6.63	3.28	-5.85	2.11	8.88	-2.58	-5.68	-2.24	0.18
Quarter										
I-07	-0.61	1.02	-0.81	-0.45	-1.10	-0.09	-1.74	-0.94	-0.01	-0.49
II-07	4.97	-1.81	0.19	-3.27	4.75	2.85	-3.29	-3.47	-1.89	-0.21
III-07	0.88	-5.94	-2.33	3.82	1.96	-4.09	2.49	4.93	4.15	1.07
IV-07	-4.23	-3.71	-3.81	5.01	-4.04	-7.60	1.21	5.21	3.48	0.19
I-08	-9.91	-0.91	-4.38	2.87	-10.93	-11.74	-2.74	1.71	4.07	-1.12
II-08	-3.24	-0.77	-0.11	-2.89	-5.08	-5.80	-4.84	-4.73	-5.37	-1.90
III-08	-8.76	9.19	-11.47	2.87	-8.36	0.07	-8.52	3.33	2.56	0.45
IV-08	-22.03	-6.45	2.21	20.55	-18.77	-24.01	28.38	25.60	11.89	4.18
I-09	-11.04	-5.75	-6.75	-6.11	-12.05	-17.10	-13.45	-7.18	-1.78	-1.14
II-09	15.90	7.62	17.72	-8.07	14.33	23.04	6.74	-9.33	-5.02	-1.36
III-09	15.57	3.21	6.50	4.27	15.46	19.16	10.94	4.17	2.16	-0.09
IV-09	6.03	-3.26	3.55	-5.53	6.05	2.59	-2.16	-5.51	-0.30	0.02

Table 9
Derived Series: Monthly Index Values
December 31, 1925 = $1.00

December 2008 to December 2009

	Inflation Adjusted Total Return ($)					
Month	Large Stocks	Small Stocks	LT-Corp Bonds	LT-Govt Bonds	IT-Govt Bonds	T-Bill
12/08	174.755	814.233	9.819	8.455	6.861	1.749
1/09	159.332	714.149	8.849	7.472	6.720	1.741
2/09	141.662	617.454	8.535	7.394	6.632	1.733
3/09	153.698	674.965	8.499	7.848	6.739	1.729
4/09	167.989	790.368	8.452	7.320	6.611	1.725
5/09	176.874	815.123	8.840	7.118	6.505	1.720
6/09	175.715	830.487	9.072	7.117	6.401	1.705
7/09	189.306	913.489	9.600	7.141	6.447	1.708
8/09	195.702	936.327	9.803	7.290	6.494	1.705
9/09	202.878	989.640	10.065	7.413	6.539	1.704
10/09	198.917	916.811	10.071	7.280	6.552	1.702
11/09	210.700	932.470	10.108	7.426	6.668	1.701
12/09	215.148	1015.290	9.847	7.005	6.519	1.704

Glossary

Bond Default Premia
Calculated as the geometric difference between long-term corporate bond total returns and long-term government bond total returns.

Bond Horizon Premia
Calculated as the geometric difference between long-term government bond total returns and Treasury bill total returns.

Equity Risk Premia
Calculated as the geometric difference between large company stock total returns and U.S. Treasury bill total returns.

Inflation
Represented by Consumer Price Index for All Urban Consumer (CPI–U), not seasonally adjusted.

Intermediate–Term Government Bonds
Measured using a one-bond portfolio with a maturity near 5 years.

Large Company Stocks
Represented by the Standard and Poor's 500 Stock Composite Index® (S&P 500) 1957–present; and the S&P 90, 1926–1956.

Long–Term Corporate Bonds
Represented by the Citigroup long-term, high-grade corporate bond total return index.

Long–Term Government Bonds
Measured using a one-bond portfolio with a maturity near 20 years.

Small Company Stocks
A portfolio of stocks represented by the fifth capitalization quintile of stocks on the NYSE for 1926–1981. For January 1982 to March 2001, the series is represented by the DFA U.S. 9–10 Small Company Portfolio and the DFA U.S. Micro Cap Portfolio thereafter.

Small Stock Premia
Calculated as the geometric difference between small company stock total returns and large company stock total returns.

U.S. Treasury Bills
Measured by rolling over each month a one-bill portfolio containing, at the beginning of each month, the bill having the shortest maturity not less than one month.

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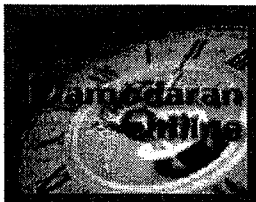

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confess I do not know how efficient or inefficient it is)

Implied Equity Risk Premium (US)

I will be posting my updates on the implied equity risk premium (ERP) on the S&P 500 on a monthly basis at the end of each month. (To see my explanation of the implied equity risk premium, please download my paper on the ERP)

Implied Premium on 1/31/10 = 4.56%
Implied ERP on 12/31/08 = 6.43%

Implied ERP (US) on 12/31/09= 4.36%
Implied premiums by month for last 18 months

Download spreadsheet

SURVEY OF PROFESSIONAL FORECASTERS

Release Date: February 12, 2010

FIRST QUARTER 2010

Forecasters Expect Continued Growth

The U.S. economy will grow at an annual rate of 2.7 percent over each of the next five quarters, according to 42 forecasters surveyed by the Federal Reserve Bank of Philadelphia. The forecasters see stronger growth over the next three quarters than they projected in the survey of three months ago, but some of that upward revision will come at the expense of slower growth at year's end. On an annual-average over annual-average basis, forecasters see real GDP growing 3.0 percent in 2010, up from their prediction of 2.4 percent in the last survey. The forecasters predict real GDP will grow 2.9 percent in 2011, 3.4 percent in 2012, and 3.1 percent in 2013.

The labor market in the near term looks a bit stronger now than it did three months ago. Unemployment is now projected to be an annual average of 9.8 percent in 2010, before falling to 9.2 percent in 2011, 8.3 percent in 2012, and 7.3 percent in 2013. On the jobs front, upward revisions for the growth in jobs over the next two quarters of 2010 are to be followed by downward revisions over the second half of the year. The forecasters see nonfarm payroll employment growing at a rate of 600 jobs per month this quarter and 117,600 jobs per month next quarter. Both estimates mark upward revisions from the previous survey. Over the second half of 2010, jobs will grow at an average rate of 96,000 per month. The forecasters' projections for the annual average level of nonfarm payroll employment suggest job losses at a monthly rate of 59,000 in 2010. Job gains in 2011 are seen averaging 142,000 per month, as the table below shows. (These annual-average estimates are computed as the year-to-year change in the annual-average level of nonfarm payroll employment, converted to a monthly rate.)

	Real GDP (%)		*Unemployment Rate (%)*		*Payrolls (000s/month)*	
	Previous	*New*	*Previous*	*New*	*Previous*	*New*
Quarterly data:						
2010: Q1	2.3	2.7	10.2	9.9	-35.0	0.6
Q2	2.4	2.7	10.1	9.9	57.6	117.6
Q3	2.6	2.7	10.0	9.8	158.6	69.3
Q4	2.9	2.7	9.8	9.7	142.2	122.2
2011: Q1	N.A.	2.7	N.A.	9.4	N.A.	143.4
Annual average data:						
2010	2.4	3.0	10.0	9.8	-69.8	-59.0
2011	3.1	2.9	9.2	9.2	N.A.	141.8
2012	3.3	3.4	8.3	8.3	N.A.	N.A.
2013	N.A.	3.1	N.A.	7.3	N.A	N.A.

RESEARCH DEPARTMENT FEDERAL RESERVE BANK OF PHILADELPHIA
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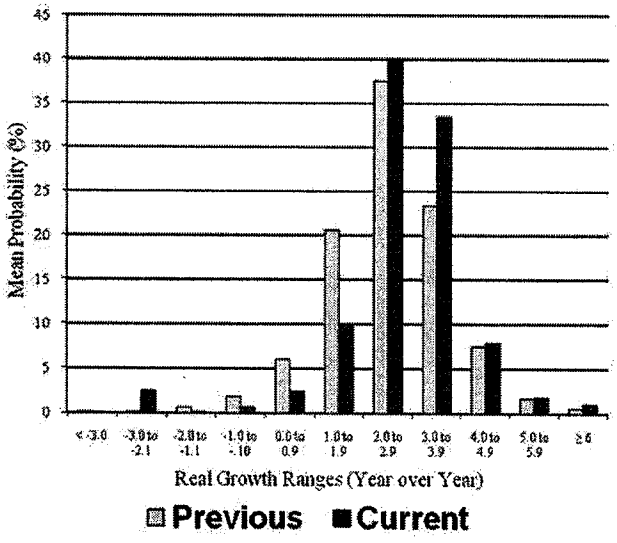
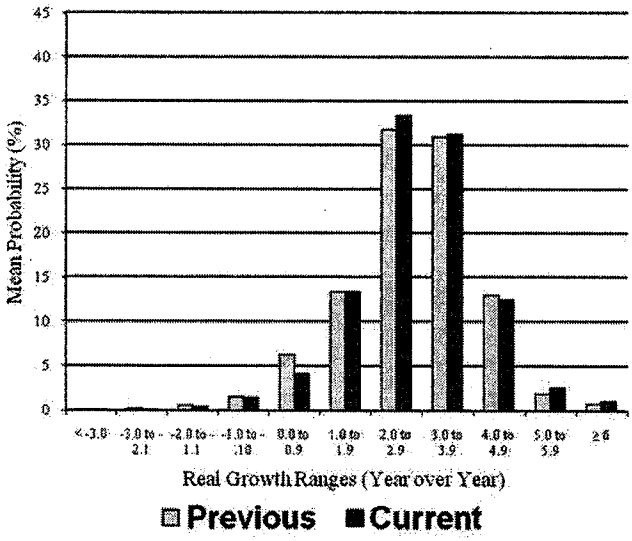
The charts below provide some insight into the degree of uncertainty the forecasters have about their projections for the rate of growth in the annual-average level of real GDP. Each chart presents the forecasters' previous and current estimates of the probability that growth will fall into each of 11 ranges. The forecasters have raised their estimate of the probability that growth will fall into the range of 2.0 percent and above in 2010, 2011, and 2012.

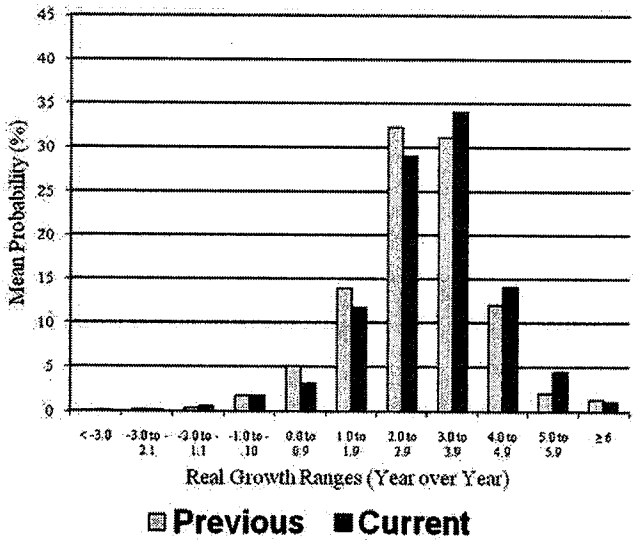
Mean Probabilities for Real GDP Growth in 2010



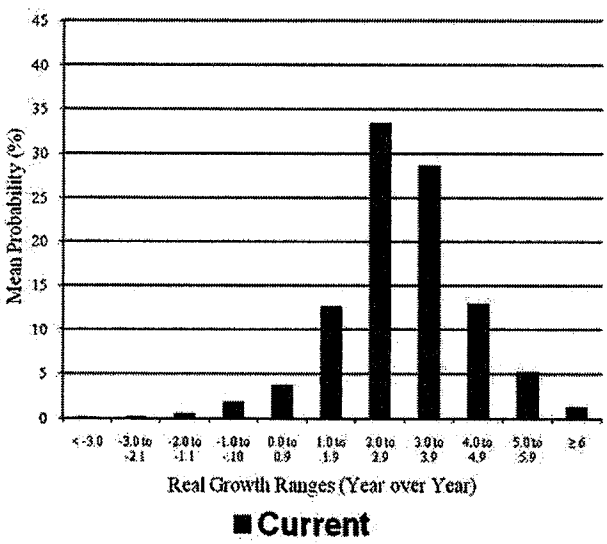
Mean Probabilities for Real GDP Growth in 2011



Mean Probabilities for Real GDP Growth in 2012

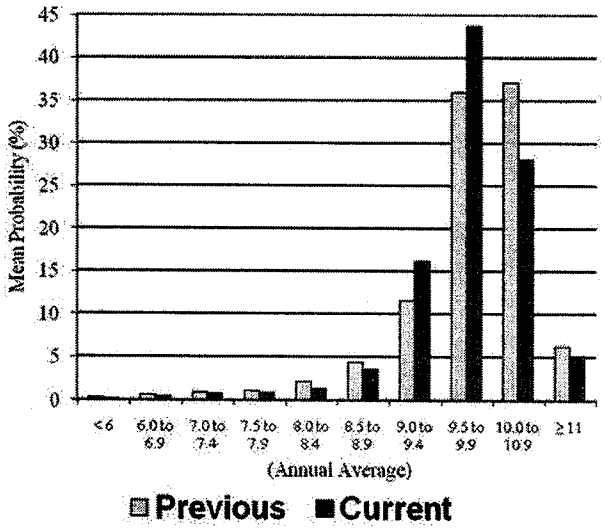


Mean Probabilities for Real GDP Growth in 2013

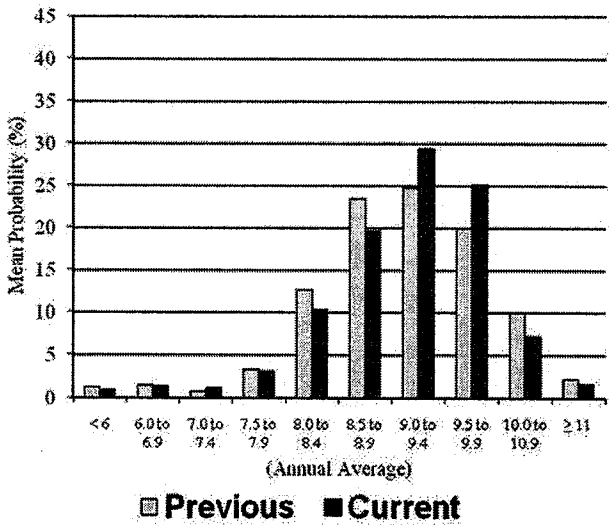


The forecasters' density projections, as shown in the charts below, shed light on the odds of a recovery in the labor market over the next four years. Each chart presents the forecasters' previous and current estimates of the probability that unemployment will fall into each of 10 ranges. The forecasters have raised the estimate of the probability that the annual average unemployment rate will be in the range of 9.0 percent to 9.4 percent in 2010, 2011, and 2012 compared with their previous estimates. The panelists have also raised their estimates of the probability that unemployment will be in the range of 9.5 percent to 9.9 percent in 2010 and 2011 compared with their previous estimates. For 2010 to 2012, the probability that unemployment will fall into the two highest ranges of outcomes is lower now than it was previously.

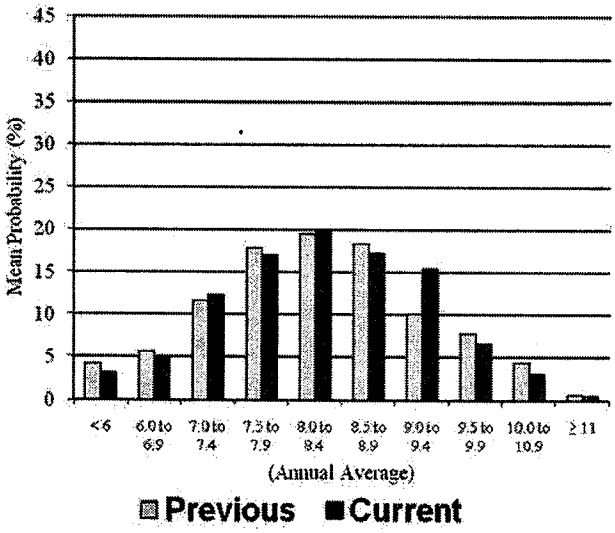
Mean Probabilities for Unemployment Rate in 2010



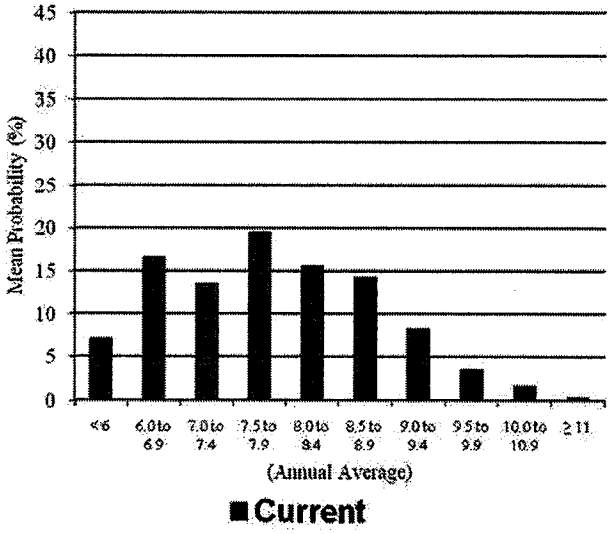
Mean Probabilities for Unemployment Rate in 2011



Mean Probabilities for Unemployment Rate in 2012



Mean Probabilities for Unemployment Rate in 2013



Upward Revision to the Outlook for Long-Term Headline CPI Inflation

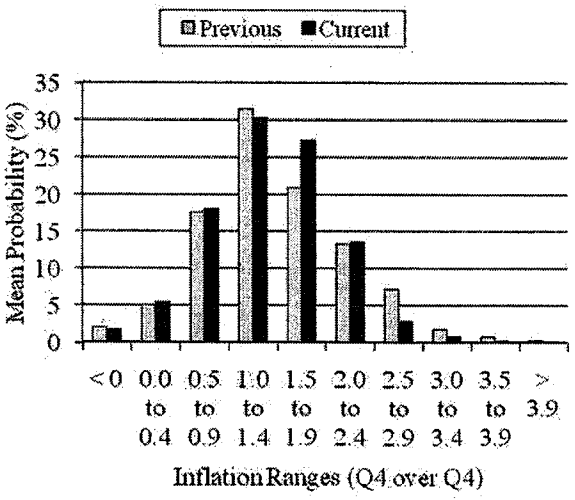
The current outlook for the headline and core measures of CPI and PCE inflation during the next two years is about the same as it was in the last survey. Over the next 10 years, 2010 to 2019, the forecasters expect headline CPI inflation to average 2.39 percent at an annual rate. This estimate is up from the last survey, when the forecasters thought headline CPI inflation over the 10-year period from 2009 to 2018 would average 2.26 percent. The 10-year outlook for PCE inflation is unchanged.

Short-Run and Long-Run Projections for Inflation (Annualized Percentage Points)

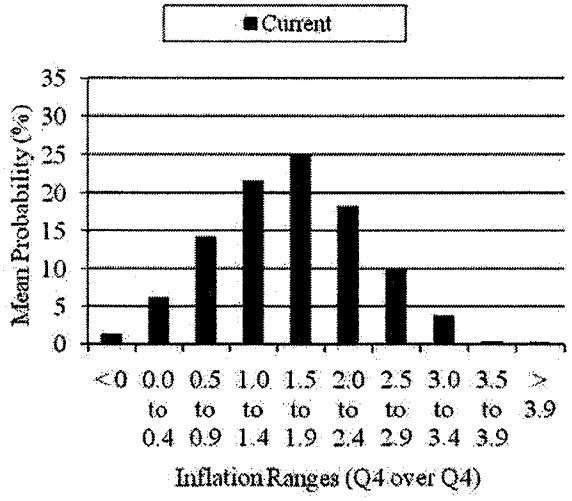
	Headline CPI		Core CPI		Headline PCE		Core PCE	
	Previous	Current	Previous	Current	Previous	Current	Previous	Current
Quarterly								
2010: Q1	1.5	2.1	1.2	1.3	1.5	1.5	1.0	1.2
Q2	1.5	1.4	1.4	1.4	1.2	1.2	1.2	1.3
Q3	1.8	1.8	1.5	1.5	1.8	1.7	1.4	1.3
Q4	1.8	1.9	1.5	1.5	1.8	1.8	1.4	1.4
2011: Q1	N.A.	2.1	N.A.	1.6	N.A.	1.8	N.A.	1.5
Q4/Q4 Annual Averages								
2010	1.7	1.7	1.4	1.4	1.3	1.4	1.3	1.3
2011	2.1	2.1	1.8	1.7	1.8	1.8	1.5	1.5
2012	N.A.	2.3	N.A.	2.0	N.A.	2.0	N.A.	1.9
Long-Term Annual Averages								
2009-2013	1.89	N.A.	N.A.	N.A.	1.83	N.A.	N.A.	N.A.
2010-2014	N.A.	2.20	N.A.	N.A.	N.A.	1.80	N.A.	N.A.
2009-2018	2.26	N.A.	N.A.	N.A.	2.10	N.A.	N.A.	N.A.
2010-2019	N.A.	2.39	N.A.	N.A.	N.A.	2.10	N.A.	N.A.

The figures below show the probabilities that the forecasters are assigning to the possibility that fourth-quarter over fourth-quarter core PCE inflation in 2010 and 2011 will fall into each of 10 ranges. The forecasters see a higher chance than they previously assigned that core PCE inflation in 2010 will fall into the range of 1.5 percent to 2.4 percent and a lower chance that inflation will be 2.5 percent and above. For 2011, the forecasters are assigning a probability of 25 percent to inflation falling into the range of 1.5 percent to 1.9 percent.

Mean Probabilities for Core PCE Inflation in 2010



Mean Probabilities for Core PCE Inflation in 2011



Forecasters State Their Views on House Prices

In this survey, a special question asked panelists to provide their forecasts for fourth-quarter over fourth-quarter growth in house prices, as measured by a number of alternative indices. The panelists were allowed to choose from a provided list of indices or to write in their own index. For each index of their choosing, the panelists provided forecasts of growth in 2010 and 2011.

Twenty panelists answered the special question. Some panelists provided projections for more than one index. The table below provides a summary of the forecasters' responses. For some indices, the number of responses (N) is very small. The median estimates for the seven house-price indices listed on the table below range from -1.9 percent to 3.0 percent in 2010 and 1.6 percent to 3.4 percent in 2011.

Projections for the Growth in Various Indices of House Prices
Q4/Q4, Percentage Points

Index	2010 (Q4/Q4 Percent Change)			2011 (Q4/Q4 Percent Change)		
	N	Mean	Median	N	Mean	Median
S&P/Case-Shiller: U.S. National	3	-3.9	-1.9	3	3.9	3.0
S&P/Case-Shiller: Composite 10	4	3.3	2.6	4	2.4	3.0
S&P/Case-Shiller: Composite 20	7	-0.5	1.3	6	2.9	3.0
FHFA: U.S. Total	8	-1.1	1.2	8	2.3	2.2
FHFA: Purchase Only	10	0.6	1.1	10	1.6	1.6
LoanPerformance: National, incl Distressed Sales (Single Family Combined)	3	3.2	3.0	3	2.3	3.0
NAR Median: Total Existing	4	-1.7	1.6	4	3.7	3.4

Forecasters See a Lower Risk of a Downturn

The forecasters are reducing the chance of a contraction in real GDP in any of the next three quarters. They have cut their estimate of the risk of a downturn this quarter to 9.9 percent compared with 15.9 percent previously. As the table below shows, the panelists have also made downward revisions to their forecasts for the following two quarters, although the Q2 and Q3 revisions are smaller than those for Q1.

		Risk of a Negative Quarter (%)	
		Previous	*New*
Quarterly data:			
2010:	Q1	15.9	9.9
	Q2	14.0	11.6
	Q3	13.8	13.2
	Q4	13.4	14.0
2011:	Q1	N.A.	14.8

Upward Revisions to Long-Term Output and Productivity Growth and Returns to Financial Assets

In first-quarter surveys, the forecasters provide their long-run projections for an expanded set of variables, including growth in output and productivity, as well as returns on financial assets. As the table below shows, the forecasters have increased their long-run estimates for the annual-average rate of growth in real GDP and productivity. Currently, the forecasters expect real GDP to grow 2.70 percent per year over the next 10 years, up from 2.56 percent in the survey of 2009 Q1. Similarly, productivity growth is now expected to average 2.0 percent, up from 1.9 percent. Upward revisions to the return on financial assets, with the exception of three-month Treasury bills, accompany the current outlook. The forecasters see the S&P 500 returning 7.00 percent per year, up from 6.50 percent, and 10-year Treasuries returning 4.95 percent, up from 4.85 percent. The forecasters continue to expect that three-month Treasury bills will return 3.0 percent per year over the next 10 years.

	Long-Term (10-year) Forecasts (%)	
	First Quarter 2009	*Current Survey*
Real GDP Growth	2.56	2.70
Productivity Growth	1.90	2.00
Stock Returns (S&P 500)	6.50	7.00
Bond Returns (10-year)	4.85	4.95
Bill Returns (3-month)	3.00	3.00

The Federal Reserve Bank of Philadelphia thanks the following forecasters for their participation in recent surveys:

Robert J. Barbera, ITG Inc.; **Jay Brinkmann**, Mortgage Bankers Association; **Joseph Carson**, Alliance Capital Management; **Christine Chmura, Ph.D.** and **Xiaobing Shuai, Ph.D.**, Chmura Economics & Analytics; **Gary Ciminero, CFA**, GLC Financial Economics; **David Crowe**, National Association of Home Builders; **Rajeev Dhawan**, Georgia State University; **Shawn Dubravac**, Consumer Electronics Association; **Michael R. Englund**, Action Economics, LLC; **Gerard F. Fuda**, Independent Economist; **Stephen Gallagher**, Societe Generale; **Timothy Gill**, NEMA; **James Glassman**, JP Morgan Chase & Co.; **Ethan Harris**, Bank of America Merrill Lynch; **William B. Hummer**, Wayne Hummer Investments; **IHS Global Insight**; **Peter Jaquette**, PIRA Energy Group; **Fred Joutz**, Benchmark Forecasts and Research Program on Forecasting, George Washington University; **Kurt Karl**, Swiss Re; **N. Karp**, BBVA Compass; **Walter Kemmsies** and **Daniel Solomon**, Moffatt & Nichol; **Jack Kleinhenz**, Kleinhenz & Associates, Inc.; **Thomas Lam**, OSK Group/DMG & Partners; **L. Douglas Lee**, Economics from Washington; **Allan R. Leslie**, Economic Consultant; **John Lonski**, Moody's Investors Service; **Macroeconomic Advisers, LLC**; **Dean Maki**, Barclays Capital; **Edward F. McKelvey**, Goldman Sachs; **Jim Meil**, Eaton Corporation; **Anthony Metz**, Pareto Optimal Economics; **Ardavan Mobasheri** and **Danielle Ferry**, American International Group; **Michael Moran**, Daiwa Securities America; **Joel L. Naroff**, Naroff Economic Advisors; **Herbert E. Neil**, Financial and Economic Strategies Corp.; **Mark Nielson, Ph.D.**, MacroEcon Global Advisors; **Michael P. Niemira**, International Council of Shopping Centers; **Luca Noto**, Prima Sgr; **Martin A. Regalia**, U.S. Chamber of Commerce; **David Resler**, Nomura Securities International, Inc.; **Merrill Lynch**; **John Silvia**, Wells Fargo; **Allen Sinai**, Decision Economics, Inc; **Sean M. Snaith, Ph.D.**, University of Central Florida; **Constantine G. Soras, Ph.D.**, CGS Economic Consulting; **Neal Soss**, Credit Suisse; **Stephen Stanley**, RBS; **Susan M. Sterne**, Economic Analysis Associates, Inc.; **Thomas Kevin Swift**, American Chemistry Council; **Lea Tyler**, Oxford Economics USA, Inc.; **Albert M. Wojnilower**; **Jay N. Woodworth**, Woodworth Holdings, Ltd.; **Richard Yamarone**, Argus Research Group; **Mark Zandi**, Economy.com; **Ellen Beeson Zentner**, Bank of Tokyo-Mitsubishi UFJ, Ltd.

This is a partial list of participants. We also thank those who wish to remain anonymous.

SUMMARY TABLE
SURVEY OF PROFESSIONAL FORECASTERS
MAJOR MACROECONOMIC INDICATORS

	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2010	2011 (YEAR-OVER-YEAR)	2012	2013
PERCENT GROWTH AT ANNUAL RATES									
1. REAL GDP (BILLIONS, CHAIN WEIGHTED)	2.7	2.7	2.7	2.7	2.7	3.0	2.9	3.4	3.1
2. GDP PRICE INDEX (PERCENT CHANGE)	1.5	1.2	1.5	1.6	1.9	1.1	1.6	N.A.	N.A.
3. NOMINAL GDP ($ BILLIONS)	4.4	3.8	4.5	4.6	5.2	4.1	4.7	N.A.	N.A.
4. NONFARM PAYROLL EMPLOYMENT									
(PERCENT CHANGE)	0.0	1.1	0.6	1.1	1.3	-0.5	1.3	N.A.	N.A.
(AVG MONTHLY CHANGE)	0.6	117.6	69.3	122.2	143.4	-59.0	141.8	N.A.	N.A.
VARIABLES IN LEVELS									
5. UNEMPLOYMENT RATE (PERCENT)	9.9	9.9	9.8	9.7	9.4	9.8	9.2	8.3	7.3
6. 3-MONTH TREASURY BILL (PERCENT)	0.1	0.2	0.3	0.7	1.1	0.4	1.7	3.1	3.6
7. 10-YEAR TREASURY BOND (PERCENT)	3.7	3.8	4.0	4.1	4.3	3.9	4.5	4.8	5.0

	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2010	2011 (Q4-OVER-Q4)	2012
INFLATION INDICATORS								
8. CPI (ANNUAL RATE)	2.1	1.4	1.8	1.9	2.1	1.7	2.1	2.3
9. CORE CPI (ANNUAL RATE)	1.3	1.4	1.5	1.5	1.6	1.4	1.7	2.0
10. PCE (ANNUAL RATE)	1.5	1.2	1.7	1.8	1.8	1.4	1.8	2.0
11. CORE PCE (ANNUAL RATE)	1.2	1.3	1.3	1.4	1.5	1.3	1.5	1.9

THE FIGURES ON EACH LINE ARE MEDIANS OF 42 INDIVIDUAL FORECASTERS.

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2010.

SURVEY OF PROFESSIONAL FORECASTERS

First Quarter 2010

Tables

Note: Data in these tables listed as "actual" are the data that were available to the forecasters when they were sent the survey questionnaire on January 29; the tables do not reflect subsequent revisions to the data. All forecasts were received on or before February 9, 2010.

TABLE ONE
MAJOR MACROECONOMIC INDICATORS
MEDIANS OF FORECASTER PREDICTIONS

	NUMBER OF FORECASTERS	ACTUAL	FORECAST					ACTUAL	FORECAST			
		2009 Q4	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2009 ANNUAL	2010 ANNUAL	2011 ANNUAL	2012 ANNUAL	2013 ANNUAL
1. GROSS DOMESTIC PRODUCT (GDP) ($ BILLIONS)	40	14463	14621	14759	14923	15092	15285	14259	14843	15540	N.A.	N.A.
2. GDP PRICE INDEX (2005=100)	40	109.93	110.34	110.67	111.07	111.51	112.03	109.75	110.91	112.70	N.A.	N.A.
3. CORPORATE PROFITS AFTER TAXES ($ BILLIONS)	21	N.A.	1134.9	1142.5	1178.2	1196.0	1216.9	N.A.	1165.4	1253.9	N.A.	N.A.
4. UNEMPLOYMENT RATE (PERCENT)	41	10.0	9.9	9.9	9.8	9.7	9.4	9.3	9.8	9.2	8.3	7.3
5. NONFARM PAYROLL EMPLOYMENT (THOUSANDS)	36	130965	130967	131320	131527	131894	132324	132003	131295	132997	N.A.	N.A.
6. INDUSTRIAL PRODUCTION (2002=100)	38	99.7	101.0	102.3	103.6	104.9	105.6	98.3	103.0	107.5	N.A.	N.A.
7. NEW PRIVATE HOUSING STARTS (ANNUAL RATE, MILLIONS)	37	0.55	0.61	0.67	0.75	0.82	0.90	0.55	0.72	0.99	N.A.	N.A.
8. 3-MONTH TREASURY BILL RATE (PERCENT)	41	0.06	0.10	0.20	0.34	0.70	1.10	0.15	0.35	1.70	3.10	3.62
9. AAA CORPORATE BOND YIELD (PERCENT)	33	5.20	5.29	5.33	5.45	5.51	5.69	5.31	5.40	5.96	N.A.	N.A.
10. BAA CORPORATE BOND YIELD (PERCENT)	26	6.33	6.37	6.48	6.52	6.68	6.77	7.30	6.51	6.85	N.A.	N.A.
11. 10-YEAR TREASURY BOND YIELD (PERCENT)	42	3.46	3.70	3.78	4.00	4.10	4.28	3.26	3.90	4.47	4.78	4.95
12. REAL GDP (BILLIONS, CHAIN WEIGHTED)	42	13155	13243	13332	13422	13512	13602	12989	13375	13757	14219	14666
13. TOTAL CONSUMPTION EXPENDITURE (BILLIONS, CHAIN WEIGHTED)	42	9298.5	9342.0	9391.0	9445.1	9501.2	9540.6	9237.3	9421.0	9628.4	N.A.	N.A.
14. NONRESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED)	39	1278.1	1281.3	1292.8	1310.2	1333.6	1352.5	1289.2	1306.9	1388.5	N.A.	N.A.
15. RESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED)	39	364.6	368.2	376.2	384.0	395.2	409.3	359.1	380.7	431.2	N.A.	N.A.
16. FEDERAL GOVERNMENT C & I (BILLIONS, CHAIN WEIGHTED)	37	1043.5	1056.3	1066.1	1075.1	1077.4	1081.9	1026.7	1068.2	1085.0	N.A.	N.A.
17. STATE AND LOCAL GOVT C & I (BILLIONS, CHAIN WEIGHTED)	37	1544.3	1545.9	1548.1	1547.8	1550.3	1552.2	1542.8	1549.8	1559.8	N.A.	N.A.
18. CHANGE IN PRIVATE INVENTORIES (BILLIONS, CHAIN WEIGHTED)	39	-33.5	0.0	17.0	28.5	30.9	35.1	-111.7	20.0	37.1	N.A.	N.A.
19. NET EXPORTS (BILLIONS, CHAIN WEIGHTED)	39	-341.1	-347.4	-350.9	-356.7	-358.7	-364.6	-353.9	-353.6	-359.2	N.A.	N.A.

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA. SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2010.

TABLE TWO
MAJOR MACROECONOMIC INDICATORS
PERCENTAGE CHANGES AT ANNUAL RATES

	NUMBER OF FORECASTERS	Q4 2009 TO Q1 2010	Q1 2010 TO Q2 2010	Q2 2010 TO Q3 2010	Q3 2010 TO Q4 2010	Q4 2010 TO Q1 2011	2009 TO 2010	2010 TO 2011	2011 TO 2012	2012 TO 2013
1. GROSS DOMESTIC PRODUCT (GDP) ($ BILLIONS)	40	4.4	3.8	4.5	4.6	5.2	4.1	4.7	N.A.	N.A.
2. GDP PRICE INDEX (2005=100)	40	1.5	1.2	1.5	1.6	1.9	1.1	1.6	N.A.	N.A.
3. CORPORATE PROFITS AFTER TAXES ($ BILLIONS)	21	16.6	2.7	13.1	6.2	7.2	17.6	7.6	N.A.	N.A.
4. UNEMPLOYMENT RATE (PERCENT)	41	-0.1	0.0	-0.1	-0.2	-0.3	0.5	-0.7	-0.9	-0.9
5. NONFARM PAYROLL EMPLOYMENT										
(PERCENT CHANGE)	36	0.0	1.1	0.6	1.1	1.3	-0.5	1.3	N.A.	N.A.
(AVG MONTHLY CHANGE)	36	0.6	117.6	69.3	122.2	143.4	-59.0	141.8	N.A.	N.A.
6. INDUSTRIAL PRODUCTION (2002=100)	38	5.4	5.1	5.1	5.1	3.0	4.8	4.4	N.A.	N.A.
7. NEW PRIVATE HOUSING STARTS (ANNUAL RATE, MILLIONS)	37	45.7	50.4	53.3	42.9	45.1	29.7	38.3	N.A.	N.A.
8. 3-MONTH TREASURY BILL RATE (PERCENT)	41	0.04	0.10	0.14	0.36	0.40	0.20	1.35	1.40	0.52
9. AAA CORPORATE BOND YIELD (PERCENT)	33	0.09	0.04	0.12	0.06	0.18	0.09	0.56	N.A.	N.A.
10. BAA CORPORATE BOND YIELD (PERCENT)	26	0.04	0.11	0.04	0.16	0.09	-0.79	0.34	N.A.	N.A.
11. 10-YEAR TREASURY BOND YIELD (PERCENT)	42	0.24	0.08	0.22	0.10	0.18	0.64	0.56	0.31	0.17
12. REAL GDP (BILLIONS, CHAIN WEIGHTED)	42	2.7	2.7	2.7	2.7	2.7	3.0	2.9	3.4	3.1
13. TOTAL CONSUMPTION EXPENDITURE (BILLIONS, CHAIN WEIGHTED)	42	1.9	2.1	2.3	2.4	1.7	2.0	2.2	N.A.	N.A.
14. NONRESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED)	39	1.0	3.6	5.5	7.3	5.8	1.4	6.2	N.A.	N.A.
15. RESIDENTIAL FIXED INVESTMENT (BILLIONS, CHAIN WEIGHTED)	39	4.0	8.9	8.6	12.2	15.1	6.0	13.3	N.A.	N.A.
16. FEDERAL GOVERNMENT C & I (BILLIONS, CHAIN WEIGHTED)	37	5.0	3.8	3.4	0.8	1.7	4.0	1.6	N.A.	N.A.
17. STATE AND LOCAL GOVT C & I (BILLIONS, CHAIN WEIGHTED)	37	0.4	0.6	-0.1	0.6	0.5	0.5	0.6	N.A.	N.A.
18. CHANGE IN PRIVATE INVENTORIES (BILLIONS, CHAIN WEIGHTED)	39	33.5	17.0	11.5	2.4	4.2	131.7	17.1	N.A.	N.A.
19. NET EXPORTS (BILLIONS, CHAIN WEIGHTED)	39	-6.3	-3.5	-5.9	-2.0	-5.9	0.3	-5.6	N.A.	N.A.

NOTE: FIGURES FOR UNEMPLOYMENT RATE, TREASURY BILL RATE, AAA CORPORATE BOND YIELD, BAA CORPORATE BOND YIELD, AND 10-YEAR TREASURY BOND YIELD ARE CHANGES IN THESE RATES, IN PERCENTAGE POINTS.
FIGURES FOR CHANGE IN PRIVATE INVENTORIES AND NET EXPORTS ARE CHANGES IN BILLIONS OF CHAIN-WEIGHTED DOLLARS.
ALL OTHERS ARE PERCENTAGE CHANGES AT ANNUAL RATES.

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA. SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2010.

TABLE THREE
MAJOR PRICE INDICATORS
MEDIANS OF FORECASTER PREDICTIONS

	NUMBER OF FORECASTERS	ACTUAL	FORECAST (Q/Q)					ACTUAL	FORECAST (Q4/Q4)		
		2009 Q4	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2009 ANNUAL	2010 ANNUAL	2011 ANNUAL	2012 ANNUAL
1. CONSUMER PRICE INDEX (ANNUAL RATE)	41	3.4	2.1	1.4	1.8	1.9	2.1	1.5	1.7	2.1	2.3
2. CORE CONSUMER PRICE INDEX (ANNUAL RATE)	39	1.5	1.3	1.4	1.5	1.5	1.6	1.7	1.4	1.7	2.0
3. PCE PRICE INDEX (ANNUAL RATE)	34	2.7	1.5	1.2	1.7	1.8	1.8	1.3	1.4	1.8	2.0
4. CORE PCE PRICE INDEX (ANNUAL RATE)	35	1.4	1.2	1.3	1.3	1.4	1.5	1.4	1.3	1.5	1.9

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA. SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2010.

TABLE FOUR
ESTIMATED PROBABILITY OF DECLINE IN REAL GDP

ESTIMATED PROBABILITY (CHANGES IN 100)	Q4 2009 TO Q1 2010	Q1 2010 TO Q2 2010	Q2 2010 TO Q3 2010	Q3 2010 TO Q4 2010	Q4 2010 TO Q1 2011
NUMBER OF FORECASTERS					
10 OR LESS	28	28	22	19	17
11 TO 20	7	5	12	15	14
21 TO 30	2	5	3	3	3
31 TO 40	2	1	2	2	4
41 TO 50	0	0	0	0	0
51 TO 60	0	0	0	0	0
61 TO 70	0	0	0	0	0
71 TO 80	0	0	0	0	0
81 TO 90	0	0	0	0	0
91 AND OVER	0	0	0	0	0
NOT REPORTING	3	3	3	3	4
MEAN AND MEDIAN					
MEDIAN PROBABILITY	5.00	10.00	10.00	12.00	15.00
MEAN PROBABILITY	9.85	11.62	13.18	14.03	14.82

NOTE: TOTAL NUMBER OF FORECASTERS REPORTING IS 39.
SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2010.

TABLE FIVE
MEAN PROBABILITIES

MEAN PROBABILITY ATTACHED TO POSSIBLE
CIVILIAN UNEMPLOYMENT RATE:

	2010	2011	2012	2013
11.0 PERCENT OR MORE	5.08	1.62	0.56	0.30
10.0 TO 10.9 PERCENT	28.11	7.19	3.06	1.58
9.5 TO 9.9 PERCENT	43.68	25.13	6.57	3.52
9.0 TO 9.4 PERCENT	16.13	29.44	15.41	8.20
8.5 TO 8.9 PERCENT	3.61	19.67	17.22	14.24
8.0 TO 8.4 PERCENT	1.30	10.33	19.83	15.56
7.5 TO 7.9 PERCENT	0.82	3.13	17.00	19.48
7.0 TO 7.4 PERCENT	0.72	1.18	12.24	13.48
6.0 TO 6.9 PERCENT	0.41	1.38	4.96	16.56
LESS THAN 6.0 PERCENT	0.14	0.94	3.15	7.08

MEAN PROBABILITY ATTACHED TO POSSIBLE
PERCENT CHANGES IN REAL GDP:

	2009-2010	2010-2011	2011-2012	2012-2013
6.0 OR MORE	1.03	1.03	1.07	1.23
5.0 TO 5.9	1.77	2.55	4.46	5.17
4.0 TO 4.9	7.87	12.39	14.07	12.85
3.0 TO 3.9	33.46	31.21	34.04	28.60
2.0 TO 2.9	40.05	33.37	29.04	33.35
1.0 TO 1.9	10.00	13.32	11.70	12.54
0.0 TO 0.9	2.46	4.13	3.15	3.73
-1.0 TO -0.1	0.64	1.45	1.70	1.79
-2.0 TO -1.1	0.15	0.42	0.52	0.50
-3.0 TO -2.1	2.51	0.08	0.17	0.17
LESS THAN -3.0	0.05	0.05	0.07	0.08

MEAN PROBABILITY ATTACHED TO POSSIBLE
PERCENT CHANGES IN GDP PRICE INDEX:

	2009-2010	2010-2011
8.0 OR MORE	0.00	0.00
7.0 TO 7.9	0.00	0.00
6.0 TO 6.9	0.03	0.14
5.0 TO 5.9	0.21	0.43
4.0 TO 4.9	0.87	1.49
3.0 TO 3.9	3.45	7.11
2.0 TO 2.9	18.05	26.27
1.0 TO 1.9	46.53	43.22
0.0 TO 0.9	25.58	16.54
WILL DECLINE	5.29	4.81

NOTE: TOTAL NUMBER OF FORECASTERS REPORTING IS 39.
SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2010.

TABLE SIX
MEAN PROBABILITY OF CORE CPI AND CORE PCE INFLATION (Q4/Q4)

MEAN PROBABILITY ATTACHED TO CORE CPI INFLATION:

	09Q4 TO 10Q4	10Q4 TO 11Q4
4 PERCENT OR MORE	0.08	0.21
3.5 TO 3.9 PERCENT	0.28	0.58
3.0 TO 3.4 PERCENT	1.56	5.00
2.5 TO 2.9 PERCENT	6.83	12.66
2.0 TO 2.4 PERCENT	17.90	22.18
1.5 TO 1.9 PERCENT	31.05	28.37
1.0 TO 1.4 PERCENT	25.50	16.79
0.5 TO 0.9 PERCENT	11.22	7.50
0.0 TO 0.4 PERCENT	2.86	3.89
WILL DECLINE	2.72	2.82

MEAN PROBABILITY ATTACHED TO CORE PCE INFLATION:

	09Q4 TO 10Q4	10Q4 TO 11Q4
4 PERCENT OR MORE	0.09	0.15
3.5 TO 3.9 PERCENT	0.16	0.26
3.0 TO 3.4 PERCENT	0.69	3.70
2.5 TO 2.9 PERCENT	2.79	9.85
2.0 TO 2.4 PERCENT	13.56	18.17
1.5 TO 1.9 PERCENT	27.29	24.97
1.0 TO 1.4 PERCENT	30.26	21.45
0.5 TO 0.9 PERCENT	18.03	14.12
0.0 TO 0.4 PERCENT	5.41	6.14
WILL DECLINE	1.71	1.20

NOTE: TOTAL NUMBER OF FORECASTERS REPORTING IS 39.
SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2010.

TABLE SEVEN
LONG-TERM (5-YEAR AND 10-YEAR) FORECASTS

ANNUAL AVERAGE OVER THE NEXT 5 YEARS: 2010-2014

CPI INFLATION RATE		PCE INFLATION RATE	
MINIMUM	-0.10	MINIMUM	0.75
LOWER QUARTILE	1.90	LOWER QUARTILE	1.60
MEDIAN	2.20	MEDIAN	1.80
UPPER QUARTILE	2.40	UPPER QUARTILE	2.20
MAXIMUM	3.50	MAXIMUM	3.40
MEAN	2.12	MEAN	1.90
STD. DEVIATION	0.70	STD. DEVIATION	0.56
N	38	N	32
MISSING	4	MISSING	10

ANNUAL AVERAGE OVER THE NEXT 10 YEARS: 2010-2019

CPI INFLATION RATE		PCE INFLATION RATE	
MINIMUM	1.00	MINIMUM	1.00
LOWER QUARTILE	2.12	LOWER QUARTILE	1.80
MEDIAN	2.39	MEDIAN	2.10
UPPER QUARTILE	2.56	UPPER QUARTILE	2.33
MAXIMUM	4.50	MAXIMUM	3.40
MEAN	2.39	MEAN	2.12
STD. DEVIATION	0.60	STD. DEVIATION	0.54
N	36	N	31
MISSING	6	MISSING	11

REAL GDP GROWTH RATE		PRODUCTIVITY GROWTH RATE	
MINIMUM	2.20	MINIMUM	1.30
LOWER QUARTILE	2.50	LOWER QUARTILE	1.70
MEDIAN	2.70	MEDIAN	2.00
UPPER QUARTILE	2.90	UPPER QUARTILE	2.10
MAXIMUM	3.80	MAXIMUM	3.50
MEAN	2.72	MEAN	1.99
STD. DEVIATION	0.37	STD. DEVIATION	0.46
N	34	N	33
MISSING	8	MISSING	9

STOCK RETURNS (S&P 500)		BOND RETURNS (10-YEAR)		BILL RETURNS (3-MONTH)	
MINIMUM	5.00	MINIMUM	0.00	MINIMUM	0.00
LOWER QUARTILE	6.43	LOWER QUARTILE	4.00	LOWER QUARTILE	2.53
MEDIAN	7.00	MEDIAN	4.95	MEDIAN	3.00
UPPER QUARTILE	8.00	UPPER QUARTILE	5.20	UPPER QUARTILE	3.70
MAXIMUM	15.00	MAXIMUM	6.00	MAXIMUM	5.25
MEAN	7.27	MEAN	4.52	MEAN	3.09
STD. DEVIATION	1.96	STD. DEVIATION	1.18	STD. DEVIATION	1.06
N	25	N	30	N	30
MISSING	17	MISSING	12	MISSING	12

SOURCE: RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA.
SURVEY OF PROFESSIONAL FORECASTERS, FIRST QUARTER 2010.

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Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

1a. Are you more or less optimistic about the U.S. economy compared to last quarter?

	Number	Percent	95% CI
3=More optimistic	216	40.4 %	± 4.2 %
2=No change	185	34.6 %	± 4.0 %
1=Less optimistic	134	25.0 %	± 3.7 %
Total	535	100.0 %	

Mean = 2.2
SD = 0.8

Missing Cases = 0
Response Percent = 100.0 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

1b. Rate your optimism about the U.S. economy on a scale from 0-100, with 0 being the least optimistic and 100 being the most optimistic.

Minimum = 0

Maximum = 100

Mean = 57.5

Median = 60

Standard Deviation (Unbiased) = 15.3

95 Percent Confidence Interval Around The Mean = 56.1 - 58.9

Quartiles

1 = 50
2 = 60
3 = 70

Valid Cases = 490
Missing Cases = 45
Response Percent = 91.6%

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

2a. Are you more or less optimistic about the financial prospects for your own company compared to last quarter?

	Number	Percent	95% CI
3=More optimistic	244	45.7 %	± 4.2 %
2=No change	161	30.1 %	± 3.9 %
1=Less optimistic	129	24.2 %	± 3.6 %
Total	534	100.0 %	

Mean = 2.2
SD = 0.8

Missing Cases = 1
Response Percent = 99.8 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

2b. Rate your optimism about the financial prospects for your own company on a scale from 0-100, with 0 being the least optimistic and 100 being the most optimistic.

Minimum = 0

Maximum = 100

Mean = 65.6

Median = 70

Standard Deviation (Unbiased) = 18.3

95 Percent Confidence Interval Around The Mean = 63.9 - 67.2

Quartiles

1 = 50.8
2 = 70
3 = 80

Valid Cases = 491
Missing Cases = 44
Response Percent = 91.8%

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

3. What are the top three external concerns facing your corporation? (rank #1, #2, #3)

(N=535)

	Mean & SD	1st	2nd	3rd	Total
Consumer demand	1.6	195	66	54	315
	0.8	36.4%	12.3%	10.1%	58.9%
Other:	1.8	27	9	17	53
	0.9	5.0%	1.7%	3.2%	9.9%
Federal government agenda/policies	1.9	96	76	75	247
	0.8	17.9%	14.2%	14.0%	46.2%
Currency risk	2.1	12	14	15	41
	0.8	2.2%	2.6%	2.8%	7.7%
Price pressure from competitors	2.1	45	88	72	205
	0.7	8.4%	16.4%	13.5%	38.3%
Global financial instability	2.1	39	61	61	161
	0.8	7.3%	11.4%	11.4%	30.1%
Credit markets/interest rates	2.1	45	69	71	185
	0.8	8.4%	12.9%	13.3%	34.6%
Federal budget deficit	2.2	25	56	46	127
	0.7	4.7%	10.5%	8.6%	23.7%
Cost of non-fuel commodities	2.2	12	22	22	56
	0.8	2.2%	4.1%	4.1%	10.5%
Cost of fuel	2.2	14	21	25	60
	0.8	2.6%	3.9%	4.7%	11.2%
Foreign competition	2.3	6	16	16	38
	0.7	1.1%	3.0%	3.0%	7.1%
Financial regulation	2.3	14	26	34	74
	0.8	2.6%	4.9%	6.4%	13.8%
Environmental regulation	2.4	4	8	17	29
	0.7	0.7%	1.5%	3.2%	5.4%
Trade policies and trade agreements	2.5	1	3	7	11
	0.7	0.2%	0.6%	1.3%	2.1%

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

3. What are the top three external concerns facing your corporation? Reverse scale & weighted by the number of respondents (Higher number = greater weighted importance)

	Mean	SD	Total
Consumer demand	1.44	1.34	534
Federal government agenda/policies	0.96	1.18	534
Price pressure from competitors	0.72	1.02	534
Credit markets/interest rates	0.64	1.00	534
Global financial instability	0.56	0.96	534
Federal budget deficit	0.44	0.86	534
Financial regulation	0.24	0.66	534
Other:	0.22	0.71	534
Cost of fuel	0.20	0.63	534
Cost of non-fuel commodities	0.19	0.61	534
Currency risk	0.15	0.56	534
Foreign competition	0.12	0.49	534
Environmental regulation	0.08	0.39	534
Trade policies and trade agreements	0.03	0.23	534

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3. What are the top three external concerns facing your corporation? - Other specified

Available management talent
Capital Spending Constraints amongst customer base
China labor
Collections from Corporate Customers
consumer price leverage
Continued economic uncertainty
Corp IT and capital investment spend
defaulting on loans by members
Disease management
Europe debt implosion
Fragmentation
Fuel Prices
Funding at State & Local levels
General Business Recovery
General financial markets
Global economy
gov't civil/military space spending
HEALTH CARE MANDATES
Health Care Deformed
Health Care Reform
health care law
health reform
Healthcare payor landscape
Heath Care reform
Housing
Inability to deal forcibly with Iran, N Korea and the attorney General who thinks he works for Obama
inflation
lack of state support dollars
local budget pressures
Market consolidation
money availability
Obtaining adequate financing
overall economy
Raw material shortages
shortage of production capacity
Significant drop in Tax revenues
Stable business model
State Budget Deficit
State budget shortfalls
state budget deficit
State deficit
State Gov't actions
state goverment funding
State/local deficits/For eign govt budgets
state/local budget deficits
stock market fluctuation
Supply Chain concerns
unemployment
unemployment; foreclosure
Wage pessure
Wage pressures

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4. What are the top three internal, company-specific concerns for your corporation? (rank #1, #2, #3)

(N=535)

	Mean & SD	1st	2nd	3rd	Total
Ability to maintain margins	1.5 0.7	218 40.7%	84 15.7%	51 9.5%	353 66.0%
Other:	1.8 0.9	17 3.2%	5 0.9%	10 1.9%	32 6.0%
Balance sheet weakness	1.8 0.8	32 6.0%	26 4.9%	19 3.6%	77 14.4%
Ability to forecast results	1.9 0.8	84 15.7%	62 11.6%	57 10.7%	203 37.9%
Protection of intellectual property	2.0 0.8	8 1.5%	8 1.5%	9 1.7%	25 4.7%
Attracting and retaining qualified employees	2.1 0.8	34 6.4%	43 8.0%	42 7.9%	119 22.2%
Supply chain risk	2.2 0.7	16 3.0%	41 7.7%	31 5.8%	88 16.4%
Working capital management	2.2 0.8	33 6.2%	57 10.7%	64 12.0%	154 28.8%
Cost of health care	2.2 0.8	32 6.0%	60 11.2%	72 13.5%	164 30.7%
Maintaining morale/productivity	2.3 0.7	37 6.9%	76 14.2%	91 17.0%	204 38.1%
Counterparty risk	2.3 0.7	4 0.7%	11 2.1%	11 2.1%	26 4.9%
Data security	2.3 0.7	4 0.7%	11 2.1%	12 2.2%	27 5.0%
Pension obligations	2.3 0.7	5 0.9%	11 2.1%	15 2.8%	31 5.8%
Managing IT systems	2.4 0.7	10 1.9%	33 6.2%	45 8.4%	88 16.4%

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4. What are the top three internal, company-specific concerns for your corporation? Reverse scale & weighted by the number of respondents (Higher number = greater weighted importance)

	Mean	SD	Total
Ability to maintain margins	1.64	1.31	533
Ability to forecast results	0.81	1.15	533
Maintaining morale/productivity	0.66	0.96	533
Cost of health care	0.54	0.91	533
Working capital management	0.52	0.91	533
Attracting and retaining qualified employees	0.43	0.89	533
Balance sheet weakness	0.31	0.82	533
Supply chain risk	0.30	0.74	533
Managing IT systems	0.26	0.66	533
Other:	0.13	0.57	533
Pension obligations	0.10	0.43	533
Protection of intellectual property	0.09	0.45	533
Data security	0.09	0.41	533
Counterparty risk	0.08	0.40	533

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4. What are the top three internal, company-specific concerns your corporation faces? - Other specified

Ability to plan for longer term
ability to launch new products on time
acquisition assimilation
borrower asset quality
business transformation
Collecting A/R
Compliance w/ govt regulation
Customer financial stability
Gaining new customers
Housing bubble overhang
Inability to remain competitive for recruitment of top talent
integration issues
labor agreement
Managing costs in a downturn
Managing growth
Managing investment risk
New Business Development
NEW PRODUCT INTRODUCTIONS
New Product Success
project management
R&D progress
Retention of top-rated employees
revenue
Revenue Generation
Revenue Growth
Revenue growth
ROIC
stimulating new sales
The lack of a state budget solution
too much illegal immigration
winning new biz
Worldwide Customer Instability

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5. Relative to the previous 12 months, what will be your company's PERCENTAGE CHANGE during the next 12 months? (e.g., +3%, -2%, etc.) [Leave blank if not applicable]

	Mean	SD	95% CI	Median	Minimum	Maximum	Total
Earnings	18.13	52.20	12.94 - 23.31	5	-75	400	389
Health care costs	9.61	7.38	8.92 - 10.31	10	-20	50	429
Capital spending	9.58	47.97	4.95 - 14.20	2	-90	400	413
Cash on the balance sheet	9.48	40.22	5.37 - 13.59	2	-80	300	368
Technology spending	7.51	25.64	4.75 - 10.27	4	-80	300	331
Marketing/advertising spending	7.06	26.95	4.17 - 9.96	2	-80	250	332
Research and development spending	5.61	13.03	3.88 - 7.35	2	-50	100	216
Productivity (output per hour worked)	4.28	8.26	3.32 - 5.24	3	-25	100	284
Dividends	4.22	18.29	-0.62 - 9.05	0	-20	100	55
Number of offshore outsourced employees	3.40	21.19	0.14 - 6.66	0	-90	200	162
Number of domestic full-time employees	2.18	21.93	0.05 - 4.31	1	-84	345	407
Wages/Salaries	2.18	6.51	1.58 - 2.79	3	-75	50	447
Share repurchases	1.72	9.68	0.07 - 3.37	0	-50	50	132
Prices of your products	1.41	6.26	0.76 - 2.07	2	-37	40	350
Number of domestic temporary employees	-0.11	17.75	-2.28 - 2.07	0	-80	100	255

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5. Relative to the previous 12 months, what will be your company's PERCENTAGE CHANGE during the next 12 months for: [Unweighted - Sorted]

(N=535)

	Mean & SD	Positive 1	Zero 0	Negative -1	Total
	0.9	403	10	16	429
Health care costs	0.4	93.9%	2.3%	3.7%	100.0%
	0.8	385	33	29	447
Wages/Salaries	0.5	86.1%	7.4%	6.5%	100.0%
	0.7	210	57	17	284
Productivity (output per hour worked)	0.6	73.9%	20.1%	6.0%	100.0%
	0.5	223	64	45	332
Technology spending	0.7	67.2%	19.3%	13.6%	100.0%
	0.5	287	27	82	396
Earnings	0.8	72.5%	6.8%	20.7%	100.0%
	0.5	117	81	18	216
Research and development spending	0.6	54.2%	37.5%	8.3%	100.0%
	0.4	190	96	46	332
Marketing/advertising spending	0.7	57.2%	28.9%	13.9%	100.0%
	0.3	196	78	76	350
Prices of your products	0.8	56.0%	22.3%	21.7%	100.0%
	0.3	239	78	101	418
Capital spending	0.8	57.2%	18.7%	24.2%	100.0%
	0.3	200	72	99	371
Cash on the balance sheet	0.9	53.9%	19.4%	26.7%	100.0%
Number of offshore outsourced	0.3	51	102	9	162
employees	0.6	31.5%	63.0%	5.6%	100.0%
	0.3	217	79	112	408
Number of domestic full-time employees	0.9	53.2%	19.4%	27.5%	100.0%
	0.2	13	39	3	55
Dividends	0.5	23.6%	70.9%	5.5%	100.0%
Number of domestic temporary	0.2	88	125	43	256
employees	0.7	34.4%	48.8%	16.8%	100.0%
	0.1	17	111	5	133
Share repurchases	0.4	12.8%	83.5%	3.8%	100.0%

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5. Relative to the previous 12 months, what will be your company's PERCENTAGE CHANGE during the next 12 months? [All Companies - Winsorized - Revenue Weighted - Sorted]

	Mean	SD	95% CI	Median	Minimum	Maximum
Earnings	11.76	31.54	11.31 - 12.21	5	-75	120.40
Capital spending	9.00	28.92	8.60 - 9.39	3	-84.40	103.60
Technology spending	5.93	12.74	5.73 - 6.12	3	-42.70	57.76
Cash on the balance sheet	5.90	25.64	5.52 - 6.28	2	-69.40	88.31
Marketing/advertising spending	3.96	10.99	3.78 - 4.13	2	-45.80	59.88
Research and development spending	3.94	8.49	3.78 - 4.10	2	-19.90	31.15
Dividends	2.72	9.30	2.47 - 2.97	0	-20	40.07
Share repurchases	1.58	5.14	1.46 - 1.70	0	-17.30	20.69
Prices of your products	1.47	4.74	1.40 - 1.54	1.50	-10.90	13.68

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5. Relative to the previous 12 months, what will be your company's PERCENTAGE CHANGE during the next 12 months? [All Companies - Winsorized - Employee Weighted - Sorted]

	Mean	SD	95% CI	Median	Minimum	Maximum
Health care costs	8.03	5.47	7.95 - 8.12	7	-4.85	24.07
Number of offshore outsourced employees	5.51	10.63	5.27 - 5.75	2	-38.10	44.93
Productivity (output per hour worked)	3.66	5.14	3.57 - 3.76	3	-11.90	20.47
Wages/Salaries	2.58	2.12	2.55 - 2.61	3	-10.60	14.94
Number of domestic full-time employees	0.68	7.11	0.57 - 0.79	0	-40.80	45.16
Number of domestic temporary employees	-0.18	10.52	-0.39 - 0.02	0	-34.90	34.68

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5. Relative to the previous 12 months, what will be your company's PERCENTAGE CHANGE during the next 12 months? [Public Companies - Winsorized - Revenue Weighted]

	Mean	SD	95% CI	Median	Minimum	Maximum
Earnings	12.14	29.98	11.50 - 12.78	10	-67	120.40
Dividends	2.79	9.57	2.52 - 3.06	0	-20	40.07
Cash on the balance sheet	2.09	26.09	1.50 - 2.68	3	-69.40	88.31
Share repurchases	1.40	3.96	1.27 - 1.53	0	0	20.69

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6. When do you anticipate domestic employment at your firm to return to year-end 2007 (pre-recession) levels?

	Number	Percent	Cumulative
Already at or exceeding year-end 2007 levels	135	25.3 %	25.3 %
Later in 2010	19	3.6 %	28.8 %
In 2011	65	12.2 %	41.0 %
In 2012	98	18.4 %	59.4 %
In 2013	47	8.8 %	68.2 %
In 2014 or later	70	13.1 %	81.3 %
Possibly never	100	18.7 %	100.0 %
Total	534	100.0 %	100.0 %

Missing Cases = 1
Response Percent = 99.8 %

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7. Did your company make cuts in any of the following employee-related areas from 2007-2009? - Reduced or eliminated from 2007-2009

	Number	Percent	95% CI
Bonuses	331	61.9 %	± 4.1 %
Domestic workforce	330	61.7 %	± 4.1 %
Overtime	270	50.5 %	± 4.3 %
Wages	246	46.0 %	± 4.2 %
Employee training/development	223	41.7 %	± 4.2 %
Company contribution to employee pension benefits (including 401K)	164	30.7 %	± 3.9 %
Average hours worked per week	155	29.0 %	± 3.9 %
Company contribution to employee health benefits	125	23.4 %	± 3.6 %
Retirement benefits	113	21.1 %	± 3.5 %
Outsourced workforce	107	20.0 %	± 3.4 %
Company contribution to other employee benefits	27	5.0 %	± 1.9 %
Total	2091		

Number of Cases =535
Number of Responses =2091
Average Number Of Responses Per Case = 3.9
Number Of Cases With At Least One Response =487
Response Percent = 91.0 %

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7. Did your company make cuts in any of the following employee-related areas from 2007-2009? - Company contribution to other employee benefits - Other specifed

eliminated all
eliminated life insurance gone/stopped paying 100% of employee portion of HC
Employee Picnic and xmas party
Executive benefits
Fewer vacation days granted
froze pension for new hires
lower potential annual wage increase
profit sharing
PTO
retiree health plan
Sports an Social Activities
Travel
Tuition reimbursement
Vehicle allowances

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7. Have you already or will you restore these items to pre-recession levels by June 2011? - Already restored or plan to restore to pre-recession levels in the next 12 months

	Number	Percent	95% CI
Bonuses	127	23.7 %	± 3.6 %
Wages	120	22.4 %	± 3.6 %
Average hours worked per week	90	16.8 %	± 3.2 %
Employee training/development	84	15.7 %	± 3.1 %
Overtime	72	13.5 %	± 2.9 %
Company contribution to employee pension benefits (including 401K)	66	12.3 %	± 2.8 %
Domestic workforce	65	12.1 %	± 2.8 %
Retirement benefits	24	4.5 %	± 1.8 %
Outsourced workforce	18	3.4 %	± 1.5 %
Company contribution to employee health benefits	17	3.2 %	± 1.5 %
Company contribution to other employee benefits	5	0.9 %	± 0.8 %
Total	688		

Number of Cases =535
Number of Responses =688
Average Number Of Responses Per Case = 1.3
Number Of Cases With At Least One Response =274
Response Percent = 51.2 %

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7. Have you already or will you restore these items to pre-recession levels by June 2011? - Already restored or plan to restore to pre-recession levels in the next 12 months - Other specifed

ESOP
Sports an Social Activities
Travel

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7. Did your company make cuts in any of the following employee-related areas from 2007-2009? Have you already or will you restore these items to pre-recession levels by June 2011? - Summary

(N=535)

	Not cut	Cut & not restored	Cut & restored
Wages	289 54.0%	126 23.6%	120 22.4%
Bonuses	204 38.1%	204 38.1%	127 23.7%
Average hours worked per week	380 71.0%	65 12.1%	90 16.8%
Overtime	265 49.5%	198 37.0%	72 13.5%
Employee training/development	312 58.3%	139 26.0%	84 15.7%
Retirement benefits	422 78.9%	89 16.6%	24 4.5%
Company contribution to employee health benefits	410 76.6%	108 20.2%	17 3.2%
Company contribution to employee pension benefits (including 401K)	371 69.3%	98 18.3%	66 12.3%
Company contribution to other employee benefits	508 95.0%	22 4.1%	5 0.9%
Domestic workforce	205 38.3%	265 49.5%	65 12.1%
Outsourced workforce	428 80.0%	89 16.6%	18 3.4%

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8. At the present time, in which of the following areas is your company focusing its investment for growth? (Check all that apply, up to three)

	Number	Percent	95% CI
Reaching new customers in existing markets	312	58.3 %	± 4.2 %
Improving existing product/service	286	53.5 %	± 4.2 %
Developing new product/service	239	44.7 %	± 4.2 %
Entering new geographic markets	166	31.0 %	± 3.9 %
Acquiring assets, a company, or companies	133	24.9 %	± 3.7 %
Not currently investing for growth	32	6.0 %	± 2.0 %
Other (Please specify)	16	3.0 %	± 1.4 %
Total	1184		

Number of Cases =535
Number of Responses =1184
Average Number Of Responses Per Case = 2.2
Number Of Cases With At Least One Response =531
Response Percent = 99.3 %

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8. At the present time, in which of the following areas is your company focusing its investment for growth? - Other specified

as a pension fund, we watch our investment allocation
Equipment expansion for capacity
Improving productivity
Investing in dealer network
IPO
IT infrastructure
Joint Ventures
Joint venture capital
opening new restaurants
Partnerships
Replacing aging facilities
strategic hires
Support customer volume increases with capacity expansions
Tax incentives for retention and growth
Trying to maintain investment return
vertical integration upstream

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9. How would you characterize your company's market position right now?

	Number	Percent	95% CI
Cautiously pursuing growth	252	47.2 %	± 4.2 %
Aggressively pursuing growth	139	26.0 %	± 3.7 %
Still coping with recession impact	97	18.2 %	± 3.3 %
On the sidelines/in a holding pattern	43	8.1 %	± 2.3 %
Other (Please specify)	3	0.6 %	± 0.6 %
Total	534	100.0 %	

Missing Cases = 1
Response Percent = 99.8 %

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9. How would you characterize your company's market position right now? - Other specified

Maintain State Government Budget
nationalized in 2010
Varies by region: aggressive in Brazil, Russia, China; holding pattern US

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10. Compared to 2009, how much do you expect consumer/customer demand for your company's goods/services to change in 2010?

Minimum = -75

Maximum = 125

Mean = 7.86

Median = 5

Standard Deviation (Unbiased) = 17.62

95 Percent Confidence Interval Around The Mean = 6.35 - 9.36

99 Percent Confidence Interval Around The Mean = 5.87 - 9.84

Quartiles

1 = 1
2 = 5
3 = 10

Valid Cases = 524
Missing Cases = 11
Response Percent = 97.9%

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10b. If you expect an increase, how confident are you in your company's ability to meet increased demand?

	Number	Percent	95% CI
3=Extremely confident	251	58.5 %	± 4.2 %
2=Somewhat confident	167	38.9 %	± 3.9 %
1=Not confident	11	2.6 %	± 1.2 %
Total	429	100.0 %	

Mean = 2.6
SD = 0.5

Missing Cases = 106
Response Percent = 80.2 %

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11. Compared to Fall 2009, does your company find borrowing now:

	Number	Percent	95% CI
1=Much more difficult	37	8.7 %	± 2.7 %
2=A little more difficult	58	13.6 %	± 3.3 %
3=About the same	227	53.4 %	± 4.8 %
4=A little easier	78	18.4 %	± 3.7 %
5=Much easier	25	5.9 %	± 2.2 %
Total	425	100.0 %	

Mean = 3.0
SD = 1.0

Missing Cases = 0
Response Percent = 100.0 %

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11b. In the past year, has your company restricted capital spending below the desired level due to funding difficulties?

	Number	Percent	95% CI
1=No	324	64.3 %	± 4.2 %
2=Yes, limited capital spending a small amount	75	14.9 %	± 3.1 %
3=Yes, limited capital spending a medium amount	55	10.9 %	± 2.7 %
4=Yes, limited capital spending a large amount	50	9.9 %	± 2.6 %
Total	504	100.0 %	

Mean = 1.7
SD = 1.0

Missing Cases = 0
Response Percent = 100.0 %

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11c. Due to capital spending below the desired level, has your company shifted (or will it shift) from "capital towards labor" in your operations?

	Number	Percent	95% CI
1=No	120	74.5 %	± 6.8 %
2=Yes, small shift away from capital towards labor	31	19.3 %	± 6.2 %
3=Yes, medium shift away from capital towards labor	9	5.6 %	± 3.6 %
4=Yes, large shift away from capital towards labor	1	0.6 %	± 1.2 %
Total	161	100.0 %	

Mean = 1.3
SD = 0.6

Missing Cases = 0
Response Percent = 100.0 %

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12. Did your firm experience a covenant violation (or near-violation) for a line of credit during 2008/2009?

	Number	Percent	95% CI
No	342	64.3 %	± 4.1 %
Yes, near violation	35	6.6 %	± 2.1 %
Yes, violation	77	14.5 %	± 3.0 %
N/A, our firm did not have a credit facility	78	14.7 %	± 3.0 %
Total	532	100.0 %	

Missing Cases = 0
Response Percent = 100.0 %

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No violation or near-violation - 12b. Even though there was no credit line violation...

	Number	Percent	95% CI
The terms of our facility were unchanged during 2008-2009	168	55.6 %	± 5.3 %
Our facility was renegotiated because the term of the facility expired	88	29.1 %	± 4.7 %
We preemptively renegotiated our credit facility	46	15.2 %	± 3.6 %
Total	302	100.0 %	

Missing Cases = 40
Response Percent = 88.3 %

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No violation or near-violation - Did you renegotiate your credit facility during 2008/2009?

	Number	Percent	95% CI
We did not renegotiate	152	44.4 %	± 5.3 %
We renegotiated	190	55.6 %	± 5.3 %
Total	342	100.0 %	

Missing Cases = 0
Response Percent = 100.0 %

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No violation or near-violation - Facility was renegotiated

(N=190)

	Mean & SD	Increased 1	Stayed the same 0	Decreased -1	Total
	0.4	90	65	19	174
Credit line costs:	0.7	51.7%	37.4%	10.9%	100.0%
	0.2	43	118	9	170
Credit line collateral requirements:	0.5	25.3%	69.4%	5.3%	100.0%

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No violation or near-violation - Facility was renegotiated

(N=190)

	Mean & SD	Expanded 1	Stayed the same 0	Reduced -1	Total
	0.0	45	82	46	173
The size of the facility was:	0.7	26.0%	47.4%	26.6%	100.0%
The tenor/maturity of the new facility was:	0.0	33	111	28	172
	0.6	19.2%	64.5%	16.3%	100.0%

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No violation or near-violation - Facility was renegotiated - Other changes specified

changed from line of credit to amortizing loan
Covenant modifications - Net Worth requirement increased
change in investment policy
More restrictive than ever
Moved from bank facility to public debt
Streamlined covenants
Covenants updated and tightened
Floor interest level of 4% invoked
tighter covenants
Covenant levels
charged pts. on unused portion

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No violation or near-violation - Consider borrowing from all of your credit lines, to what extent had your firm drawn on its lines of credit during 2008/2009?

Minimum = 0

Maximum = 100

Mean = 31.43

Median = 20

Standard Deviation (Unbiased) = 31.68

95 Percent Confidence Interval Around The Mean = 27.89 - 34.98

99 Percent Confidence Interval Around The Mean = 26.78 - 36.09

Quartiles

1 = 0
2 = 20
3 = 57.25

Valid Cases = 307
Missing Cases = 35
Response Percent = 89.8%

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Near-violation - 12b. Given that you had a near violation...

	Number	Percent	95% CI
The terms of our facility were unchanged during 2008-2009	6	17.1 %	± 13.2 %
Our facility was renegotiated because the term of the facility expired	13	37.1 %	± 16.9 %
We preemptively renegotiated our credit facility	16	45.7 %	± 17.4 %
Total	35	100.0 %	

Missing Cases = 0
Response Percent = 100.0 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Near-violation - Did you renegotiate your credit facility during 2008/2009?

	Number	Percent	95% CI
We did not renegotiate	6	17.1 %	± 13.2 %
We renegotiated	29	82.9 %	± 13.2 %
Total	35	100.0 %	

Missing Cases = 0
Response Percent = 100.0 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Near-violation - Facility was renegotiated

(N=29)

	Mean & SD	Increased 1	Stayed the same 0	Decreased -1	Total
	0.5	18	6	4	28
Credit line costs:	0.7	64.3%	21.4%	14.3%	100.0%
	0.4	14	12	2	28
Credit line collateral requirements:	0.6	50.0%	42.9%	7.1%	100.0%

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Near-violation - Facility was renegotiated

(N=29)

	Mean & SD	Expanded 1	Stayed the same 0	Reduced -1	Total
	-0.4	4	9	15	28
The size of the facility was:	0.7	14.3%	32.1%	53.6%	100.0%
The tenor/maturity of the new facility was:	0.2	12	10	6	28
	0.8	42.9%	35.7%	21.4%	100.0%

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Near-violation - Facility was renegotiated - Other changes specified

Paid a fee to relax a covenant
Converted to equity
interest rate floor added
Paid off with capital infusion

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Near-violation - Consider borrowing from all of your credit lines.

	Mean	SD	Median	Total
To what extent had your firm drawn on its lines of credit during 2008/2009?	57.9	31.5	63.5	30
In the period following the violation/renegotiation, how much did the maximum of the line change?	-0.2	28.6	0	29
In the period following the violation/renegotiation, what was the percentage drawdown?	37.4	30.7	40	27

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Violation - We violated:

We violated:	Number	Percent	95% CI
Financial covenant	77	100.0 %	± 0.0 %
Operational covenant	8	10.4 %	± 7.0 %
Other	0	0.0 %	± 0.0 %
Total	85		

Number of Cases =77
Number of Responses =85
Average Number Of Responses Per Case = 1.1
Number Of Cases With At Least One Response =77
Response Percent = 100.0 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Violation - We violated: - Other specified

--- No Response ---

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Violation - Tell us about your covenant violation and the consequences:

	Number	Percent	95% CI
Even though we violated, we did not renegotiate our facility	29	37.2 %	± 2.0 %
As a result of the violation, we were compelled to renegotiate the facility	41	52.6 %	± 2.3 %
All of our credit lines were canceled	7	9.0 %	± 1.0 %
One or more (but not all) of our credit lines were canceled	1	1.3 %	± 0.4 %
Total	78	100.0 %	

Missing Cases = 457
Response Percent = 14.6 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Violation - Did you renegotiate your credit facility during 2008/2009?

	Number	Percent	95% CI
We did not renegotiate	12	15.6 %	± 8.3 %
We renegotiated	65	84.4 %	± 8.3 %
Total	77	100.0 %	

Missing Cases = 0
Response Percent = 100.0 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Violation - Facility was renegotiated

(N=65)

	Mean & SD	Increased 1	Stayed the same 0	Decreased -1	Total
	0.6	36	12	5	53
Credit line costs:	0.7	67.9%	22.6%	9.4%	100.0%
	0.5	30	24	1	55
Credit line collateral requirements:	0.5	54.5%	43.6%	1.8%	100.0%

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Violation - Facility was renegotiated

(N=65)

	Mean & SD	Expanded 1	Stayed the same 0	Reduced -1	Total
	-0.4	8	17	27	52
The size of the facility was:	0.7	15.4%	32.7%	51.9%	100.0%
The tenor/maturity of the new facility	0.0	12	29	11	52
was:	0.7	23.1%	55.8%	21.2%	100.0%

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Violation - Facility was renegotiated - Other changes specified

Collateral valuation was reduced; more stringent covenants were put in place.
MORE FREQUENT REPORTING
Temporary waivers as cash flow remained healthy
additional covenants.
Increased Frequency of Collateral Reporting
Forbearance agreements with some creditors
raised new facility 10/09 to refi as mkts re-opened
Creidt facility was reduced in size and number of participating banks reduced from 4 to 1.
requirements for a covenant were relaxed

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Violation - Consider borrowing from all of your (remaining) credit lines,

	Mean	SD	Median	Total
To what extent had your firm drawn on its lines of credit during 2008/2009?	59.7	33.9	65	65
In the period following the violation/renegotiation, how much did the maximum of the line change?	-4.8	30.6	0	57
In the period following the violation/renegotiation, what was the percentage drawdown?	33.6	32.9	25	55

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

13. Compared to your company's views prior to the credit crisis, is your company now more willing to pay for a "rainy day" credit facility (which could simply be a larger line of credit than usual), that you have no real intention of drawing on but which would provide liquidity if needed in extreme circumstances?

	Number	Percent	95% CI
No, not willing to pay premium for a rainy day credit facility	181	34.9 %	± 4.0 %
No, not willing to pay premium for a rainy day credit facility because we hold excess cash for the same purpose	125	24.1 %	± 3.6 %
Yes, willing to pay a small premium for a rainy day credit facility	148	28.5 %	± 3.8 %
Yes, willing to pay a moderate premium for a rainy day credit facility	60	11.6 %	± 2.7 %
Yes, willing to pay a large premium for a rainy day credit facility	5	1.0 %	± 0.8 %
Total	519	100.0 %	

Missing Cases = 16
Response Percent = 97.0 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

13. Compared to your company's views prior to the credit crisis, is your company now more willing to pay for a "rainy day" credit facility (which could simply be a larger line of credit than usual), that you have no real intention of drawing on but which would provide liquidity if needed in extreme circumstances? - Additional information

as a pension fund, we have no need for a credit facility
Do not need it.
Currently have one in the amount of 8 million
I had such facilities in place since 1999 and they were arbitraily withdrawn by the bank in 2009. Why would I then pay again for something which once it becomes likely that I will need, will be withdrawn by the bank?
Our credit limits have been reduced and we can't pay more because more is not available
Cash availabilty (on-hand plus net borrowings available) is managed to provide 6 months to downsize business.
Current Cash on Hand and funding 'interest' would say there is no need to pay a premium.
We have always had a 'rainy day' facility.
Premium paid in the form of standby or undrawn line fee.
Seeking PO and other asset based financing
Will focus on building cash reserves
We have always retained some excess availability
Helps with funding growth
Capital availability is the single most important issue for SMM manufacturers.
We are willing to pay for a committed faciltiy versus a revolving line of credit
we feel it is an expensive insurance policy
N/A

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

14. On May 24, 2010 the annual yield on 10-yr treasury bonds was 3.2%. Please complete the following:

	Mean	SD	95% CI	Median	Minimum	Maximum	Total
Over the next 10 years, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be less than:	0.96	7.01	0.33 - 1.59	2	-50	60	477
Over the next 10 years, I expect the average annual S&P 500 return will be: Expected return:	6.85	6.73	6.25 - 7.44	6	-15	80	488
Over the next 10 years, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be greater than:	11.15	9.65	10.29 - 12.01	10	0	100	478
Over the next year, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be less than:	-4.84	10.71	-5.80 - -3.87	0	-50	40	474
Over the next year, I expect the average annual S&P 500 return will be: Expected return:	4.47	6.25	3.91 - 5.02	4	-20	77	481
Over the next year, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be greater than:	10.73	8.96	9.93 - 11.54	9	-6	100	471

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Revenue Weighted: 14. On May 24, 2010 the annual yield on 10-yr treasury bonds was 3.2%. Please complete the following:

	Mean	SD	95% CI	Median	Minimum	Maximum
Over the next 10 years, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be less than:	1.12	4.68	1.06 - 1.18	2	-12.80	14.70
Over the next 10 years, I expect the average annual S&P 500 return will be: Expected return:	6.65	3.72	6.60 - 6.69	6	-6.34	20.04
Over the next 10 years, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be greater than:	10.58	5.52	10.51 - 10.65	10	0	30.06
Over the next year, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be less than:	-4.88	9.21	-5.00 - -4.76	0	-25.80	16.15
Over the next year, I expect the average annual S&P 500 return will be: Expected return:	4.30	4.70	4.24 - 4.36	4	-7.78	16.72
Over the next year, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be greater than:	10.42	6.68	10.33 - 10.50	10	-6	28.29

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Employee Weighted: 14. On May 24, 2010 the annual yield on 10-yr treasury bonds was 3.2%. Please complete the following:

	Mean	SD	95% CI	Median	Minimum	Maximum
Over the next 10 years, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be less than:	0.60	4.78	0.53 - 0.66	1	-12.80	14.70
Over the next 10 years, I expect the average annual S&P 500 return will be: Expected return:	6.43	3.58	6.38 - 6.48	6	-6.34	20.04
Over the next 10 years, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be greater than:	10.36	5.38	10.28 - 10.43	10	0	30.06
Over the next year, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be less than:	-5.46	9.35	-5.59 - -5.33	-2	-25.80	16.15
Over the next year, I expect the average annual S&P 500 return will be: Expected return:	3.83	4.49	3.77 - 3.90	4	-7.78	16.72
Over the next year, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be greater than:	9.94	6.54	9.85 - 10.03	9	-6	28.29

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Industry

	Number	Percent	95% CI
Manufacturing	133	25.2 %	± 3.7 %
Retail/Wholesale	75	14.2 %	± 3.0 %
Banking/Finance/Insurance	68	12.9 %	± 2.8 %
Other	65	12.3 %	± 2.8 %
Service/Consulting	48	9.1 %	± 2.4 %
Healthcare/Pharmaceutical	37	7.0 %	± 2.2 %
Mining/Construction	35	6.6 %	± 2.1 %
Transportation/Energy	25	4.7 %	± 1.8 %
Tech [Software/Biotech]	21	4.0 %	± 1.7 %
Communications/Media	21	4.0 %	± 1.7 %
Total	528	100.0 %	

Missing Cases = 7
Response Percent = 98.7 %

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Industry (Other specified)

Aerospace & Defense
AG
Agricultural Supply Chain
Aquarium
Assisted Living
Benefits Administration
business imaging supplies
Chinese Consumer Goods-Infant Milk Formula
Commercial Real Estate (retail props)
Consumer Electronics
Direct Marketing
distribution
Education
Education
Education
Education
education
Educational Testing
Elderly Health Service Case Management
food
Food Processor
Food Services
food services
For Profit education
Forest Products
Foundation
Government
Government Pension System
government
government
Hospitality/gaming
leisure
Local government
MLM
Multifamily housing
non profit
non profit international relief
nonprofit social services
Not for profit
Not for profit
Professional Association
Professional Sports Entertainment
professional services
Publishing
Quasi Government Eco. Dev. agency
Real Estate
Real Estate
Real Estate
Real Estate
Real Estate Development/Management
real estate
real estate development
Restaurants
service to Georgia citizens
Social Services NFP
Staffing
Supply Chain Management

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Industry (Other specified)

Telecom
Telecommunications
timber/Forestry
tour operator/travel services
Waste Paper Broker

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Sales Revenue

	Number	Percent	95% CI
Less than $25 million	45	8.6 %	± 2.4 %
$25-$99 million	144	27.4 %	± 3.8 %
$100-$499 million	189	35.9 %	± 4.1 %
$500-$999 million	50	9.5 %	± 2.5 %
$1-$4.9 billion	62	11.8 %	± 2.7 %
$5-$9.9 billion	14	2.7 %	± 1.4 %
More than $10 billion	22	4.2 %	± 1.7 %
Total	526	100.0 %	

Missing Cases = 9
Response Percent = 98.3 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Weighted Sales Revenue (Millions)

Minimum = 25

Maximum = 11000

Mean = 1211.51

Median = 300

Standard Deviation (Unbiased) = 2499.97

95 Percent Confidence Interval Around The Mean = 997.86 - 1425.16

99 Percent Confidence Interval Around The Mean = 930.82 - 1492.19

Skewness = 2.93

Kolmogorov-Smirnov Statistic For Normality = 8.89

Quartiles

1 = 62
2 = 300
3 = 750

Valid Cases = 526
Missing Cases = 9
Response Percent = 98.3%

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Number of Employees

	Number	Percent	95% CI
Fewer than 100	68	14.9 %	± 2.8 %
100-499	162	35.5 %	± 3.9 %
500-999	69	15.1 %	± 2.9 %
1,000-2,499	50	11.0 %	± 2.5 %
2,500-4,999	34	7.5 %	± 2.1 %
5,000-9,999	25	5.5 %	± 1.8 %
Over 10,000	48	10.5 %	± 2.4 %
Total	456	100.0 %	

Missing Cases = 79
Response Percent = 85.2 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Weighted Number of Employees

Minimum = 100

Maximum = 12000

Mean = 2380.81

Median = 300

Standard Deviation (Unbiased) = 3755.98

95 Percent Confidence Interval Around The Mean = 2036.07 - 2725.56

99 Percent Confidence Interval Around The Mean = 1927.90 - 2833.73

Skewness = 1.81

Kolmogorov-Smirnov Statistic For Normality = 7.10

Quartiles

1 = 300
2 = 300
3 = 1750

Valid Cases = 456
Missing Cases = 79
Response Percent = 85.2%

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Where are you personally located?

	Number	Percent	95% CI
Midwest U.S.	157	29.6 %	± 3.9 %
Northeast U.S.	115	21.7 %	± 3.5 %
South Atlantic U.S.	91	17.1 %	± 3.2 %
Pacific US	78	14.7 %	± 3.0 %
South Central U.S.	56	10.5 %	± 2.6 %
Mountain U.S.	18	3.4 %	± 1.5 %
Central/Latin America	6	1.1 %	± 0.9 %
Other	5	0.9 %	± 0.8 %
Canada	4	0.8 %	± 0.7 %
Europe	1	0.2 %	± 0.4 %
Asia	0	0.0 %	± 0.0 %
Total	531	100.0 %	

Missing Cases = 4
Response Percent = 99.3 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Where are you personally located? - Other specified

Arizona
Australia
Caribbean
China
Mexico
Southwest U.S.
Southwest US

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Ownership

	Number	Percent	95% CI
Private	329	65.4 %	± 4.1 %
Public, NYSE	82	16.3 %	± 3.1 %
Public, NASDAQ/AMEX	40	8.0 %	± 2.2 %
Nonprofit	37	7.4 %	± 2.2 %
Government	15	3.0 %	± 1.4 %
Total	503	100.0 %	

Missing Cases = 32
Response Percent = 94.0 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

Foreign Sales

	Number	Percent	95% CI
0%	227	42.8 %	± 4.2 %
1-24%	214	40.4 %	± 4.2 %
25-50%	51	9.6 %	± 2.5 %
More than 50%	38	7.2 %	± 2.2 %
Total	530	100.0 %	

Missing Cases = 5
Response Percent = 99.1 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

What is your company's credit rating?

	Number	Percent	Cumulative
AAA	50	13.0 %	13.0 %
AA+	35	9.1 %	22.0 %
AA	39	10.1 %	32.1 %
AA-	17	4.4 %	36.5 %
A+	24	6.2 %	42.7 %
A	26	6.7 %	49.5 %
A-	33	8.5 %	58.0 %
BBB+	26	6.7 %	64.8 %
BBB	27	7.0 %	71.8 %
BBB-	13	3.4 %	75.1 %
BB+	22	5.7 %	80.8 %
BB	16	4.1 %	85.0 %
BB-	8	2.1 %	87.0 %
B+	7	1.8 %	88.9 %
B	16	4.1 %	93.0 %
B-	10	2.6 %	95.6 %
CCC	11	2.8 %	98.4 %
CC	0	0.0 %	98.4 %
D	6	1.6 %	100.0 %
Total	386	100.0 %	100.0 %

Missing Cases = 0
Response Percent = 100.0 %

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

What is your company's credit rating?

N=386	Total	Credit Rating	
		Actual A	Estimate B
Total	386	151	235
	100.0%	39.1%	60.9%
AAA	50	22	28
	13.0%	14.6%	11.9%
AA+	35	13	22
	9.1%	8.6%	9.4%
AA	39	19	20
	10.1%	12.6%	8.5%
AA-	17	8	9
	4.4%	5.3%	3.8%
A+	24	10	14
	6.2%	6.6%	6.0%
A	26	7	19
	6.7%	4.6%	8.1%
A-	33	12	21
	8.5%	7.9%	8.9%
BBB+	26	10	16
	6.7%	6.6%	6.8%
BBB	27	11	16
	7.0%	7.3%	6.8%
BBB-	13	6	7
	3.4%	4.0%	3.0%
BB+	22	8	14
	5.7%	5.3%	6.0%
BB	16	5	11
	4.1%	3.3%	4.7%
BB-	8	4	4
	2.1%	2.6%	1.7%
B+	7	3	4
	1.8%	2.0%	1.7%
B	16	7	9
	4.1%	4.6%	3.8%

Significance Tests Between Columns: Lower case: $p<.05$ Upper case: $p<.01$

Duke CFO magazine Global Business Outlook survey - U.S. - Second Quarter, 2010

What is your company's credit rating?

N=386	Total	Credit Rating	
		Actual A	Estimate B
B-	10	1	9
	2.6%	0.7%	3.8%
CCC	11	4	7
	2.8%	2.6%	3.0%
CC	0	0	0
	0.0%	0.0%	0.0%
D	6	1	5
	1.6%	0.7%	2.1%

Significance Tests Between Columns: Lower case: $p<.05$ Upper case: $p<.01$

Market Risk Premium used in 2010 by Analysts and Companies: a survey with 2,400 answers

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ABSTRACT

The average MRP used by analysts in the USA and Canada (5.1%) was similar to the one used by their colleagues in Europe (5.0%), and UK (5.2%). But the average MRP used by companies in the USA and Canada (5.3%) was smaller than the one used by companies in Europe (5.7%), and UK (5.6%).

The dispersion of the MRP used was high, but lower than the one of the professors: the average range of MRP used by analysts (companies) for the same country was 5.7% (4.1%) and the average standard deviation was 1.7% (1.2%). These statistics were 7.4% and 2.4% for the professors.

Most previous surveys have been interested in the Expected MRP, but this survey asks about the Required MRP. The paper also contains the references that analysts and companies use to justify their MRP, and comments from 89 respondents that illustrate the various interpretations of what is the required MRP.

JEL Classification: G12, G31, M21

Keywords: market risk premium; required equity premium; expected equity premium; historical equity premium

May 17, 2010

xPpprfA500

I sent a short email (see exhibit 1) on April 2010 to about 8,500 email addresses of analysts and managers of companies obtained from previous correspondence, papers and webs. I asked about the Market Risk Premium (**MRP**) ***"used to calculate the required return to equity"*** in 2010 and in 2009. I also asked about "*Books or articles that I use to support this number*".

By May 10, 2010, I had received 2,460 responses: 711 from analysts and 1,749 from other companies[1]. Of these answers, 601 analysts and 901 companies provided a specific MRP used in 2010.

1. Market Risk Premium (MRP) used in 2010 by analysts

Table 1. MRP used by analysts in 2010: 711 answers

	USA & Canada	Europe	UK	Other	Sum
Answers reported	**107**	**197**	**31**	**266**	**601**
Do not provide a figure:					
"My MRP changes weekly" or "monthly"	40	31	19	3	93
"It is confidential"	7	8	2		17

Euro: Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden and Switzerland **Other:** Argentina, Australia, Brazil, Chile, China, Colombia, Czech Republic, Dubai, Egypt, Hong Kong, Hungary, India, Indonesia, Iran, Israel, Japan, Kazakhstan, Kuwait, Malaysia, Mexico, New Zealand, Pakistan, Peru, Poland, Qatar, R.Dominicana, Romania, Russia, Saudi Arabia, Singapore, South Africa, South Korea, Sri Lanka, Taiwan, Thailand, Turkey, UA Emirates, Ukraine, Uruguay, Venezuela and Vietnam

Table 2 contains the statistics of the MRP used in 2010. It is worth mentioning that the average MRP used by analysts in the USA and Canada (5.1%) was similar to the one used by their colleagues in Europe (5.0%), and UK (5.2%).[2].

Figure 1 is a graphic representation of the 601 MRPs considered in table 2.

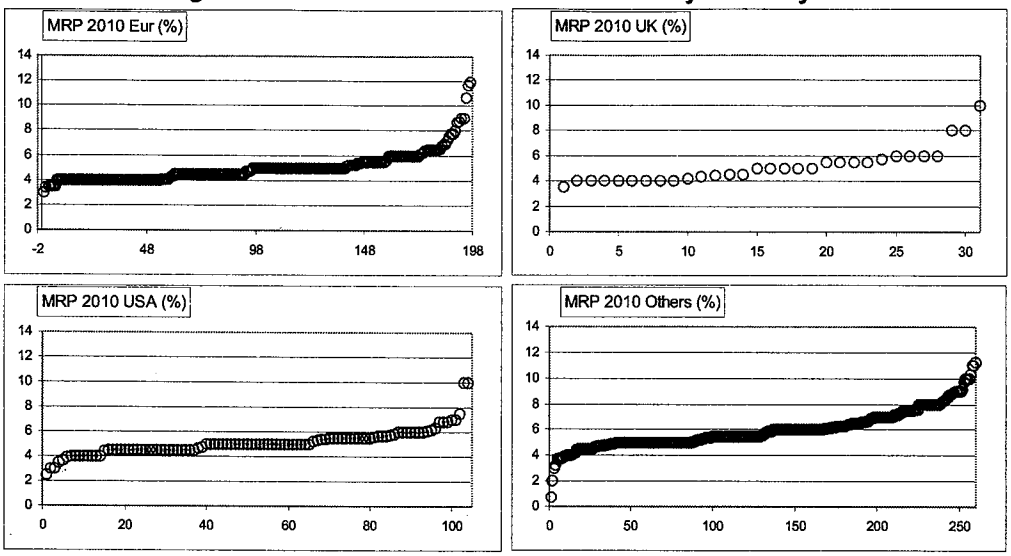
Table 2. Market Risk Premium used in 2010 by 601 analysts

		USA & Canada	Euro	UK	Other	Sum
MRP used in 2010	**Average**	**5.1**	**5.0**	**5.2**	**6.3**	
	St. dev.	1.1	1.3	1.4	2.2	
	MAX	10.0	11.9	10.0	25.0	
	Q3	5.5	5.5	5.7	7.0	
	Median	5.0	5.0	4.5	5.9	
	Q1	4.5	4.0	4.0	5.0	
	min	2.5	3.0	3.5	0.7	
	Number	104	197	31	269	**601**
Justify the number:						
Own research/calculations		*4*	*8*	*1*	*0*	***22***
I do not justify the number / do not answer		*151*	*56*	*14*	*4*	***273***
Reference to books or articles		*191*	*110*	*29*	*12*	***437***
Historic Data		*116*	*20*	*5*	*7*	***170***

[1] I also received answers from 1,511 professors. I analyse them in the separate document. *"Market Risk Premium Used in 2010 by Professors: a Survey with 1,500 Answers"*: http://ssrn.com/abstract=1606563

[2] 43 analysts provided a range with an average wide of 0.6%: I considered the medium point of the range.

Figure 1. Market Risk Premium used in 2010 by 601 analysts



2. MRP used by analysts in 2010 and in 2009

514 analysts indicated which MRP they used in 2009. **Figure 2** shows the difference between the MRP used in 2010 and the MRP used in 2009 for each one of the respondents

1 32% of the analysts decreased the MRP in 2010 (-1% on average)
2 57% used the same MRP, and
3 11% increased it (1.3% on average).

Figure 2. [MRP used in 2010] - [MRP used in 2009] by 601 analysts

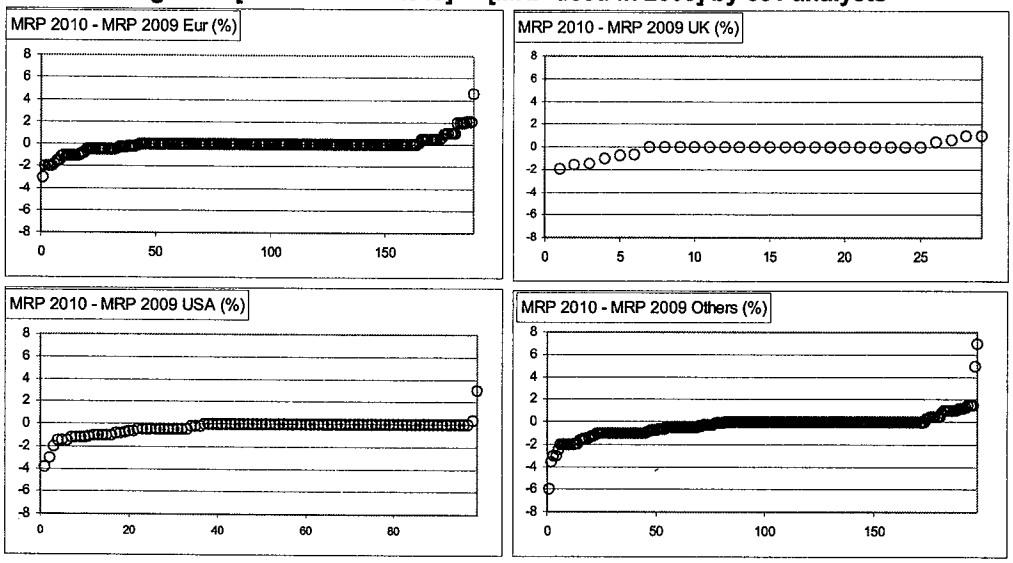


Table 3 contains the main statistics of the difference [MRP used in 2010] - [MRP used in 2009].

Table 3. [MRP used in 2010] - [MRP used in 2009] by analysts

		USA & Canada	Euro	UK	Other	All
MRP used in 2010 - MRP used in 2009	Average	**-0,3**	**0,0**	**-0,1**	**-0,3**	**-0,2**
	St. dev.	0.7	0.7	0.7	1.1	0.9
	MAX	3.0	4.6	1.0	7.0	7.0
	Median	0.0	0.0	0.0	0.0	0.0
	min	-3.9	-3.0	-2.0	-6.0	-6.0
	Number	99	189	29	197	**514**
	< 0	36	42	6	82	**166**
	= 0	61	122	19	91	**293**
	> 0	2	25	4	24	**55**

3. MRP used by analysts in 2010: a closer look by country

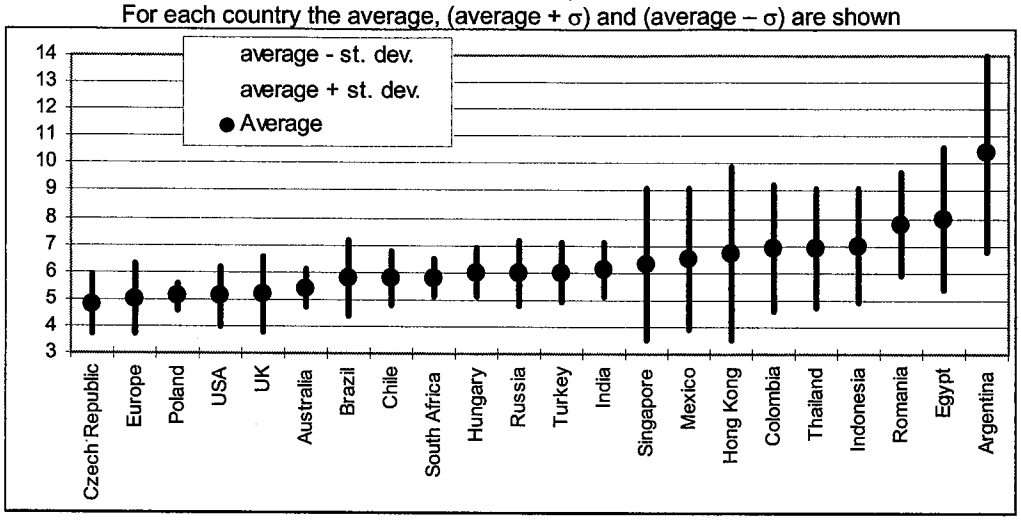
Table 4 contains the statistics by country of the MRP used in 2010. We only report statistics for the 22 countries with 5 or more answers. The average MRP used by analysts in the USA (5.12%) was higher than the one used by their colleagues in any European country.

Figure 4 is a graphic representation of the results of table 4.

Table 4. Market Risk Premium used in 2010 by analysts of 22 different countries

	Average	St. dev.	MAX	Q3	Median	Q1	min	Number of analysts
Argentina	**10.4**	3.6	14.5	14.0	**8.6**	8.0	6.4	5
Australia	**5.4**	0.7	6.0	6.0	**5.5**	5.0	4.1	7
Brazil	**5.8**	1.4	10.0	6.0	**5.6**	5.3	2.0	36
Colombia	**6.9**	2.3	12.0	7.3	**6.4**	5.7	4.5	8
Czech Republic	**4.8**	1.1	6.0	5.5	**4.8**	5.5	3.0	6
Chile	**5.8**	1.0	8.0	6.2	**5.8**	5.1	3.8	14
Egypt	**8.0**	2.6	13.7	8.2	**8.0**	6.4	5.4	8
Europe	**5.0**	1.3	11.9	5.5	**5.0**	4.0	3.0	197
Hong Kong	**6.7**	3.2	12.5	9.0	**5.0**	4.2	3.7	9
Hungary	**6.0**	0.9	7.5	6.3	**5.5**	5.5	5.3	5
India	**6.1**	1.0	7.5	7.0	**6.0**	5.2	5.0	10
Indonesia	**7.0**	2.1	11.0	8.0	**6.2**	5.4	5.0	7
Mexico	**6.5**	2.6	15.0	7.3	**5.5**	5.0	3.7	20
Poland	**5.1**	0.5	6.5	5.4	**5.0**	4.8	4.5	18
Romania	**7.8**	1.9	10.0	8.8	**7.6**	7.2	5.0	5
Russia	**6.0**	1.2	8.9	6.5	**5.5**	5.0	5.0	11
Singapore	**6.3**	2.8	10.3	8.0	**4.6**	4.4	3.9	5
South Africa	**5.8**	0.7	7.3	6.0	**6.0**	5.0	4.9	13
Thailand	**6.9**	2.2	12.0	7.5	**6.4**	5.0	4.9	13
Turkey	**6.0**	1.1	8.3	6.6	**6.0**	5.0	4.5	21
UK	**5.2**	1.4	10.0	5.7	**5.0**	4.1	3.5	31
USA	**5.1**	1.1	10.0	5.5	**5.0**	4.5	2.5	104
Grand Total	**5.6**	1.9	25.0	6.0	**5.0**	4.5	0.7	601

Figure 4. MRP used in 2010 by analyts for different countries
For each country the average, (average + σ) and (average – σ) are shown



4. Market Risk Premium (MRP) used in 2010 by companies

Table 5. MRP used in 2010 by companies: 1,749 answers

	USA	Europe	UK	Other	Sum
Answers reported	**205**	**543**	**30**	**123**	**901**
Outliers	**2**	**9**			**11**
MRP is confidencial	**39**	**17**	**9**	**5**	**70**
Companies that do NOT use MRP	**153**	**405**	**65**	**144**	**767**
Use a minimum IRR	*48*	*75*	*42*	*107*	
Use a required return to equity	*7*	*12*	*3*		
Use other criteria	*4*	*11*	*2*	*5*	
"MRP is a concept that we do not use"	*54*	*307*	*18*	*32*	

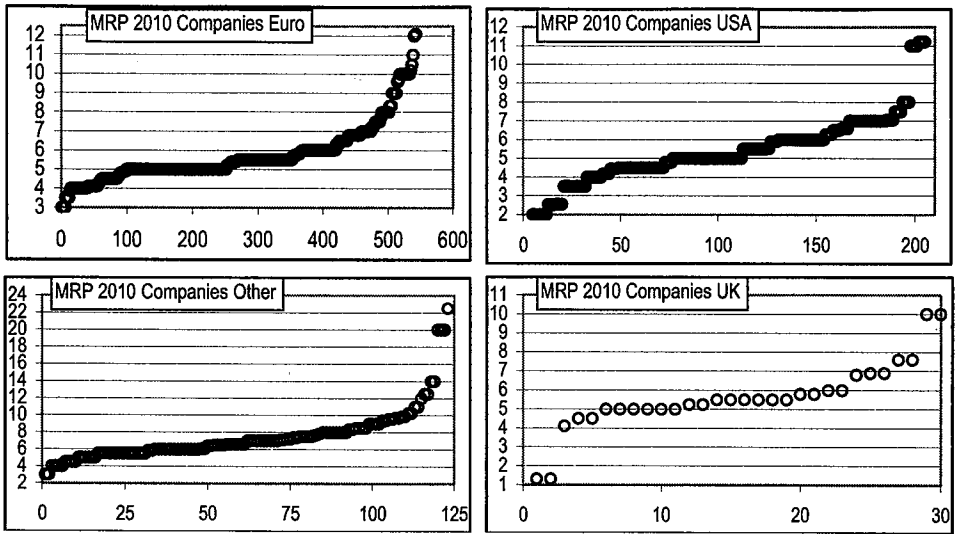
Euro: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and Switzerland **Other:** Argentina, Australia, Barbados, Brazil, Chile, Colombia, Ecuador, India, Iran, Israel, Japan, Kazakhstan, Marocco, Mexico, New Zealand, Peru, Poland, Russia, South Africa, Turkey, Ukraine and Vietnam

Table 6 contains the statistics of the MRP used in 2010. **Figure 5** is a graphic representation of the 902 MRPs considered in Table 6.

Table 6. Market Risk Premium used in 2010 by companies

		USA	Euro	UK	Other	Sum
MRP used in 2010	**Average**	5.3	5.7	5.6	7.5	
	Median	5.0	5.5	5.5	7.0	
	St. dev.	1.8	1.5	1.8	3.2	
	MAX	11.2	12.1	10.0	22.5	
	min	1.9	3.0	1.3	3.0	
	Number	205	543	30	123	**901**
Justify the number:						
Own research/calculations		*38*	*67*	*5*	*21*	*131*
I do not justify the number / do not answer		*40*	*154*	*5*	*34*	*233*
Reference to books or articles		*96*	*229*	*18*	*54*	*397*
Historic Data		*8*	*53*	*3*	*18*	*82*
Implied Market Risk Premium		*12*	*41*	*2*	*0*	*55*
Analyst reports		*3*	*46*	*0*	*2*	*51*

Figure 5. Market Risk Premium used in 2010 by companies



5. MRP used by companies in 2010 and in 2009

845 companies indicated which MRP they used in 2009. **Figure 6** shows the difference between the MRP used in 2010 and the MRP used in 2009:

1. 32% of the companies decreased the MRP in 2010 (-1% on average)
2. 57% used the same MRP, and
3. 11% increased it (1.3% on average).

Figure 6. [MRP used in 2010] - [MRP used in 2009] by companies

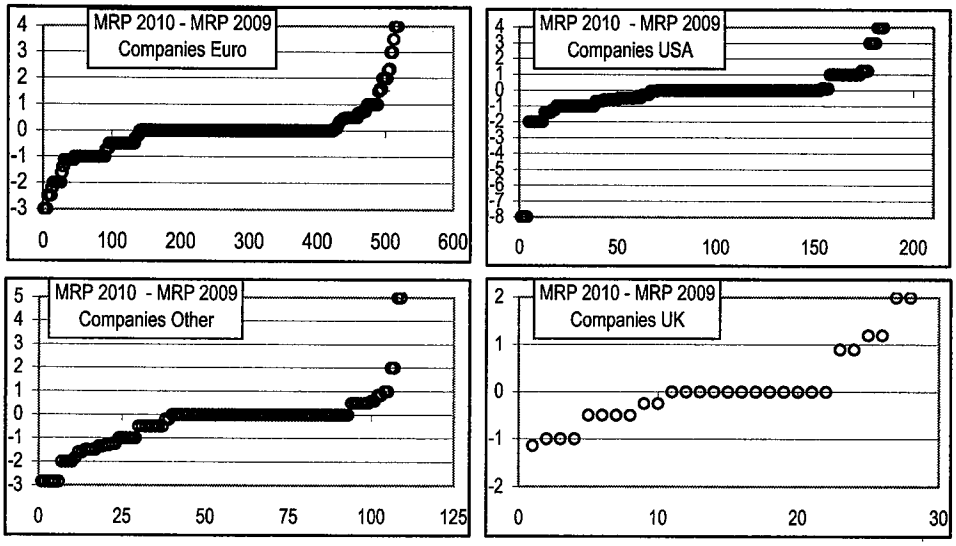


Table 7 contains the main statistics of the difference [MRP used in 2010] - [MRP used in 2009].

Table 7. [MRP used in 2010] - [MRP used in 2009] by companies

		USA	Euro	UK	Other	All
MRP used in 2010 - MRP used in 2009 (%)	Average	-0.13	-0.07	0.06	-0.30	-0.11
	St. dev.	1.7	1.0	0.8	1.2	1.2
	MAX	4.1	4.0	2.0	5.0	5.0
	Median	0.0	0.0	0.0	0.0	0.0
	min	-8.0	-3.0	-1.1	-2.8	-8.0
	Number	189	519	28	109	845
	< 0	70	141	10	39	260
	= 0	83	282	12	54	431
	> 0	36	96	6	16	154

6. References used by companies and analysts to justify the MRP figure

436 analysts and 639 companies indicated which books or papers they use as reference to justify the MRP that they use (127 of them provided more than a reference). **Table 8** contains the most cited references.

Table 8. References used by companies and analysts to justify the Market Risk Premium

	Companies					Analysts				
	USA	Euro	UK	Other	All	USA & Canada	Euro	UK	Other	All
Internal estimate	38	67	5	21	131	23	65	5	91	184
Damodaran	12	83	5	18	118	15	15	0	43	73
Morningstar/Ibbotson	40	32	8	10	90	10	9	3	10	32
Historic data	8	39	3	14	64	6	14	3	39	62
Implied MRP	12	41	2	0	55	1	5	0	5	11
Analysts / Other analysts	3	46	0	2	51	2	2	0	3	7
Mckinsey, Copeland	4	40	1	0	45	6	8	0	7	21
Fernandez	4	31	0	4	39	1	2	0	1	4
Experience, subjective, own judgement	12	14	0	8	34	5	7	1	14	27
Surveys, conversations,...	8	10	0	4	22	3	2	0	3	8
Brealy and Myers	8	14	0	0	22	0	0	0	2	2
Bloomberg	0	16	0	4	20	5	5	0	11	21
Dimson, Marsh and Staunton	4	8	4	0	16	3	3	2	1	9
CFA books	4	2	0	4	10	2	0	0	3	5
Fama and French (2002)	0	4	0	2	6	2	0	0	1	3
Grabowski / Pratt's and Grabowski	0	0	0	0	0	3	0	1	1	5
Mehra & Prescott	0	0	0	0	0	1	1	0	1	3
Other	19	37	11	7	74	8	16	6	19	49

7. MRP used by companies in 2010: a closer look by country

Table 9 contains the statistics by country of the MRP used in 2010. We only report statistics for the 26 countries with 5 or more answers.

Table 9. Market Risk Premium used in 2010 by companies in 26 different countries

	Aver	Std Dev	Median	Max	min	Count
Austria	5.3	0.7	5.3	6.8	4.1	10
Belgium	5.3	0.6	5.3	6.8	4.1	11
Brazil	7.3	1.9	6.8	9.7	4.5	12
Chile	7.4	3.1	6.5	14.0	4.0	14
Denmark	5.2	1.1	5.0	7.0	4.0	12
Finland	5.0	0.9	5.0	6.8	4.0	10
France	5.6	0.7	5.5	6.8	4.1	20
Germany	5.9	1.0	6.0	8.0	4.1	20
Greece	5.7	0.9	5.8	6.8	4.1	10
India	7.9	0.8	8.0	9.0	6.6	11
Ireland	5.5	0.8	5.5	6.8	4.1	8
Israel	5.9	1.1	5.9	7.0	4.5	7
Italy	5.8	1.4	5.3	9.6	4.1	22
Mexico	6.9	3.0	5.5	12.5	4.0	13
Netherlands	5.3	0.9	5.0	6.8	4.1	12
Norway	5.0	1.0	5.0	6.8	4.0	8
Peru	7.6	1.7	8.0	9.9	5.5	10
Poland	5.8	0.3	6.0	6.0	5.5	6
Portugal	5.4	0.7	5.5	6.8	4.1	9
South Africa	5.8	0.3	6.0	6.0	5.5	6
Spain	5.9	1.7	5.5	12.1	3.0	369
Sweden	5.3	0.6	5.5	6.8	4.1	12
Switzerland	5.2	0.8	5.0	6.8	4.1	8
UK	5.6	1.8	5.5	10.0	1.3	30
USA	5.3	1.8	5.0	11.2	1.9	205
Vietnam	13.3	6.4	12.0	20.0	7.2	5

8. Differences in the MRP used by analysts, companies and professors

Table 10 shows the MRPs used in 2010 by analysts and professors for different countries. Professors used for almost every country, on average, a higher MRP than analysts. The dispersion of the MRPs used by professors was also higher than that of the analysts

Table 10. Difference between Analyst and Professors in their estimations of the MRP in 2010

	Analysts						Professors					
	Average	Median	St. dev.	MAX	min	Answers	Average	Median	St. dev.	MAX	min	Answers
Argentina	**10.4**	8.6	3.6	14.5	6.4	5	**12.4**	7.1	8.9	25.0	4.3	5
Australia	**5.4**	5.5	0.7	6.0	4.1	7	**6.1**	6.0	1.9	10.0	4.0	21
Brazil	**5.8**	5.6	1.4	10.0	2.0	36	**6.8**	6.0	1.1	9.0	6.0	9
Colombia	**6.9**	6.4	2.3	12.0	4.5	8	**8.7**	7.3	4.7	15.0	3.4	5
Egypt	**8.0**	8.0	2.6	13.7	5.4	8	**7.1**	7.0	2.0	9.0	4.1	7
Europe	**5.0**	5.0	1.3	11.9	3.0	197	**5.3**	5,0	1,7	12.0	2.0	194
India	**6.1**	6.0	1.0	7.5	5.0	10	**10.3**	8.5	6.6	30.0	4.4	13
Mexico	**6.5**	5.5	2.6	15.0	3.7	20	**10.9**	9.1	7.3	25.0	5.5	6
Poland	**5.1**	5.0	0.5	6.5	4.5	18	**6.3**	6.5	1.2	8.0	4.4	6
Singapore	**6.3**	4.6	2.8	10.3	3.9	5	**8.4**	7.2	2.5	12.0	6.0	5
South Africa	**5.8**	6.0	0.7	7.3	4.9	13	**5.5**	6.0	1.3	7.0	4.0	8
Turkey	**6.0**	6.0	1.1	8.3	4.5	21	**8.0**	6.0	4.7	16.0	4.5	5
UK	**5.2**	5.0	1.4	10.0	3.5	31	**5.0**	5.0	1.6	10.3	2.5	49
USA	**5.1**	5.0	1.1	10.0	2.5	104	**6.0**	6.0	1.7	12.0	2.0	462

Table 11 shows the MRPs used in 2010 by professors, analysts and companies for USA, Euro, UK and other countries. Professors had a higher dispersion than Analysts and Companies. **Figure 7** is a graphic representation of the main results of table 11.

Table 12 shows the MRPs used in 2010 and 2009 by professors, analysts and companies for USA, Euro, UK and other countries. The average MRP used by the groups in 2010 is lower than the one used in 2009. **Figure 8** is a graphic representation of the main results of table 11

Table 11. Market Risk Premium used in 2010 by Professors, Analysts and Companies in some countries

	Analysts			Professors			Companies		
	Average	Median	St. dev.	Average	Median	St. dev.	Average	Median	Std Dev
Brazil	**5.8**	5.6	1.4	**6.8**	6.0	1.1	**7.3**	6.8	1.9
Europe	**5.0**	5.0	1.3	**5.3**	5.0	1.7	**5.7**	5.5	1.5
India	**6.1**	6.0	1.0	**10.3**	8.5	6.6	**7.9**	8.0	0.8
Mexico	**6.5**	5.5	2.6	**10.9**	9.1	7.3	**6.9**	5.5	3.0
Poland	**5.1**	5.0	0.5	**6.3**	6.5	1.2	**5.8**	6.0	0.3
South Africa	**5.8**	6.0	0.7	**5.5**	6.0	1.3	**5.8**	6.0	0.3
UK	**5.2**	5.0	1.4	**5.0**	5.0	1.6	**5.6**	5.5	1.8
USA	**5.1**	5.0	1.1	**6.0**	6.0	1.7	**5.3**	5.0	1.8

	Analysts			Professors			Companies		
	MAX	min	Answers	MAX	min	Answers	MAX	min	Answers
Brazil	10.0	2.0	36	9.0	6.0	9	9.7	4.5	12
Europe	11.9	3.0	197	12.0	2.0	194	12.1	3.0	543
India	7.5	5.0	10	30.0	4.4	13	9.0	6.6	11
Mexico	15.0	3.7	20	25.0	5.5	6	12.5	4.0	13
Poland	6.5	4.5	18	8.0	4.4	6	6.0	5.5	6
South Africa	7.3	4.9	13	7.0	4.0	8	6.0	5.5	6
UK	10.0	3.5	31	10.3	2.5	49	10.0	1.3	30
USA	10.0	2.5	104	12.0	2.0	462	11.2	1.9	205

Table 12. Market Risk Premium used in 2010 and in 2009 by Professors, Analysts and Companies

		2010				2009			
		USA	Euro	UK	Other	USA	Euro	UK	Other
Professors	**Average**	**6.0**	**5.3**	**5.0**	**7.8**	6.4	5.4	4.9	8.9
Analysts	**Average**	**5.1**	**5.0**	**5.2**	**6.3**	5.5	5.1	5.3	6.3
Companies	**Average**	**5.3**	**5.7**	**5.6**	**7.5**	5.5	5.8	5.9	7.3
Professors	**St. dev.**	**1.7**	**1.7**	**1.6**	**4.2**	2.4	1.9	1.5	3.8
Analysts	**St. dev.**	**1.1**	**1.3**	**1.4**	**2.2**	1.3	1.2	1.2	2.0
Companies	**St. dev.**	**1.8**	**1.5**	**1.8**	**3.2**	1.8	1.6	0.8	2.3
Professors	**Median**	**6.0**	**5.0**	**5.0**	**7.0**	6.0	5.0	5.0	7.1
Analysts	**Median**	**5.0**	**5.0**	**4.5**	**5.9**	5.0	5.0	5.0	6.0
Companies	**Median**	**5.0**	**5.5**	**5.5**	**7.0**	5.5	5.5	5.8	7.0
Professors	**Respondents**	**462**	**194**	**49**	**145**	448	194	49	140
Analysts	**Respondents**	**104**	**197**	**31**	**269**	99	189	29	197
Companies	**Respondents**	**205**	**543**	**30**	**123**	189	521	28	109

Figure 7. MRP used in 2010 by analyst, professors and companies for different countries
The chart shows the average and the interval [(average - σ) , (average + σ)]

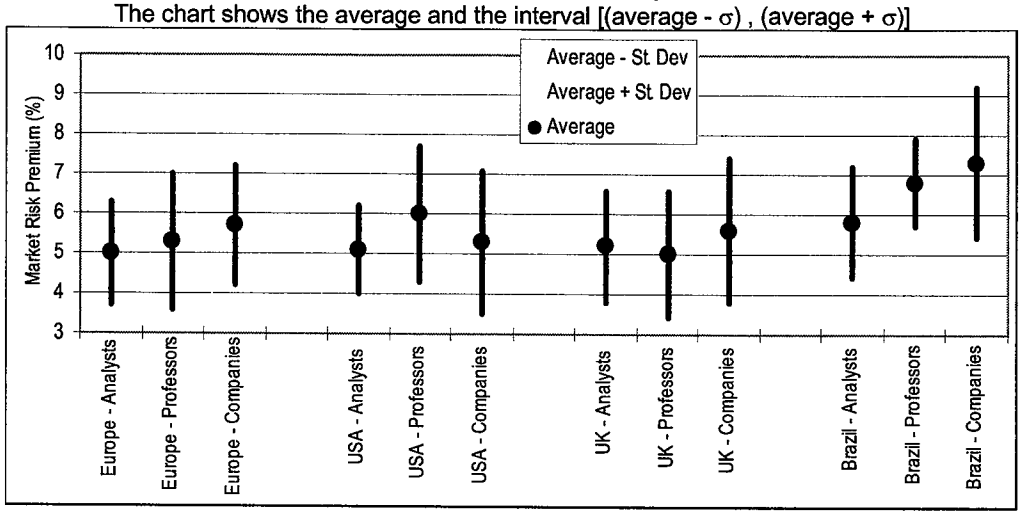
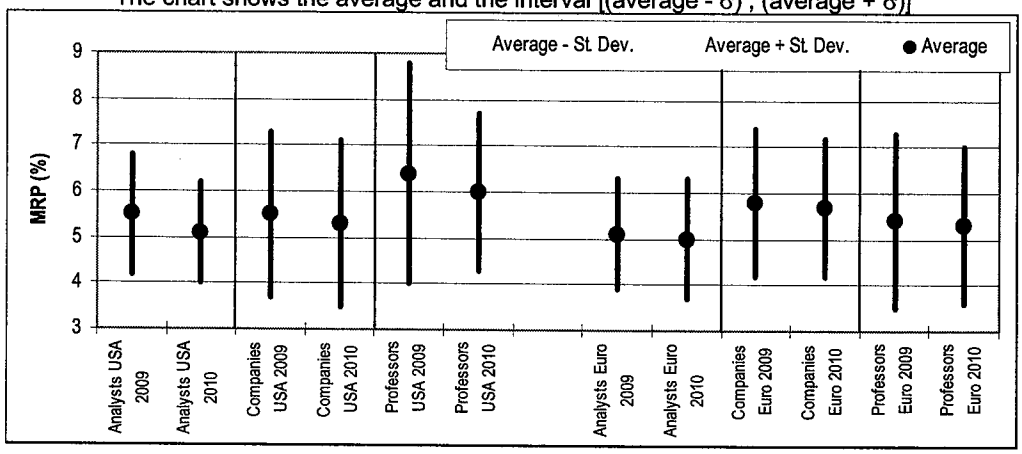


Figure 8. MRP used in 2010 and 2009 by analyst, professors and companies for USA and Europe
The chart shows the average and the interval [(average - σ) , (average + σ)]



9. Conclusion

Most surveys have been interested in the Expected MRP, but this survey asks about the Required MRP.

The average MRP used by analysts in the USA and Canada (5.1%) was similar to the one used by their colleagues in Europe (5.0%), and UK (5.2%). But the average MRP used by companies in the USA and Canada (5.3%) was smaller than the one used by companies in Europe (5.7%), and UK (5.6%).

The dispersion of the MRP used was high, but lower than the one of the professors: the average range of MRP used by analysts (companies) for the same country was 5.7% (4.1%) and the average standard deviation was 1.7% (1.2%). These statistics were 7.4% and 2.4% for the professors.

The paper also contains the references that analysts and companies use to justify their MRP, and comments from 89 respondents that illustrate the various interpretations of what is the required MRP.

EXHIBIT 1. Mail sent on April and May 2010

I am doing a survey about the Market Risk Premium (MRP) that companies, analysts and professors use to calculate the required return to equity in different countries.
I will be very grateful to you if you kindly reply to the following 3 questions.
Of course, no individuals, universities or companies will be identified and only aggregate data will be made public.

Best regards and thanks,
Pablo Fernandez
Professor of Finance. IESE Business School. Spain

3 questions:

1. The Market Risk Premium that I am using in 2010 is: _____%

2. Books or articles that I use to support this number:

3. Last year, I used a different MRP: _____%

Comments

EXHIBIT 2
COMMENTS OF ANALYSTS AND COMPANIES THAT DID NOT PROVIDE THE MRP USED IN 2010

1. I regularly use the Monthly CRSP index return (value weighted to reduce the effect of low liquidity small stocks) then substract the U.S. one month T-bill.
2. I use a 'rule of thumb' discount rate of 10% and a further (arbitrary) discount rate to proxy remaining project execution risk.
3. Average long term yield on government bonds for companies that we follow in UK/Europe
4. Banks to me are giant bond portfolios and should trade at off book value, the is usually supported by some type of earnings multiple, which is higher dependent on the ROEs of the business. Higher the ROE of course, the higher the multiples.
5. Biotech companies: the lowest discount factor I use this year and last year is 12%
6. DCF's are too sensitive and arbitrary
7. Nuestros accionistas esperan un TIR mínimo de un 20%
8. Nuestro Grupo no cotiza y no invierte en Bolsa. No tenemos criterio de prima de riesgo para acciones.
9. For the large cap oil stocks that I cover – I use an Equity Risk Premium in my DCF valuations ranging from 5.0% to 7.5% based on market of inception ERP skewed by an appreciation of the geographical bias (and therefore political risk) for operations.
10. For valuing biotech companies, depending on the stage of development of the drugs, I use a different rate which also must take into account another discount rate reflection how novel the technology is. My discount rate varies between 30-70% for non-revenue companies.
11. I can't really disclose our assumptions as it is part of the "research", which is exclusively disclosed to our clients (apart from selective dispatch press).
12. I do not make these calculations in my work, but rather follow what the market tells me....I am only an observer.
13. I do not use cost of capital method to value securities – PE multiple is the predominantly used metric
14. I don't use it – as far as I am concerned it is not a number of any worth to me. It is either subjective, or wrong. Too theoretical, he said heretically! It is not quite all about the numbers...
15. I rarely use CAPM in valuation

16. I really do not put a market risk premium on my price targets. While I should use DCF calculations more often, I have found that in the real world these either 1) do not play out due to the lack of pure information that only insiders have or 2) the length of time it takes for the DCF scenario to play out is well beyond 2-3 years, and I am charged with a 6-18 month outlook, and this time frame is often driven largely by other factors.
17. While I should use DCF calculations more often, I have found that in the real world these either 1) do not play out due to the lack of pure information that only insiders have or 2) the length of time it takes for the DCF scenario to play out is well beyond 2-3 years, and I am charged with a 6-18 month outlook, and this time frame is often driven largely by other factors.
18. I really don't use a fixed MRP. We invest primarily in private companies. Beta, CAPM, etc. are frameworks that don't apply well to how we view risk/return and ultimately how we derive required return on specific investments. For us it is as much art as it is science.
19. I use cost of debt + 300bps for cost of equity
20. I use the market measured risk premium. I do not use books to justify the method. Variations occur in the MRP all the time
21. if we do MRP we just take it from Bloomberg (VERY rarely)
22. I'm afraid we don't use a formal MRP. The events of last 2 years have rather dissuaded investors asking about such things - prices of equities seen to be driven much more by animal spirits than by theoretical WACC calcs. We rather boringly use WACCs of 8-9% for large FTSE corporates when calculating DCFs if only becuase they seem to be the industry norm.
23. I can't stress enough though how much distrust there is with DCF as a valuation methodology now - risk aversion means short term earnings and cash flow metrics rule.
24. In valuing my universe of small companies, I do not specifically take into account the expected return on stocks or the risk free return.
25. La prima de riesgo es un concepto que aprendí y que no se utiliza mucho porque el que toma la decisión no tiene que justificarse con nadie, sólo con su conciencia, y la prima de riesgo no la alivia...
26. No hacemos uso de tan odiado concepto, y no sabemos qué valor le dan a nivel corporativo en USA
27. Me definen una rentabilidad de proyecto mínima que todos los proyectos han de superar
28. Mostly we just do comps
29. What if companies in Resources segment in Russia never in the past generated free-cash flow? Even in the years when commodity prices were extremely high. What will change in future? Companies become less acquisitive? No. Companies focus on free cash flow? No. Management focuses on Growth no matter how much free cash flow it costs to achieve it. Owners focus on maximizing share price and again they don't care how much it will cost to achieve in terms of free cash flow. So while dividends are paid out from Net income and not from free cash flow investors will focus also not on free cash flow. So in my opinion the whole notion of free cash flow and DCF is too academic and applicable to only selected few companies that take a long-term horizon which is very rare in public equities.
30. I do not refer to books and I don't calculate WACC from basic principles. When I calculate cash flows from future mine production, I use a 'rule of thumb' discount rate of 10% and a further (arbitrary) discount rate to proxy remaining project execution risk.
31. No uso este concepto en mis actividades inversoras. Es más, me parece un disparate que conduce a muchos sinsentidos. Si el equity risk premium, como dicen muchos, fuese algo que se obtendría con seguridad a largo plazo ¿donde está el risk que se hace merecedor del premium?
32. Nuestros objetivos los marcamos en conseguir una TIR mínima. En nuestro caso la TIR puede variar entre el 12 y 16%
33. Our models are based on fundamental analysis, personal experience of analysts and what is more important on analysis of macroeconomical and geopolitical factors. We consider analyst's opinion and vision of political games to be the most important when estimating market risk. In our opinion, Russia's strock market can not be analysed only in traditional ways of fundamental analysis. Due to this I can not answer 1, 2 questions. As for the 3rd question, our analysts do read a lot of books and articles about stock market and related issues. However, we do not support technical analysis
34. Real WACC 8%
35. Regarding your message I would like to inform you that I am not directly related to the issue. However, I asked a couple of my colleagues to get their ideas. I will let you know when I receive feedback from them.
36. The ERP and the market prices of equities are dynamic
37. We are Valuation Consultants and have no involvement in MRP.
38. We are using a blended Cost of Equity of between 9.5%-11% per division. We have not adjusted the risk premium for the artificially low 'risk free rates', as they are a reflection of flight to quality and high risk adverseness in the market place.
39. We cover more than 130 companies in many countries. We use a standardised 10% nominal discount rate is DCF calculations. Given 24 years in finance, I find that while the market may be efficient overall in a

general sense, for each individual stock it is not. We also find that investors in different countries have different attitudes to country risk and hence required returns on equity. For example, the London market is more willing to accept a lower return on Russian investments than the US market. Canada is more comfortable in central American countries than the UK. Risk, and hence required returns and MRP, like beauty is in the eye of the beholder.

40. We rather boringly use WACCs of 8-9% for large FTSE corporates
41. We simply use a WACC of 7.5% to 8.0%, depending on the segment
42. We tend to use a constant WACC over time within our research of either 7% or 8%. we have found within the capital goods sector, the number 1 approach for stock selection (in terms of both annual returns and consistency as an investment strategy) is earnings momentum (e.g. earnings growth or consensus upgrades/downgrade), irrespective of valuation.
43. We use a 11.5% cost of equity
44. We use a 14% required rate of return in all of our research since it is the expected performance many investors, on average, demand for an investment in a bank stock (which is my sector focus). I suppose we could say the risk-free rate is 3% to 4% today, so the market risk premium is 10% to 11%, but that may not be the correct way to explain it.
45. We use a flat 9% discount rate in our DCF calculation for oil and gas companies in North America
46. We use EV/EBITDA, P/E and P/B.
47. We use EV/Sales or EV/EBITDA
48. We use Ke

EXHIBIT 3
COMMENTS OF ANALYSTS AND COMPANIES THAT DID PROVIDE THE MRP USED IN 2010

1. Reasonable people disagree and unreasonable people may agree on application of CAPM
2. Risk premia = actual averages derived from data since the year 2000.
3. Equity risk premia applied to individual firms will vary according to individual risk.
4. ROE – Cost of debt
5. Spain 0.5% higher than USA or UK.
6. Please note that I use the 10-year US Treasury bond rate as my risk-free rate, not the T-bill rate.
7. Possibly an area where a practitioner like me would benefit is whether it makes sense to use different MRP estimates as economic conditions change and/or the use of ranges for cost of capital estimates for valuations/ capital budgeting/ performance measurement etc.. The long run historical average seems almost meaningless when one looks at both the standard error of the estimate (7.5% imputation adjusted average with a SE of 23%) and at the ranges/volatility of annual estimates.
8. Risk is increasing with market crashes, not identified in historical calculations in my view. Check the second edition of "Security Analysis On Wall Street" (john wiley and sons, 2010)
9. Different companies use different MRP depending on the the expectation of return
10. As this premium is so hotly debated, I've decided to continue to use the practitioner norm from the valuation industry.
11. Aparte de la prima de riesgo de mercado (5%) introducimos una prima de riesgo país (CRP) en base a Damodaran
12. Tomo la prima del año anterior como referencia y la aumento o disminuyo de acuerdo con criterios totalmente discutibles y opinables.
13. Aunque las valoraciones por DCF son muy ocasionales en Leveraged Finance (e inexistentes en Project Finance) sí que las hemos usado ocasionalmente para análisis de Loan to Enterprise Value, bien internas o principalmente hechas por terceros (incluídos Sponsors financieros). El valor que hemos usado / obtenido para Market risk (como prima sobre risk free rate Rf) en el último caso es 6%. No se hicieron análisis en 2009.
14. El inverso del PER medio del mercado menos el valor del dinero "libre de riesgo" aplicado a un mismo periodo t me daría la prima de riesgo. El PER estimado para el IBEX 2010 es 12.53; pues si al inverso, 7.78 le restamos la rentabilidad del tipo swap a 5 años, (estimamos 5 años como una inversión típica en RV) nos da un 5,38%. Para calcular el 2009 con la vol. que tuvimos el dato varió mucho y el PER fluctuó entre 8 y 13. Pero cogiendo una media así grosso modo con una rentabilidad del 5 años swap a 2,8%, me sale un 7% de PdR
15. El wacc de la compañía en 2009 estuvo entre el 7-10% y que es lo que se suele usar a la hora de la valoración.
16. Emerging Markets Bond Index (EMBI) + 550bp

17. En 2009 y 2010 la rentabilidad que exigen los inversores a los fondos propios desembolsados es 20%; ello implica que la PRM es 16%.
18. Of course there have been significant changes to the expectations on the markets between 2008 and 2009 and historical series have radically changed. However expectations for the long term are still difficult to foresee, and risks for the long term could be considered similar to 2009. Of course all these considerations will be verified during 2010, because, especially when examining statistic parameters, the crisis has no precedent and it is difficult to understand.
19. However, it is my belief that historical data results in an overestimation of the MRP. I subscribe to the view that the United States and the world have had a better the expected realization over the last 50 years with respect to the long-run growth of the economy and the riskiness of treasuries. Thus, my MRP is downweighted somewhat.
20. I have been an Investment professional (analyst, portfolio manager and investment manager) in the market for 30 years and I have drawn the conclusion that 6% (MRP over local long bond rate) is a fair long-term reflection of the market premium, but with considerable volatility about the mean. I am a supporter of EVA and similar concepts.
21. I have not changed the rate since there is no significant change in risk perception in the market place and industry in general .
22. I strongly belive that it is the long term risk premium that is interesting when doing equity valuation and that the long term risk premium does not change. If you take the markets present risk premium in to the equation, you'll simply end up finding the market price, and equity as an asset will never be cheap or expensive. Also I belive that in my talks with investors it is my estimates for the individual company that should be in focus and not my assesment of the market risk. Changes in a target price should be driven by change of estimates and not changes in market risk premium.
23. I think 5% ERP is already low enough, I've seen people using lower figures but do not agree with that, speacially in EM.
24. I think the risk is very low and the prospects for appreciation are huge
25. Ibbotson and Goetzmann , I'm a Yale School of Mgmt grad
26. In Australia, there are a significant number of regulatory decisions, which use the CAPM framework and go through a public consultation process. There are a significant number of submissions made on CAPM with expert opinions provided.
27. In fact, I distinguish passive premiums (asset classes, the numbers I gave) and active premiums (via TAA).
28. I work with Sharpe ratio (0.3 for passive / strategic phase in developed markets - a bit more on emerging markets - and 0.4 or 0.5 for TAA) and the anticipation of volatility for each market. I exclude voluntarily an economic approach here because I want to use the structural value of the asset classes. I have another phase that alters the premium on the economic cycle.
29. Letras del tesoro más entre 3% y 4%. Basado en estudios de 100 años en las bolsas mundiales.
30. Ahora le doy más valor al dinero, tras vivir la crisis financiera del 2008, por lo que exigiría al mercado una rentabilidad superior a la que exigía antes;
31. No utilizo libros porque ninguno me va a decir cuáles son mis expectativas.
32. MRP in Vietnam is strongly connected with real estate and stocks market (the most booming and beneficial market in Vietnam).
33. MRP varies with the risk free rate as measured by 10 Year Treasuries
34. No books or articles are relevant, since there is no research which can take account of crisis or post-crisis scenarios
35. Pm= 10%-4% = 6%
36. Presently I am asking for the sponsors of the projects I valuate to estimate directly a "subjective" required return to unlevered equity, Ku. It ranges from 10% to 10%, real.
37. Prima de Riesgo = diferencial entre la Renta Variable y la Renta Fija en España desde 1980.
38. As a subsidiary of a multinational group we are forced to use WACC's provided by HQs. The latest update of WACC's (by business unit) to be used was issued in Sep 09. The MRP of 4.5% remained unchanged compared to the previous year.
39. The implications of the Financial Crisis will further challenge entrepreneurs as they seek capital to finance expansion or undertake strategic acquisitions. This point is highlighted by the U.S. national Debt to Capital ratio in 2004 of 2.33, where total corporate debt equaled $12.1 trillion versus $5.2 trillion in corporate equity. This contrasts with the same ratio at the end of 2008 of 1.35, with $9.6 trillion in debt and $7.1 trillion in equity. Themes for U.S. businesses will likely continue to include:
40. The underlying risk premium is derived from regression approach of OSEBX vs. World index.
41. We use the interbank CD rate (CDI) as the benchmarket for risk free rate. This rate is published by Banco Central and is currently at 8.75. The future rate indicated by the market goes from 10 to 11% for the second half. Consequently a MRP at 9.75% is an acceptable benchmark.

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Long-Run Stock Returns: Participating in the Real Economy

Roger G. Ibbotson and Peng Chen

In the study reported here, we estimated the forward-looking long-term equity risk premium by extrapolating the way it has participated in the real economy. We decomposed the 1926–2000 historical equity returns into supply factors—inflation, earnings, dividends, the P/E, the dividend-payout ratio, book value, return on equity, and GDP per capita. Key findings are the following. First, the growth in corporate productivity measured by earnings is in line with the growth of overall economic productivity. Second, P/E increases account for only a small portion of the total return of equity. The bulk of the return is attributable to dividend payments and nominal earnings growth (including inflation and real earnings growth). Third, the increase in the equity market relative to economic productivity can be more than fully attributed to the increase in the P/E. Fourth, a secular decline has occurred in the dividend yield and payout ratio, rendering dividend growth alone a poor measure of corporate profitability and future growth. Our forecast of the equity risk premium is only slightly lower than the pure historical return estimate. We estimate the expected long-term equity risk premium (relative to the long-term government bond yield) to be about 6 percentage points arithmetically and 4 percentage points geometrically.

Numerous authors are directing their efforts toward estimating expected returns on stocks incremental to bonds.[1] These equity risk premium studies can be categorized into four groups based on the approaches the authors took. The first group of studies has attempted to derive the equity risk premium from the historical returns of stocks and bonds; an example is Ibbotson and Sinquefield (1976a, 1976b). The second group, which includes our current work, has used fundamental information—such as earnings, dividends, or overall economic productivity—to measure the expected equity risk premium. The third group has adopted demand-side models that derive expected equity returns through the payoff demanded by investors for bearing the risk of equity investments, as in the Ibbotson, Diermeier, and Siegel (1984) demand framework and, especially, in the large body of literature following the seminal work of Mehra and Prescott (1985).[2] The fourth group has relied on opinions of investors and financial professionals garnered from broad surveys.

In the work reported here, we used supply-side models. We first used this type of model in Diermeier, Ibbotson, and Siegel (1984). Numerous other authors have used supply-side models, usually with a focus on the Gordon (1962) constant-dividend-growth model. For example, Siegel (1999) predicted that the equity risk premium will shrink in the future because of low current dividend yields and high equity valuations. Fama and French (2002), studying a longer time period (1872–1999), estimated a historical expected geometric equity risk premium of 2.55 percentage points when they used dividend growth rates and a premium of 4.32 percentage points when they used earnings growth rates.[3] They argued that the increase in the P/E has resulted in a realized equity risk premium that is higher than the *ex ante* (expected) premium. Campbell and Shiller (2001) forecasted low returns because they believe the current market is overvalued. Arnott and Ryan (2001) argued that the forward-looking equity risk premium is actually negative. This conclusion was based on the low

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current dividend yield plus their forecast for very low dividend growth. Arnott and Bernstein (2002) argued similarly that the forward-looking equity risk premium is near zero or negative (see also Arnott and Asness 2003).

The survey results generally support somewhat higher equity risk premiums. For example, Welch (2000) conducted a survey of 226 academic financial economists about their expectations for the equity risk premium. The survey showed that they forecasted a geometric long-horizon equity risk premium of almost 4 pps.[4] Graham and Harvey (2001) conducted a multiyear survey of chief financial officers of U.S. corporations and found their expected 10-year geometric average equity risk premium to range from 3.9 pps to 4.7 pps.[5]

In this study, we linked historical equity returns with factors commonly used to describe the aggregate equity market and overall economic productivity. Unlike some studies, ours portrays results on a per share basis (per capita in the case of GDP). The factors include inflation, EPS, dividends per share, P/E, the dividend-payout ratio, book value per share, return on equity, and GDP per capita.[6]

We first decomposed historical equity returns into various sets of components based on six methods. Then, we used each method to examine each of the components. Finally, we forecasted the equity risk premium through supply-side models using historical data.

Our long-term forecasts are consistent with the historical supply of U.S. capital market earnings and GDP per capita growth over the 1926–2000 period. In an important distinction from the forecasts of many others, our forecasts assume market efficiency and a constant equity risk premium.[7] Thus, the current high P/E represents the market's forecast of higher earnings growth rates. Furthermore, our forecasts are consistent with Miller and Modigliani (1961) theory, in that dividend-payout ratios do not affect P/Es and high earnings-retention rates (usually associated with low yields) imply higher per share future growth. To the extent that corporate cash is not used for reinvestment, we assumed it to be used to repurchase a company's own shares or, perhaps more frequently, to purchase other companies' shares. Finally, our forecasts treat inflation as a pass-through, so the entire analysis can be done in real terms.

Six Methods for Decomposing Returns

We present six different methods for decomposing historical equity returns. The first two methods (especially Method 1) are based entirely on historical returns. The other four methods are methods of the supply side. We evaluated each method and its components by applying historical data for 1926–2000. The historical equity return and EPS data used in this study were obtained from Wilson and Jones (2002).[8] The average compound annual return for the stock market over the 1926–2000 period was 10.70 percent. The arithmetic annual average return was 12.56 percent, and the standard deviation was 19.67 percent. Because our methods used geometric averages, we focus on the components of the 10.70 percent geometric return. When we present our forecasts, we convert the geometric average returns to arithmetic average returns.

Method 1. Building Blocks. Ibbotson and Sinquefield developed a "building blocks" model to explain equity returns. The three building blocks are inflation, the real risk-free rate, and the equity risk premium. Inflation is represented by changes in the U.S. Consumer Price Index (*CPI*). The equity risk premium for year t, ERP_t, and the real risk-free rate for year t, RRf_t, are given by, respectively,

$$ERP_t = \frac{1+R_t}{1+Rf_t} - 1 = \frac{R_t - Rf_t}{1+Rf_t} \quad (1)$$

and

$$RRf_t = \frac{1+Rf_t}{1+CPI_t} - 1 = \frac{Rf_t - CPI_t}{1+CPI_t}, \quad (2)$$

where R_t, the return of the U.S. stock market, represented by the S&P 500 Index, is

$$R_t = (1+CPI_t)(1+RRf_t)(1+ERP_t) - 1 \quad (3)$$

and Rf_t is the return of risk-free assets, represented by the income return of long-term U.S. government bonds.

The compound average for equity return was 10.70 percent for 1926–2000. For the equity risk premium, we can interpret that investors were compensated 5.24 pps a year for investing in common stocks rather than long-term risk-free assets (such as long-term U.S. government bonds). This calculation also shows that roughly half of the total historical equity return has come from the equity risk premium; the other half is from inflation and the long-term real risk-free rate. Average U.S. equity returns from 1926 through 2000 can be reconstructed as follows:[9]

$$\bar{R} = (1+\overline{CPI})(1+\overline{RRf})(1+\overline{ERP})-1$$
$$10.70\% = (1+3.08\%)\times(1+2.05\%)\times(1+5.24\%)-1.$$

The first column in **Figure 1** shows the decomposition of historical equity returns for 1926–2000 according to the building blocks method.

Method 2. Capital Gain and Income. The equity return, based on the form in which the return is distributed, can be broken into capital gain, *cg*, and income return, *Inc*. Income return of common stock is distributed to investors through dividends, whereas capital gain is distributed through price appreciation. Real capital gain, *Rcg*, can be computed by subtracting inflation from capital gain. The equity return in period t can then be decomposed as follows:

$$R_t = [(1+CPI_t)(1+Rcg_t)-1]+Inc_t+Rinv_t, \qquad (4)$$

where *Rinv* is reinvestment return.

The average income return was calculated to be 4.28 percent in the study period, the average capital gain was 6.19 percent, and the average real capital gain was 3.02 percent. The reinvestment return averaged 0.20 percent from 1926 through 2000. For Method 2, the average U.S. equity return for 1926–2000 can thus be computed according to

$$\bar{R} = [(1+\overline{CPI})(1+\overline{Rcg})-1]+\overline{Inc}+\overline{Rinv}$$
$$10.70\% = [(1+3.08\%)\times(1+3.02\%)-1]+4.28\%+0.20\%.$$

The second column in Figure 1 shows the decomposition of historical equity returns for 1926–2000 according to the capital gain and income method.

Method 3. Earnings. The real-capital-gain portion of the return in the capital gain and income method can be broken into growth in real EPS, g_{REPS}, and growth in P/E, $g_{P/E}$:

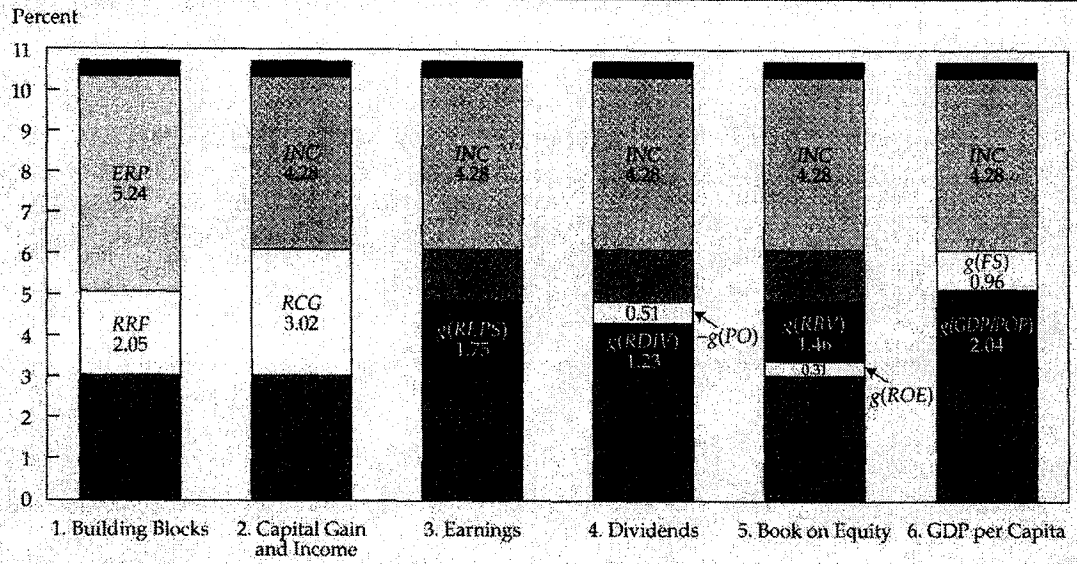
$$\begin{aligned} Rcg_t &= \frac{P_t}{P_{t-1}}-1 \\ &= \frac{P_t/E_t}{P_{t-1}/E_{t-1}}\left(\frac{E_t}{E_{t-1}}\right)-1 \\ &= (1+g_{P/E,t})(1+g_{REPS,t})-1. \end{aligned} \qquad (5)$$

Therefore, equity's total return can be broken into four components—inflation, growth in real EPS, growth in P/E, and income return:

$$R_t = [(1+CPI_t)(1+g_{REPS,t})(1+g_{P/E,t})-1] + Inc_t+Rinv_t. \qquad (6)$$

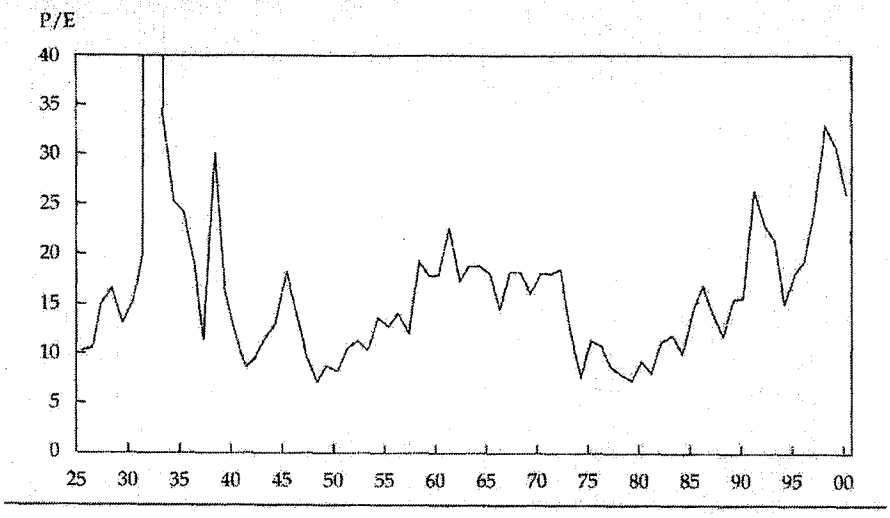
The real earnings of U.S. equity increased 1.75 percent annually between 1926 and 2000. The P/E, as **Figure 2** illustrates, was 10.22 at the beginning of 1926 and 25.96 at the end of 2000. The highest P/E (136.50 and off the chart in Figure 2) was recorded during the Great Depression, in December 1932, when earnings were near zero, and the lowest in the period (7.07) was recorded in 1948. The average year-end P/E was 13.76.[10]

Figure 1. Decomposition of Historical Equity Returns by Six Methods, 1926–2000



Notes: The block on the top of each column is the reinvestment return plus the geometric interactions among the components. Including the geometric interactions ensured that the components summed to 10.70 percent in this and subsequent figures. The table that constitutes Appendix A gives detailed information on the reinvestment and geometric interaction for all the methods.

Figure 2. P/E, 1926–2000



The U.S. equity returns from 1926 and 2000 can be computed according to the earnings method as follows:

$$\bar{R} = [(1+\overline{CPI})(1+\overline{g_{REPS}})(1+\overline{g_{P/E}})-1] + \overline{Inc}+\overline{Rinv}$$

$$10.70\% = [(1+3.08\%)\times(1+1.75\%)\times(1+1.25\%)-1] + 4.28\%+0.20\%.$$

The third column in Figure 1 shows the decomposition of historical equity returns for 1926–2000 according to the earnings method.

Method 4. Dividends. In this method, real dividends, *RDiv*, equal the real earnings times the dividend-payout ratio, *PO*, or

$$REPS_t = \frac{RDiv_t}{PO_t}; \tag{7}$$

therefore, the growth rate of earnings can be calculated by the difference between the growth rate of real dividends, g_{RDiv}, and the growth rate of the payout ratio, g_{PO}:

$$(1+g_{REPS,t}) = \frac{(1+g_{RDiv,t})}{(1+g_{PO,t})}. \tag{8}$$

If dividend growth and payout-ratio growth are substituted for the earnings growth in Equation 6, equity total return in period *t* can be broken into (1) inflation, (2) the growth rate of P/E, (3) the growth rate of the dollar amount of dividends after inflation, (4) the growth rate of the payout ratio, and (5) the dividend yield:

$$R_t = \left[(1+CPI_t)(1+g_{P/E,t})\left(\frac{1+g_{RDiv,t}}{1+g_{PO,t}}\right)-1\right] + Inc_t + Rinv_t. \tag{9}$$

Figure 3 shows the annual income return (dividend yield) of U.S. equity for 1926–2000. The dividend yield dropped from 5.15 percent at the beginning of 1926 to only 1.10 percent at the end of 2000. **Figure 4** shows the year-end dividend-payout ratio for 1926–2000. On average, the dollar amount of dividends after inflation grew 1.23 percent a year, while the dividend-payout ratio decreased 0.51 percent a year. The dividend-payout ratio was 46.68 percent at the beginning of 1926. It had decreased to 31.78 percent at the end of 2000. The highest dividend-payout ratio was recorded in 1932, and the lowest was the 31.78 percent recorded in 2000.

The U.S. equity returns from 1926 through 2000 can be computed in the dividends method according to

$$\bar{R} = \left[(1+\overline{CPI})(1+\overline{g_{P/E}})\left(\frac{1+\overline{g_{RDiv}}}{1+\overline{g_{PO}}}\right)-1\right] + \overline{Inc}+\overline{Rinv}$$

$$10.70\% = \left[(1+3.08\%)\times(1+1.25\%)\times\left(\frac{1+1.23\%}{1-0.51\%}\right)-1\right] + 4.28\%+0.20\%.$$

The decomposition of equity return according to the dividends method is given in the fourth column of Figure 1.

Method 5. Return on Book Equity. Earnings can be broken into the book value of equity, *BV*, and return on the book value of equity, *ROE*:

$$EPS_t = BV_t(ROE_t). \tag{10}$$

The growth rate of earnings can be calculated from the combined growth rates of real book value, g_{RBV}, and of *ROE*:

$$1+g_{REPS,t} = (1+g_{RBV,t})(1+g_{ROE,t}). \tag{11}$$

Figure 3. Income Return (Dividend Yield), 1926–2000

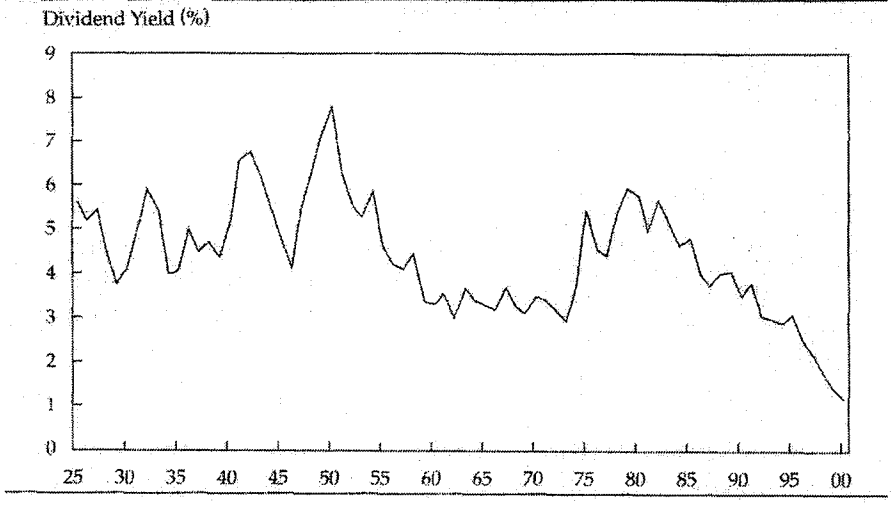
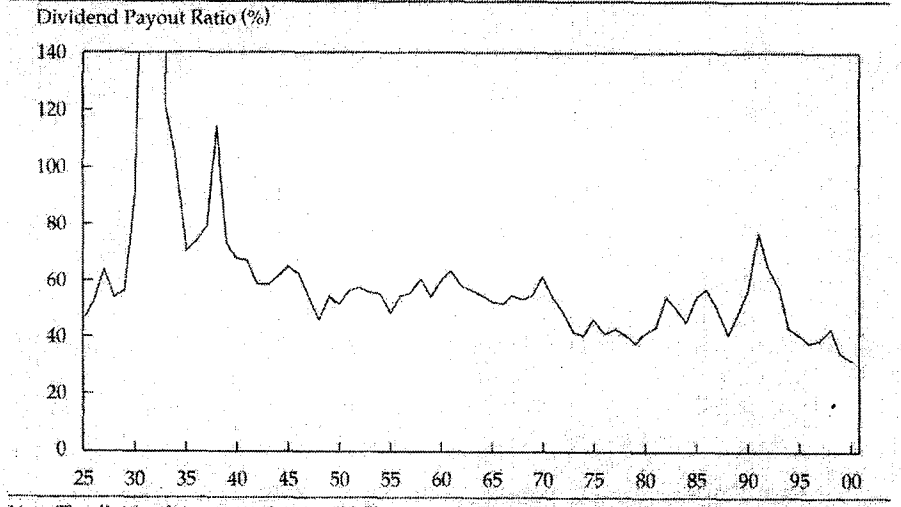


Figure 4. Dividend-Payout Ratio, Year-End 1926–2000



Note: The dividend-payout ratio was 190.52 percent in December 1931 and 929.12 percent in December 1932.

In this method, *BV* growth and *ROE* growth are substituted for earnings growth in the equity return decomposition, as shown in the fifth column of Figure 1. Then, equity's total return in period t can be computed by

$$R_t = [(1 + CPI_t)(1 + g_{P/E,t})(1 + g_{RBV,t})(1 + g_{ROE,t}) - 1] + Inc_t + Rinv_t. \quad (12)$$

We estimated that the average growth rate of the book value after inflation was 1.46 percent for 1926–2000.[11] The average *ROE* growth a year during the same time period was calculated to be 0.31 percent:

$$\bar{R} = [(1 + \overline{CPI})(1 + \overline{g_{P/E}})(1 + \overline{g_{BV}})(1 + \overline{g_{ROE}}) - 1] + \overline{Inc} + \overline{Rinv}$$
$$10.70\% = [(1 + 3.08\%)(1 + 1.25\%)(1 + 1.46\%)(1 + 0.31\%) - 1] + 4.28\% + 0.20\%.$$

Method 6. GDP per Capita. Diermeier et al. proposed a framework to analyze the aggregate supply of financial asset returns. Because we were interested only in the supply model of the equity returns in this study, we developed a slightly different supply model based on the growth of economic productivity. In this method, the market return over the long run is decomposed into (1)

inflation, (2) the real growth rate of overall economic productivity (GDP per capita, $g_{GDP/POP}$), (3) the increase in the equity market relative to overall economic productivity (the increase in the factor share of equities in the overall economy, g_{FS}), and (4) dividend yields.[12] This model is expressed by the following equation:

$$R_t = [(1 + CPI_t)(1 + g_{GDP/POP,t})(1 + g_{FS,t}) - 1] + Inc_t + Rinv_t. \quad (13)$$

Figure 5 shows the growth of the U.S. stock market, GDP per capita, earnings, and dividends initialized to unity ($1.00) at the end of 1925. The level of all four factors dropped significantly in the early 1930s. For the whole period, GDP per capita slightly outgrew earnings and dividends, but all four factors grew at approximately the same rate. In other words, overall economic productivity increased slightly faster than corporate earnings or dividends over the past 75 years. Although GDP per capita outgrew earnings and dividends, the overall stock market price grew faster than GDP per capita. The primary reason is that the market P/E increased 2.54 times during the same time period.

Average equity market return can be calculated according to this model as follows:

$$\bar{R} = [(1 + \overline{CPI})(1 + \overline{g_{GDP/POP}})(1 + \overline{g_{FS}}) - 1] + \overline{Inc} + \overline{Rinv}$$

$$10.70\% = [(1 + 3.08\%)(1 + 2.04\%)(1 + 0.96\%) - 1] + 4.28\% + 0.20\%.$$

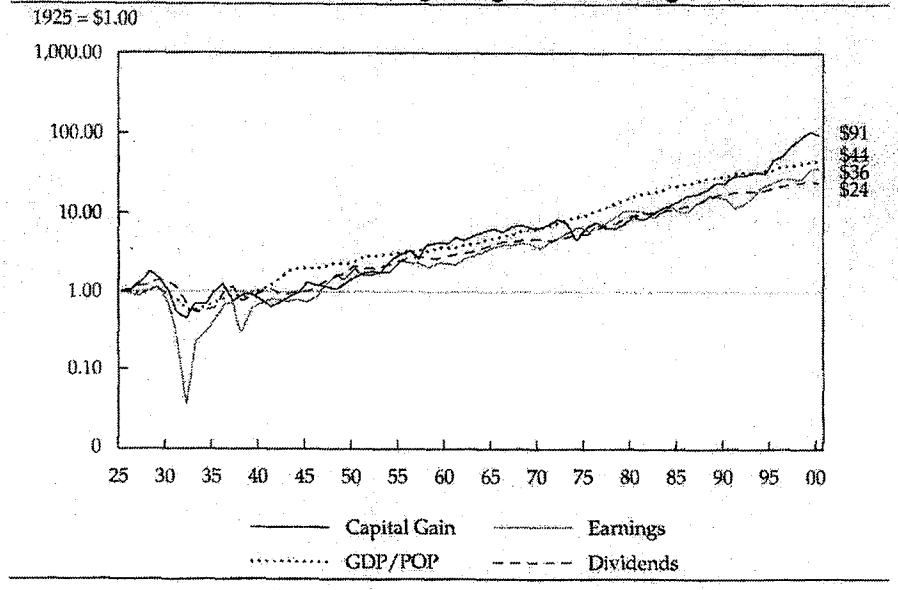
We calculated the average annual increase in the factor share of the equity market relative to the overall economy to be 0.96 percent. The increase in this factor share is less than the annual increase of the P/E (1.25 percent) over the same time period. This finding suggests that the increase in the equity market share relative to the overall economy can be fully attributed to the increase in its P/E.

The decomposition of historical equity returns by the GDP per capita model is given in the last column of Figure 1.

Summary of Equity Returns and Components. The decomposition of the six models into their components can be compared by looking at Figure 1. The differences among the five models arise from the different components that represent the capital gain portion of the equity returns.

This analysis produced several important findings. First, as Figure 5 shows, the growth in corporate earnings has been in line with the growth of overall economic productivity. Second, P/E increases accounted for only 1.25 pps of the 10.70 percent total equity return. Most of the return has been attributable to dividend payments and nominal earnings growth (including inflation and real earnings growth). Third, the increase in the relative factor share of equity can be fully attributed to the increase in P/E. Overall, economic productivity outgrew both corporate earnings and dividends from 1926 through 2000. Fourth, despite the record earnings growth in the 1990s, the dividend yield and the payout ratio declined sharply, which renders dividends alone a poor measure for corporate profitability and future earnings growth.

Figure 5. Growth of $1 from the Beginning of 1926 through 2000



Long-Term Forecast of Equity Returns

Supply-side models can be used to forecast the long-term expected equity return. The supply of stock market returns is generated by the productivity of the corporations in the real economy. Over the long run, the equity return should be close to the long-run supply estimate. In other words, investors should not expect a much higher or a much lower return than that produced by the companies in the real economy. Therefore, we believe investors' expectations for long-term equity performance should be based on the supply of equity returns produced by corporations.

The supply of equity returns consists of two main components—current returns in the form of dividends and long-term productivity growth in the form of capital gains. In this section, we focus on two of the supply-side models—the earnings model and the dividends model (Methods 3 and 4).[13] We studied the components of these two models by identifying which components are tied to the supply of equity returns and which components are not. Then, we estimated the long-term, sustainable return based on historical information about these supply components.

Model 3F. Forward-Looking Earnings. According to the earnings model (Equation 6), the historical equity return can be broken into four components—the income return, inflation, the growth in real EPS, and the growth in P/E. Only the first three of these components are historically supplied by companies. The growth in P/E reflects investors' changing predictions of future earnings growth. Although we forecasted that the past supply of corporate growth will continue, we did not forecast any change in investor predictions. Thus, the supply side of equity return, *SR*, includes only inflation, the growth in real EPS, and income return:[14]

$$SR_t = [(1 + CPI_t)(1 + g_{REPS,t}) - 1] + Inc_t + Rinv_t. \quad (14)$$

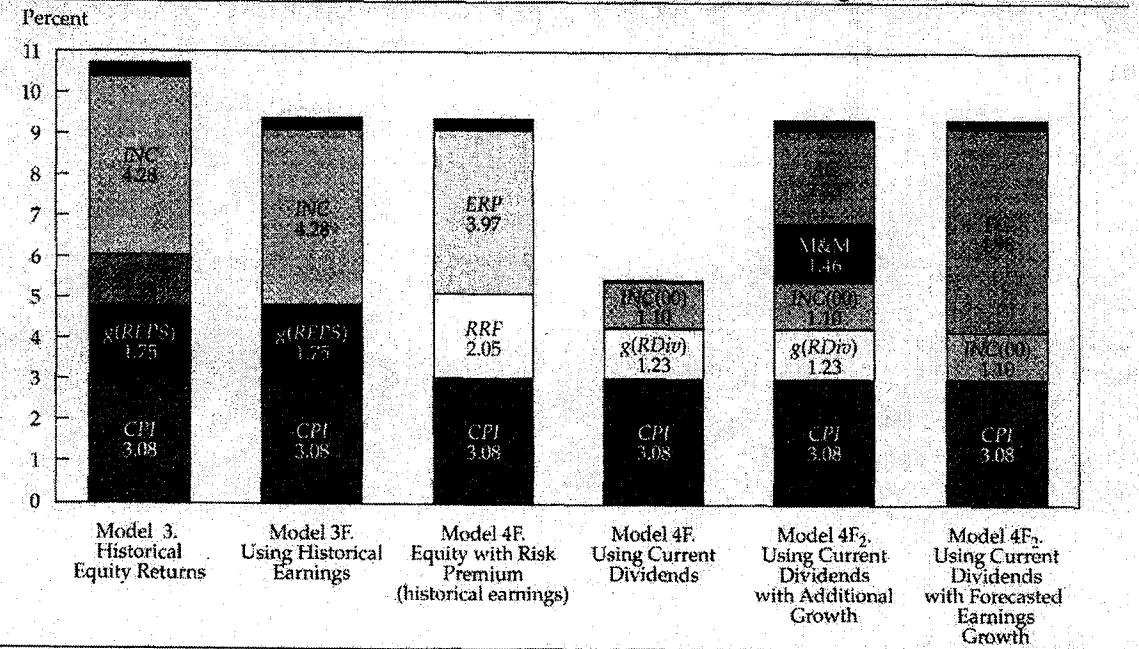
The long-term supply of U.S. equity returns based on the earnings model is 9.37 percent, calculated as follows:

$$\overline{SR} = [(1 + \overline{CPI})(1 + \overline{g_{REPS}}) - 1] + \overline{Inc} + \overline{Rinv}$$

$$9.37\% = [(1 + 3.08\%)(1 + 1.75\%) - 1] + 4.28\% + 0.20\%.$$

The decomposition according to Model 3F is compared with that of Method 3 (based on historical data plus the estimated equity risk premium) in the first two columns of **Figure 6**.

Figure 6. Historical vs. Current Dividend-Yield Forecasts Based on Earnings and Dividends Models



Notes: *Inc*(00) is the dividend yield in year 2000. *FG* is the real earnings growth rate, forecasted to be 4.98 percent. Model 4F$_2$ corrects Model 4F as follows: add 1.46 pps for M&M consistency and add 2.24 pps for the additional growth, *AG*, implied by the high current market P/E.

The supply-side equity risk premium, *ERP*, based on the earnings model is calculated to be 3.97 pps:

$$\overline{ERP} = \frac{(1+\overline{SR})}{(1+\overline{CPI})(1+\overline{RRf})} - 1$$
$$= \frac{1+9.37\%}{(1+3.08\%)(1+2.05\%)} - 1$$
$$= 3.97\%.$$

The *ERP* is taken into account in the third column of Figure 6.

Model 4F. Forward-Looking Dividends. The forward-looking dividends model is also referred to as the constant-dividend-growth model (or the Gordon model). In it, the expected equity return equals the dividend yield plus the expected dividend growth rate. The supply of the equity return in the Gordon model includes inflation, the growth in real dividends, and dividend yield.

As is commonly done with the constant-dividend-growth model, we used the current dividend yield of 1.10 percent instead of the historical dividend yield of 4.28 percent. This decision reduced the estimate of the supply of equity returns to 5.44 percent:

$$\overline{SR} = [(1+\overline{CPI})(1+\overline{g_{RDiv}})-1] + Inc(00) + \overline{Rinv}$$
$$5.54\% = [(1+3.08\%)(1+1.23\%)-1] + 1.10\% + 0.20\%,$$

where *Inc*(00) is the dividend yield in year 2000. The equity risk premium was estimated to be 0.24 pps:

$$\overline{ERP} = \frac{(1+\overline{SR})}{(1+\overline{CPI})(1+\overline{RRf})} - 1$$
$$= \frac{1+5.54\%}{(1+3.08\%)+(1+2.05\%)} - 1$$
$$= 0.24\%.$$

Figure 6 allows a comparison of forecasted equity returns including the equity risk premium estimates based on the earnings model and the dividends model. In the next section, we show why we disagree with the dividends model and prefer to use the earnings model to estimate the supply-side equity risk premium.

Differences between the Earnings Model and the Dividends Model. The earnings model (3F) and the dividends model (4F) differ in essentially two ways. The differences relate to the low current payout ratio and the high current P/E. These two differences are reconciled in what we will call Model $4F_2$ shown in the two right-hand columns of Figure 6. First, to reflect growth in productivity, the earnings model uses historical earnings growth whereas the dividend model uses historical dividend growth. Historical dividend growth underestimates historical earnings growth, however, because of the decrease in the payout ratio. Overall, the dividend growth underestimated the increase in earnings productivity by 0.51 pps a year for 1926–2000. Today's low dividend yield also reflects the current payout ratio, which is at a historical low of 31.8 percent (compared with the historical average of 59.2 percent). Applying such a low rate to the future would mean that even more earnings would be retained in the future than in the historical period studied. But had more earnings been retained, the historical earnings growth would have been 0.95 pps a year higher, so (assuming the historical average dividend-payout ratio) the current yield of 1.10 percent would need to be adjusted upward by 0.95 pps.

By using the current dividend-payout ratio in the dividend model, Model 4F creates two errors, both of which violate Miller and Modigliani theory. A company's dividend-payout ratio affects only the form in which shareholders receive their returns (i.e., dividends versus capital gains), not their total returns. The *current* low dividend-payout ratio should not affect our forecast. Companies today probably have such low payout ratios to reduce the tax burden on their investors. Instead of paying dividends, many companies reinvest earnings, buy back shares, or use the cash to purchase other companies.[15] Therefore, the dividend growth model has to be upwardly adjusted by 1.46 pps (0.51 pp plus 0.95 pp) so as not to violate M&M theory.

The second difference between Model 3F and Model 4F is related to the fact that the current P/E (25.96) is much higher than the historical average (13.76). The current yield (1.10 percent) is at a historic low—because of the previously mentioned low payout ratio and because of the high P/E. Even assuming the historical average payout ratio, the current dividend yield would be much lower than its historical average (2.05 percent versus 4.28 percent). This difference is geometrically estimated to be 2.28 pps a year. In Figure 6, the additional growth, *AG*, accounts for 2.28 pps of the return; in the last column, the forecasted real earnings growth rate, *FG*, accounts for 4.98 pps. The high P/E could be caused by (1) mispricing, (2) a low required rate of return, and/or (3) a high expected future earnings growth rate. Mispricing as a cause is eliminated by our assumption of market efficiency, and a low required rate of return is eliminated by our assumption of a constant equity risk premium through the past and future periods that we are trying to estimate. Thus, we interpret the high P/E as the market expectation of higher earnings growth and the following equation is the model for

Model $4F_2$, which reconciles the differences between the earnings model and the dividends model:[16]

$$\overline{SR} = [(1+\overline{CPI})(1+\overline{g_{RDiv}})(1-\overline{g_{PO}})-1] + Inc(00) + AY + AG + \overline{Rinv}$$

$$9.67\% = [(1+3.08\%)(1+1.23\%)(1+0.51\%)-1] + 1.10\% + 0.95\% + 2.28\% + 0.20\%.$$

To summarize, the earnings model and the dividends model have three differences. The first two differences relate to the dividend-payout ratio and are direct violations of M&M. The third difference results from the expectation of higher-than-average earnings growth, which is predicted by the high current P/E. Reconciling these differences reconciles the earnings and dividends models.

Geometric vs. Arithmetic. The estimated equity return (9.37 percent) and equity risk premium (3.97 pps) are geometric averages. The arithmetic average, however, is often used in portfolio optimization. One way to convert the geometric average into an arithmetic average is to assume the returns are independently lognormally distributed over time. Then, the arithmetic average, R_A, and geometric average, R_G, have roughly the following relationship:

$$R_A = R_G + \frac{\sigma^2}{2}, \quad (15)$$

where σ^2 is the variance.

The standard deviation of equity returns is 19.67 percent. Because almost all the variation in equity returns is from the equity risk premium, rather than the risk-free rate, we need to add 1.93 pps to the geometric estimate of the equity risk premium to convert the returns into arithmetic form, so $R_A = R_G + 1.93$ pps. The arithmetic average equity risk premium then becomes 5.90 pps for the earnings model.

To summarize, the long-term supply of equity return is estimated to be 9.37 percent (6.09 percent after inflation), conditional on the historical average risk-free rate. The supply-side equity risk premium is estimated to be 3.97 pps geometrically and 5.90 pps arithmetically.[17]

Conclusions

We adopted a supply-side approach to estimate the forward-looking, long-term, sustainable equity return and equity risk premium. We analyzed historical equity returns by decomposing returns into factors commonly used to describe the aggregate equity market and overall economic productivity—inflation, earnings, dividends, P/E, the dividend-payout ratio, BV, ROE, and GDP per capita. We examined each factor and its relationship to the long-term supply-side framework. We used historical information in our supply-side models to forecast the equity risk premium. A complete tabulation of all the numbers from all models and methods is presented in Appendix A.

Contrary to several recent studies on the equity risk premium declaring the forward-looking premium to be close to zero or negative, we found

Appendix A. Summary Tabulations for Forecasted Equity Return

Method/Model	Sum	Inflation	Real Risk-Free Rate	Equity Risk Premium	Real Capital Gain	g(Real EPS)	g(Real Div)	−g(Payout Ratio)
A. Historical								
Method 1	10.70	3.08	2.05	5.24				
Method 2	10.70	3.08			3.02			
Method 3	10.70	3.08				1.75		
Method 4	10.70	3.08					1.23	0.51
Method 5	10.70	3.08						
Method 6	10.70	3.08						
B. Forecast with historical dividend yield								
Model 3F	9.37	3.08				1.75		
Model 3F (*ERP*)	9.37	3.08	2.05	3.97				
C. Forecast with current dividend yield								
Model 4F	5.44	3.08					1.23	
Model 4F (*ERP*)	5.44	3.08	2.05	0.24				
Model $4F_2$	9.37	3.08					1.23	0.51
Model $4F_2$ (*FG*)	9.37	3.08						

[a]2000 dividend yield.
[b]Assuming the historical average dividend-payout ratio, the 2000 dividend yield is adjusted up 0.95 pps.

the long-term supply of the equity risk premium to be only slightly lower than the straight historical estimate. We estimated the equity risk premium to be 3.97 pps in geometric terms and 5.90 pps on an arithmetic basis. These estimates are about 1.25 pps lower than the historical estimates. The differences between our estimates and the ones provided by several other recent studies result principally from the inappropriate assumptions those authors used, which violate the M&M theorem. Also, our models interpret the current high P/E as the market forecasting high future growth rather than a low discount rate or an overvaluation. Our estimate is in line with both the historical supply measures of public corporations (i.e., earnings) and overall economic productivity (GDP per capita).

The implication of an estimated equity risk premium being far closer to the historical premium than zero or negative is that stocks are expected to outperform bonds over the long run. For long-term investors, such as pension funds and individuals saving for retirement, stocks should continue to be a favored asset class in a diversified portfolio. Because our estimate of the equity risk premium is lower than historical performance, however, some investors should lower their equity allocations and/or increase their savings rate to meet future liabilities.

Notes

1. In our study, we defined the equity risk premium as the difference between the long-run expected return on stocks and the long-term risk-free (U.S. Treasury) yield. [Some other studies, including Ibbotson and Sinquefield (1976a, 1976b) used short-term U.S. T-bills as the risk-free rate.] We did all of our analysis in geometric form, then converted to arithmetic data at the end, so the estimate is expressed in both arithmetic and geometric forms.
2. See also Mehra (2003).
3. Comparing estimates from one study with another is sometimes difficult because of changing points of reference. The equity risk premium estimate can be significantly different simply because the authors used arithmetic versus geometric returns, a long-term risk-free rate versus a short-term risk-free rate, bond income return (yield) versus bond total return, or long-term strategic forecasting versus short-term market-timing estimates. We provide a detailed discussion of arithmetic versus geometric returns in the section "The Long-Term Forecast."
4. Welch's survey reported a 7 pp equity risk premium measured as the arithmetic difference between equity and T-bill returns. To make an apples-to-apples comparison, we converted the 7 pp number into a geometric equity risk premium relative to the long-term U.S. government bond income return, which produced an estimate of almost 4 pps.
5. For further discussion of approaches to estimating the equity risk premium, see the presentations and discussions at www.aimrpubs.org/ap/home.html from AIMR's *Equity Risk Premium Forum*.
6. Each per share quantity is per share of the S&P 500 portfolio. Hereafter, we will merely refer to each factor without always mentioning "per share"—for example, "dividends" instead of "dividends per share."
7. Many theoretical models suggest that the equity risk premium is dynamic over time. Recent empirical studies (e.g., Goyal and Welch 2001; Ang and Bekaert 2001) found no evidence, however, of long-horizon return predictability by using either earnings or dividend yields. Therefore, instead

g(*BV*)	*g*(*ROE*)	*g*(*P/E*)	*g*(Real GDP/ *POP*)	*g*(*FS-GDP/POP*)	Income Return	Reinvestment + Interaction	Additional Growth	Forecasted Earnings Growth
						0.33		
					4.28	0.32		
		1.25			4.28	0.34		
		1.25			4.28	0.35		
1.25	0.31	1.25			4.28	0.31		
			2.04	0.96	4.28	0.32		
					4.28	0.26		
						0.27		
					1.10[a]	0.03		
						0.07		
					2.05[b]	0.21	2.28	
					1.10[a]	0.21		4.98

of trying to build a model for a dynamic equity risk premium, we assumed that the long-term equity risk premium is constant. This assumption provided a benchmark for analysis and discussion.

8. We updated the series with data from Standard and Poor's to include the year 2000.
9. Appendix A summarizes all the tabulations we discuss.
10. The average P/E was calculated by reversing the average earnings-to-price ratio for 1926–2000.
11. Book values were calculated from the book-to-market ratios reported in Vuolenteenaho (2000). The aggregate book-to-market ratio was 2.0 in 1928 and 4.1 in 1999. We used the growth rate in book value calculated for 1928–1999 as the proxy for the growth rate for 1926–2000. The average ROE growth rate was calculated from the derived book value and the earnings data.
12. Instead of assuming a constant equity factor share, we examined the historical growth rate of the equity factor share relative to the overall growth of the economy.
13. We did not use Methods 1, 2, and 5 in forecasting because the forecasts of Methods 1 and 2 would be identical to the historical estimate reported in the previous section and because the forecast of Method 5 would require more complete BV and ROE data than we currently have available. We did use Method 6 to forecast future stock returns but found the results to be very similar to those for the earnings model; therefore, we do not report the results here.
14. This model uses historical income return as an input for reasons that are discussed in the section "Differences between the Earnings Model and the Dividends Model."
15. The current tax code provides incentives for companies to distribute cash through share repurchases rather than through dividends. Green and Hollifield (2001) found that the tax savings through repurchases are on the order of 40–50 percent of the taxes that investors would have paid if dividends were distributed.
16. Contrary to efficient market models, Shiller (2000) and Campbell and Shiller argued that the P/E appears to forecast future stock price change.
17. We could also use the GDP per capita model to estimate the long-term equity risk premium. This model implies long-run stock returns should be in line with the productivity of the overall economy. The equity risk premium estimated by using the GDP per capita model would be slightly higher than the *ERP* estimate from the earnings model because GDP per capita grew slightly faster than corporate earnings in the study period. A similar approach can be found in Diermeier et al., who proposed using the growth rate of the overall economy as a proxy for the growth rate in aggregate wealth in the long run.

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Estimating the Real Rate of Return on Stocks Over the Long Term

Papers by

John Y. Campbell
Peter A. Diamond
John B. Shoven

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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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

[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,

[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.

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[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.

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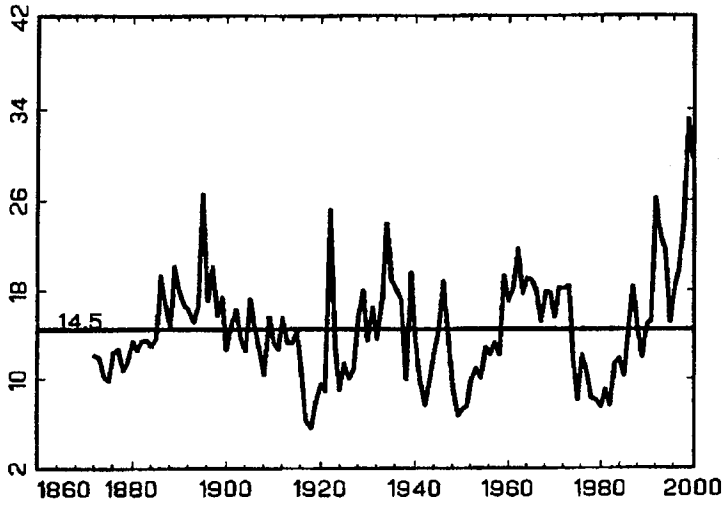
[5] Campbell and Cochrane (1999) present a model in which investors judge their well-being by their consumption relative to a recent average of past aggregate consumption. In this model investors are more risk-tolerant when consumption grows rapidly and they have a "cushion of comfort" relative to their 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.

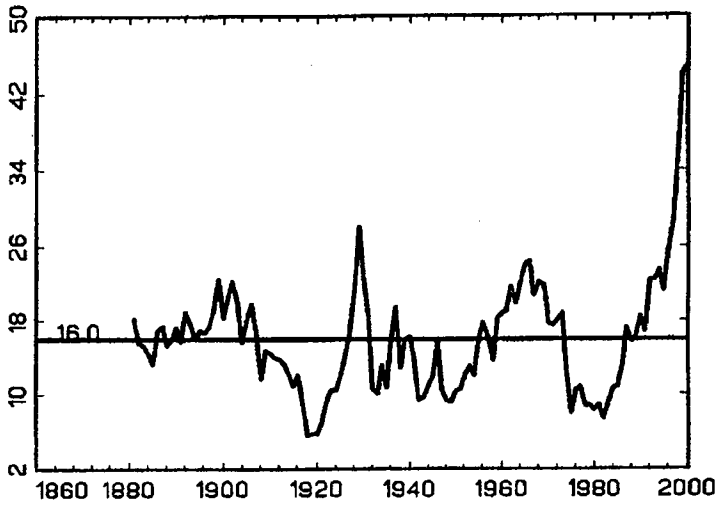
[6] This compromise view also implies that negative serial correlation, or mean-reversion, is likely to remain a characteristic of stock returns in the 21st Century.

Figure 4. S&P Composite Stock Data, January Values 1872-1997

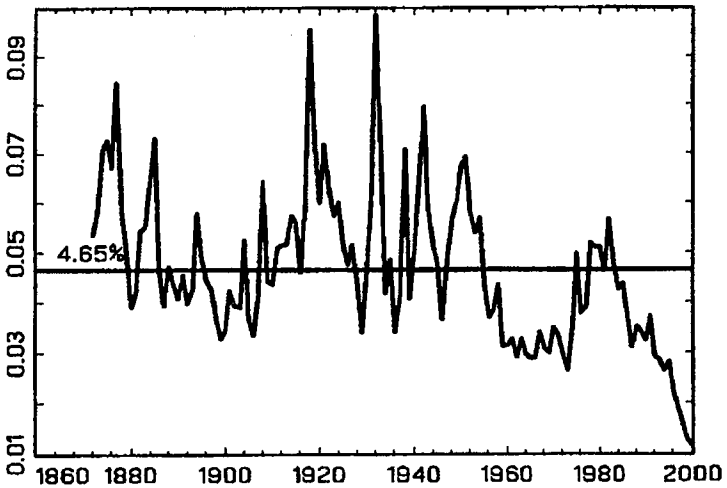
P/E



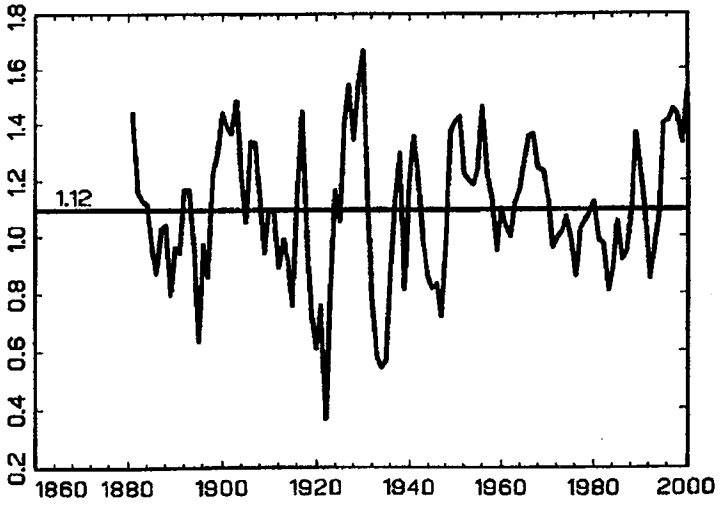
P/10-year MA(E)



D/P



E/10-year MA(E)



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What Stock Market Returns to Expect for the Future: An Update

Peter A. Diamond, Professor of Economics
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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

Social Security Bulletin • Vol. 63 • No. 2 • 2000

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.

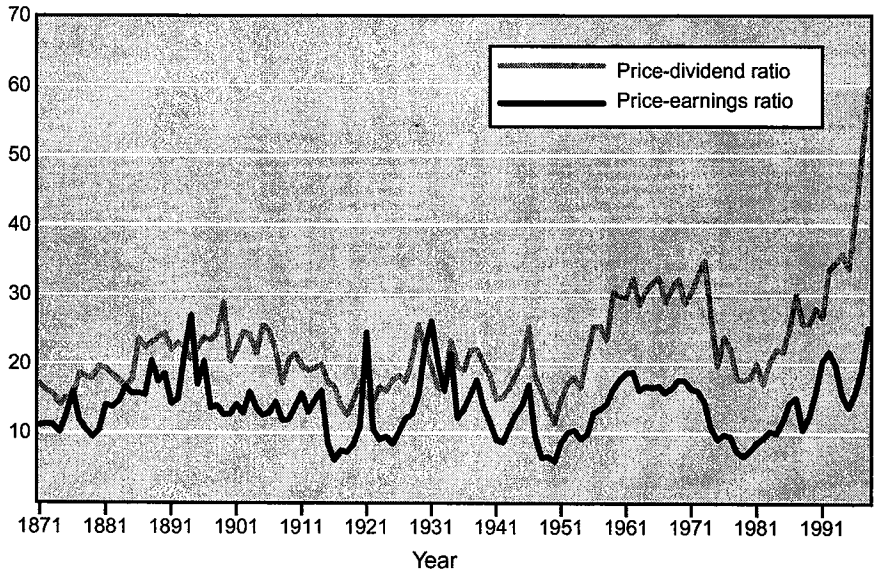
On balance, the continued growth and development of mutual funds and the broader participation in the stock market should contribute to a drop in future equity premiums relative to the historical premium, but the drop is limited.[26] Other factors, such as investors' time horizons and understanding, 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).

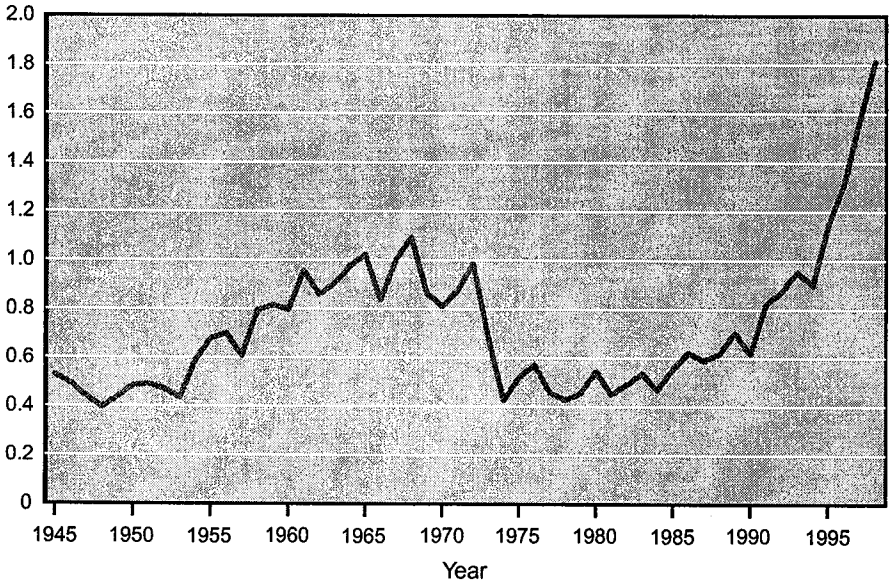
The inconsistency of current share prices and 7.0 percent real returns, given OCACT's assumptions for GDP growth, can be illustrated in two ways. The first way is to project the ratio of the stock market's value to GDP, starting with today's values and given assumptions about the future. The second way 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."

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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:

$$P(t) = P(0)\{(r-g-a)e^{rt} + ae^{gt}\}/(r-g)$$
$$= P(0)\{e^{rt} - (a/(r-g))(e^{rt} - e^{gt})\}$$

Taking the ratio of prices to GDP, we have:

$$P(t)/Y(t) = \{P(0)/Y(0)\}\{(r-g-a)e^{(r-g)t} + a\}/(r-g)$$
$$= \{P(0)/Y(0)\}\{(e^{(r-g)t} - (a/(r-g))(e^{(r-g)t} - 1)\}$$

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 V is the intrinsic value of the equity, D is the cash dividends, k is capital asset pricing model required rate of return for equity of this risk class, and g is the growth rate of dividends.

The modernized Gordon model can be represented as

$$k = \theta \frac{E}{P} + (1 - \theta)\rho$$

where k is the expected real return to equity, θ is the fraction of earnings paid out to shareholders via dividends or share repurchases, E is earnings per share, 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.

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[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

$$\theta\frac{E}{P} = \frac{D}{P} + \frac{S}{P} \text{ and } (1-\theta)\rho = g$$

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.

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[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.

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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.

Peter A. Diamond

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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Chapter 2

Evaluating the Historical Record

Primitive peoples, with no knowledge of modern science, express confidence in the proposition that the sun will rise tomorrow. The reason is that the historical record is unambiguous on this point. Ask whether it will rain tomorrow, though, and doubt arises. Because of random variation in weather, the historical record is a good deal more ambiguous. Rain today does not necessarily mean rain tomorrow.

With respect to the equity premium, the confidence that can be placed in the assumption that the future will be like the past depends on two related characteristics of the historical data: how accurately the historical premium can be measured and the extent to which the measured premium depends on the choice of the sample period. Before those questions can be addressed, however, there is the issue of how the average returns that go into the premium should be computed in the first place.

Computing the Average Premium: Arithmetic versus Geometric

The historical equity risk premium equals the difference between the average return on equities and the average return on treasury

securities calculated over a specified time period. It can be seen in Table 1.2, for instance, that over the full sample period between 1926 and 1997, the average return on stocks was 13.0% and the average return on treasury bills was 3.8%, so the equity risk premium over bills was 9.2%. Those are arithmetic averages. They are computed in the standard way: Add up all the annual returns and divide by the numbers of years (in this case, 72).

Although it is familiar, the arithmetic average has a peculiar property. As an illustration, suppose that an investor earns returns of 10%, 20%, –25%, and 15% in 4 consecutive years. The arithmetic average of the four returns is 5%. Now consider an investor who starts with $100. If he or she earns 10%, 20%, –25%, and 15% in each of 4 years, his or her ending wealth will be $113.85. However, if that investor earns 5% per year for 4 years, he or she will end up with $121.55. This is a general problem. Investors who earn the arithmetic average of a series of returns wind up with more money than investors who earn the series of returns that are being averaged.

The geometric average solves this problem. By definition, the geometric average is the constant return an investor must earn every year to arrive at the same final value that would be produced by a series of variable returns. The geometric average is calculated using the formula

$$\text{Geometric Average} = (\text{Final Value}/\text{Initial Value})^{1/n} - 1$$

where n is the number of periods in the average. When the formula is applied to the preceding example, the results are as follows:

$$\text{Geometric Average} = (113.85/100)^{1/4} - 1 = 3.29\%$$

An investor who earns 3.29% for 4 years will end up with $113.85.

There are four properties of arithmetic and geometric averages that are worth noting:

- The geometric average is always less than or equal to the arithmetic average. For instance, in Table 1.2 the arithmetic average stock return is 13.0%, but the geometric average is only 11.0%. (The geometric averages are reported at the bottom of the path of wealth columns in Table 1.2.)
- The more variable the series of returns, the greater the difference between the arithmetic and geometric average. For example, the returns for common stock are highly variable. As a result, the arithmetic average exceeds the geometric average by 200 basis points. For treasury bonds, whose returns are less variable, the difference between the two averages is only 40 basis points.
- For a given sample period, the geometric average is independent of the length of the observation interval.[1] The arithmetic average, however, tends to rise as the observation interval is shortened. For instance, the arithmetic average of monthly returns for the S&P 500 (calculated on an annualized basis by compounding the monthly arithmetic average) over the period between 1926 and 1997 is 13.1%, compared with the 13.0% average of annual returns.
- The difference between the geometric averages for two series does not equal the geometric average of the difference. Consider, for instance, stock returns and inflation. Table 1.2 reveals that the geometric average stock return is 11.0% and the average inflation rate is 3.1%, for a difference of 7.9%. However, Table 1.3 shows that the geometric average real return on common stock was 7.7%. This discrepancy does not arise for arithmetic averages, where the mean difference always equals the difference of the means.

With respect to the equity risk premium, the manner in which the average is calculated makes a significant difference. When compared with treasury bills over the full 1926-to-1997 period, the arithmetic average risk premium is 9.2%, whereas the geometric average premium is only 7.2%. Which average is the more appropriate choice? That depends on the question being asked. Assuming that the returns being averaged are largely independent and that the future is like the past, the best estimate of expected returns over a given future holding period is the arithmetic average of past returns over the same holding period. For instance, if the goal is to estimate future stock-market returns on a year-by-year basis, the appropriate average is the annual arithmetic risk premium. On the other hand, if the goal is to estimate what the average equity risk premium will be over the next 50 years, the geometric average is a better choice. Because the ultimate goal in this book is to arrive at reasonable forward-looking estimates of the equity risk premium, both arithmetic and geometric averages are employed where they are useful.

It is worth reiterating that projection of any past average is based on the implicit assumption that the future will be like the past. If the assumption is not reasonable, both the arithmetic and geometric averages will tend to be misleading.

[1] This follows immediately from the fact that the geometric average depends only on the initial and final values of the investment.

How Accurately Can the Historical Risk Premium Be Measured?

The accuracy with which the historical risk premium can be measured depends on the variability of the observations from which the average is calculated. In an assessment of the impact of that variability, the best place to start is with an expanded version of Table 1.2 that includes monthly returns for the four asset classes over the period between 1926 and 1997. Given this expanded data set, one way to assess the variability of the ex-post risk premium, defined as the difference between the observed returns for stocks and the related treasury securities, is to plot one histogram for stocks versus bonds and another for stocks versus bills. Each bar on the histogram represents the fraction of the 864 monthly

The Debate over Future Stock Market Returns

The impressive performance of the stock market over the last two decades and the resultant increase in investor expectations have spurred numerous articles that call attention to the historical market return and caution investors about their overly optimistic expectations. The articles point to the recent stock market performance which was well below its historical average, while the bond market, on the contrary, has performed quite well. In fact, many studies are predicting stock returns that are much lower when compared to the historical average. A few even predict that stocks won't outperform bonds in the future.

Approaches to Calculating the Equity Risk Premium

The expected return on stocks over bonds, the equity risk premium, has been estimated by a number of authors who have utilized a variety of different approaches. Such studies can be categorized into four groups based on the approaches they have taken. The first group of studies derive the equity risk premium from historical returns between stocks and bonds. Supply side models, using fundamental information such as earnings, dividends, or overall productivity, are used by the second group to measure the expected equity risk premium. A third group adopts demand side models that derive the expected returns of equities through the payoff demanded by equity investors for bearing the additional risk. The opinions of financial professionals through broad surveys are relied upon by the fourth and final group.

This section is based upon the work by Roger G. Ibbotson and Peng Chen, who combined the first and second approaches to arrive at their forecast of the equity risk premium.[11] By proposing a new supply side methodology, the Ibbotson-Chen study challenges current arguments that future returns on stocks over bonds will be negative or close to zero. The results affirm the relationship between the stock market and the overall economy.

Supply Model

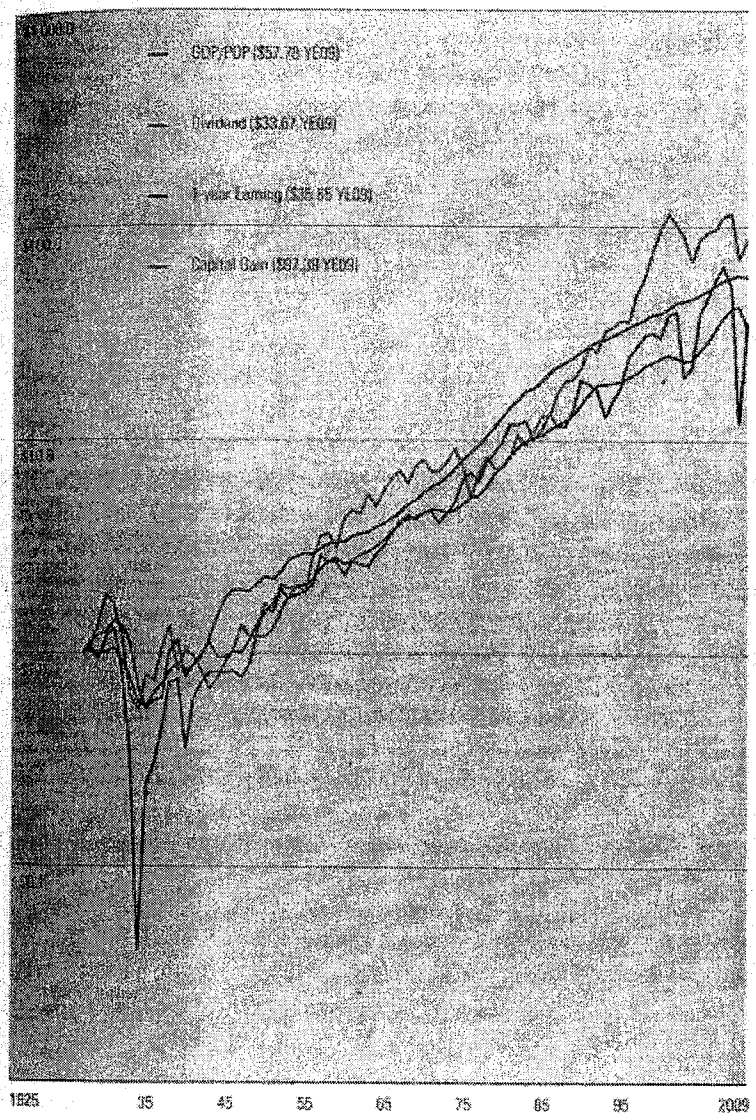
Long-term expected equity returns can be forecasted by the use of supply side models. The supply of stock market returns is generated by the productivity of the corporations in the real economy. Investors should not expect a much higher or lower return than that produced by the companies in the real economy. Thus, over the long run, equity return should be close to the long-run supply estimate.

Earnings, dividends, and capital gains are supplied by corporate productivity. Graph 10-8 illustrates that earnings and dividends have historically grown in tandem with the overall economy (GDP per capita). However, GDP per capita did not outpace the stock market. This is primarily because the P/E ratio increased 2.45 times during the same period. So, assuming that the economy will continue to grow, all three should continue to grow as well.

Forward-Looking Earnings Model

Roger G. Ibbotson and Peng Chen forecast the equity risk premium through a supply side model using historical data. They utilized an earnings model as the basis for their suppy side estimate. The earnings model breaks the historical equity return into four pieces, with only three historically being supplied by companies: inflation, income return, and growth in real earnings per share. The growth in the P/E ratio, the fourth piece, is a reflection of investors' changing prediction of future earnings growth. The past supply of corporate growth is forecasted to continue; however, a change in investors' predictions is not. P/E rose dramatically from 1980 through 2001 because people believed that corporate earnings were going to grow faster in the future. This growth in P/E drove a small portion of the rise in equity returns over the same period.

Graph 10-8: Capital Gains, GDP Per Capita, Earnings, and Dividends
Index (Year-End 1925 = $1.00

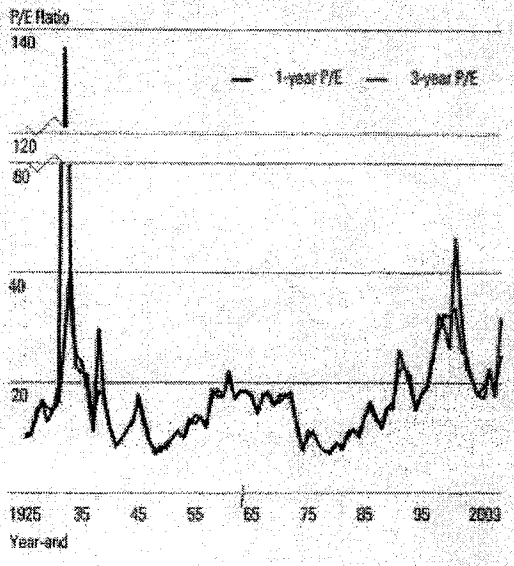


Data from 1925–2009

Graph 10-9 illustrates the price to earnings ratio from 1926 to 2009. The P/E ratio, using one-year average earnings, was 10.22 at the beginning of 1926 and ended the year 2009 at 25.06, an average increase of 1.07 percent per year. The highest P/E was 136.55 recorded in 1932, while the lowest was 7.07 recorded in 1948. Ibbotson Associates revised the calculation of the P/E ratio from a one-year to a three-year average earnings for use in equity forecasting.

This is because reported earnings are affected not only by the long-term productivity, but also by "one-time" items that do not necessarily have the same consistent impact year after year. The three-year average is more reflective of the long-term trend than the year-by-year numbers. The P/E ratio calculated using the three-year average of earnings had an increase of 1.31 percent per year.

Graph 10-9: Large Company Stocks



The historical P/E growth factor, using three-year earnings, of 1.31 percent per year is subtracted from the equity forecast, because it is not believed that P/E will continue to increase in the future. The market serves as the cue. The current P/E ratio is the market's best guess for the future of corporate earnings and there is no reason to believe, at this time, that the market will change its mind.

Thus, the supply of equity return only includes inflation, the growth in real earnings per share, and income return. The forward-looking earnings model calculates the long-term supply of U.S. equity returns to be 8.44 percent:

$$SR = \left[\left(1+CPI\right)\times\left(1+g_{REPS}\right)-1\right]+Inc+Reinv$$

$$9.00\%^{*} = \left[\left(1+3.01\%\right)\times\left(1+1.58\%\right)-1\right]+4.15\%+0.20\%$$

where:

SR = the supply of the equity return;
CPI = Consumer Price Index (inflation);
g_{REPS} = the growth in real earning per share;
Inc = the income return;
Reinv = the reinvestment return.

The equity risk premium, based on the supply side earnings model, is calculated to be 3.08 percent on a geometric basis:

$$SR = \left[\left(1+CPI\right)\times\left(1+g_{REPS}\right)-1\right]+Inc+Reinv$$

$$9.00\%^{*} = \left[\left(1+3.01\%\right)\times\left(1+1.58\%\right)-1\right]+4.15\%+0.20\%$$

*difference due to rounding

where:

SERP = the supply side equity risk premium;
SR = the supply of the equity return;
CPI = Consumer Price Index (inflation);
RRf = the real risk-free rate.

Converting the geometric average into an arithmetic average results in an equity risk premium of 5.73%:

$$R_A = R_G + \frac{\sigma^2}{2}$$

$$5.18\% = 3.08\% + \frac{20.51\%^2}{2}$$

where:

R_A = the arithmetic average;
R_G = the geometric average;
σ = the standard deviation of equity returns.

Long-Term Market Predictions

The supply side model estimates that stocks will continue to provide significant returns over the long run, averaging around 8.44 percent per year, assuming historical inflation rates. The equity risk premium, based on the supply side earnings model, is calculated to be 3.08 percent on a geometric basis and 5.18 percent on an arithmetic basis.

In the future, Ibbotson and Chen predict increased earnings growth that will offset lower dividend yields. The fact that earnings will grow as dividend payouts shrink is in line with Miller and Modigliani Theory.

The forecasts for the market are in line with both the historical supply measures of public corporations (i.e. earnings) and overall economic productivity (GDP per capita). ■

Endnotes

[1] **Page 114** The standard deviation is the square root of the variance; hence the term "mean-variance" in describing this form of the optimization problem.

[2] **Page 115** Markowitz, Harry M., *Portfolio Selection: Efficient Diversification of Investments*, New York: John Wiley & Sons, 1959.

[3] **Page 115** For more information about Morningstar *EnCorr*® software, refer to the Investment Tools and Resources page at the back of this book, or within the United States, call +1 866 910-0840. Outside the United States, call +44 020 3107-0020.

[4] **Page 115** It is also possible to conduct a simulation using entire data sets, that is, without estimating the statistical parameters of the data sets. Typically, in such a nonparametric simulation, the frequency of an event occurring in the simulated history is equal to the frequency of the event occurring in the actual history used to construct the data set.

[5] **Page 116** The expected capital gain on a par bond is self-evidently zero. For a zero-coupon (or other discount) bond, investors expect the price to rise as the bond ages, but the expected portion of this price increase should not be considered a capital gain. It is a form of income return.

[6] **Page 119** For more information about Morningstar *EnCorr*® software and other Morningstar products, refer to the Investment Tools and Resources page at the back of this book, or within the United States, call +1 866 910-0840. Outside the United States, call +44 020 3107-0020.

[7] **Page 120** See Chapter 11, "Wealth Forecasting with Monte Carlo Simulation" for more information.

[8] **Page 120** See Markowitz and Usmen [2003].

[9] **Page 123** Ranking investment strategies by forecasted GM is sometimes described as applying the Kelly Criterion; an idea promoted by William Poundstone [2005].

[10] **Page 125** Other researchers have also proposed using GM and CVaR as the measures of reward and risk in an efficient frontier. See for example Sheikh and Qiao, [2009].

[11] **Page 126** "Long-Run Stock Returns: Participating in the Real Economy," Roger G. Ibbotson and Peng Chen, Financial Analysts Journal, January/February 2003.