Expected Returns on Stocks and Bonds

Investors must moderate their expectations.

Antti Ilmanen

The equity-bond risk premium—the long-run expected return advantage of stocks over government bonds—is one of the biggest questions in financial markets. The extent of the premium is widely debated, but it is reasonably clear that it declined in the last quarter of the 20th century, to partly rebound in the first years of the 21st century.

Our review provides a road map to the complex literature on the topic. We explain the key drivers of the risk premium and varying assumptions about them, letting investors themselves assess the long-run prospects for stocks versus bonds. Long-term government bond yields are known, while prospective equity returns are inherently less transparent and thus more open to question.

There is an ongoing shift in opinion about expected returns. Long-term equity premiums have traditionally been predicted from historical average asset performance assuming a constant risk premium, but today they are increasingly predicted with the help of dividend discount models, assuming time-varying expected returns.

We first review the historical average returns of major asset classes and explain why these are misleading guides for the future. Essentially, the double-digit returns of the 20th century were due to equities starting cheap and getting richer over time. Many investors extrapolated this past performance and expected (at least) as high future returns. Investors thus missed, first, the fact that a part of realized returns was unexpected windfalls from rising equity valuation multiples, and, second, that when starting from high valuation levels it is not reasonable to

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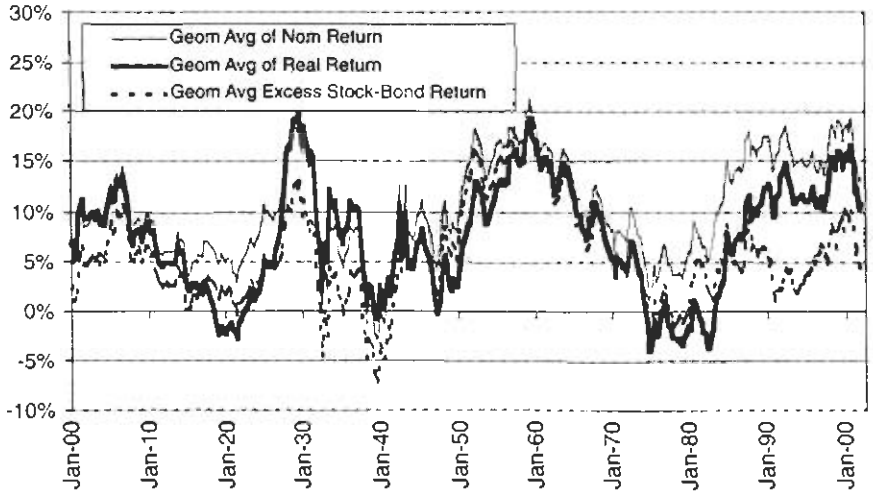
EXHIBIT 1
Road Map to Equity Risk Premiums—Alternative Means for Assessing Levels

	Historical Ex Post Excess Returns	Surveys	Ex Ante Models and Market Data
Means of Assessing the Equity-Bond Risk Premium	Historical average is a popular proxy for the ex ante premium – but likely to be misleading.	Investor and expert surveys can provide direct estimates of prevailing expected returns/premiums.	Current financial market prices (simple valuation ratios or DDM-based measures) can give most objective estimates of feasible ex ante equity-bond risk premiums.
Problems/ Debated Issues	Time-variation in required returns and systematic selection and other biases have boosted valuations over time, and have exaggerated realized excess equity returns compared with ex ante expected premiums.	Limited survey histories and questions of survey representativeness. Surveys may tell more about hoped-for expected returns than about objective required premiums due to irrational biases such as extrapolation.	Assumptions needed for DDM inputs, notably the trend earnings growth rate, make even these models' outputs subjective. Range of views on this growth rate (plus debates on relevant stock and bond yields) => range of premium estimates.

EXHIBIT 2
Moving Average of 10-Year Stock Market Performance 1900–2001



Sources: Ibbotson Associates, Arnott (private correspondence), Shiller website, and Schroder Salomon Smith Barney.

expect as high returns as in the past.

The painful lessons of the recent bear market have made investors more aware of forward-looking expected return measures; the starting price matters. Since market yields give good proxies for the expected returns of long-term bonds, the question of the ex ante equity-bond premium boils down to the ex ante equity return. The dividend discount model (DDM) shows that in the absence of predictable valuation changes (often a good base case), feasible long-run equity return is the sum of dividend yield and a long-run earnings growth rate.[1]

We stress the distinction between two types of expected returns—objectively feasible long-run returns, and subjective return expectations—as well as the balance between them. Objectively high feasible returns are bullish for equities, while excessive subjective investor expectations are bearish, because high hopes make future disappointment more likely.

Neither expected return can be directly observed, but we attempt to estimate them by analyzing historical returns, investor surveys, and market valuation indicators (*see Exhibit 1*). Surveys provide direct estimates of changing return expectations, but they may reflect hoped-for returns as much as required returns.[2]

As of the time of writing in mid-2002, long-term bond yields are 4%–5%, and the DDM suggests feasible long-run equity returns between 5% and 8% (depending on input assumptions). There may still be an imbalance between the objective return prospects and subjective expectations that we put between 8% and 10%. The gap has narrowed significantly from the year 2000 when feasible returns were even lower (due to higher valuation multiples), while subjective return expectations were well into double-digits.[3]

PITFALLS OF BACKWARD-LOOKING RETURNS

The 20th century was the century of equities. Dimson, Marsh, and Staunton [2002] review the 1900–2000

asset returns in 16 countries, and conclude that in all markets stocks handily outperformed bonds and cash. We extend the data to include the 2001 experience, and discuss primarily the U.S. market history.

Even after large losses in the last two years, U.S. equities' average real returns over the 1900–2001 period are 6.5%, with excess return over long-term government bonds of 4.8 percentage points.[4] Looking at just the 1950–1999 period, stocks did even better, outperforming bonds by 7.7 percentage points per year. For comparison, the excess return of equities over bonds was much slimmer (0.5 percentage point) in the 19th century (1802–1899), while the realized average real equity return was similar (6.2%) (see Siegel [1998] and Arnott and Bernstein [2002]).[5]

Exhibit 2 plots the ten-year average compound returns of stocks since 1900—comparing nominal returns, real returns, and excess returns over bonds. In some studies, equity performance is expressed in raw returns, while in others the inflation rate or long-term bond return (or short-term bill return) is subtracted from it. Another distinction is between compound (geometric) average returns and simple (arithmetic) average returns.

Given that the United States has been the world's most successful economy of the past two centuries, it is not surprising that real equity returns have been somewhat lower in most other markets. For example, the average real equity returns for the other G-5 markets over the 1900–2001 period range between 3.4% (Germany) and 5.6% (the United Kingdom). Hyperinflation experiences make excess stock returns versus government bonds harder to gauge.

Did Realized Returns Exaggerate Expected Returns?

A consensus is emerging that the high long-term returns on equities, relative to bonds, are unlikely to persist. The 20th century was favorable to stocks and unfavorable to bonds. Improved valuations boosted ex post equity returns, while rising inflation expectations and real yields hurt bonds. Thus, the realized return gap almost surely exaggerates the expected return gap investors actually required (in the past, let alone after the decline in required returns).

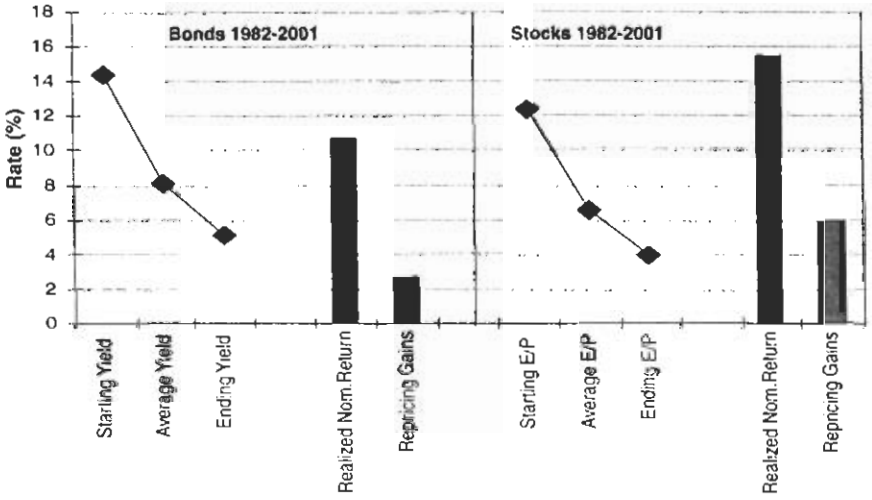
- Various systematic biases make it likely that the publicized realized equity market returns from historical studies exceed the returns that were anticipated—notably survivorship bias, easy data bias, and the so-called peso problem (see Dimson, Marsh, and Staunton [2002] and Fama and French [2002], among others).
- Survivorship bias raises the odds that we examine countries that have had good capital market performance (say, the current G-5 as opposed to Russia, Austria-Hungary, India, Turkey, or Argentina).
- Easy data bias makes it likely that we start samples after unusual events (war, hyperinflation, market closure), which often means that assets are cheap at the start of the period and that no comparable turmoil occurs again during the period.
- The peso problem literature recognizes that past U.S. market pricing was influenced by what could have happened but did not.[6] With hindsight we know that the United States and its market economy survived two world wars, the Cold War, and the Great Depression, and did not suffer the hyperinflation, invasion, or other calamities of many other countries. This was not a forgone conclusion at the time, so it is little wonder that realized equity returns have been boosted by a repricing effect.

Despite these arguments, it is common to use historical excess returns as a proxy for the ex ante risk premium; indeed this is the approach taken in most investment textbooks. Historical average returns equal expected returns, however, only if expected returns are constant, and if unexpected returns from trendwise valuation changes do not distort the within-sample results. Such valuation changes can materially impact average realized returns even over long sample periods—and indeed they have done so in the 20th century. Thus the crucial distinction between realized (ex post) average excess returns and expected (ex ante) risk premiums.

Bond investors understand better than equity investors the folly of extrapolating expected returns from past average returns drawn from a time when valuation levels have trended up or down. A rally—high realized returns—caused by falling discount rates will reduce future yields (feasible expected returns), rather than raise them.

The example in Exhibit 3 shows that between 1982 and 2001 ten-year Treasury yields averaged 8.1%, but the realized annual return was 10.7% because the downtrend in yields (from 14.4% to 5.1%) added almost 3 percentage points of annual capital gains to the yield income. Using the 10.7% realized annual return or even the 8.1% average yield as an expected return proxy makes little sense

EXHIBIT 3
Bond and Stock Market Repricing Gains Due to Falling Discount Rates Between 1982 and 2001



Source: Schroder Salomon Smith Barney.

now that the yield is 5%. The transparency of market yields prevents bondholders from harboring excessive return expectations after a long bull market.

Exhibit 3 shows that the revaluation effect was even greater for equities. The earnings-to-price (E/P) ratio fell from 12.4% to 4.0% in 20 years; that is, the market paid 3.1 times more for a given amount of dollar earnings at the end of 2001 than at the end of 1981. This repricing explains almost 6 percentage points of the S&P 500's 15.5% realized annual return (11.8% real). Again the realized average return clearly exceeds the forward-looking return that was feasible in the 1980s, let alone now. Unfortunately, most equity investors may have focused more on historical returns than on forward-looking returns.

Repricing: Valuation-Neutral Sample or Adjusted Realized Returns

If required returns vary over time, past average returns may be poor predictors of future returns. We try to recover the past average expected returns using two approaches—by selecting a sample period when valuation changes were minimal, and by adjusting realized returns for the estimated repricing impact.

We first focus on a relatively valuation-neutral subperiod—1960-2001. Realized average returns can be dominated by unexpected capital gains/losses even over long sample periods if markets undergo significant valuation changes. Indeed, starting from 1900 or 1950, D/P and E/P ratios have fallen dramatically, while bond yields have risen. These within-sample changes are much smaller between 1960 and 2001, which means that future expected return extrapolations from this subperiod should be less distorted.

The 3.3 percentage point excess return in the United States falls short of the 4.8 percentage points for the 1900-2001 period. During the same period, the excess returns in Germany and Japan (1.1 and 0.0 percentage points) are even slimmer as real equity returns have been lower and real bond returns higher than in the U.S.

These average returns conceal significant time variation in market performance. Besides the equity correction of 2000-2002, these numbers show that equities can underperform long bonds over a period as long as a decade (Germany in the 1970s, Japan in the 1990s). In Japan, the realized excess return over the past 30 years is now negative. Because such a sustained underperformance did not take place in the United States in the last century, many investors took the idea of equities' long-run superiority too far, and believed that equities will always beat bonds over a 20- to 30-year horizon.

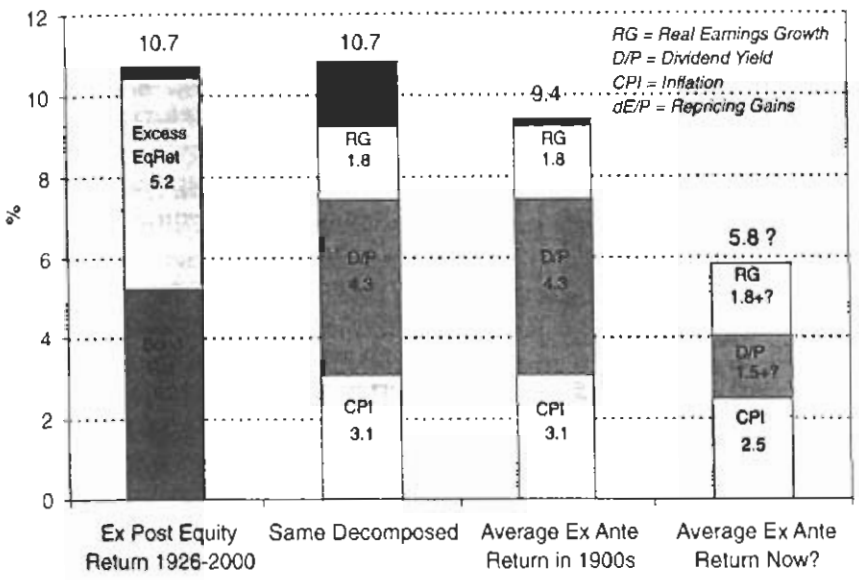
By now it is clear that all statements about the probability of stocks beating bonds were distorted by the favorable sample period, and that the outperformance odds are much slimmer now, given the narrower equity-bond premium.

Alternatively, we can pick any sample period and adjust the returns for unexpected capital gains. Several recent studies take this approach, notably Dimson, Marsh, and Staunton [2002], Fama and French [2002], and Ibbotson and Chen [2002]. Each study uses a slightly different way to remove the impact of unexpected capital gains to recover the typical expected equity risk premium over the sample period. All three studies find (adjusted) expected equity-bond risk premium near 4 percentage points in the United States, averaged over very long histories.

Moving Toward Forward-Looking Expected Returns

Exhibit 4 shows how Ibbotson and Chen [2002] decompose the realized 75-year average compound stock

EXHIBIT 4
Decomposition of 1926–2000 Equity Market Returns



Sources: Ibbotson-Chen [2002], Schroder Salomon Smith Barney.

market return of 10.7% into demanded or supplied parts. The total return is split either into:

- A sum of demanded returns on the assumption that sample averages capture required returns well (5.2% nominal Treasury bond return + 5.2% ex post equity risk premium + small interaction/reinvestment terms), or into:
- A sum of supplied returns (3.1% inflation + 4.3% dividend yield + 1.8% real earnings growth rate + 1.3% repricing effect + small interaction/reinvestment terms).

The third column in Exhibit 4 removes from the supplied returns the unexpected repricing effect (1.3%, the annualized impact of the within-sample change in E/P ratio). The study concludes that investors required a nominal equity market return of 9.4% between 1926 and 2000, on average.

Analysis of *past average* levels can be a misleading guide for the future when current dividend yields and inflation expectations are much lower than the sample average. It misses the point that if expected returns and valuations vary over time, historical averages incorporate limited information about medium-term market prospects. Using strictly the dividend yield and inflation expectations from mid-2002 together with the historical real earnings growth rate, in the spirit of the DDM, the prospective long-term equity market return is below 6%. The implicit equity-bond premium is about 1 percentage point.

The question marks in the last column in Exhibit 4 are related to debates that we review below.

The ongoing shift from constant risk premiums and rational investors to time-varying risk premiums and partly irrational investors means that forward-looking (ex ante) returns are gaining ground over historical (ex post) returns. This change is moderating experts' and investors' perceptions of prospective long-run equity returns and equity-bond premiums, given that the fourth column in Exhibit 4 (ex ante return) is much lower than the first column (ex post return).

Survey Evidence on Subjective Return Expectations

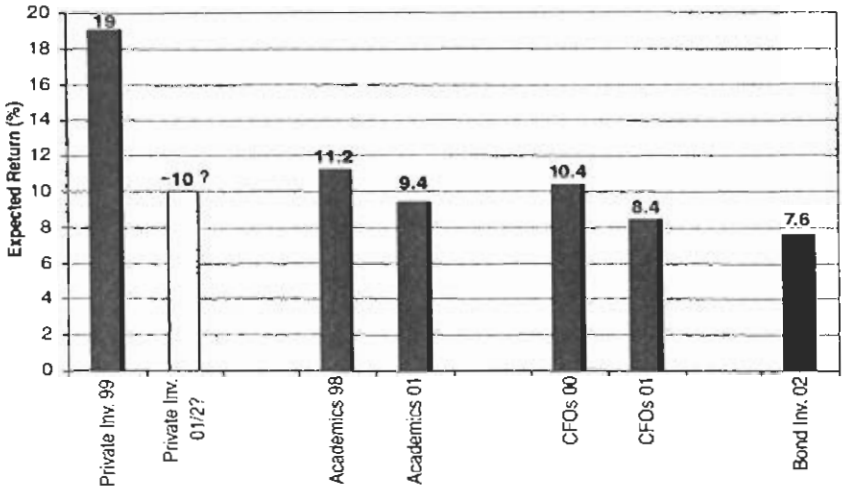
There is a dichotomy between *objectively feasible* return prospects and less rational *subjective* expectations. To provide direct evidence on subjective return expectations, Exhibit 5 summarizes survey views on nominal long-term equity returns from various sources.[7]

Private investors' subjective return expectations were especially high in the late 1990s. Poterba [2001] quotes a broad Gallup poll from 1999 when the consensus of private investors expected 19% annual returns over the long term. Presumably these were deemed moderate expectations after five years of 20%–40% annual returns.

No follow-up surveys tell us how much these excessive expectations have fallen, but we would guess to around 10%. Consensus forecasts in one-year-ahead surveys seem to center around 10% (but dropped in summer 2002 below 8%), while many U.S. pension funds continue to budget well over 10% annual equity returns.

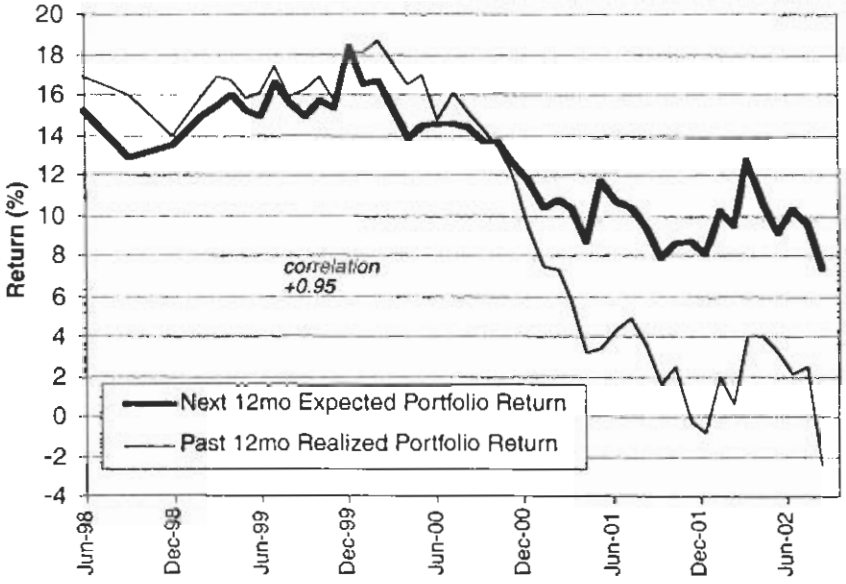
Two surveys of different U.S. experts—finance and economics professors by Welch [2000, 2001] and CFOs and treasurers by Graham and Harvey [2001]—imply long-run equity returns of 8%–9% and stock-bond risk premium estimates of 3.5 to 4.5 percentage points. The equity return forecast in the CFO survey has stabilized at around 8.2% to 8.3% in 2002.

EXHIBIT 5
Survey Forecasts of Long-Term Nominal Expected Returns of U.S. Equities



Sources: Graham and Harvey [2001], Poterba [2001], Welch [2001], and Schroder Salomon Smith Barney.

EXHIBIT 6
Individual Investor Extrapolative Return Expectations—June 1998–August 2002



Sources: Gallup/UBS Paine Webber Survey of Index of Investor Optimism.

Our own survey in April 2002 of global bond investors comes up with the most cautious views on future equity market returns. The mean forecast for next-decade average equity market return is 7.6% for the United States. Compared with bond yields of around 5.2%, these forecasts imply a stock-bond risk premium of 2.4 percentage points.

Are these survey-based risk premium estimates useful proxies for the equity risk premium that the market requires? One can always question how representative any survey is of market views. More important, because of behavioral biases, survey-based expected returns may tell us more about hoped-for returns than about required returns.

Private investor surveys appear especially prone to extrapolation (high hopes after high returns); witness the striking 95% correlation between the past year's returns and next year's expected returns in Exhibit 6. Even the expert surveys are not free from this bias, as consensus views of future risk premiums have edged lower amid poor market performance.[8]

Given the tendency of investors to extrapolate from past returns, the danger of exaggerated expectations and the scope for subsequent disappointment were especially high after two decades of double-digit returns. To quote Dimson, Marsh, and Staunton [2002, p. 4]:

> The most fundamental question of all is: Do investors realize that returns are likely to revert to more normal levels, or do current valuations embody exaggerated expectations based on imperfect understanding of history?

Survey data indicate that investor expectations have corrected lower in the past two years—but it is not possible to say whether the adjustment has gone far enough.

How High Should the Equity-Bond Risk Premium Be?

There is also a normative question about the appropriate size of the equity risk premium, but academic theories provide limited guidance. In the context of the capital asset pricing model, the required market risk premium

should reflect the *price* of risk (market risk aversion) and the *amount* of risk (stock market volatility). Other asset pricing models relate the required risk premium to asset return covariances with consumption; intuitively, the risk premium should be high for assets that perform poorly in bad states of the world when losses hurt most (economic downturns with high marginal utility and low consumption).

Given the low observed correlations between equity returns and consumption data, popular utility functions need extremely high risk aversion coefficients to justify the high observed equity risk premium; see Mehra and Prescott [1985]. Academics have proposed various solutions to this equity premium puzzle—alternative utility functions and market imperfections—but there is little agreement on the topic.

While the academic consensus has been shifting from constant risk premiums to time-varying expected returns, opinions vary about the source of the variation: rational time variation in required risk premiums or irrational fluctuations in market sentiment. We believe that both matter.

Because stock prices can be viewed as discounted values of expected future cash flows, it is an accounting identity that higher stock prices and realized returns reflect higher earnings growth expectations or lower required returns. Both factors likely contributed to the run-up in stock prices in the 1990s. The growth optimism was based on a range of factors from real evidence on higher productivity to irrational hopes about the Internet and the new economy (see Asness [2000a] and Shiller [2000]).

Here we focus on a host of possible reasons for the 1990s fall in required equity returns:

- Declines in riskless Treasury yields that contribute to equity discount rates.
- Changing risk—Output volatility and earnings volatility have fallen during past decades; recessions are less frequent (as well as shorter and shallower); monetary and fiscal policies are more stable; improved regulatory and legal infrastructures arguably make transactions safer; and world wars and the Cold War are history.
- Changing risk aversion—Consumer surveys reveal a fall in perceived risk aversion that may be attributed to wealth-dependent risk tolerance or demographic developments. Lower risk and risk aversion are intertwined in many arguments.
  —Higher realized volatility and market losses may remind investors of their risk aversion. Many authors contrast investor caution about equities after the depression of the 1930s with the market-dips-are-buying-opportunities mentality in the 1990s. The optimistic spin is that investors learned in the 1980s–1990s about the consistency of equity long-horizon outperformance, and that this learning enhanced investors' risk tolerance and thereby slimmed equities' required return cushion over less risky assets.
  —Lower trading costs, better market access, greater global diversification opportunities, and negative stock-bond correlations enabled investors to reduce the systematic risk in their portfolios, which in turn raised investors' willingness to take risks.

Some of these factors have reversed since 2000. Although macroeconomic volatility remains low by historical standards, financial market volatility has been extremely high, and perceived risks have risen since September 11, 2001, and various corporate scandals. Sharp falls in share prices certainly have reminded investors of the innate riskiness in equity investing and brought investors closer to their subsistence levels, thereby raising the risk aversion level. If investors perceived, say, a 2 percentage point equity-bond premium sufficient three years ago, we suspect they would now require twice as high compensation for bearing equity risks. Finally, the latest declines in government bond yields appear related to bonds' safe-haven characteristics and should not help reduce the equity discount rates.[9]

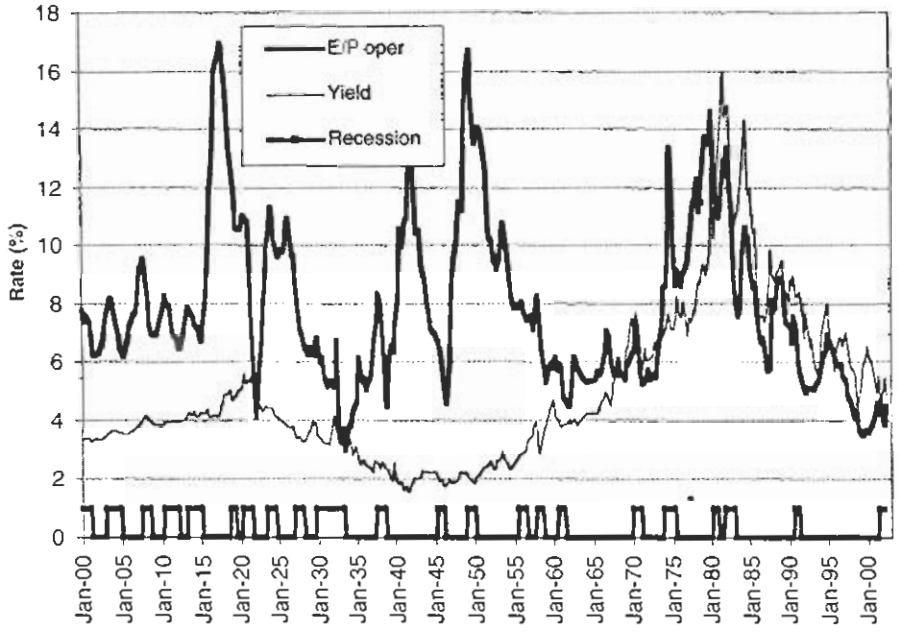
SIMPLE VALUATION RATIOS AS EQUITY-BOND PREMIUM PROXIES

A stock market's price-earnings (P/E) ratio is the most popular pure-equity valuation indicator. Similarly, the ratio of government bond yield (Y) over earnings yield (E/P) is the most popular relative valuation measure for the two major asset classes and thus a shorthand for the equity-bond premium. (Sometimes the earnings yield spread is used instead of the yield ratio, but the broad patterns tend to be similar.)

Lower Bond Yields Explain Lower Earnings Yields

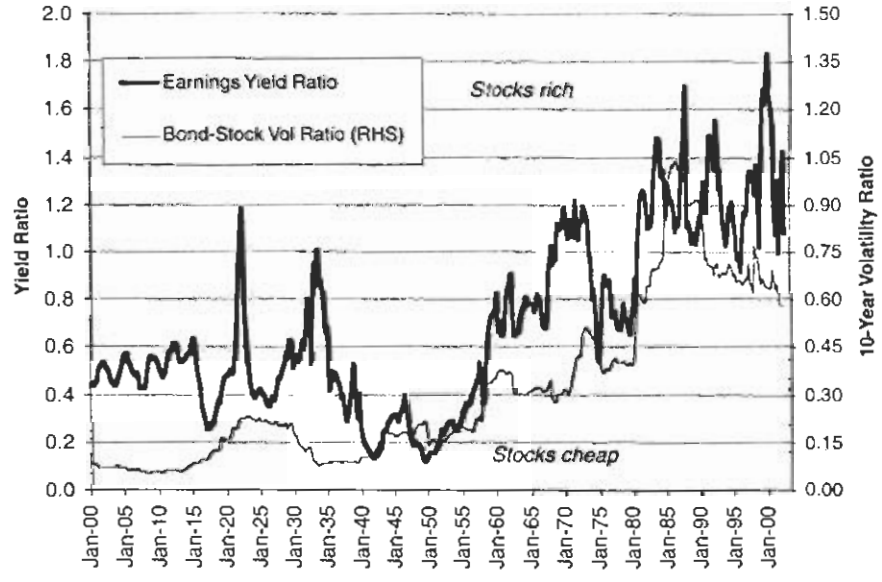
Exhibit 7 shows the history of earnings yield and the ten-year government bond yield for over one century. We focus on the earnings yield rather than its reciprocal

EXHIBIT 7
Earnings Yield of S&P 500 (Operating Earnings) and 10-Year Treasury Yield, 1900–June 2002



Sources: Ibbotson Associates, NBER, Arnott, Shiller website, and Schroder Salomon Smith Barney.

EXHIBIT 8
Bond-Earnings Yield Ratio and Bond-Stock Volatility Ratio 1900–June 2002



Sources: Ibbotson Associates, NBER, Arnott, Shiller website, and Schroder Salomon Smith Barney.

(P/E), because the former is a rate of return measure, akin to a bond yield. Unless otherwise stated, our earnings yield refers to the trailing one-year operating earnings per share of the S&P 500 index and its predecessors.[10]

The broad picture is that the earnings yield has ranged between 4% and 16%, but has been near historical lows for the past few years. Bond yields traded between 2% and 6% for the first 70 years, then hit a 16% peak in the early 1980s, followed by a decline to 4%–5% in 2002. Bond yields traded systematically below earnings yields for most of the century, but traded above them for the last two decades. The measures at the foot of the graph show the timing of the increasingly rare official recessions.

While earnings yields and bond yields were hardly related until 1960, since then they have shared common uptrends and downtrends. Exhibit 8 plots the yield ratio of the Treasury yield over the earnings yield. This ratio is high when stocks are expensive versus bonds, in the sense that bond yields exceed earnings yields.

For the last 20 years, this ratio has been neatly mean-reverting, providing good relative-value signals for asset allocation trades between stock and bond markets. Over this period, we can say that lower bond yields explain lower earnings yields (higher equity market valuations). This is not surprising, because bonds are the main competing asset class for equities, and the bond yield constitutes the riskless part of equities' discount rate.

But what are we to make of the long-run trends in the yield ratio? If we cannot explain them, we may deem the last 40 years' close relation between stock and bond yields as spurious, perhaps related to the broad rises and falls in inflation.

Lower Relative Risk of Stocks versus Bonds Explains the Long-Run Puzzle

The yield ratio series was relatively trendless in the first half of the 20th century but clearly upward-trending in the second, signaling relative richening of stocks versus bonds. Asness [2000b] proposes an appealing explanation for the long upward trend in the yield ratio: The relative risk of bonds versus stocks has grown over time.

The thin line in Exhibit 8 shows the relative return volatility of ten-year government bonds and the stock market index, measured by ten-year moving standard deviations. In the first half of the century, stock market returns were about seven times as volatile as bond returns. By the 1980s, relative volatilities were virtually equal—although subsequent disinflation has reduced bond volatility to about half of stock market volatility.

The trend increase in the volatility ratio reflects an increase in bond volatility, particularly in the 1970s–1980s, and a decline in stock volatility since the 1930s. The related underlying macroeconomic trends are:

- Growing inflation uncertainty associated with the persistent rise in inflation until the early 1980s.
- More stable real growth, as evidenced by lower volatilities in real output and earnings growth rates and by less frequent, shorter, and shallower recessions.[11]

Changing relative risk between asset classes is a structural change that undermines the usefulness of valuation signals like the yield ratio. This ratio will serve well as a mean-reverting signal within any one regime, but it typically gives a wrong value signal when a structural change occurs.

How to watch out for those structural changes? One guidepost is the relative importance of long-run inflation and growth risks.

- If central bank credibility and other arguments, for example, convince people of future inflation stability, and thus of relatively higher real growth risks, relative bond-stock volatility may again shift lower. Such a change should favor bonds and perhaps move the yield ratio back below unity in the medium term. Exhibit 8 shows a reversal in the volatility ratio in the past 15 years but not yet any trend reversal in the yield ratio. (In third quarter 2002, the yield ratio did fall below unity, however.)
- As a more current example, we think that in the world after September 11, 2001, with heightened security concerns and policy uncertainties, both growth and inflation risks have increased. It is less clear which has increased more, making the impact on the yield ratio debatable.
- Deflation would arguably reduce the required bond risk premium and raise the required equity risk premium. Thus, incipient deflation should systematically reduce the yield ratio.

Drivers of Earnings Yields

Since stock prices reflect the discounted values of expected future cash flows, it is an accounting identity that low earnings yields (high P/E ratios) reflect some combination of low discount rates and/or high expected earnings growth rates.

Like many others, we find that various growth indicators are only loosely related to earnings yield fluctuations and that P/E ratios have only a modest ability to predict subsequent earnings growth. Discount rate effects may reflect the riskless yield component or the required equity-bond risk premium. The sensitivity of earnings yields to nominal bond yields can be traced back to expected inflation rates or required real bond yields. Historical analysis suggests that earnings yields have been more closely related to inflation than to any other series, including nominal or real bond yields.

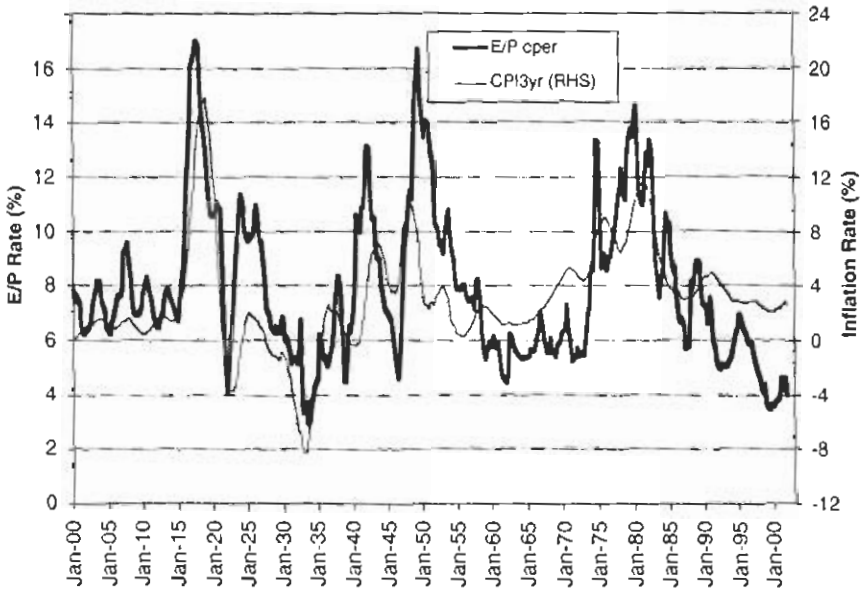
Exhibit 9 depicts the relation between U.S. earnings yields and the previous three years' average inflation. There is a similarly close relationship in other countries, including Japan.[12]

A high correlation between earnings yields and inflation rates may be surprising, because the E/P is supposed to be a real variable. The textbook view is that stocks are real assets since higher inflation should be fully compensated by higher nominal earnings growth rate, with little impact on the stock price or the D/P or E/P ratios.

What explains this anomalous correlation? Here are the main candidates, all of which may contribute:

- Inflation may impact real earning growth prospects —steady low-but-positive inflation appears to be the optimal environment for real growth.
- Inflation may raise prospective real returns because irrational money illusion makes equity markets undervalued (overvalued) when inflation is high (low).[13]

EXHIBIT 9
Dependence of Earnings Yields on Inflation Level—1900–2001



Sources: Shiller website, Schroder Salomon Smith Barney.

- Inflation may raise required real returns on bonds *and* equities (rational inflation-related risk premium).

We can explain the bulk of the past 50 years' variation in earnings yields by just two factors: inflation level, and output volatility (see Bernstein [1999], Wieting [2001], and Ilmanen [2002]). The rise and fall in inflation explains the humped shape (20-year rise in earnings yields before 1980 and 20-year fall thereafter), while the trailing volatility of GDP growth rates (or earnings growth rates) explains the general downtrend.

By the end of the century, equity markets benefited from low levels in both factors, in addition to a record-long expansion, productivity optimism, and high risk tolerance after a persistent bull market. No wonder that irrational exuberance and overshooting valuations followed.

The good news is that at least part of the multiple expansion is fundamentally justified. Above-average P/E levels may then be sustainable (as long as inflation stays at the apparently optimal level for equities, near 2%–4%, and macroeconomic stability rather than equity volatility drives equity investors' risk aversion). Yet many observers appear to forget that sustainably high P/E still means low E/P and low long-term equity returns; sustainability would just remove the need for further cheapening in the near term (as the P/E falls to the historical mean).

EXPECTED EQUITY PREMIUMS BASED ON DDM

While the yield ratio is a useful shorthand for the equity-bond premium, the dividend discount model gives us directly what we really want to see: the difference between stocks' and bonds' expected long-run returns.[14] In the basic version of the DDM, equity cash flows (dividends) are assumed to grow at a constant annual rate G. A feasible long-run return on equities is then the sum of the cash flow yield (D/P) and the trend cash flow growth rate (see the appendix). The required return on equities, or the discount rate, can be viewed as a sum of the riskless long-term government yield (Y) and the required equity-bond risk premium (ERP).

Intuitively, markets are in equilibrium when the equity market return that investors require (Y + ERP) equals the rationally feasible expected return (D/P + G). This equality can be reshuffled to express the ex ante equity-bond risk premium in terms of three building blocks:

Equity-Bond Risk Premium ≈
Expected Stock Return –
Expected Bond Return

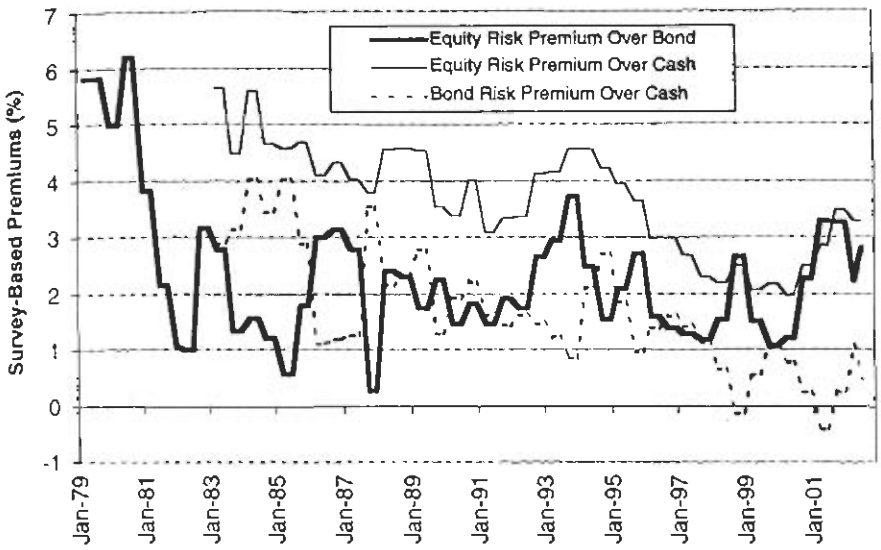
or

$$ERP = D/P + G_{nom} - Y_{nom}$$

The appendix shows how this model can be extended to real (inflation-adjusted) terms or to discounted earnings terms. The DDM framework is simple, but there is a wide disagreement about the inputs to the equity premium calculation. There are two main unobservables, ERP and G. One can either infer ERP for a given G assumption, as we do, or one can reshuffle the equation to infer G (implied growth rate) for a given ERP assumption.

Even the observable inputs—dividend yield and bond yield—are ambiguous. It may be debated whether to include share repurchases in dividend yield and whether to use a ten-year or longer-maturity Treasury yield. The

EXHIBIT 10
Survey-Based Asset Class Premiums—Using Consensus Forecasts of Long-Term GDP Growth, Inflation, and Short-Term Rates—1979–June 2002



Sources: Best and Byrne [2001], Blue Chip Economic Indicators, IBES, and Schroder Salomon Smith Barney.

main source of contention, though, is the assumed trend profit growth rate G.

Instead of assuming a constant profit growth rate, we may allow G to vary over time according to survey forecasts or statistical estimates. Before we explore the various debates, we present equity-bond premium estimates based on survey forecasts of long-term GDP growth rate, motivated by the widely held idea that corporate profit trends are somehow tied to output trends.

Best and Byrne [2001] examine risk premium estimates that use consensus forecasts of next-decade average real GDP growth and inflation as inputs for nominal G. Exhibit 10 shows that the estimated equity-cash risk premium and bond risk premium together trended downward between 1983 and 2000, while the ex ante equity-bond risk premium ranged between 0.5 and 3.5 percentage points.[15]

Debates on Inputs for Statistical Risk Premium Estimates

There will never be full agreement about the equity-bond premium, because there are a wide range of views about DDM inputs. Here we simply summarize the key questions.

Long-Run Growth Rate (G). This is the main debate. Since G is the least-anchored DDM input, differing views on it can shift risk premium estimates by several percentage points, while disagreements about dividend yields and bond yields are worth about 1 percentage point, at most.

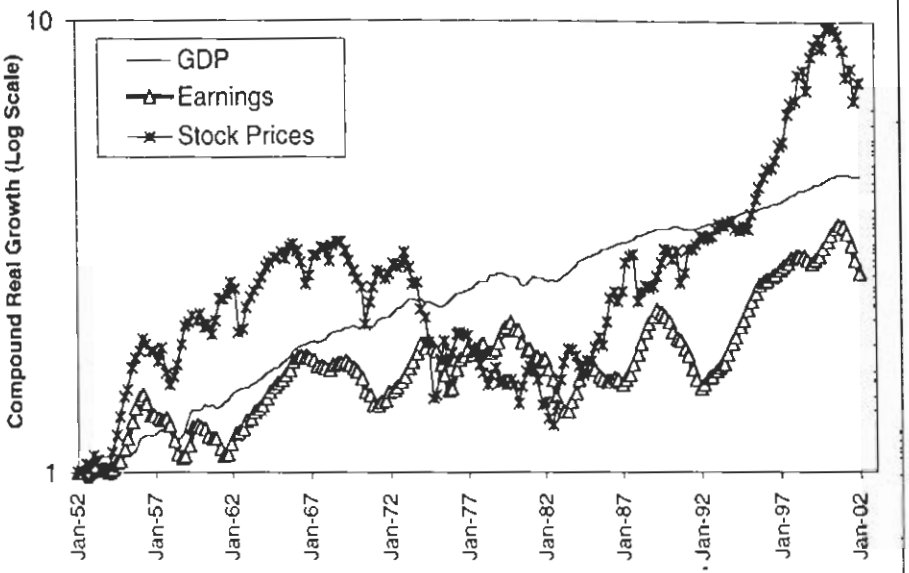
Earnings or dividend data? In historical analyses, some authors use earnings data, others dividend data, and yet others gross domestic product data to proxy for cash flows. While earnings data have their own shortcomings, we use them. Historical dividend growth is arguably understated by the declining trend in dividend payout rate since the late 1970s, partly related to firms' shift from dividend payments toward share repurchases.

Nominal or real G? Many observers refer to historical earnings growth rates in nominal terms (perhaps even using arithmetic averages), thereby overstating future prospects now that inflation rates are quite low. We prefer to assess expected inflation and real earnings growth separately. We do concede that assuming stable nominal earnings growth rates over time could work surprisingly well, because inflation may be inversely related to real earnings growth.

Relation to GDP growth? It is useful to first assess the trend GDP growth rate and then the gap between earnings and GDP growth.

- The long-run productivity growth is important because it determines the potential earnings growth rate, and because persistent changes influence stock prices much more than cyclical changes. If the recent extraordinary productivity growth is sustained, it could be quite bullish for long-run profits and share valuations.
- Historical evidence on the gap between earnings (or dividends) and GDP growth is less encouraging—indeed, recent findings are shocking to many market participants. Several recent studies show that per share earnings and dividends have over long histories lagged the pace of GDP growth and in many cases even per capita GDP growth. Focusing on our past-century sample period (1900–2001), U.S. GDP growth averaged 3.3% in real terms, compared with 1.9% GDP per capita growth, 1.5% earnings growth, and 1.1% dividend growth.

EXHIBIT 11
Cumulative Real Growth of GDP, S&P 500 Operating Earnings, and Stock Prices—1952–2001



Sources: Arnott, Shiller website, and Schroder Salomon Smith Barney.

Exhibit 11 shows that cumulative real growth of earnings has consistently lagged GDP growth in the past 50 years, while stock prices beat GDP only because of the multiple expansion. International evidence in Arnott and Ryan [2001] is hardly more encouraging, and Dimson, Marsh, and Staunton [2002] show that real dividend growth has lagged real GDP per capita growth between 1900–2000 in 15 of the 16 countries they examine.

- What explains these disappointing results? Arnott and Bernstein [2002] attribute them to the dynamic nature of entrepreneurial capitalism. New entrepreneurs and labor (perhaps especially top management) capture a large share of economic growth at the expense of current shareholders. Stock market indexes (made up of listed stocks) do not participate in all growth, and indeed may miss the most dynamic growth of yet-unlisted start-up ventures. Arnott and Bernstein argue that aggregate earnings growth of the corporate sector (listed and unlisted firms) should better keep pace with aggregate GDP growth, and this conjecture seems to hold in the national accounts data.

Siegel [1999] adds that real output growth related to technological progress may have been largely labor-augmenting and wage-enhancing rather than the capital-enhancing type that would spur EPS growth (also see discussion in Nordhaus [2002] and "Proceedings of Equity Risk Premium Forum" [2002]).

Can we do better than using historical averages? Empirical studies find limited predictability in long-term earnings growth rates (see Fama and French [2002]). No predictability implies that the historical sample average may be the best estimate of future earnings growth.

How long a sample? The compound average real earnings growth rate over very long periods is around 1.5%. Others argue that the world has changed, and that the future should be more like the 1990s' experience, with its 4.3% average real earnings growth, and unlike the preceding decades (0.4% in the 1980s and 1.8%–2.9% in the 1950s, 1960s, and 1970s).

Payout rates appear to have some ability to predict future growth, but the results are debatable. Ibbotson and Chen [2002] argue on theoretical grounds that low dividend payout rates are a sign of high growth prospects. Arnott and Asness [2002] show that the empirical experience has been exactly opposite. Low dividend payout rates have preceded low subsequent earnings growth. If this pattern holds, it is a bad omen for the coming years, given the low payout rates of the boom years.[16]

On a positive note, there are some signs that real earnings growth is higher when the trend productivity growth is higher, when the inflation rate is lower (but positive), and when earnings volatility is lower. Lower inflation and volatility drags may have boosted real earnings in the last 15 years and, if sustained, could keep future trend earnings growth more in line with the GDP growth (see Wieting [2001]).

Dividend Yield (D/P). Dividend yields in the United States fell even faster in the 1980s and 1990s than earnings yields. The declining propensity to pay dividends partly reflects a shift toward more tax-efficient share repurchases; by the late 1990s, U.S. firms disbursed cash flows more in share repurchases than in dividends (see Wadhwani [1999], Fama and French [2001], and Jagan-

nathan, McGrattan, and Scherbina [2001]). Adding up dividends and gross buy-backs, however, exaggerates sustainable cash flow yields. One reason is that gross buy-backs should be adjusted for related share issuance (buy-backs are often linked to employee stock options); another is that share repurchase programs are less permanent (easier to discontinue) than dividend payments.

While gross buy-backs added perhaps 2 percentage points and net repurchase payouts 1.5 percentage points to U.S. cash flow yields during the late 1990s peak buy-back years, Liang and Sharpe [1999] argue that adding 0.5 percentage point to dividend yields is a more realistic medium-term estimate. Even this adjustment may be questioned because the 1990s share buy-backs never exceeded new share issuance.

Bond Yield (Y). It is common to use the ten-year government bond yield in equity-bond premium calculations, mainly for data availability reasons. In fact, the "duration" of equities is much longer. Using a longer-maturity yield may thus be appropriate.[17]

Yield curves tend to be upward-sloping, so the use of a longer yield typically reduces the equity-bond premium. But when the yield curve was inverted in the early 1980s, the reverse was true.

Inputs for Ex Ante Asset Returns and Premiums—and Resulting Outputs

Arnott and Bernstein [2002] carefully create a time series of ex ante real long-term stock and bond returns since the early 1800s that would have been realistic to expect, given the information available at the time. Roughly speaking, their inputs include the historical average real dividend growth rate to proxy for the real G (averaging previous 40 years and full-sample experience), a regression-based proxy for expected future inflation, and dividend yield and long-term Treasury yield.[18] These plausible inputs give rise to recently low equity-bond risk premium estimates: near-zero average since the mid-1980s, and negative values between 1997 and 2001.

We propose an alternative set of plausible input assumptions that are somewhat more optimistic for stocks and thus give rise to higher risk premium estimates.[19]

Exhibit 12 summarizes our selections, and Exhibit 13 shows the histories of our inputs (except for yields).

D/P: Since raw dividend yields arguably underestimate recent equity market cash flow yields due to share buy-backs, and since we do not have long histories of net buy-back-adjusted dividend yields, we prefer to use earnings data that have not undergone such a structural change as dividends. We use smoothed earnings yields multiplied by a constant payout rate (0.59) as a proxy for sustainable dividend yields.[20]

G_{real}: As we find limited predictability in long-term real earnings growth, we assume that investors take historical average real earnings growth as a proxy for future G_{real}. The geometric average growth rate is more relevant than the arithmetic average if investors are interested in a long-run wealth accumulation rate.[21]

The historical window length is ambiguous, and we prefer to take an average of the past 10, 20, 30, 40, and 50 years' average growth rates; this choice gives more weight to more recent decades and implies shorter windows than in Arnott and Bernstein [2002]. This approach hopes to capture some slow-moving variation in trend earnings growth rates that may be associated with changing productivity trends and changing inflation or volatility drags.

Since these historical averages are quite unstable over time—the extremes of their range (from –4% to +6%) appear unreasonable for long-run ex ante G views—we take an average of these averages and a 2% anchor for the G_{real} proxy. This admittedly ad hoc approach succeeds in giving a plausible ex ante G_{real} series (a range between 0 and 4% most of the time), while allowing slow variation over time (*see Exhibit 13*). The latest value is 2.5%.

Y: We use the longest available Treasury yield (Ibbotson Associates' roughly 20-year bond until 1951, Salomon Brothers' 20-year or 30-year on-the-run series thereafter), and annualize it. These long bonds' durations are roughly double the ten-year maturity bonds' durations (near seven), and thus are closer to equity durations, although still shorter.

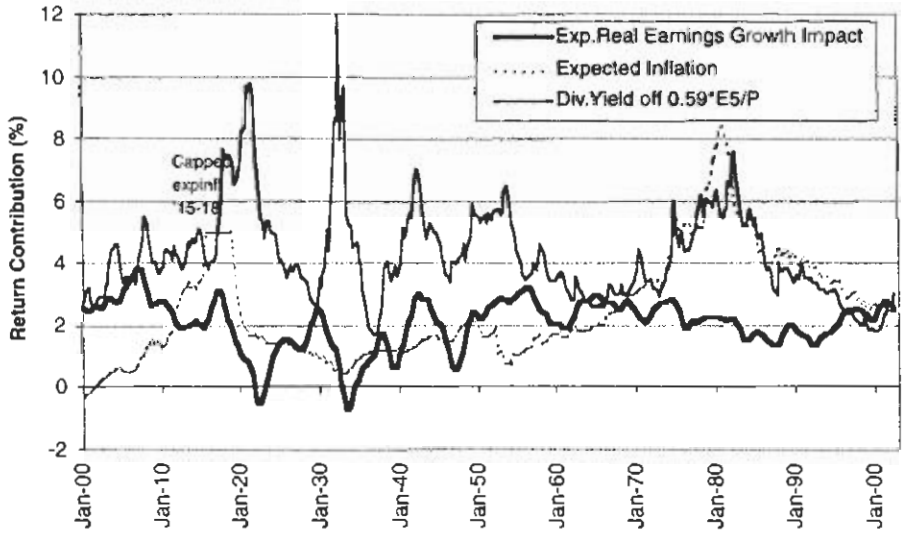
Ex Ante Inflation: We follow Arnott and Bernstein [2002] in regressing each quarter the next-decade inflation on the previous three years' inflation and using the fitted value as a quasi-out-of-sample prediction of the long-term inflation outlook.[22] The regression window length is arbitrary. We use a moving 30-year window and full sample since 1870, averaging the two. We make one exception around World War I; we cap the 1915–1918 expected inflation at 5%, even though our regression proxy rose above it, peaking above 9%.[23]

When survey-based inflation forecasts become available, we incorporate them. After 1951, we use the Livingston survey's median forecast of one-year-ahead inflation as a third component in the average that proxies for expected inflation. And from 1979 when ten-year-ahead

EXHIBIT 12
Estimates of Expected Asset Class Returns and Underlying Input Assumptions

	Input/Assumption:	Mid-2002	*End-99*	(50yr Avg)
Ex Ante Real Stock Return:		*5.5%*	*4.0%*	(6.2%)
D/P	0.59(5-Year Operating) Earnings Yield	3.0	*1.8*	(3.9)
+ Real Growth (G_{real})	Average of 2% and past 10/20/30/40/50yr real earnings growth adjusted for volatility	2.5	*2.2*	(2.3)
Ex Ante Real Bond Return:		**3.0**	*3.9*	(3.3)
Long Govt Yield	30- or 20-Year Treasury Yield (annualized)	5.6	*6.6*	(6.7)
– Ex Ante Inflation ($E\pi$)	Consensus forecast of decade-ahead inflation since 1979; earlier regression-based long-run inflation forecasts	2.6	*2.7*	(3.4)

EXHIBIT 13
Three Components of Ex Ante Nominal Stock Return—1900–June 2002



Sources: Blue Chip Economic Indicators, FRB Philadelphia, Ibbotson Associates, Arnott, and Schroder Salomon Smith Barney.

survey forecasts are available, we use them as our expected inflation proxy.[24]

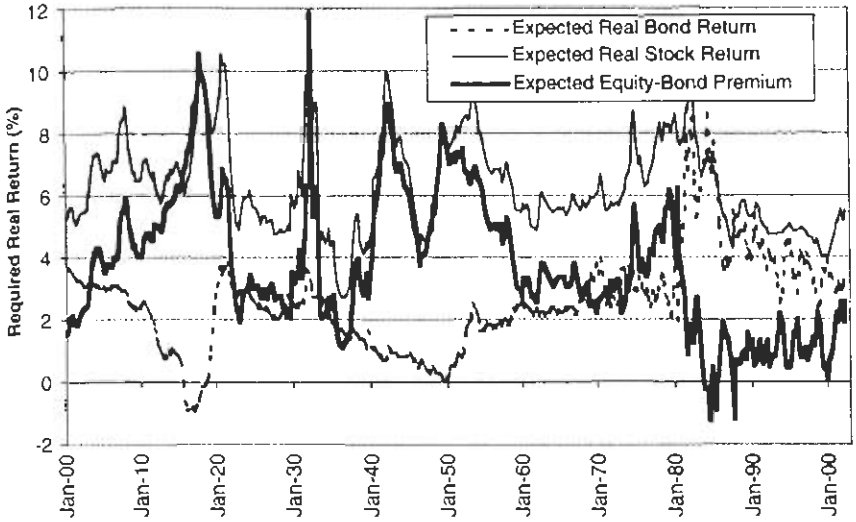
This set of inputs results in the feasible ex ante real long-term stock and bond return series shown in Exhibit 14. The estimated real stock returns varied between 4% and 9% most of the century, sweeping from the top of this range to the bottom between 1982 and 1999. The estimated real bond returns varied between 0% and 5% except for the 1980–1985 period, when ex ante real returns occasionally exceeded 8%. Overall, the post-Second World War pattern of a long upward trend (pre-1982) and a long downward trend (post-1982) in inflation is matched in required real bond returns, although with a short lag.

Bernstein [2002] notes that the great variation in required bond and stock returns in recent decades makes the use of historical returns either irrelevant or, worse, misleading for any kind of future projections.

The equity-bond premium (the difference between the other two series) experienced a clear downward shift 20 years ago. Before 1982, the premium ranged between 2 and 10 percentage points most of the time, while since 1982 the range has mostly been 0 to 2 percentage points.

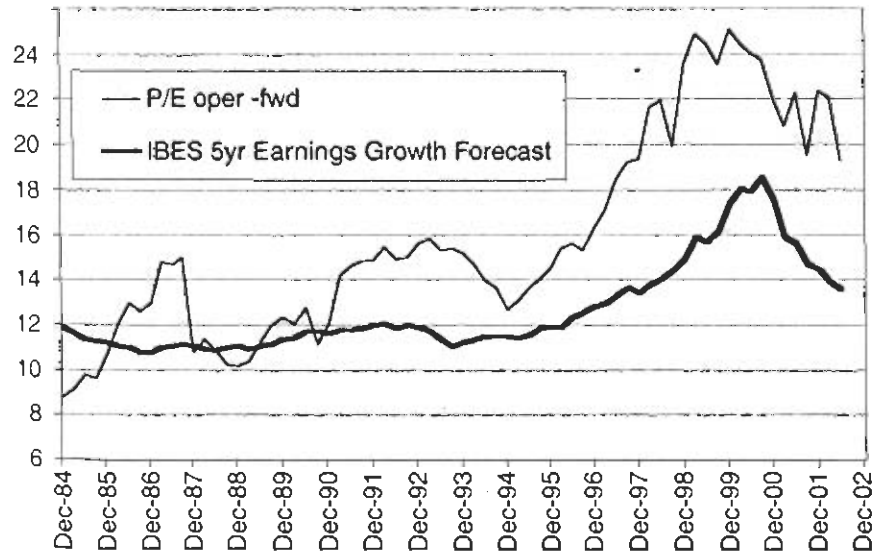
The lowest equity-bond premiums—June 1984, September 1987, and December 1999—coincided with temporary peaks in bond risk premiums. On all three occasions, a Fed tightening triggered a heavy bond market sell-off (year-on-year rises in ten-year yields of 310bp, 220bp, and 180bp, respectively), while equity markets had not yet suffered much. Over

EXHIBIT 14
Estimated Long-Term Real Stock and Bond Returns and their Difference (Ex Ante Premium)—1900–June 2002



Source: Schroder Salomon Smith Barney.

EXHIBIT 15
Forward-Looking P/E Ratio and Analysts' Medium-Term Earnings Growth Forecasts—1985–June 2002



Sources: IBES and Schroder Salomon Smith Barney.

the following year, stocks underperformed bonds by 5, 25, and 26 percentage points, respectively.

It is counter-intuitive that the ex ante equity-bond premium was averaging just 1 percentage point during the great bull market, while realized equity returns between 1982–2001 were 16% per year (*see Exhibit 3*). Using the more conservative Arnott and Bernstein estimates, the ex ante premium was actually negative most of this period.

How could equities outperform bonds by 5 percentage points per year with such a slim ex ante premium? The first answer that comes to mind, a falling equity-bond premium, is not valid for this period; the premium already had shrunk by 1982 and actually edged a bit wider during the 20-year period. A better answer is that discount rates fell (ex ante real returns for stocks fell by 3.5 percentage points, and expected long-run inflation fell even more), and the longest-duration asset class, equities, reaped the greatesr windfall gains from falling rates.

This analysis assigns almost all of the equity outperformance and P/E multiple expansion to lower discount rates rather than greater growth optimism. But recall that our series of feasible ex ante equity returns is based on pretty rational real earnings growth forecasts (that rose just by 1% in the 1990s; see Exhibit 13). Actual subjective growth forecasts probably were much less rational during the Internet boom. Indeed, analysts' medium-term earnings growth forecasts rose from their normally overoptimistic 11%–12% level (of nominal annual growth) to a heady 18%–19% level in 2000, before tailing off (*see Exhibit 15*).

EXHIBIT 16
Forecasting Ability of Various Predictors—Predictive Correlations Based on Quarterly Data

Forecast Horizon and Data Window =>	10yr Return 1900-2001	5yr Return 1900-2001	5yr Return 1960-2001	1yr Return 1900-2001	1yr Return 1983-2001
Predict Real Equity Return Using:					
Trailing Earnings Yield	0.58	0.27	0.17	0.06	0.33
Ex Ante Real Equity Return Estimate	0.40	0.31	0.03	0.25	0.26
Past 5yr Real Equity Return	-0.13	-0.13	0.26	-0.14	-0.40
Predict Real Bond Return Using:					
Nominal Bond Yield	0.54	0.42	0.65	0.29	0.50
Ex Ante Real Bond Return Estimate	0.54	0.61	0.77	0.60	0.62
Past 5yr Real Bond Return	0.08	0.17	0.10	0.04	0.23
Predict Equity-Bond Excess Return Using:					
Earnings Yield Gap (EarnY – GovtY)	0.53	0.32	0.19	0.20	0.56
Ex Ante Equity-Bond Premium Estimate	0.51	0.32	0.05	0.26	0.47
Past 5yr Equity-Bond Excess Return	-0.03	-0.22	-0.28	-0.21	-0.32

Sharpe [2002] uses these growth forecasts, without prejudging their rationality, and estimates that about half of the late-1990s P/E expansion reflects lower discount rates and half greater growth optimism. Thus, part of the late-1990s decline in feasible real equity return in Exhibit 14 likely should be attributed to irrational growth forecasts.

How robust are these estimates of ex ante asset class returns? Details are sensitive to the input assumptions, but the broad contours of such estimates tend to be similar (compare Exhibits 10 and 14), because all are anchored by market yields on equities and bonds.[25] The long-term growth forecasts can vary more widely, and in the basic DDM these forecasts translate one-on-one into higher or lower estimated equity returns or premiums.

Predictive Ability of Equity-Bond Premium Estimates

To assess the usefulness of our ex ante expected return estimates, we use these measures to predict real stock return and real bond return and their difference (excess return) over ten-year, five-year, and one-year horizons. Exhibit 16 displays for each trade the predictive ability of our ex ante expected return measure and two alternative predictors, a simpler yield proxy and a past-return measure.

In all cases, our estimates exhibit reasonable forecasting ability, but they are clearly better predictors than the simple yield measures only at the short (one-year) horizon. The long-horizon correlations are typically higher than short-horizon correlations, mainly because the realized returns are smoother at longer horizons.

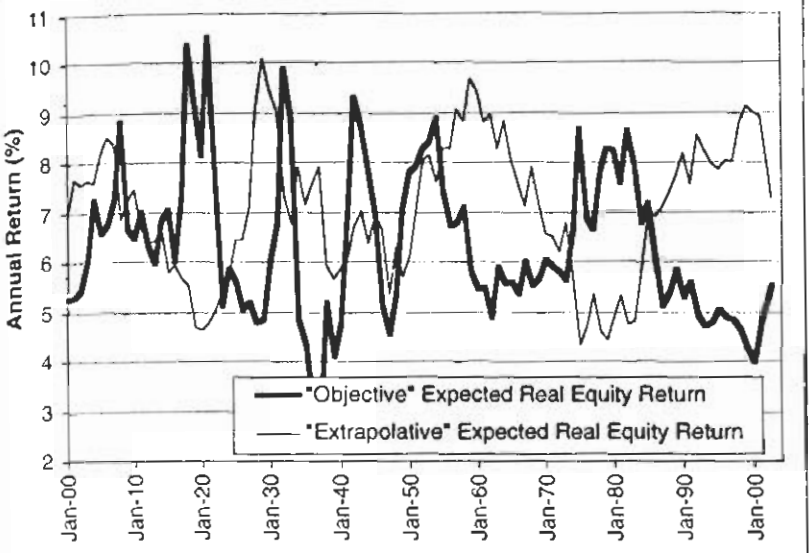
For example, the correlations between the ex ante equity-bond premium and subsequent realized outperformance of equities over bonds are 0.51 for the ten-year horizon, 0.32 for the five-year horizon, and 0.26 for the one-year horizon. In a scatterplot of ex post long-run equity-bond premiums on the ex ante premiums, the 1998–2000 observations show up as major outliers.

Past five-year equity returns (real and excess) have generally been negatively correlated with future returns, consistent with a mild mean-reversion tendency. This pattern underscores the extrapolation risk following an extended period of above-average market returns. Past bond returns on the contrary have been positively related to future returns, consistent with slow-moving variation in required returns.

WHERE DO WE STAND?

While our analysis cannot unambiguously reveal the current extent of the equity-bond premium, our framework does clarify the assumptions needed for various risk premium estimates. Moreover, we argue that

EXHIBIT 17
Gap Between Objectively Feasible (Rational) and Extrapolative (Irrational) Return Expectations—1900–June 2002



Source: Schroder Salomon Smith Barney.

"how high are objectively feasible future stock returns?" is not the only critical question for equity markets' medium-term prospects. Acknowledging the role of irrational expectations, another key question is: "How high returns do investors subjectively expect?" If objective and subjective return expectations are not in balance, equity markets remain vulnerable to disappointments.

There are no directly observable proxies for either return, but we have tried to provide evidence on both. As an illustration only, Exhibit 17 contrasts our estimate of feasible ex ante real equity return with a simple proxy of extrapolative subjective return expectations (75% of a long-run anchor, 7% real equity return, plus 25% of past-decade average real equity return).

Clearly a wide gap arose between the two series in the late 1990s. Just when rising valuations reduced feasible future returns, many investors confused recent windfall gains as a sign of permanently higher equity returns. This gap has narrowed from both sides since the end-1999 peak, but at least in this illustration the gap has not yet been closed.

At a minimum, our framework should give structure to the dialogue about future equity returns. Aggressive return forecasts must be explained by something: high dividend yield, high trend real earnings growth, high inflation, or further multiple expansion. Low dividend yields remain a reality, and from the current above-average valuation levels, further multiple expansion is unlikely.[26]

Since inflation is also likely to remain low, high returns need to be earned the hard way—by very high real profit growth rates.

The mega-bullish equity market view requires throwing away the history books and fully embracing the "this time is different" idea. For example, technology-related arguments might be used to justify a tripling of long-run G_{real} to 4%–5%, which would enable long-run nominal equity returns near 9%–10%. (The finding that the trend earnings growth lags the trend GDP growth does challenge the credibility of such assumptions, given the consensus view of next-decade real GDP growth at 3.1%.)

A moderately constructive case is that feasible and subjectively expected long-run equity returns are in balance near 7%–8%. The deliberately optimistic assumptions we use in Exhibit 12 give rise to 8% feasible (nominal) return, almost as high as the CFO survey forecasts. Stable inflation, low macroeconomic volatility, reduced trading costs, and better diversification opportunities may help sustain the above-average P/E levels. And, given the fall in bond yields, equities again offer more than a negligible risk premium.[27]

A moderately bearish view is that the feasible long-run nominal equity return is closer to 5%–6% than 7%–8%. Such estimates simply follow from using (unadjusted) dividend yields and historical average dividend growth rates.

The most bearish view involves further declines (mean reversion) in the market's P/E multiples. Below-average earnings growth and higher risk aversion are plausible scenarios (see Campbell and Shiller [2001] and Arnott and Asness [2002]). Unwarranted investor optimism, a remnant of the 1990s bull market returns, can also be bad news. Refusal of investors to reconcile themselves to the moderate feasible long-run returns is not sustainable in the medium term.

APPENDIX

Dividend Discount Models and Equity-Bond Premiums

Dividend discount models analyze stocks as if they were perpetual (consol) bonds, with the twist that their coupon rate is expected to grow over time. We describe here the basic Gordon [1962] model with a constant dividend growth rate. Given a constant discount rate R (which can be viewed as a sum of riskless component Y and an equity-bond risk premium com-

ponent ERP), the stock price can be expressed as the sum of expected discounted future cash flows:

$$P_t = E_t[\sum_{j=1}^{\infty}(\frac{1}{1+R})^j(D_{t+j})]$$

where $R = Y + ERP$.

If we assume a constant growth rate G:

$$E_t(D_{t+j}) = (1+G)E_t(D_{t+j-1}) = (1+G)^jD_t$$

we can express the stock price simply as

$$P_t = E_t(D_{t+1})/(R-G) = (1+G)D_t/(R-G)$$

Thus:

$$E(D_{t+1})/P_t = R - G$$

or as an approximation of the dividend yield:

$$D/P = R - G = Y + ERP - G$$

In equilibrium the equity return that investors require ($R = Y + ERP$) must equal the rationally feasible long-run return ($D/P + G$).

Earnings Discount Model: To express the equation in terms of the E/P ratio, we assume a constant dividend payout rate $k \equiv D/E$. With a constant dividend payout rate, dividend growth rate and earnings growth rate are equal. Then

$$D/P = (E/P)(D/E) = Y + ERP - G$$

Thus:

$$E/P = (Y + ERP - G)/k$$

Real or Nominal: The DDM can be expressed in real terms or in nominal terms. Mechanically, a rise in expected inflation rate raises both the dividend growth rate and the bond yield, without having an impact on the stock price. Empirically, however, the correlation between inflation rates and earnings yields suggests that either real growth rates, payout rates, or equity risk premiums are related to inflation.

Dynamic Models: It is not necessary to assume a constant growth rate. Practical implementations often involve multistage models where growth rate varies over the horizon (see Cornell [1999] and Jagannathan, McGrattan, and Scherbina [2001]). Sharpe [2002] uses a dynamic version of the growth model that allows growth rates and required returns to vary over time. It still follows that low earnings yields are related to high growth prospects or low required returns.

ENDNOTES

The author thanks Robert Arnott, Clifford Asness, Peter Bernstein, Alistair Byrne, and Steven Wieting for helpful discussions and for help in acquiring historical data. This article is largely based on research reports written for Schroder Salomon Smith Barney in May and June 2002. The original disclaimer there applies.

[1]If the payout rate is constant, dividend growth rate and earnings growth rate are equal. We use the latter because payout rates fell in the 1980s and 1990s, and many observers argue that share buy-backs have replaced dividend payments.

[2]The distinction between objective and subjective expectations implies that the subjective expectations can be irrational. In fully rational markets, there is just one expected return that clears the market. The feasible asset return that investors can rationally expect is, by assumption, equal to the required asset return.

[3]Most of our data analysis focuses on U.S. markets because the literature has concentrated on them, partly because of better data availability and reliability. The global leading role of the U.S. economy and asset markets and higher valuation ratios than in most other major equity markets also make the U.S. experience the most interesting topic.

[4]All returns are expressed as annual compound returns, unless otherwise stated.

[5]One reason is that U.S. government bonds were not perceived to be riskless until the 20th century. In addition, yield trends were more favorable for bonds as the 19th century ended with extended deflation. Long yields were then halved from 1802's near-6% level to near 3% at the beginning of 1900, and then doubled back by the end of 2001. Of course, equity and bond markets also were less developed in the 1800s, making data less comprehensive and reliable.

[6]The peso problem refers to infrequent, unlikely events such as currency devaluation that may influence market pricing (e.g., forward bias in peso-dollar pricing) but may not show up, even in a long historical sample.

[7]The CFO survey and our bond investor survey asked for views on the expected annual return of a major equity index over the next decade. The academic survey required some adjustments because it asked for the 30-year equity-bill-premium (and only an arithmetic average in 1998). We first subtract from the 7% consensus view in 1998 0.8 percentage point (the gap between arithmetic and geometric means in the later survey), then add a 5% expected average bill rate (typical long-run view of economists in 1998 from another survey) to get an 11.2% expected nominal return. In 2001, the survey quotes a 4.7 percentage point geometric mean premium over bills; we add 4.7% expected average bill rate to it to get a 9.4% estimate.

[8]The falling consensus views may partly reflect a real change due to the growing literature on the changing equity risk premium, besides simple extrapolation from recent returns.

[9]Specifically, we have found that the negative correlation between stock and bond returns has made government bonds

the ultimate safe haven. The negative beta feature can even justify a negative risk premium for government bonds when the traditional inflation risk premium has fallen to near zero. All else equal, a low or negative bond risk premium (over cash) makes the current equity-bond premium wider. (See Best, Byrne, and Ilmanen [1998] and Ilmanen [2002].)

[10]We use operating earnings rather than reported earnings since the former became available in the early 1980s. Broadly speaking, operating earnings are earnings from continuous operations, excluding non-recurring items. Operating earnings may give a better picture of trend earnings, as they are less influenced by one-off events and cyclical downturns (see Wieting and Peng [2002]).

Findings of aggressive and even illegal earnings accounting practices, however, have made many investors prefer the reported earnings. Stock option expensing and pension return assumptions are other contentious earnings topics. Any adjustments to recent earnings levels would imply lower earnings yields and lower ex ante equity returns in our empirical analysis.

[11]Improving macro stability has not brought along financial market stability, an unattractive outcome for equity investors. Alan Greenspan, among others, highlighted the contrast between low output volatility and high equity market volatility in his annual Jackson Hole speech in August 2002.

[12]Overall, Japan's experience confirms the inflation-dependence of earnings yields but there is a hint of a leaning J-shape. We conjecture that earnings yields could actually rise in a deflationary environment. Low-but-positive inflation is the optimal environment for equity valuations; both higher inflation and deflation can hurt equities and raise E/P ratios. This also suggests that U.S. equity multiples already reflect all the possible gains from disinflation and that the best they can do now is to hold onto these gains (if inflation remains near 2%–4%).

[13]Modigliani and Cohn [1979] argue that investors and analysts incorrectly discount real dividend streams with nominal discount rates, resulting in too low a price for real fundamentals when inflation is high. For a recent review, see Ritter and Warr [2002]. Sharpe [2002] suggests a variant of inflation illusion: Investors and analysts actually discount nominal cash flows using nominal discount rates, but do not make sufficient inflation adjustments to their extrapolative nominal growth forecasts.

[14]Under certain conditions, the earnings yield equals the ex ante real equity return—for example, if the constant retention rate (1 – payout rate) matches the constant dividend growth rate. Intuitively, earnings yield understates expected return because it excludes dividend growth, but it exaggerates expected return because only a part of earnings are paid out as dividends. Unless the two extra terms just balance, the DDM should provide a better ex ante real return measure than the earnings yield.

[15]The equity-cash premium is the difference between the ex ante equity return and the expected average Treasury bill rate over the next decade. The bond risk premium is the difference between the ten-year Treasury yield and the expected average Treasury bill rate over the next decade. The equity-bond premium is the difference between the ex ante equity return and the ten-year Treasury yield.

The nominal ex ante equity return is estimated as a sum of the dividend yield (proxied by a forward-looking earnings yield times a constant assumed payout rate), expected long-run real GDP growth rate, and expected inflation. The main raw material is economists' consensus forecasts of next-decade average real GDP growth, inflation, and Treasury bill rates from the semiannual Blue Chip Economic Indicators survey.

Note that using the current Treasury bill yield in equity premium calculations could be quite misleading when short rates are exceptionally low (or high) and expected to revert to normal levels. For example, the current three-month rate is near 2%, while the expected next-decade average short rate is above 4%.

[16]The theoretical argument is in the "Modigliani-Miller spirit," based on the idea that management retains a greater share of earnings when it sees greater future profit opportunities. The empirical finding that high retention rates predict low earnings growth may reflect management's exuberance or inefficient empire building (see Arnott and Asness [2002]). Alternatively, management may be concerned with dividend smoothing, and will pay higher dividends only when it can afford (or dares) to do so, given its expectation of strong future profit growth.

[17]In the DDM context, the equity market can be viewed as a consol bond with a growing coupon rate. It follows from simple algebra that the modified duration of equities is $1/(R - G)$, which is just the inverse of the dividend yield. For D/P of 2.5%, this duration is 40, but this result is model-dependent; recall that the basic model assumes constant R and G. More generally, equities really are long-duration assets, that is, very sensitive to *permanent* discount rate changes—and more so when dividend yields are low.

[18]Arnott and Bernstein present the real dividend growth rate component in two parts: the predicted long-run growth rate of GDP per capita, and the predicted dilution of dividend growth versus GDP per capita growth.

[19]Our exercise follows in the same spirit as the Arnott-Bernstein study—trying to come up with reasonable views on each of the DDM inputs (say, what long-term real growth rate and what inflation rate investors could have expected at the time). There is sufficient uncertainty about these inputs that both sets of assumptions can be deemed plausible. Our assumptions are deliberately more optimistic than those of Arnott and Bernstein, to see how much expected returns rise if we add an implicit adjustment for share buy-backs to dividend yields, and if we use higher, but not outrageous, earnings growth estimates.

[20]Recall that $D/P = (D/E)(E/P)$. Since one-year trailing earnings yields are volatile, we use smoother five-year average earnings.

[21]We do not use geometric averages but rather a closely related procedure proposed in Fama and French [2002]. We reduce arithmetic averages by half the variance difference

between the earnings growth rate and dividend growth rate.

[22]The simple approach we use captures both the past average as an anchor and the varying sensitivity of future expectations to current inflation; this sensitivity increased during the 20th century once inflation became more persistent. We explored other inflation forecasting models with yield and growth indicators. The results were not robust, perhaps because forecasting decade-ahead developments leaves us with few independent observations.

[23]War-related inflations had typically been temporary before the First World War. More generally, inflation had not been persistent in the past, so investors had little reason to raise long-run inflation expectations sky-high (and would have been right, as a deflation soon followed). The 5% cap actually may be too high, given that the 1800s experienced mild net deflation, and given that bond yields stayed below 5% through the 1915–1918 period.

[24]Our proxy series and the consensus forecast are closely related during the overlapping period, and there is no large jump when moving from one series to another.

[25]As we have noted, even these yields are subject to debate about the impact of share buy-backs on dividend yields and about the appropriate Treasury maturity. Our current D/P estimate of 3.0% in Exhibit 12 is especially high, virtually double the raw number. This high level is partly offset in the equity-bond premium by our use of the 30-year Treasury yield (1 percentage point higher than the 10-year yield).

[26]Our analysis ends in mid-2002, but even during the third-quarter 2002 equity sell-off the dividend yield rose only to 2%. The long duration of equities means that feasible returns rise painfully slowly; a 15%–20% price decline may increase the feasible long-term return by about 0.5 percentage point. Yet the 1% fall in long-term Treasury yields in the third quarter had a greater impact on the equity-bond premium, raising our estimate to nearly 4 percentage points. Greater attractiveness versus bonds can benefit equities in the near term, but a wide cushion does not make the absolute level of feasible equity return any higher. It is unclear whether absolute or relative return prospects matter more.

Further disinflation or yield declines are unlikely to boost P/E ratios, because they likely would reflect bad deflation. Moreover, there appears little chance that the late-1990s growth optimism, exuberant sentiment, and risk tolerance will reappear any time soon. Observed empirical patterns (mean reversion, low payout rates) point rather to lower P/E multiples in the future. A cyclical upturn supported by easy monetary policy can of course raise equity valuations and realized returns over a shorter horizon.

[27]Siegel [1999] and Carlson, Pelz, and Wohar [2002] review these arguments. Jones [2002] provides specific evidence of falling trading costs during the past century and notes that the gross equity premium may have fallen by 1 percentage point as a result.

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