Some existing firms go out of business while new firms are created. For considering the return on a given fraction of the entire outstanding traded stock, it is necessary to include the negative cash flow associated with additional traded companies. The direct cash flow of IPO's that are previously owned by individuals is such a negative cash flow. In addition, the value retained by the original owners also represents a dilution in the value of existing shareholders and also needs to be counted. Thus actual cash flow for new firms that were previously private needs to be increased by a multiplier – with 3 being a reasonable estimate. However, the analysis is different for new companies that are spin-offs from existing firms. The cash flow paid for them is a negative cash flow for shareholders as a whole. However, there is no need for a multiplier since the value of retained shares by corporations is retained by the aggregate of current shareholders. Thus there is a need to separate out these two types of IPO's. I have not seen an estimate separating these two parts.

In the methodology used in my previous paper, these various steps, along with any divergence of the current position from a steady state, were combined to produce a range of values referred to as adjusted dividend flow. In Table 1 are the implied ratios of stock market value to GDP at the end of the 75-year projection period based on stock market and GDP values at the end of 1998 and the assumptions in the 1999 Trustees' Report as well as values at the end of 2000 and end of the first quarter of 2001 and the assumptions in the 2001 Trustees' Report. The Table suggests that the 7 percent assumption throughout the next 75 years is not plausible in that it requires a rise in stock values to GDP that is implausible. The level of implausibility is not quite as high as two years ago, but it is still implausible. A sensitivity analysis is presented in Table 2 that varies the growth rate of GDP. Moderate increases in GDP growth above the levels assumed in the Trustees' Report still leave a 7% return throughout the next 75 years implausible.

Table 3 presents the size of the real drop in stock market values over the next ten years that are sufficient for the Gordon formula to yield a steady return of 7 percent thereafter (along with calculations for 6.5 and 6.0). Poor returns over the next ten years are needed for consistency with a higher ultimate long-run number, almost as poor as two years ago, for a given adjusted dividend level. Table 4 presents sensitivity analysis.

An important issue is whether it is more plausible to have a poor short-run return followed by a return to historic yields or to believe that the long-run ultimate return has dropped. Given the rest of the assumptions used by OCACT (particularly the assumption of a 3% real yield on long-term Treasuries), that is tantamount to a drop in the equity premium. I think many investors are not expecting as low a return as would be called for by the assumption that we are now in a steady state. Therefore, I continue to think a poor return over the next decade is a more plausible assumption. It seems sensible to lower the long-run return a little from the 7% historic norm in recognition of the unusually long period of very high returns that we have experienced (although one can wonder what would have happened in the late 20's and early 30's if Alan Greenspan had headed the Fed). Moreover, since it is impossible to predict timing of market corrections and it is sensible to work with a single rate of return for projection purposes, a lower rate of return is appropriate to correct for a period of lower returns even if the correction scenario returning all the way to 7% is right. Thus projection values around 6.0% or 6.5% seem to me appropriate for projection purposes. Of course, a wider band is important for high and low cost projections in order to show the extreme uncertainty associated with such a projection.

Table 1

Projections of the Ratio of Stock Market Value
To GDP Assuming 7 Percent Real Return

End of 1998 Projections

	Adjusted Dividends			
	2.0%	2.5%	3.0%	3.5%
2073 Market to GDP	68.49	58.32	48.16	38.00
Ratio 2073 to Current	37.76	32.15	26.55	20.95

End of 2000 Projections

	Adjusted Dividends			
	2.0%	2.5%	3.0%	3.5%
2075 Market to GDP	44.93	37.73	30.54	23.34
Ratio 2075 to Current	26.47	22.23	17.99	13.75

End of First Quarter 2001 Projections

	Adjusted Dividends			
	2.0%	2.5%	3.0%	3.5%
2075 Market to GDP	39.54	33.29	27.03	20.77
Ratio 2075 to Current	26.81	22.57	18.33	14.08

Table 2

Projections of the Ratio of Stock Market Value To GDP Assuming 7 Percent Real Return

End of First Quarter 2001 Projections

	Adjusted Dividends 2.0%	2.5%	3.0%	3.5%
Under Current Projections				
2075 Market to GDP	39.54	33.29	27.03	20.77
Ratio 2075 to Current	26.81	22.57	18.33	14.08
GDP Growth 0.1% Higher				
2075 Market to GDP	36.34	30.43	24.51	18.60
Ratio 2075 to Current	24.64	20.63	16.62	12.61
GDP Growth 0.3% Higher				
2075 Market to GDP	30.65	25.37	20.08	14.79
Ratio 2075 to Current	20.78	17.20	13.61	10.02
GDP Growth 0.5% Higher				
2075 Market to GDP	25.81	21.07	16.34	11.60
Ratio 2075 to Current	17.50	14.29	11.08	7.86

*Assuming 7% stock yield, and using 2001 trustees projections.
** Using Estimated Market Value for April 1, 2001.

Table 3

Required Percentage Decline in Real Stock Prices Over the Following Ten Years To Justify a 7.0, 6.5, and 6.0 Percent Return Thereafter (end 1998)

Adjusted Dividend Yield	Long-run Return 7.0	6.5	6.0
2.0	55	51	45
2.5	44	38	31
3.0	33	26	18
3.5	21	13	4

Required Percentage Decline in Real Stock Prices Over the Following Ten Years To Justify a 7.0, 6.5, and 6.0 Percent Return Thereafter (end 2000)

Adjusted Dividend Yield	Long-run Return 7.0	6.5	6.0
2.0	53	48	42
2.5	41	35	28
3.0	29	22	13
3.5	17	9	-1

Source: Author's Calculations

Note: Derived from the Gordon Formula. Dividends are assumed to grow in line with GDP, which the OCACT assumed in 1999 is 2.0 percent over the next 10 years and 1.5 percent for the long run; and in 2001, 2.3 percent and then 1.6 percent.

Table 4

Required Percentage Decline in Real Stock Prices Over the Next Ten Years To Justify a 7.0, 6.5, and 6.0 Percent Return Thereafter (end 2000)

Under Current Projections

Adjusted Dividend Yield	Long-run Return 7.0	6.5	6.0
2.0	53	48	42
2.5	41	35	28
3.0	29	22	13
3.5	17	9	-1

GDP Growth 0.3% Higher Each Year

Adjusted Dividend Yield	Long-run Return 7.0	6.5	6.0
2.0	48	43	36
2.5	35	28	20
3.0	23	14	4
3.5	10	0	-12

Source: Author's Calculations

Note: Derived from the Gordon Formula. Dividends are assumed to grow in line with GDP, which the OACT assumes is 2.3 percent over the next 10 years. For long-run GDP growth, the OACT assumes 1.6 percent.

What Stock Market Returns to Expect for the Future?

Peter A. Diamond

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High stock prices, together with projected slow economic growth, are not consistent with the 7.0 percent return that the Office of the Chief Actuary has generally used when evaluating proposals with stock investments. Routes out of the inconsistency include assuming higher GDP growth, a lower long-run stock return, or a lower short-run stock return with a 7.0 percent return on a lower base thereafter. In short, either the stock market is overvalued and requires a correction to justify a 7.0 percent return thereafter, or it is correctly valued and the long-run return is substantially lower than 7.0 percent (or some combination of the two). This article argues that the former view is more convincing, since accepting the "correctly valued" hypothesis implies an implausibly small equity premium.

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I. Summary

In evaluating proposals for reforming Social Security that involve stock investments, the Office of the Chief Actuary (OCACT) has generally used a 7.0 percent real return for stocks. The 1994-96 Advisory Council specified that OCACT should use that return in making its 75-year projections of investment-based reform proposals. The assumed ultimate real return on Treasury bonds of 3.0 percent implies a long-run equity premium of 4.0 percent. There are two equity-premium concepts: the *realized* equity premium, which is measured by the actual rates of return; and the *required* equity premium, which investors expect to receive for being willing to hold available stocks and bonds. Over the past two centuries, the realized premium was 3.5 percent on average, but 5.2 percent for 1926 to 1998.

Some critics argue that the 7.0 percent projected stock returns are too high. They base their arguments on recent developments in the capital market, the current high value of the stock market, and the expectation of slower economic growth.

Increased use of mutual funds and the decline in their costs suggest a lower required premium, as does the rising fraction of the American public investing in stocks. The size of the decrease is limited, however, because the largest cost savings do not apply to the very wealthy and to large institutional investors, who hold a much larger share of the stock market's total value than do new investors. These trends suggest a lower equity premium for projections than the 5.2 percent of the past 75 years. Also, a declining required premium is likely to imply a temporary increase in the realized premium because a rising willingness to hold stocks tends to increase their price. Therefore, it would be a mistake during a transition period to extrapolate what may be a temporarily high realized return. In the standard (Solow) economic growth model, an assumption of slower long-run growth lowers the marginal product of capital if the savings rate is constant. But lower savings as growth slows should partially or fully offset that effect.

The present high stock prices, together with projected slow economic growth, are not consistent with a 7.0 percent return. With a plausible level of adjusted dividends (dividends plus net share repurchases), the ratio of stock value to gross domestic product (GDP) would rise more than 20-fold over 75 years. Similarly, the steady-state Gordon formula—that stock returns equal the adjusted dividend yield plus the growth rate of stock prices (equal to that of GDP)—suggests a return of roughly 4.0 percent to 4.5 percent. Moreover, when relative stock values have been high, returns over the following decade have tended to be low.

To eliminate the inconsistency posed by the assumed 7.0 percent return, one could assume higher GDP growth, a lower long-run stock return, or a lower short-run stock return with a 7.0 percent return on a lower base thereafter. For example, with an adjusted dividend yield of 2.5 percent to 3.0 percent, the market would have to decline about 35 percent to 45 percent in real terms over the next decade to reach steady state.

In short, either the stock market is overvalued and requires a correction to justify a 7.0 percent return thereafter, or it is correctly valued and the long-run return is substantially lower than 7.0 percent (or some combination). This article argues that the "overvalued" view is more convincing, since the "correctly valued" hypothesis implies an implausibly small equity premium. Although OCACT could adopt a lower rate for the entire 75-year period, a better approach would be to assume lower returns over the next decade and a 7.0 percent return thereafter.

II. Introduction

All three proposals of the 1994-96 Advisory Council on Social Security (1997) included investment in equities. For assessing the financial effects of those proposals, the Council members agreed to specify a 7.0 percent long-run real (inflation-adjusted) yield from stocks.[1] They devoted little attention to different short-run returns from stocks.[2] The Social Security Administration's Office of the Chief Actuary (OCACT) used this 7.0 percent return, along with a 2.3 percent long-run real yield on Treasury bonds, to project the impact of the Advisory Council's proposals.

Since then, OCACT has generally used 7.0 percent when assessing other proposals that include equities.[3] In the 1999 Social Security Trustees Report, OCACT used a higher long-term real rate on Treasury bonds of 3.0 percent.[4] In the first 10 years of its projection period, OCACT makes separate assumptions about bond rates for each year and assumes slightly lower real rates in the short run.[5] Since the assumed bond rate has risen, the assumed equity premium, defined as the difference between yields on equities and Treasuries, has declined to 4.0 percent in the long run.[6] Some critics have argued that the assumed return on stocks and the resulting equity premium are still too high.[7]

This article examines the critics' arguments and, rather than settling on a single recommendation, considers a range of assumptions that seem reasonable.[8] The article:

- Reviews the historical record on rates of return,
- Assesses the critics' reasons why future returns may be different from those in the historical record and examines the theory about how those rates are determined, and
- Considers two additional issues: the difference between gross and net returns, and investment risk.

Readers should note that in this discussion, a decline in the equity premium need not be associated with a decline in the return on stocks, since the return on bonds could increase. Similarly, a decline in the return on stocks need not be associated with a decline in the equity premium, since the return on bonds could also decline. Both rates of return and the equity premium are relevant to choices about Social Security reform.

III. Historical Record

Realized rates of return on various financial instruments have been much studied and are presented in Table 1.[9] Over the past 200 years, stocks have produced a real return of 7.0 percent per year. Even though annual returns fluctuate enormously, and rates vary significantly over periods of a decade or two, the return on stocks over very long periods has been quite stable (Siegel 1999).[10] Despite that long-run stability, great uncertainty surrounds both a projection for any particular period and the relevance of returns in any short period of time for projecting returns over the long run.

The equity premium is the difference between the rate of return on stocks and on an alternative asset—Treasury bonds, for the purpose of this article. There are two concepts of equity premiums. One is the *realized* equity premium, which is measured by the actual rates of return. The other is the *required* equity premium, which equals the premium that investors expect to get in exchange for holding available quantities of assets. The two concepts are closely related but different—significantly different in some circumstances.

The realized equity premium for stocks relative to bonds has been 3.5 percent for the two centuries of available data, but it has increased over time (Table 2).[11, 12] That increase has resulted

Table 1.
Compound annual real returns, by type of investment, 1802-1998 (in percent)

Period	Stocks	Bonds	Bills	Gold	Inflation
1802-1998	7.0	3.5	2.9	-0.1	1.3
1802-1870	7.0	4.8	5.1	0.2	0.1
1871-1925	6.6	3.7	3.2	-0.8	0.6
1926-1998	7.4	2.2	0.7	0.2	3.1
1946-1998	7.8	1.3	0.6	-0.7	4.2

Source: Siegel (1999).

Table 2.
Equity premiums: Differences in annual rates of return between stocks and fixed-income assets, 1802-1998

	Equity premium (percent)	
Period	With bonds	With bills
1802-1998	3.5	5.1
1802-1870	2.2	1.9
1871-1925	2.9	3.4
1926-1998	5.2	6.7
1946-1998	6.5	7.2

Source: Siegel (1999).

from a significant decline in bond returns over the past 200 years. The decline is not surprising considering investors' changing perceptions of default risk as the United States went from being a less-developed country (and one with a major civil war) to its current economic and political position, where default risk is seen to be virtually zero.[13]

These historical trends can provide a starting point for thinking about what assumptions to use for the future. Given the relative stability of stock returns over time, one might initially choose a 7.0 percent assumption for the return on stocks—the average over the entire 200-year period. In contrast, since bond returns have tended to decline over time, the 200-year number does not seem to be an equally good basis for selecting a long-term bond yield. Instead, one might choose an assumption that approximates the experience of the past 75 years—2.2 percent, which suggests an equity premium of around 5.0 percent. However, other evidence, discussed below, argues for a somewhat lower value.[14]

IV. Why Future Returns May Differ From Past Returns

Equilibrium and Long-Run Projected Rates of Return

The historical data provide one way to think about rates of return. However, thinking about how the future may be different from the past requires an underlying theory about how those returns are determined. This section lists some of the actions by investors, firms, and government that combine to determine equilibrium; it can be skipped without loss of continuity.

In asset markets, the demand by individual and institutional investors reflects a choice among purchasing stocks, purchasing Treasury bonds, and making other investments.[15] On the supply side, corporations determine the supplies of stocks and corporate bonds through decisions on dividends, new issues, share repurchases, and borrowing. Firms also choose investment levels. The supplies of Treasury bills and bonds depend on the government's budget and debt management policies as well as monetary policy. Whatever the supplies of stocks and bonds, their prices will be determined so that the available amounts are purchased and held by investors in the aggregate.

The story becomes more complicated, however, when one recognizes that investors base decisions about portfolios on their projections of both future prices of assets and future dividends.[16] In addition, market participants need to pay transactions costs to invest in assets, including administrative charges, brokerage commissions, and the bid-ask spread. The risk premium relevant for investors' decisions should be calculated net of transactions costs. Thus, the greater cost of investing in equities than in Treasuries must be factored into any discussion of the equity premium.[17] Differences in tax treatments of different types of income are also relevant (Gordon 1985; Kaplow 1994).

In addition to determining the supplies of corporate stocks and bonds, corporations also choose a debt/equity mix that affects the risk characteristics of both bonds and stocks. Financing a given level of investment more by debt and less by equity leaves a larger interest cost to be paid from the income of corporations before determining dividends. That makes both the debt and the equity more risky. Thus, changes in the debt/equity mix (possibly in response to prevailing stock market prices) should affect risk and, therefore, the equilibrium equity premium.[18]

Since individuals and institutions are generally risk averse when investing, greater expected variation in possible future yields tends to make an asset less valuable. Thus, a sensible expectation about long-run equilibrium is that the expected yield on equities will exceed that on Treasury bonds. The question at hand is how much more stocks should be expected to yield.[19] That is, assuming that volatility in the future will be roughly similar to volatility in the past, how much more of a return from stocks would investors need to expect in order to be willing to hold the available supply of stocks. Unless one thought that stock market volatility would collapse, it seems plausible that the premium should be significant. For example, equilibrium with a premium of 70 basis points (as suggested by Baker 1999a) seems improbable, especially since transactions costs are higher for stock than for bond investments. In considering this issue, one needs to recognize that a greater willingness to bear the risk associated with stocks is likely to be accompanied by greater volatility of stock prices if bond rates are unchanged. That is, fluctuations in expected growth in corporate profits will have bigger impacts on expected discounted returns (which approximate prices) when the equity premium, and so the discount rate, is lower.[20]

Although stocks should earn a significant premium, economists do not have a fully satisfactory explanation of why stocks have yielded so much more than bonds historically, a fact that has been called the equity-premium puzzle (Mehra and Prescott 1985; Cochrane 1997). Ongoing research is trying to develop more satisfactory explanations, but the theory still has inadequacies.[21] Nevertheless, to explain why the future may be different from the past, one needs to rely on some theoretical explanation of the past in order to have a basis for projecting a different future.

Commentators have put forth three reasons as to why future returns may be different from those in the historical record. First, past and future long-run trends in the capital market may imply a decline in the equity premium. Second, the current valuation of stocks, which is historically high relative to various benchmarks, may signal a lower future rate of return on equities. Third, the projection of slower economic growth may suggest a lower long-run marginal product of capital, which is the source of returns to financial assets. The first two issues are discussed in the context of financial markets; the third, in the context of physical assets. One should distinguish between arguments that suggest a lower equity premium and those that suggest lower returns to financial assets generally.

Equity Premium and Developments in the Capital Market

The capital market has experienced two related trends—the decrease in the cost of acquiring a diversified portfolio of stocks and the spread of stock ownership more widely in the economy. The relevant equity premium for investors is the equity premium net of the costs of investing. Thus, if the cost of investing in some asset decreases, that asset should have a higher price and a lower expected return gross of investment costs. The availability of mutual funds and the decrease in the cost of purchasing them should lower the equity premium in the future relative to long-term historical values. Arguments have also been raised about investors' time horizons and their understanding of financial markets, but the implications of those arguments are less clear.

Mutual Funds. In the absence of mutual funds, small investors would need to make many small purchases in different companies in order to acquire a widely diversified portfolio. Mutual funds provide an opportunity to acquire a diversified portfolio at a lower cost by taking advantage of the economies of scale in investing. At the same time, these funds add another layer of intermediation, with its costs, including the costs of marketing the funds.

Nevertheless, as the large growth of mutual funds indicates, many investors find them a valuable way to invest. That suggests that the equity premium should be lower in the future than in the past, since greater diversification means less risk for investors. However, the significance of the growth of mutual funds depends on the importance in total equity demand of "small" investors who purchase them, since this argument is much less important for large investors, particularly large institutional investors. According to recent data, mutual funds own less than 20 percent of U.S. equity outstanding (Investment Company Institute 1999).

A second development is that the average cost of investing in mutual funds has decreased. Rea and Reid (1998) report a drop of 76 basis points (from 225 to 149) in the average annual charge of equity mutual funds from 1980 to 1997. They attribute the bulk of the decline to a decrease in the importance of front-loaded funds (funds that charge an initial fee when making a deposit in addition to annual charges). The development and growth of index funds should also reduce costs, since index funds charge investors considerably less on average than do managed funds while doing roughly as well in gross rates of return. In a separate analysis, Rea and Reid (1999) also report a decline of 38 basis points (from 154 to 116) in the cost of bond mutual funds over the same period, a smaller drop than with equity mutual funds. Thus, since the cost of stock funds has fallen more than the cost of bond funds, it is plausible to expect a decrease in the equity premium relative to historical values. The importance of that decline is limited, however, by the fact that the largest cost savings do not apply to large institutional investors, who have always faced considerably lower charges.

A period with a declining required equity premium is likely to have a temporary increase in the realized equity premium. Assuming no anticipation of an ongoing trend, the divergence occurs because a greater willingness to hold stocks, relative to bonds, tends to increase the price of stocks. Such a price rise may yield a realized return that is higher than the required return.[22] The high realized equity premium since World War II may be partially caused by a decline in the required equity premium over that period. During such a transition period, therefore, it would be a mistake to extrapolate what may be a temporarily high realized return.

Spread of Stock Ownership. Another trend that would tend to decrease the equity premium is the rising fraction of the American public investing in stocks either directly or indirectly through mutual funds and retirement accounts (such as 401(k) plans). Developments in tax law, pension provision, and the capital markets have expanded the base of the population who are sharing in the risks associated with the return to corporate stock. The share of households investing in stocks in any form increased from 32 percent in 1989 to 41 percent in 1995 (Kennickell, Starr-McCluer, and Sundén 1997). Numerous studies have concluded that widening the pool of investors sharing in stock market risk should lower the equilibrium risk premium (Mankiw and Zeldes 1991; Brav and Geczy 1996; Vissing-Jorgensen 1997; Diamond and Geanakoplos 1999; Heaton and Lucas 2000). The importance of that trend must be weighted by the low size of investment by such new investors.[23]

Investors' Time Horizons. A further issue relevant to the future of the equity premium is whether the time horizons of investors, on average, have changed or will change.[24] Although the question of how time horizons should affect demands for assets raises subtle theoretical issues (Samuelson 1989), longer horizons and sufficient risk aversion should lead to greater willingness to hold stocks given the tendency for stock prices to revert toward their long-term trend (Campbell and Viceira 1999).[25]

The evidence on trends in investors' time horizons is mixed. For example, the growth of explicit individual retirement savings vehicles, such as individual retirement accounts (IRAs) and 401(k)s, suggests that the average time horizons of individual investors may have lengthened. However, some of that growth is at the expense of defined benefit plans, which may have longer horizons. Another factor that might suggest a longer investment horizon is the increase in equities held by institutional investors, particularly through defined benefit pension plans. However, the relevant time horizon for such holdings may not be the open-ended life of the plan but rather the horizon of the plans' asset managers, who may have career concerns that shorten the relevant horizon.

Other developments may tend to lower the average horizon. Although the retirement savings of baby boomers may currently add to the horizon, their aging and the aging of the population generally will tend to shorten horizons. Finally, individual stock ownership has become less concentrated (Poterba and Samwick 1995), which suggests a shorter time horizon because less wealthy investors might be less concerned about passing assets on to younger generations. Overall, without detailed calculations that would go beyond the scope of this article, it is not clear how changing time horizons should affect projections.

Investors' Understanding. Another factor that may affect the equity premium is investors' understanding of the properties of stock and bond investments. The demand for stocks might be affected by the popular presentation of material, such as Siegel (1998), explaining to the general public the difference between short- and long-run risks. In particular, Siegel highlights the risks, in real terms, of holding nominal bonds. While the creation of inflation-indexed Treasury bonds might affect behavior, the lack of wide interest in those bonds (in both the United States and the United Kingdom) and the failure to fully adjust future amounts for inflation generally (Shafir, Diamond, and Tversky 1997) suggest that nominal bonds will continue to be a major part of portfolios. Perceptions that those bonds are riskier than previously believed would then tend to decrease the required equity premium.

Popular perceptions may, however, be excessively influenced by recent events—both the high returns on equity and the low rates of inflation. Some evidence suggests that a segment of the public generally expects recent rates of increase in the prices of assets to continue, even when those rates seem highly implausible for a longer term (Case and Shiller 1988). The possibility of such extrapolative expectations is also connected with the historical link between stock prices and inflation. Historically, real stock prices have been adversely affected by inflation in the short run. Thus, the decline in inflation expectations over the past two decades would be associated with a rise in real stock prices if the historical pattern held. If investors and analysts fail to consider such a connection, they might expect robust growth in stock prices to continue without recognizing that further declines in inflation are unlikely. Sharpe (1999) reports evidence that stock analysts' forecasts of real growth in corporate earnings include extrapolations that may be implausibly high. If so, expectations of continuing rapid growth in stock prices suggest that the required equity premium may not have declined.

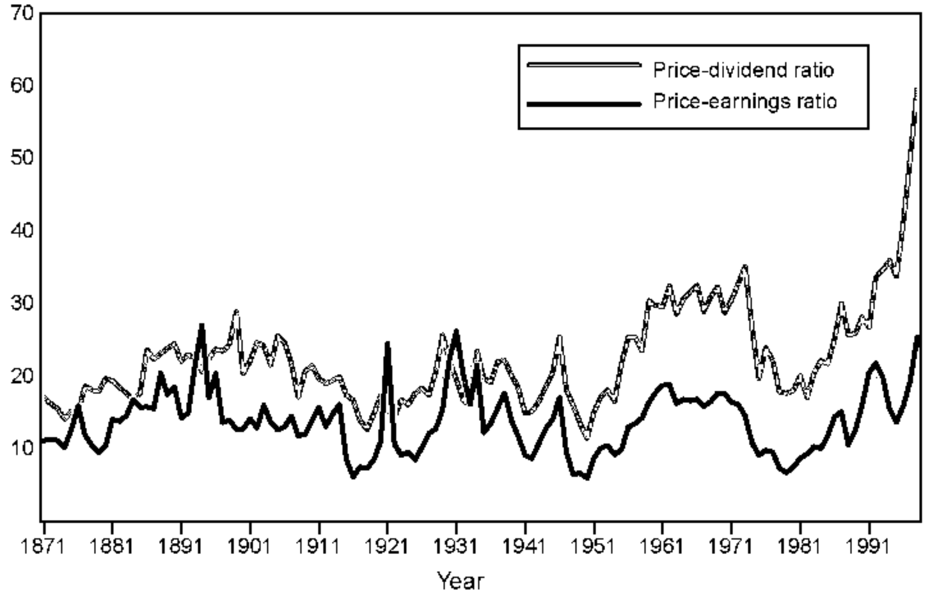
On balance, the continued growth and development of mutual funds and the broader participation in the stock market should contribute to a drop in future equity premiums relative to the historical premium, but the drop is limited.[26] Other factors, such as investors' time horizons and understanding,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

Equity Premium and Current Market Values

At present, stock prices are very high relative to a number of different indicators, such as earnings, dividends, book values, and gross domestic product (GDP) (Charts 1 and 2). Some critics, such as Baker (1998), argue that this high market value, combined with projected slow economic growth, is not consistent with a 7.0 percent return. Possible implications of the high prices have also been the subject of considerable discussion in the finance community (see, for example, Campbell and Shiller 1998; Cochrane 1997; Philips 1999; and Siegel 1999).

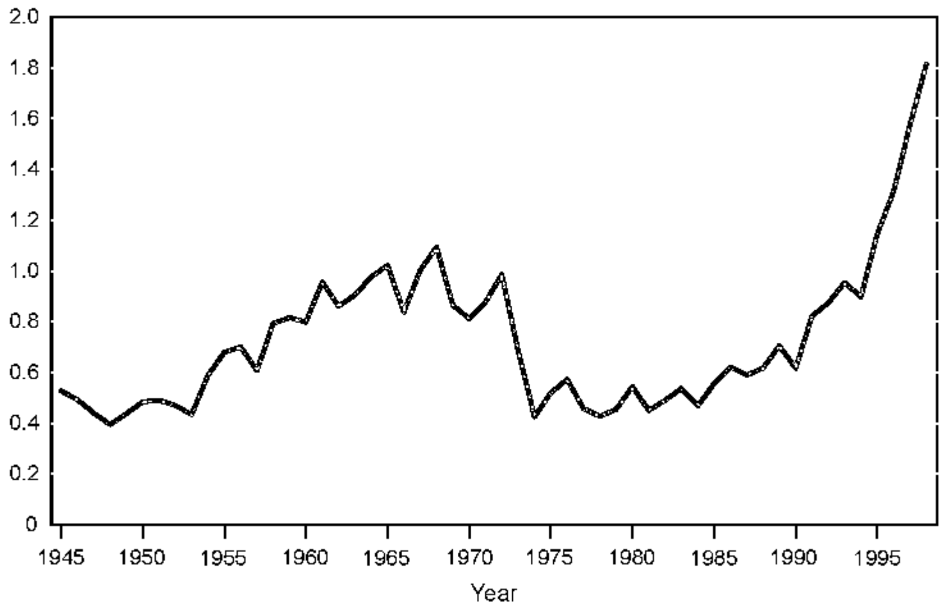
The inconsistency of current share prices and 7.0 percent real returns, given OCACT's assumptions for GDP growth, can be illustrated in two ways. The first way is to project the ratio of the stock market's value to GDP, starting with today's values and given assumptions about the future. The second way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

Chart 1.
Price-dividend ratio and price-earnings ratio, 1871-1998



Source: Robert Shiller, Yale University. Available at www.econ.yale.edu/~shiller/data/chapt26.html.
Note: These ratios are based on Standard and Poor's Composite Stock Price Index.

Chart 2.
Ratio of market value of stocks to gross domestic product,1945-1998



Source: Bureau of Economic Analysis data from the national income and product accounts and federal flow of funds.

The first calculation requires assumptions for stock returns, adjusted dividends (dividends plus net share repurchases),[27] and GDP growth. For stock returns, the 7.0 percent assumption is used. For GDP growth rates, OCACT's projections are used. For adjusted dividends, one approach is to assume that the ratio of the aggregate adjusted dividend to GDP would remain the same as the current level. However, as discussed in the accompanying box, the current ratio seems too low to use for projection purposes. Even adopting a higher, more plausible level of adjusted dividends, such as 2.5 percent or 3.0 percent, leads to an implausible rise in the ratio of stock value to GDP—in this case, a more than 20-fold increase over the next 75 years. The calculation derives each year's capital gains by subtracting projected adjusted dividends from the total cash flow to shareholders needed to return 7.0 percent on that year's share values. (See Appendix A for an alternative method of calculating this ratio using a continuous-time differential equation.)

A second way to consider the link between stock market value, stock returns, and GDP is to look at a steady-state relationship. The Gordon formula says that stock returns equal the ratio of adjusted dividends to prices (or the adjusted dividend yield) plus the growth rate of stock prices.[28] In a steady state, the growth rate of prices can be assumed to equal that of GDP. Assuming an adjusted dividend yield of roughly 2.5 percent to 3.0 percent and projected GDP growth of 1.5 percent, the Gordon equation implies a stock return of roughly 4.0 percent to 4.5 percent, not 7.0 percent. Those lower values would imply an equity premium of 1.0 percent to 1.5 percent, given OCACT's assumption of a 3.0 percent yield on Treasury bonds. Making the equation work with a 7.0 percent stock return, assuming no change in projected GDP growth, would require an adjusted dividend yield of roughly 5.5 percent—about double today's level.[29]

For such a large jump in the dividend yield to occur, one of two things would have to happen—adjusted dividends would have to grow much more rapidly than the economy, or stock prices would have to grow much less rapidly than the economy (or even decline). But a consistent projection would take a very large jump in adjusted dividends, assuming that stock prices grew along with GDP starting at today's value. Estimates of recent values of the adjusted dividend yield range from 2.10 percent to 2.55 percent (Dudley and others 1999; Wadhwani 1998).[30]

Even with reasons for additional growth in the dividend yield, which are discussed in the box on projecting future dividends, an implausible growth of adjusted dividends is needed if the short- and long-term returns on stocks are to be 7.0 percent. Moreover, historically, very low values of the dividend yield and earnings-price ratio have been followed primarily by adjustments in stock prices, not in dividends and earnings (Campbell and Shiller 1998).

If the ratio of aggregate adjusted dividends to GDP is unlikely to change substantially, there are three ways out of the internal inconsistency between the market's current value and OCACT's assumptions for economic growth and stock returns. One can:

- Assume higher GDP growth, which would decrease the implausibility of the calculations described above for either the ratio of market value to GDP or the steady state under the Gordon equation. (The possibility of more rapid GDP growth is not explored further in this article.[31])

Projecting Future Adjusted Dividends

This article uses the concept of adjusted dividends to estimate the dividend yield. The adjustment begins by adding the value of net share repurchases to actual dividends, since that also represents a cash flow to stockholders in aggregate. A further adjustment is then made to reflect the extent to which the current situation might not be typical of the relationship between dividends and gross domestic product (GDP) in the future. Three pieces of evidence suggest that the current ratio of dividends to GDP is abnormally low and therefore not appropriate to use for projection purposes.

First, dividends are currently very low relative to corporate earnings—roughly 40 percent of earnings compared with a historical average of 60 percent. Because dividends tend to be much more stable over time than earnings, the dividend-earnings ratio declines in a period of high growth of corporate earnings. If future earnings grow at the same rate as GDP, dividends will probably grow faster than GDP to move toward the historical ratio.[1] On the other hand, earnings, which are high relative to GDP, might grow more slowly than GDP. But then, corporate earnings, which have a sizable international component, might grow faster than GDP.

Second, corporations are repurchasing their outstanding shares at a high rate. Liang and Sharpe (1999) report on share repurchases by the 144 largest (nonbank) firms in the Standard and Poor's 500. From 1994 to 1998, approximately 2 percent of share value was repurchased, although Liang and Sharpe anticipate a lower value in the future. At the same time, those firms were issuing shares because employees were exercising stock options at prices below the share values, thus offsetting much of the increase in the number of shares outstanding. Such transfers of net wealth to employees presumably reflect past services. In addition, initial public offerings (IPOs) represent a negative cash flow from stockholders as a whole. Not only the amount paid for stocks but also the value of the shares held by insiders represents a dilution relative to a base for long-run returns on all stocks. As a result, some value needs to be added to the current dividend ratio to adjust for net share repurchases, but the exact amount is unclear. However, in part, the high rate of share repurchase may be just another reflection of the low level of dividends, making it inappropriate to both project much higher dividends in the near term and assume that all of the higher share repurchases will continue. Exactly how to project current numbers into the next decade is not clear.

Finally, projected slow GDP growth, which will plausibly lower investment levels, could be a reason for lower retained earnings in the future. A stable level of earnings relative to GDP and lower retained earnings would increase the ratio of adjusted dividends to GDP.[2]

In summary, the evidence suggests using an "adjusted" dividend yield that is larger than the current level. Therefore, the illustrative calculations in this article use adjusted dividend yields of 2.0 percent, 2.5 percent, 3.0 percent, and 3.5 percent. (The current level of dividends without adjustment for share repurchases is between 1.0 percent and 2.0 percent.)

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[1] For example, Baker and Weisbrot (1999) appear to make no adjustment for share repurchases or for current dividends being low. However, they use a dividend payout of 2.0 percent, while Dudley and others (1999) report a current dividend yield on the Wilshire 5000 of 1.3 percent.

[2] Firms might change their overall financing package by changing the fraction of net earnings they retain. The implications of such a change would depend on why they were making it. A long-run decrease in retained earnings might merely be increases in dividends and borrowing, with investment held constant. That case, to a first approximation, is another application of the Modigliani-Miller theorem, and the total stock value would be expected to fall by the decrease in retained earnings. Alternatively, a change in retained earnings might signal a change in investment. Again, there is ambiguity. Firms might be retaining a smaller fraction of earnings because investment opportunities were less attractive or because investment had become more productive. These issues tie together two parts of the analysis in this article. If slower growth is associated with lower investment that leaves the return on capital relatively unchanged, then what financial behavior of corporations is required for consistency? Baker (1999b) makes such a calculation; it is not examined here.

• Adopt a long-run stock return that is considerably less than 7.0 percent.

• Lower the rate of return during an intermediate period so that a 7.0 percent return could be applied to a lower market value base thereafter.

A combination of the latter two alternatives is also possible.

In considering the prospect of a near-term market decline, the Gordon equation can be used to compute the magnitude of the drop required over, for example, the next 10 years in order for stock returns to average 7.0 percent over the remaining 65 years of OCACT's projection period (see Appendix B). A long-run return of 7.0 percent would require a drop in real prices of between 21 percent and 55 percent, depending on the assumed value of adjusted dividends (Table 3).[32] That calculation is relatively sensitive to the assumed rate of return—for example, with a long-run return of 6.5 percent, the required drop in the market falls to a range of 13 percent to 51 percent.[33]

The two different ways of restoring consistency—a lower stock return in all years or a near-term decline followed by a return to the historical yield—have different implications for Social Security finances. To illustrate the difference, consider the contrast between a scenario with a steady yield of 4.25 percent derived by using current values for the Gordon equation as described above (the steady-state scenario) and a scenario in which stock prices drop by half immediately and the yield on stocks is 7.0 percent thereafter (the market-correction scenario).[34] First, dollars newly invested in the future (that is, after any drop in share prices) earn only 4.25 percent per year under the steady-state scenario, compared with 7.0 percent per year under the market-correction scenario. Second, even for dollars currently in the market, the long-run yield differs under the two scenarios when the returns on stocks are being reinvested.

Under the steady-state scenario, the yield on dollars currently in the market is 4.25 percent per year over any projected time period; under the market-correction scenario, the annual rate of return depends on the time horizon used for the calculation.[35] After one year, the latter scenario has a rate of return of –46 percent. By the end of 10 years, the annual rate of return with the latter scenario is –0.2 percent; by the end of 35 years, 4.9 percent; and by the end of 75 years, 6.0 percent. Proposals for Social Security generally envision a gradual buildup of stock investments, which suggests that those investments would fare better under the market-correction scenario. The importance of the difference between scenarios depends also on the choice of additional changes to Social Security, which affect how long the money can stay invested until it is needed to pay benefits.

Given the different impacts of these scenarios, which one is more likely to occur? The key issue is whether the current stock market is overvalued in the sense that rates of return are likely to be lower in the intermediate term than in the long run. Economists have divergent views on this issue.

Table 3.
Required percentage decline in real stock prices over the next 10 years to justify a return of 7.0, 6.5, and 6.0 percent thereafter

	Percentage decline to justify a long-run return of—		
Adjusted dividend yield	7.0	6.5	6.0
2.0	55	51	45
2.5	44	38	31
3.0	33	26	18
3.5	21	13	4

Source: Author's calculations.
Note: Derived from the Gordon formula. Dividends are assumed to grow in line with gross domestic product (GDP), which the Office of the Chief Actuary (OCACT) assumes is 2.0 percent over the next 10 years. For long-run GDP growth, OCACT assumes 1.5 percent.

One possible conclusion is that current stock prices signal a significant drop in the long-run required equity premium. For example, Glassman and Hassett (1999) have argued that the equity premium will be dramatically lower in the future than it has been in the past, so that the current market is not overvalued in the sense of signaling lower returns in the near term than in the long run.[36] Indeed, they even raise the possibility that the market is "undervalued" in the sense that the rate of return in the intermediate period will be higher than in the long run, reflecting a possible continuing decline in the required equity premium. If their view is right, then a 7.0 percent long-run return, together with a 4.0 percent equity premium, would be too high.

Others argue that the current stock market values include a significant price component that will disappear at some point, although no one can predict when or whether it will happen abruptly or slowly. Indeed, Campbell and Shiller (1998) and Cochrane (1997) have shown that when stock prices (normalized by earnings, dividends, or book values) have been far above historical ratios, the rate of return over the following decade has tended to be low, and the low return is associated primarily with the price of stocks, not the growth of dividends or earnings.[37] Thus, to project a steady rate of return in the future, one needs to argue that this historical pattern will not repeat itself. The values in Table 3 are in the range suggested by the historical relationship between future stock prices and current price-earnings and price-dividend ratios (see, for example, Campbell and Shiller 1998).

Therefore, either the stock market is overvalued and requires a correction to justify a 7.0 percent return thereafter, or it is correctly valued and the long-run return is substantially lower than 7.0 percent. (Some combination of the two is also possible.) Under either scenario, stock returns would be lower than 7.0 percent for at least a portion of the next 75 years. Some evidence suggests, however, that investors have not adequately considered that possibility.[38] The former view is more convincing, since accepting the "correctly valued" hypothesis implies an implausibly small long-run equity premium. Moreover, when stock values (compared with earnings or dividends) have been far above historical ratios, returns over the following decade have tended to be low. Since this discussion has no direct bearing on bond returns, assuming a lower return for stocks over the near- or long-term also means assuming a lower equity premium.

In short, given current stock values, a constant 7.0 percent return is not consistent with OCACT's projected GDP growth.[39] However, OCACT could assume lower returns for a decade, followed by a return equal to or about 7.0 percent.[40] In that case, OCACT could treat equity returns as it does Treasury rates, using different projection methods for the first 10 years and for the following 65. This conclusion is not meant to suggest that anyone is capable of predicting the timing of annual stock returns, but rather that this is an approach to financially consistent assumptions. Alternatively, OCACT could adopt a lower rate of return for the entire 75-year period.

Marginal Product of Capital and Slow Growth

In its long-term projections, OCACT assumes a slower rate of economic growth than the U.S. economy has experienced over an extended period. That projection reflects both the slowdown in labor force growth expected over the next few decades and the slowdown in productivity growth since 1973.[41] Some critics have suggested that slower growth implies lower projected rates of return on both stocks and bonds, since the returns to financial assets must reflect the returns on capital investment over the long run. That issue can be addressed by considering either the return to stocks directly, as discussed above, or the marginal product of capital in the context of a model of economic growth.[42]

For the long run, the returns to financial assets must reflect the returns on the physical assets that support the financial assets. Thus, the question is whether projecting slower economic growth is a reason to expect a lower marginal product of capital. As noted above, this argument speaks to rates of return generally, not necessarily to the equity premium.

The standard (Solow) model of economic growth implies that slower long-run economic growth with a constant savings rate will yield a lower marginal product of capital, and the relationship may be roughly point-for-point (see Appendix C). However, the evidence suggests that savings rates are not unaffected by growth rates. Indeed, growth may be more important for savings rates than savings are for growth rates. Bosworth and Burtless (1998) have observed that savings rates and long-term rates of income growth have a persistent positive association, both across countries and over time. That observation suggests that if future economic growth is slower than in the past, savings will also be lower. In the Solow model, low savings raise the marginal product of capital, with each percentage-point decrease in the savings rate increasing the marginal product by roughly one-half of a percentage point in the long run. Since growth has fluctuated in the past, the stability in real rates of return to stocks, as shown in Table 1, suggests an offsetting savings effect, preserving the stability in the rate of return.[43]

Focusing directly on demographic structure and the rate of return rather than on labor force growth and savings rates, Poterba (1998) does not find a robust relationship between demographic structure and asset returns. He does recognize the limited power of statistical tests based on the few "effective degrees of freedom" in the historical record. Poterba suggests that the connection between demography and returns is not simple and direct, although such a connection has been raised as a possible reason for high current stock values, as baby boomers save for retirement, and for projecting low future stock values, as they finance retirement consumption. Goyal (1999) estimates equity premium regressions and finds that changes in population age structure add significant explanatory power. Nevertheless, using a vector autoregression approach, his analysis predicts no significant increase in *average* outflows over the next 52 years. That occurs despite the retirement of baby boomers. Thus, both papers reach the same conclusion—that demography is not likely to effect large changes in the long-run rate of return.

Another factor to consider in assessing the connection between growth and rates of return is the increasing openness of the world economy. Currently, U.S. corporations earn income from production and trade abroad, and individual investors, while primarily investing at home, also invest abroad. It is not clear that putting the growth issue in a global context makes much difference. On the one hand, since other advanced economies are also aging, increased economic connections with other advanced countries do not alter the basic analysis. On the other hand, although investment in the less-developed countries may preserve higher rates, it is not clear either how much investment opportunities will increase or how to adjust for political risk. Increasing openness further weakens the argument for a significant drop in the marginal product of capital, but the opportunities abroad may or may not be realized as a better rate of return.

On balance, slower projected growth may reduce the return on capital, but the effect is probably considerably less than one-for-one. Moreover, this argument relates to the overall return to capital in an economy, not just stock returns. Any impact would therefore tend to affect returns on both stocks and bonds similarly, with no directly implied change in the equity premium.[44]

V. Other Issues

This paper has considered the gross rate of return to equities and the equity premium generally. Two additional issues arise in considering the prospect of equity investment for Social Security: how gross returns depend on investment strategy and how they differ from net returns; and the degree of risk associated with adding stock investments to a current all-bond portfolio.

Gross and Net Returns

A gross rate of return differs from a net return because it includes transactions costs such as brokerage charges, bid-ask spreads, and fees for asset management.[45]

If the Social Security trust fund invests directly in equities, the investment is likely to be in an index fund representing almost all of the equities outstanding in the United States. Thus, the analysis above holds for that type of investment. Although some critics have expressed concern that political influence might cause deviations from a broad-based indexing strategy, the evidence suggests that such considerations would have little impact on the expected rate of return (Munnell and Sundén 1999).

If the investment in stocks is made through individual accounts, then individuals may be given some choice either about the makeup of stock investment or about varying the mix of stocks and bonds over time. In order to consider the rate of return on stocks held in such individual accounts, one must consider the kind of portfolio choices individuals might make, both in the composition of the stock portfolio and in the timing of purchases and sales. Given the opportunity, many individuals would engage in numerous transactions, both among stocks and between stocks and other assets (attempts to time the market).

The evidence suggests that such transactions reduce gross returns relative to risks, even before factoring in transactions costs (Odean 1998). Therefore, both the presence of individual accounts with choice and the details of their regulation are likely to affect gross returns. On average, individual accounts with choice are likely to have lower gross returns from stocks than would direct trust fund investment.

Similarly, the cost of administration as a percentage of managed assets varies depending on whether there are individual accounts and how they are organized and regulated (National Academy of Social Insurance 1998; Diamond 2000). Estimates of that cost vary from 0.5 basis points for direct trust fund investment to 100 to150 basis points for individually organized individual accounts, with government-organized individual accounts somewhere in between.

Investment Risk of Stocks

The Office of the Chief Actuary's projections are projections of plausible long-run scenarios (ignoring fluctuations). As such, they are useful for identifying a sizable probability of future financial needs for Social Security. However, they do not address different probabilities for the trust fund's financial condition under different policies.[46] Nor are they sufficient for normative evaluation of policies that have different distributional or risk characteristics.

Although investment in stocks entails riskiness in the rate of return, investment in Treasury bonds also entails risk. Therefore, a comparison of those risks should consider the distribution of outcomes—concern about risk should not be separated from the compensation for bearing risk. That is, one needs to consider the probabilities of both doing better and doing worse as a result of holding some stocks. Merely observing that stocks are risky is an inadequate basis for policy evaluations. Indeed, studies of the historical pattern of returns show that portfolio risk decreases when some stocks are added to a portfolio consisting only of nominal bonds (Siegel 1998). Furthermore, many risks affect the financial future of Social Security, and investing a small portion of the trust fund in stocks is a small risk for the system as a whole relative to economic and demographic risks (Thompson 1998).

As long as the differences in risk and expected return are being determined in a market and reflect the risk aversion of market participants, the suitability of the trust fund's portfolio can be considered in terms of whether Social Security has more or less risk aversion than current investors. Of course, the "risk aversion" of Social Security is a derived concept, based on the risks to be borne by future beneficiaries and taxpayers, who will incur some risk whatever portfolio Social Security holds. Thus, the question is whether the balance of risks and returns looks better with one portfolio than with another. The answer is somewhat complex, since it depends on how policy changes in taxes and benefits respond to economic and demographic outcomes. Nevertheless, since individuals are normally advised to hold at least some stocks in their own portfolios, it seems appropriate for Social Security to also hold some stocks when investing on their behalf, at least in the long run, regardless of the rates of return used for projection purposes (Diamond and Geanakoplos 1999).[47]

VI. Conclusion

Of the three main bases for criticizing OCACT's assumptions, by far the most important one is the argument that a constant 7.0 percent stock return is not consistent with the value of today's stock market and projected slow economic growth. The other two arguments—pertaining to developments in financial markets and the marginal product of capital—have merit, but neither suggests a dramatic change in the equity premium.

Given the high value of today's stock market and an expectation of slower economic growth in the future, OCACT could adjust its stock return projections in one of two ways. It could assume a decline in the stock market sometime over the next decade, followed by a 7.0 percent return for the remainder of the projection period. That approach would treat equity returns like Treasury rates, using different short- and long-run projection methods for the first 10 years and the following 65 years. Alternatively, OCACT could adopt a lower rate of return for the entire 75-year period. That approach may be more acceptable politically, but it obscures the expected pattern of returns and may produce misleading assessments of alternative financing proposals, since the appropriate uniform rate to use for projection purposes depends on the investment policy being evaluated.

Notes

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[1] This 7.0 percent real rate of return is gross of administrative charges.

[2] To generate short-run returns on stocks, the Social Security Administration's Office of the Chief Actuary (OCACT) multiplied the ratio of one plus the ultimate yield on stocks to one plus the ultimate yield on bonds by the annual bond assumptions in the short run.

[3] An exception was the use of 6.75 percent for the President's proposal evaluated in a memorandum on January 26, 1999.

[4] This report is formally called the *1999 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds.*

[5] For OCACT's short-run bond projections, see Table II.D.1 in the 1999 Social Security Trustees Report.

[6] This article was written in the summer of 1999 and uses numbers appropriate at the time. The 2000 Trustees Report uses the same assumptions of 6.3 percent for the nominal interest rate and 3.3 percent for the annual percentage change in the consumer price index. The real wage is assumed to grow at 1.0 percent, as opposed to 0.9 percent in the 1999 report.

[7] See, for example, Baker (1999a) and Baker and Weisbrot (1999). This article only considers return assumptions given economic growth assumptions and does not consider growth assumptions.

[8] This article does not analyze the policy issues related to stock market investment either by the trust fund or through individual accounts. Such an analysis needs to recognize that higher expected returns in the U.S. capital market come with higher risk. For the issues relevant for such a policy analysis, see National Academy of Social Insurance (1998).

[9] Ideally, one would want the yield on the special Treasury bonds held by Social Security. However, this article simply refers to published long-run bond rates.

[10] Because annual rates of return on stocks fluctuate so much, a wide band of uncertainty surrounds the best statistical estimate of the average rate of return. For example, Cochrane (1997) notes that over the 50 years from 1947 to 1996, the excess return of stocks over Treasury bills was 8 percent, but, assuming that annual returns are statistically independent, the standard statistical confidence interval extends from 3 percent to 13 percent. Using a data set covering a longer period lowers the size of the confidence interval, provided one is willing to assume that the stochastic process describing rates of return is stable for the longer period. This article is not concerned with that uncertainty, only with the appropriate rate of return to use for a central (or intermediate) projection. For policy purposes, one must also look at stochastic projections (see, for example, Copeland, VanDerhei, and Salisbury 1999; and Lee and Tuljapurkar 1998). Despite the value of stochastic projections, OCACT's central projection plays an important role in thinking about policy and in the political process. Nevertheless, when making a long-run projection, one must realize that great uncertainty surrounds any single projection and the relevance of returns in any short period of time.

[11] Table 2 also shows the equity premiums relative to Treasury bills. Those numbers are included only because they arise in other discussions; they are not referred to in this article.

[12] For determining the equity premium shown in Table 2, the rate of return is calculated assuming that a dollar is invested at the start of a period and the returns are reinvested until the end of the period. In contrast to that geometric average, an arithmetic average is the average of the annual rates of return for each of the years in a period. The arithmetic average is larger than the geometric average. Assume, for example, that a dollar doubles in value in year 1 and then halves in value from year 1 to year 2. The geometric average over the 2-year period is zero; the arithmetic average of +100 percent and –50 percent annual rates of return is +25 percent. For projection purposes, one looks for an estimated rate of return that is suitable for investment over a long period. Presumably the best approach would be to take the arithmetic average of the rates of return that were each the geometric average for different historical periods of the same length as the average investment period within the projection period. That calculation would be close to the geometric average, since the variation in 35- or 40-year geometric

rates of return, which is the source of the difference between arithmetic and geometric averages, would not be so large.

[13] In considering recent data, some adjustment should be made for bond rates being artificially low in the 1940s as a consequence of war and postwar policies.

[14] Also relevant is the fact that the real rate on 30-year Treasury bonds is currently above 3.0 percent.

[15] Finance theory relates the willingness to hold alternative assets to the expected risks and returns (in real terms) of the different assets, recognizing that expectations about risk and return are likely to vary with the time horizon of the investor. Indeed, time horizon is an oversimplification, since people are also uncertain about when they will want to have access to the proceeds of those investments. Thus, finance theory is primarily about the difference in returns to different assets (the equity premium) and needs to be supplemented by other analyses to consider the expected return to stocks.

[16] With Treasury bonds, investors can easily project future nominal returns (since default risk is taken to be virtually zero), although expected real returns depend on projected inflation outcomes given nominal yields. With inflation-protected Treasury bonds, investors can purchase bonds with a known real interest rate. Since those bonds were introduced only recently, they do not play a role in interpreting the historical record for projection purposes. Moreover, their importance in future portfolio choices is unclear.

[17] In theory, for determining asset prices at which markets clear, one wants to consider marginal investments. Those investments are made up of a mix of marginal portfolio allocations by all investors and by marginal investors who become participants (or nonparticipants) in the stock and/or bond markets.

[18] This conclusion does not contradict the Modigliani-Miller theorem. Different firms with the same total return distributions but different amounts of debt outstanding will have the same total value (stock plus bond) and so the same total expected return. A firm with more debt outstanding will have a higher expected return on its stock in order to preserve the total expected return.

[19] Consideration of equilibrium suggests an alternative approach to analyzing the historical record. Rather than looking at realized rates of return, one could construct estimates of expected rates of return and see how they have varied in the past. That approach has been taken by Blanchard (1993). He concluded that the equity premium (measured by expectations) was unusually high in the late 1930s and 1940s and, since the 1950s, has experienced a long decline from that unusually high level. The high realized rates of return over this period are, in part, a consequence of a decline in the equity premium needed for people to be willing to hold stocks. In addition, the real expected returns on bonds have risen since the 1950s, which should have moderated the impact of a declining equity premium on expected stock returns. Blanchard examines the importance of inflation expectations and attributes some of the recent trend to a decline in expected inflation. He concluded that the premium in 1993 appeared to be around 2 percent to 3 percent and would probably not move much if inflation expectations remain low. He also concluded that decreases in the equity premium were likely to involve both increases in expected bond rates and decreases in expected rates of return on stocks.

[20] If current cash returns to stockholders are expected to grow at rate g, with projected returns discounted at rate r, this fundamental value is the current return divided by $(r - g)$. If r is smaller, fluctuations in long-run projections of g result in larger fluctuations in the fundamental value.

[21] Several explanations have been put forth, including: (1) the United States has been lucky, compared with stock investment in other countries, and realized returns include a premium for the possibility that the U.S. experience might have been different; (2) returns to actual investors are considerably less than the returns on indexes that have been used in analyses; and (3) individual preferences are different from the simple models that have been used in examining the puzzle.

[22] The timing of realized returns that are higher than required returns is somewhat more complicated, since recognizing and projecting such a trend will tend to boost the price of equities when the trend is recognized, not when it is realized.

[23] Nonprofit institutions, such as universities, and defined benefit plans for public employees now hold more stock than in the past. Attributing the risk associated with that portfolio to the beneficiaries of those institutions would further expand the pool sharing in the risk.

[24] More generally, the equity premium depends on the investment strategies being followed by investors.

[25] This tendency, known as mean reversion, implies that a short period of above-average stock returns is likely to be followed by a period of below-average returns.

[26] To quantify the importance of these developments, one would want to model corporate behavior as well as

investor behavior. A decline in the equity premium reflects a drop to corporations in the "cost of risk" in the process of acquiring funds for risky investment. If the "price per unit of risk" goes down, corporations might respond by selecting riskier investments (those with a higher expected return), thereby somewhat restoring the equity premium associated with investing in corporations.

[27] In considering the return to an individual from investing in stocks, the return is made up of dividends and a (possible) capital gain from a rise in the value of the shares purchased. When considering the return to all investment in stocks, one needs to consider the entire cash flow to stockholders, including dividends and net share repurchases by the firms. That suggests two methods of examining the consistency of any assumed rate of return on stocks. One is to consider the value of all stocks outstanding. If one assumes that the value of all stocks outstanding grows at the same rate as the economy (in the long run), then the return to all stocks outstanding is that rate of growth plus the sum of dividends and net share repurchases, relative to total share value. Alternatively, one can consider ownership of a single share. The assumed rate of return minus the rate of dividend payment then implies a rate of capital gain on the single share. However, the relationship between the growth of value of a single share and the growth of the economy depends on the rate of share repurchase. As shares are being repurchased, remaining shares should grow in value relative to the growth of the economy. Either approach can be calculated in a consistent manner. What must be avoided is an inconsistent mix, considering only dividends and also assuming that the value of a single share grows at the same rate as the economy.

[28] Gordon (1962). For an exposition, see Campbell, Lo, and MacKinlay (1997).

[29] The implausibility refers to total stock values, not the value of single shares—thus, the relevance of net share repurchases. For example, Dudley and others (1999) view a steady equity premium in the range of 1.0 percent to 3.0 percent as consistent with current stock prices and their projections. They assume 3.0 percent GDP growth and a 3.5 percent real bond return, both higher than the assumptions used by OCACT. Wadhwani (1998) finds that if the S&P 500 is correctly valued, he has to assume a negative risk premium. He considers various adjustments that lead to a higher premium, with his "best guess" estimate being 1.6 percent. That still seems too low.

[30] Dudley and others (1999) report a current dividend yield on the Wilshire 5000 of 1.3 percent. They then make an adjustment that is equivalent to adding 80 basis points to that rate for share repurchases, for which they cite Campbell and Shiller (1998). Wadhwani (1998) finds a current expected dividend yield of 1.65 percent for the S&P 500, which he adjusts to 2.55 percent to account for share repurchases. For a discussion of share repurchases, see Cole, Helwege, and Laster (1996).

[31] Stock prices reflect investors' assumptions about economic growth. If their assumptions differ from those used by OCACT, then it becomes difficult to have a consistent projection that does not assume that investors will be surprised.

[32] In considering these values, note the observation that a fall of 20 percent to 30 percent in advance of recessions is typical for the U.S. stock market (Wadhwani 1998). With OCACT assuming a 27 percent rise in the price level over the next decade, a 21 percent decline in real stock prices would yield the same nominal prices as at present.

[33] The importance of the assumed growth rate of GDP can be seen by redoing the calculations in Table 3 for a growth rate that is one-half of a percent larger in both the short and long runs. Compared with the original calculations, such a change would increase the ratios by 16 percent.

[34] Both scenarios are consistent with the Gordon formula, assuming a 2.75 percent adjusted dividend yield (without a drop in share prices) and a growth of dividends of 1.5 percent per year.

[35] With the steady-state scenario, a dollar in the market at the start of the steady state is worth 1.0425^t dollars t years later, if the returns are continuously reinvested. In contrast, under the market-correction scenario, a dollar in the market at the time of the drop in prices is worth $(1/2)(1.07^t)$ dollars t years later.

[36] The authors appear to assume that the Treasury rate will not change significantly, so that changes in the equity premium and in the return to stocks are similar.

[37] One could use equations estimated on historical prices to check the plausibility of intermediate-run stock values with the intermediate-run values needed for plausibility for the long-run assumptions. Such a calculation is not considered in this article. Another approach is to consider the value of stocks relative to the replacement cost of the capital that corporations hold, referred to as Tobin's q. That ratio has fluctuated considerably and is currently unusually high. Robertson and Wright (1998) have analyzed the ratio and concluded that a cumulative real decline in the stock market over the first decades of the 21st century has a high probability.

[38] As Wadhwani (1998, p. 36) notes, "Surveys of individual investors in the United States regularly suggest that they expect returns above 20 percent, which is obviously unsustainable. For example, in a survey conducted by Montgomery Asset Management in 1997, the typical mutual fund investor expected annual returns from the

stock market of 34 percent over the next 10 years! Most U.S. pension funds operate under actuarial assumptions of equity returns in the 8-10 percent area, which, with a dividend yield under 2 percent and nominal GNP growth unlikely to exceed 5 percent, is again, unsustainably high."

[39] There is no necessary connection between the rate of return on stocks and the rate of growth of the economy. There is a connection among the rate of return on stocks, the current stock prices, dividends relative to GDP, and the rate of growth of the economy.

[40] The impact of such a change in assumptions on actuarial balance depends on the amount that is invested in stocks in the short term relative to the amount invested in the long term. The levels of holdings at different times depend on both the speed of initial investment and whether stock holdings are sold before very long (as would happen with no other policy changes) or whether, instead, additional policies are adopted that result in a longer holding period, possibly including a sustained sizable portfolio of stocks. Such an outcome would follow if Social Security switched to a sustained level of funding in excess of the historical long-run target of just a contingency reserve equal to a single year's expenditures.

[41] "The annual rate of growth in total labor force decreased from an average of about 2.0 percent per year during the 1970s and 1980s to about 1.1 percent from 1990 to 1998. After 1998 the labor force is projected to increase about 0.9 percent per year, on average, through 2008, and to increase much more slowly after that, ultimately reaching 0.1 percent toward the end of the 75-year projection period" (Social Security Trustees Report, p. 55). "The Trustees assume an intermediate trend growth rate of labor productivity of 1.3 percent per year, roughly in line with the average rate of growth of productivity over the last 30 years" (Social Security Trustees Report, p. 55).

[42] Two approaches are available to answer this question. Since the Gordon formula, given above, shows that the return to stocks equals the adjusted dividend yield plus the growth of stock prices, one needs to consider how the dividend yield is affected by slower growth. In turn, that relationship will depend on investment levels relative to corporate earnings. Baker (1999b) makes such a calculation, which is not examined here. Another approach is to consider the return on physical capital directly, which is the one examined in this article.

[43] Using the Granger test of causation (Granger 1969), Carroll and Weil (1994) find that growth causes saving but saving does not cause growth. That is, changes in growth rates tend to precede changes in savings rates but not vice versa. For a recent discussion of savings and growth, see Carroll, Overland, and Weil (2000).

[44] One can also ask how a change in policy designed to build and maintain a larger trust fund in a way that significantly increases national saving might affect future returns. Such a change would plausibly tend to lower rates of return. The size of that effect depends on the size of investment increases relative to available investment opportunities, both in the United States and worldwide. Moreover, it depends on the response of private saving to the policy, including the effect that would come through any change in the rate of return. There is plausibly an effect here, although this article does not explore it. Again, the argument speaks to the level of rates of return generally, not to the equity premium.

[45] One can also ask how changed policies might affect future returns. A change in portfolio policy that included stocks (whether in the trust fund or in individual accounts) would plausibly lower the equity premium somewhat. That effect could come about through a combination of a rise in the Treasury rate (thereby requiring a change in tax and/or expenditure policy) and a fall in expected returns on stocks. The latter depends on both the underlying technology of available returns to real investments and the effect of portfolio policy on national saving. At this time, research on this issue has been limited, although it is plausible that the effect is not large (Bohn 1998; Abel 1999; Diamond and Geanakoplos 1999).

[46] For stochastic projections, see Copeland, VanDerhei, and Salisbury (1999); and Lee and Tuljapurkar (1998). OCACT generally provides sensitivity analysis by doing projections with several different rates of return on stocks.

[47] Cochrane (1997, p. 32) reaches a similar conclusion relative to individual investment: "We could interpret the recent run-up in the market as the result of people finally figuring out how good an investment stocks have been for the last century, and building institutions that allow wise participation in the stock market. If so, future returns are likely to be much lower, but there is not much one can do about it but sigh and join the parade."

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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:

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

Taking the ratio of prices to GDP, we have:

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

Consistent with the Gordon formula, a constant ratio of P/Y (that is, a steady state) follows from $r = g + a$. As a non-steady-state example—with values of .07 for r, .015 for g, and .03 for a—$P(75)/Y(75) = 28.7P(0)/Y(0)$.

Appendix B:

Calculation Using the Gordon Equation

In discrete time, once we are in a steady state, the Gordon growth model relates a stock price P at time t to the expected dividend D in the following period, the rate of growth of dividends G, and the rate of return on the stock R. Therefore, we have:

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

We denote values after a decade (when we are assumed to be in a steady state) by P' and D' and use an "adjusted" initial dividend that starts at a ratio X times current stock prices. Thus, we assume that dividends grow at the rate G from the "adjusted" current value for 10 years, where G coincides with GDP growth over the decade. We assume that dividends grow at G' thereafter, which coincides with long-run GDP growth. Thus, we have:

$$\begin{aligned} P'/P &= (1+G')D'/((R-G')P) \\ &= (1+G')D(1+G)^{10}/((R-G')P) \\ &= X(1+G')(1+G)^{10}/(R-G') \end{aligned}$$

For the basic calculation, we assume that R is .07, G is .02, G' is .015. In this case, we have:

$$P'/P = 22.5X$$

Thus, for initial ratios of adjusted dividends to stock prices of .02, .025, .03, and .035, P'/P equals .45, .56, .67 and .79, respectively. Subtracting those numbers from 1 yields the required decline in the real value of stock prices as shown in the first column of Table 3. Converting them into nominal values by multiplying by 1.27, we have values of .57, .71, and .86. If the long-run stock return is assumed to be 6.5 percent instead of 7.0 percent, the ratio P'/P is higher and the required decline is smaller. Increasing GDP growth also reduces the required decline. Note that the required declines in stock values in Table 3 is the decline in real values; the decline in nominal terms would be less.

Appendix C:

A Cobb-Douglas Solow Growth Model in Steady State

Variables

Y .... output
K .... capital
L .... labor
a .... growth rate of Solow residual
g .... growth rate of both K and Y
n .... growth rate of labor
b .... share of labor
s .... savings rate
c .... depreciation rate
$MP(K)$ ... marginal product of capital

Equations

$$\log[Y] = at + b\log[L] + (1- b)\log[K]$$
$$(dL/dt)/L = n$$
$$(dY/dt)/Y = (dK/dt)/K = g$$
$$dK/dt = sY - cK$$
$$(dK/dt)/K = sY/K - c$$
$$Y/K = (g + c)/s$$
$$MP(K) = (1 - b)Y/K = (1- b)(g + c)/s$$
$$g = a + bn + (1 - b)g$$
$$g = (a + bn)/b$$
$$MP(K) = (1 - b)\{(a + bn)/(bs) + c/s\}$$
$$dMP(K)/da = (1- b)/(bs)$$
$$dg/da = 1/b$$

Assume that the share of labor is .75 and the gross savings rate is .2. Then the change in the marginal product of capital from a change in the growth rate is:

(Note that these are gross savings, not net savings. But the corporate income tax reduces the return to savers relative to the return to corporate capital, so the derivative should be multiplied by roughly 2/3.)

$$dMP(K)/dg = (dMP(K)/da)/(dg/da) = (1 - b)/s == .25/.2$$

Similarly, we can consider the effect of a slowdown in labor force growth on the marginal product of capital:

$$dMP(K)/dn = (1-b)/s$$

$$dg/dn = 1$$

$$dMP(K)/dg = (dMP(K)/dn)/(dg/dn) = (1-b)/s == .25/.2$$

(This is the same expression as when the slowdown in economic growth comes from a drop in technical progress.)

Turning to the effects of changes in the savings rate, we have:

$$dMP(K)/ds = -MP(K)/s == .5$$

Thus, the savings rate has a large impact on the marginal product of capital as well.

Both of these effects are attenuated to the extent that the economy is open and rates of return in the United States change less because some of the effect occurs abroad.

What Are Reasonable Long-Run Rates of Return to Expect on Equities?

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July 20, 2001

I. Introduction

The average inflation-adjusted rate of return on large capitalization stocks from 1926-2000 was 9.7 percent (Ibbotson (2001)). Over the same period of time, the average real return on Treasury Bills was 0.8 percent while it was 2.7 percent on long-term U.S. government bonds. The premium of stocks over long-term government bonds was 7.0 percent.[1]

The question of interest is not what happened in the past, but what is likely to happen over the next fifty or seventy-five years. Will stocks once again outperform bonds by 7 percent? One needs to be humble when predicting the stock market, although ironically it may be easier to look further into the future than it is to predict what will happen over the next few months or years. In the very long-run, stock returns are more likely to be driven by fundamentals, while in the short-run price movements can appear to have a life of their own.

There are a number of reasons to expect the return on stocks and the premium of the return of stocks over bonds to be lower than over the last three-fourths of the twentieth century. This paper reviews those reasons and concludes with an estimate of the expected long-run real rate of return for equities and an implied equity premium.

II. Dividends Are Obsolete

Traditional equity valuation models (Gordon(1962)) are based on the value of shares being equal to the present value of future dividends. This leads to the result that the expected return to holding stocks is equal to the current dividend yield plus the growth rate in dividend payments. This basic structure is behind most analysis of long-run stock returns today (see, for example, Campbell and Shiller (2001)). The problem with this framework is that dividends are only one way for the corporate sector to transfer money to shareholders and a particularly tax inefficient way at that (Shoven (1987)). Dividend payments are fully taxable for investors who do not have their equity sheltered in pension accounts or other tax deferred or exempt vehicles. In contrast, companies can buy their own shares from their shareholders and achieve the same cash transfer with much lower taxation. With a share repurchase, some of the money is treated as a return of basis and the rest is treated as a capital gain. The tax saving can be enormous. Companies began to take advantage of share repurchases in a significant way in the mid-1980s. In recent years the

[1] All of these numbers are arithmetic averages. The geometric mean real return on large capitalization stocks was 7.7%, whereas it was 2.2% on long-term government bonds. The geometric premium of stocks over long-term government bonds was thus 5.5%.

aggregate amount of share repurchases has exceeded dividends and is currently running at about \$150 billion per year (Liang and Sharpe (1999)). Clearly share repurchases can no longer be treated as a footnote in a story primarily concerned with dividends as a mechanism for transferring cash to shareholders. Companies can also buy the shares of other companies. The extreme form of this is a cash merger. Once again, cash is transferred from companies to shareholders, affecting the valuation of shares. While it is hard to get precise information on the amounts involved, the cash transferred to shareholders via cash mergers is almost certainly even larger than the amount in share repurchases. The point of this is to emphasize that dividends are a choice variable and dividend-price ratios should not be a fundamental building block of share valuation or long-run shareholder return. In fact, it is not clear that companies founded in the 1980s and later will ever pay dividends in the same way as older companies.

III. The Model

The original Gordon model had the intrinsic value of the firm depending on dividends and the growth rate of dividends such that

$$V = \frac{D}{k - g}$$

$$or$$

$$k = \frac{D}{V} + g$$

where 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.

[2] Share repurchases can be added to the cash flow yield as in the equation in the paper or added to the growth rate term, but not both. Investors who don't participate in a share repurchase benefit from owning a growing fraction of the company. Investors taken as a group receive the cash from a share repurchase just like a dividend. The company's opportunities are the same after the payment of an equivalent amount in dividends or share repurchases.

[3] I have not required ρ to equal k in the long-run steady state, although an argument could be made that they should be equated. If they are equal, then the expected return to equity is independent of payout policy and is simply equal to the reciprocal of the P-E ratio.

IV. Steady State Returns

The model just presented gives the steady state real returns that investors can expect to receive from equity markets. The steady state assumption is that aggregate corporate earnings, aggregate dividends, the total market capitalization of stocks, the total money used for share repurchases, and GDP all grow at the same long-run rate. In such a scenario, the price-earnings ratio would remain stable. However, the role of share repurchases would continue to be very important. Due to the declining number of shares, stock prices, dividends per share, and earnings per share would all grow at a rate faster than GDP and the other aggregates. The equilibrium real rate of return to owning stock would be the total of three terms: the dividend rate, the share repurchase rate, and the steady-state growth rate of aggregates in the economy including GDP. That is,

$$k = \frac{D}{P} + \frac{S}{P} + g$$

where S is share repurchases and g is the common steady-state growth rate of economic aggregates. This is simply a different way to write the equation of the previous section. It does highlight that real share prices would go up at the rate of g plus the rate of net share repurchases. To make the equivalence with the previous formulation clear note that

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

V. The Big Question: Future P-E Ratios

The very difficult question is whether the current price-earnings ratio of roughly 25 represents a new steady-state level. Of course, no one would assume that fluctuations in price-earnings ratios will cease, but will 25 be the average level for the next 50 or 75 years? My guess is that the long-run steady state level for the price-earnings ratio will be somewhere between its current level (24 as I write this on July 20, 2001) and its average level over the past 75 years of approximately 15. A reasonable guess would be that P-E ratios might average 20 over the next 50 to 75 years. What would be the consequences of a steady-state P-E ratio of 20 on real expected stock returns? That means that ***(E/P)*** would average .05. Firms pay out somewhere between half and three-fourths of their earnings as dividends and net share repurchases, so a reasonable value for θ is 0.625. The ROE of retained earnings is approximately 8 percent, so ρ can be set at that level. [4] Substituting these values into the model gives

$$k = (.625)(.05) + (.375)(.08) = .03125 + .03 = .06125$$

This model and these parameters predict the expected long-run real return to equity to be 6.125 percent.

[4] This value is roughly consistent with the rate of return to corporate capital reported in Poterba (1997).

From its current levels, the S&P 500 would not have to crash to reach a P-E level of 20. In fact, the current S&P forecast for next year's earnings of the S&P 500 is $62.88, so the market is currently selling at 19.3 times next year's predicted earnings. That means that if the market were to go up 3.5 percent over the next year and the 2002 earnings forecasts panned out exactly, then by mid-2002 the market would be selling for exactly 20 times earnings. Obviously, there are other combinations of earnings realizations and price appreciation that would allow the market to equilibrate at a P-E of 20 over the next couple of years.

What would be the consequences of a long run average price-earnings ratio of 15 rather than 20? This would put the P-E ratio close to its average level for the past 75 years. In the short-run this implies that the current market is almost 40 percent overvalued and would indicate that near-term stock returns might be quite poor. On the other hand, once the correction is completed and the equilibrium P-E ratio of 15 is established the real rate of return to equities could average slightly better than 7 percent. If we stick with the assumption that ρ is .08, the expected real return to equity would be in the 7 to 7.5 percent range for all reasonable cash-payout rates (i.e. for all reasonable values of θ).

So, we see that the assumed equilibrium price-earnings rate is important. It should be noted that a near-term market correction to bring about a P-E ratio of 15 would not hurt the proposed Social Security individual accounts as long as it occurred before they had accumulated significant balances. In general, the fact that the individual accounts do not yet exist and will have small balances over the next several years even if they are established soon means that the timing of returns matters a lot. Low returns over the next several years followed by high returns would be much better for the balances in these new Social Security individual accounts than high returns first followed by low ones. There is a big difference between the circumstances of someone who has a lot of wealth but is not saving and someone who is just starting to systematically accumulate assets. The non-saving wealth holder is indifferent to the order of returns. However, the systematic saver has little at stake early in his or her accumulation period, but much more at stake later. Even if real stock returns average 6.0 percent over the next 50 years, the Social Security individual account holders would prefer a pattern where the real returns averaged 2.0 percent for the first decade and 7.0 percent thereafter rather than a pattern of 10.0 percent in the first decade and 5.0 percent thereafter.

VI. The Long-Run Outlook for Equity Rates of Return

My own estimate for the long-run real return to equities looking forward is 6 to 6.5 percent. I come to that using roughly the parameters chosen above. If the P-E ratio fluctuates around 20, the cash payouts to shareholders should range from 3 to 3.5 percent. I am relatively optimistic about the possible steady-state growth rate of GDP and would choose 3 percent for that number.[5]

[5] It should be noted that the Trustees are projecting long-run average growth in aggregate labor income of slightly less than 2 percent. If 2 percent were the steady-state growth rate rather than three percent, then that would lower my prediction for equilibrium real stock returns by 0.5 percent. The reason that a one-percent drop in the economy wide growth rate would not lower stock returns by a full one percent is that the lower growth rate would require lower retained earnings and permit a higher rate of payout of earnings. For example, you then could support a value of θ of .75 with an E-P ratio of .05 and a value of ρ of .08.

That leads me to my 6 to 6.5 percent real rate of return range. While this is the range that I would choose as the expected return to equities, it does not indicate the degree of uncertainty about actual outcomes over the next 50-75 years. I think there is a great deal of uncertainty about long-run equity returns. A range of outcomes as wide as 2.0 to 10.0 percent would not strike me as unreasonable. Even this wide range of possible outcomes indicates that the 9.7 percent real return that stocks actually earned over the 1926-2000 period is quite unlikely to be repeated.

VII. Why Won't Equity Returns Be As Good in the 21st Century?

Why is it somewhat unlikely that the future returns will be as favorable as the past returns? There actually are quite a few reasons. First, share prices went up faster in the last twenty years than the value of the underlying capital. This relative price appreciation of paper claims to real assets is unlikely to continue over the long haul. Second, of the entire world's equity markets, the American market was the strongest over the last 75 years (see, Jorion and Goetzmann (1999)). While we might come in first again over the next half or three-quarters of a century, one shouldn't count on it. Third, the nature of stockholders has changed dramatically over the last few decades, with far more of the market being held by pension accounts. Whereas stock holdings used to be concentrated amongst the superrich, there has been a noticeable democratization of shareholding over the post World War II period. While it is speculative to be sure, one could argue that the degree of risk aversion displayed in the market has decreased as the market has become more democratic. Fourth, the changing demographics with the increase in the number of elderly relative to the number of working age adults can dampen the demand for financial assets (Schieber and Shoven (1997) and Abel (2001)).[6] Fifth, stock returns in the past may have been enhanced due to low *ex-post* real returns of long-term bonds. These low real returns were due to unexpectedly high inflation, particularly in the 1960s and 1970s. The total impact of these and other arguments is an equity premium that is likely to be considerably smaller than that observed since 1926.

VIII. The Equity Premium Will Be Lower Because Real Interest Rates Are Higher

The real return on long-run (30-year) inflation-indexed Treasury securities (TIPS) today is about 3.5 percent. Presumably the expected real return on regular nominal Treasury bonds is at least as high. If one uses my central guess for the average real return on equity markets of 6.0 to 6.5 percent, that leaves an equity premium on the order of 2.5 to 3.0 percent. Of course, real interest rates may drift down from current levels, increasing the equity premium. In fact, Social Security currently assumes that long-term government bonds will yield 3.0 percent in the future. That strikes me as reasonable and would not cause me to materially change my 6.0 to 6.5 percent range for the expected long-run real return on equities. Obviously, that leaves an equity premium of 3.0 to 3.5 percent, far lower than experienced during the last three-fourths of the 20th Century.

[6] For a skeptical view on the impact of demographics on asset prices see Poterba (2001).

IX. Which Rate To Use for Projections?

The next issue is whether one should use the expected equity returns to estimate the future balance of an equity portfolio or should one use the return on safe inflation-indexed government securities. On balance, I favor using the safe bond return on the argument that the extra expected return on equities is compensated for by the extra variance in the outcomes. Both the expected and median return for equities is almost certainly greater than for safe bonds. However, in order for markets to be in equilibrium, the poor equity outcomes must be worse than bond returns. Therefore, a scenario analysis for equity investments would, in my opinion, have to include outcomes worse than bonds as well as those better than for a bond portfolio. I find it preferable to simply calculate the outcomes with a safe investment strategy such as 100 percent Treasury Inflation-Protected Securities and then state that the expected outcome would be higher with stocks in the portfolio but that the risk would be correspondingly greater. The "no free lunch" saying is as true in finance as in the rest of the economy. The extra return of a stock heavy portfolio is matched by the extra riskiness (MaCurdy and Shoven (2000)).

One aside that the discussion of equity premium brings up is the useful role that government bonds play in anchoring financial returns and in providing a relatively risk-free asset alternative. The discussion in Washington of eliminating the publicly held federal debt should at least consider the value of such debt to financial markets. Another point worth remembering is that the traditional pay-as-you-go defined benefit structure is not without risk. The risks of a PAYGO system depend on fertility rates, immigration rates, mortality rates, labor force participation, and worker productivity. The risks of the defined benefit program are not perfectly correlated with the risks of individual accounts invested in private securities. One of the strongest arguments in favor of individual accounts is risk diversification. Clearly more work should be done to quantify the covariance between financial returns and the factors influencing the sustainability of a PAYGO system.

X. Conclusions

My best guess for a real equity return over a long-horizon is 6.0 to 6.5 percent per year. I suggest that Social Security lower its intermediate assumption for real equity returns from its current level of 7.0 percent to 6.5 percent or slightly lower. The narrowness of my range for the expected return does not represent a high degree of certainty about the actually realized real return on equities over the next 50-75 years. Throughout this note I have used terms like "best guess." That was totally intentional. Even if forecasting stock returns is easier over long horizons, it still isn't science. To put this concretely, I think that there is something like a 5 percent chance that real stock returns over the next 50 years will be worse than 2.5 percent and there is similarly something like a 5 percent chance that they will exceed 9.5 percent. While it is possible that stocks will underperform bonds over that horizon, it is quite unlikely. However, I think there is only a very slight chance that stocks will outperform bonds in the future by as much as they have in the past. That is, the equity premium is likely to be lower than it has been. My own best guess for the equity premium (stock return over the return on long-term government bonds) is 3.0 to 3.5 percent.

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Biographies of Authors

John Y. Campbell

John Y. Campbell grew up in Oxford, England, and received a B.A from Oxford in 1979. He came to the United States to attend graduate school, earning his Ph. D. from Yale in 1984. He spent the next ten years teaching at Princeton, moving to Harvard in 1994 to become the first Otto Eckstein Professor of Applied Economics. Campbell has co-edited the *American Economic Review* and currently edits the *Review of Economics and Statistics*; he is a Fellow of the Econometric Society and the American Academy of Arts and Sciences, and a Research Associate and former Director of the Program in Asset Pricing at the National Bureau of Economic Research. His research concerns asset markets, the macroeconomy, and the links between them. His graduate-level textbook on empirical finance, *The Econometrics of Financial Markets*, written with Andrew Lo and Craig MacKinlay, was published by Princeton University Press in 1997. His latest book on *Strategic Asset Allocation: Portfolio Choice for Long-Term Investors*, with Luis Viceira, will be published by Oxford University Press in 2001. Campbell is also a founding partner of Arrowstreet Capital, LP, a quantitative asset management firm in Cambridge, Massachusetts.

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Peter Diamond is an Institute Professor at the Massachusetts Institute of Technology, where he has taught since 1966. He received his B.A. in Mathematics from Yale University in 1960 and his Ph.D. in Economics from M.I.T. in 1963. He has been President of the Econometric Society and Vice-President of the American Economic Association. He is a Founding Member and member of the Board of the National Academy of Social Insurance, where he has been President and Chair of the Board. He is a Fellow of the American Academy of Arts and Sciences and a Member of the National Academy of Sciences. He has written on behavioral economics, public finance, social insurance, uncertainty and search theories, and macroeconomics. He was Chair of the Panel on Privatization of Social Security of the National Academy of Social Insurance, whose report, *Issues in Privatizing Social Security* has been published by M.I.T. Press. He has written about social security in Chile, Germany, Italy, the Netherlands, Sweden and the U.S.

John B. Shoven

John Shoven is a member of Stanford University's Economics Department, where he holds the Charles R. Schwab Professorship. The holder of a Ph.D. in economics from Yale University, Dr. Shoven has been at Stanford since 1973, serving as Chairman of the Economics Department from 1986 to 1989, as Director of the Center for Economic Policy Research from 1989 to 1993, and as Dean of the School of Humanities and Sciences form 1993 to 1998. An expert on tax policy, Dr. Shoven was a consultant for the U.S. Treasury Department from 1975 to 1988. The author of approximately eighty professional articles and ten books, he has been a visiting professor at Harvard University, the London School of Economics, Kyoto University and Monash University. In 1995 he was elected a fellow of the American Academy of Arts and Sciences. Dr. Shoven has participated in various Hoover Programs and conferences, including the 1997 symposium "Facing the Age Wave," at which he addressed the taxing of pensions as an illustration of tax policy that seems to have gone awry and that may limit the most important form of savings in America. He also contributed a chapter to the book that resulted from the symposium.

Appendix

Equity Yield Assumptions Used by the Office of the Chief Actuary, Social Security Administration, to Develop Estimates for Proposals with Trust Fund and/or Individual Account Investments

Stephen C. Goss
Chief Actuary
May 8, 2001

Initial Assumptions in 1995

The Office of the Chief Actuary (OCACT) has been making estimates for proposals including investments in equities since 1995. A memorandum dated May 12, 1995 presented estimates for the Kerrey-Simpson proposal which included both individual accounts (with the opportunity for equity investment) and provision for investment of 25 percent of OASDI trust fund assets in equities. The assumed average real annual yield on equities for these estimates was 7 percent, consistent with the assumption developed for estimates being produced concurrently for the 1994-96 Advisory Council on Social Security.

Historical analysis of equity yields during the 20th century using Ibbottson data was provided to the Council by Joel Dickson of the Vanguard Group. Based on this analysis, the Advisory Council members and the OCACT agreed that the 7-percent average annual real yield experienced for the 20th century, particularly for the period beginning 1926, seemed to represent a reasonable assumption for an average real yield over long periods in the future as had occurred in the past. It was recognized that this average yield level was recorded rather consistently over long periods of time in the past which incorporated complete market cycles. The work of Dr. Jeremy Siegel of the Wharton School was also noted as supporting a long-term average yield on equities of about 7 percent.

Council Chairman Edward Gramlich noted that the equity market was then currently priced at a level above the historical average, as indicated by relatively high price-to-earnings (PE) ratios. However, it was agreed that in the future market cycles would continue, likely resulting in yields for investments made in successive future years that would average close to the average yields of the past. Estimates produced for the three proposals developed for the Advisory Council (included in Appendix 2 of Volume 1 of the Council's Report) used a 7-percent average real equity yield as an intermediate assumption. Estimates were also produced assuming that equities would achieve a long-term average yield no higher than the yield on long-term U.S. Government marketable securities (Treasury securities), in order to illustrate both the sensitivity of estimates to this assumption and the uncertainty about the likely average yield on equities for even very long periods of time in the future. For individual account proposals, analysis of expected benefit levels and money's worth was also provided using a higher average real annual equity-yield assumption of about 9.6 percent. This higher average yield reflected the arithmetic mean, rather than the geometric mean (which was 7 percent), of historical data for annual yields. It was suggested by Dr. Dickson that financial analysts generally use the arithmetic mean yield as a basis for illustrating likely expected yield on investments. It was observed that this approach was consistent with assuming that future annual yields would occur as if drawn at random, independently from the distribution of past annual yields.

Estimates for the Kerrey-Simpson proposal and for the Advisory Council proposals were based on the intermediate assumptions of the 1995 Trustees Report, including an assumption of an average annual future real yield of 2.3 percent for Treasury securities. Thus, an equity premium over long-term Treasury securities of 4.7 percentage points was implicitly assumed. It was noted that the historical average equity premium was higher, because the average real yield on Treasury securities was lower than 2.3 percent for the past.

Assumptions Since 1995

Since 1995, the OCACT has continued to use an assumption that average annual real yield on equities will be about 7 percent for investments made in future years. Because the Trustees have gradually increased their assumption for the average future real yield on Treasury securities from 2.3 to 3.0 percent, the implicit equity premium has been reduced from 4.7 to 4 percentage points. In addition, OCACT has continued to provide estimates using lower assumed equity yields for all proposals, in order to illustrate the uncertainty and sensitivity of these estimates.

While it has been recognized that the equity market has continued to be priced at levels above the historical average (as indicated by PE ratios) since 1995, future cycles have been assumed to continue as in the past, so that the average real yield on equity investments made in future years will vary but will still average at a level similar to the past. While an "overpriced" current market suggests that current equity investments may be expected to achieve lower than average real yield, investments made in future years, when the price of stocks may have dropped to a cyclical low, may be expected to achieve a higher than average real yield. Market trends for 2000 and 2001 suggest that the equity market is no longer as "overpriced" as it had been in late 1999, supporting the assumption that future market cycles and average PE ratios may indeed continue to mirror the past.

OCACT has recognized that future equity yields will depend on the future return to capital and many other factors, as it has in the past. Based on the Trustees assumptions in the 2001 Trustees Report, labor productivity is projected to continue to increase in the future at a rate similar to past average growth over long periods of time. This assumption implies that capital deepening (increasing ratio of capital to labor) in the U.S. economy will also continue to trend at about the same rate as in the past. This is believed to be consistent with the assumption that real equity returns and the return to capital will be similar in the future to those in the past. On this basis, OCACT believes that assumption of a future average real equity yield of about 7 percent is consistent with the Trustees assumptions.

Other Views

Some have suggested that slower growth in the U.S. labor force in the future may result in accelerated capital deepening based on an assumed continuation in the historical rate of growth in domestic capital investment, and thus a lower future return to capital (and lower equity yields) in the U.S. economy. Specifically, this would imply that capital investment would grow to levels higher than could be accommodated with current technology while maintaining the marginal product of capital at a maximum. While this may be plausible (if investors have nowhere else to invest and are willing to accept a lower return), it would also imply a higher rate of growth in labor productivity than in the past, and thus would be inconsistent with current Trustees assumptions.

A more compelling argument may be that the general investor may see equities as less risky in the future than in the past, or may be less averse to the level of risk that is present. This attitude would be consistent with a higher level of equity prices, higher PE ratios, lower dividend ratios (to price), and thus a lower real yield on equities (see Diamond 1999). However, OCACT believes that the perception in 1999 that equities will be consistently less risky in the future than in the past may already have been dispelled by price changes since 1999. In the future, OCACT believes that it is likely that stocks will be viewed as risky to about the same extent as in the past, over long periods of time.

Growth in the Total Value of the Equity Market

The assumption that future PE ratios will average at about the same level as in the past implies that the AGGREGATE price of all equities outstanding will grow at the same rate as for aggregate corporate earnings, and thus for GDP. This means that a slower future rate of growth in labor force and GDP (as projected by the Trustees) implies a slower future growth rate for aggregate stock value. In order to be consistent with a continuation of the past equity yield of 7 percent, this would imply that the dividend ratio will be higher in the future, offsetting the lower growth in corporate sales (GDP) and earnings, and thus share values. This would seem to be a reasonable consequence of slower labor force growth. Slower growth in employment from one year to the next means that the share of each year's corporate earnings that must be retained for investment in a growing workforce is reduced. These corporate earnings may reasonably be assumed to be distributed in the form of dividends, providing an equity yield that compensates for the slower increase in equity price.

An alternative assumption might be that corporate earnings that would be retained for a faster growing work force might be invested by the corporation abroad, thus effectively expanding labor and output offshore. This would result in increases in corporate output (although not in domestic GDP) and corporate earnings that would in turn support higher increases in equity prices, and thus total equity yield.

THE SOCIAL SECURITY ADVISORY BOARD

Establishment of the Board

In 1994, when the Congress passed legislation establishing the Social Security Administration as an independent agency, it also created a 7-member bipartisan Advisory Board to advise the President, the Congress, and the Commissioner of Social Security on matters relating to the Social Security and Supplemental Security Income (SSI) programs. The conference report on this legislation passed both Houses of Congress without opposition. President Clinton signed the Social Security Independence and Program Improvements Act of 1994 into law on August 15, 1994 (P.L. 103-296).

Advisory Board members are appointed to 6-year terms, made up as follows: 3 appointed by the President (no more than 2 from the same political party); and 2 each (no more than one from the same political party) by the Speaker of the House (in consultation with the Chairman and Ranking Minority Member of the Committee on Ways and Means) and by the President pro tempore of the Senate (in consultation with the Chairman and Ranking Minority Member of the Committee on Finance). Presidential appointees are subject to Senate confirmation. Board members serve staggered terms. There is currently one vacancy on the Board.

The Chairman of the Board is appointed by the President for a 4-year term, coincident with the term of the President, or until the designation of a successor.

Members of the Board

Stanford G. Ross, Chairman

Stanford Ross is a partner in the law firm of Arnold & Porter, Washington, D.C. He has dealt extensively with public policy issues while serving in the Treasury Department, on the White House domestic policy staff, as Commissioner of Social Security, and as Public Trustee of the Social Security and Medicare Trust Funds. He is a Founding Member and a former Director and President of the National Academy of Social Insurance. He has provided technical assistance on Social Security and tax issues under the auspices of the International Monetary Fund, World Bank, and U.S. Treasury Department to various foreign countries. He has taught at the law schools of Georgetown University, Harvard University, New York University, and the University of Virginia, and has been a Visiting Fellow at the Hoover Institution, Stanford University. He is the author of many papers on Social Security and Federal taxation subjects. Term of office: October 1997 to September 2002.

Jo Anne Barnhart

Jo Anne Barnhart is a political consultant and public policy consultant to State and local governments on welfare and social services program design, policy, implementation, evaluation, and legislation. From 1990 to 1993 she served as Assistant Secretary for Children and Families, Department of Health and Human Services, overseeing more than 65 programs, including Aid to Families with Dependent Children, the Job Opportunities and Basic Skills Training program, Child Support Enforcement, and various child care programs. Previously, she was Minority Staff Director for the U.S. Senate Committee on Governmental Affairs, and legislative assistant for domestic policy issues for Senator William V. Roth. Ms. Barnhart served as Political Director for the National Republican Senatorial Committee. First term of office: March 1997 to September 1998; current term of office: October 1998 to September 2004.

Martha Keys

Martha Keys served as a U.S. Representative in the 94th and 95th Congresses. She was a member of the House Ways and Means Committee and its Subcommittees on Health and Public Assistance and Unemployment Compensation. Ms. Keys also served on the Select Committee on Welfare Reform. She served in the executive branch as Special Advisor to the Secretary of Health, Education, and Welfare and as Assistant Secretary of Education. She was a member of the 1983 National Commission (Greenspan) on Social Security Reform. Martha Keys is currently consulting on public policy issues. She has held executive positions in the non-profit sector, lectured widely on public policy in universities, and served on the National Council on Aging and other Boards. Ms. Keys is the author of *Planning for Retirement: Everywoman's Legal Guide*. First term of office: November 1994 to September 1999; current term of office: October 1999 to September 2005.

David Podoff

David Podoff is visiting Associate Professor at the Department of Economics and Finance at the Baruch College of the City University of New York. Recently, he was Minority Staff Director and Chief Economist for the Senate Committee on Finance. Previously, he also served as the Committee's Minority Chief Health and Social Security Counselor and Chief Economist. In these positions on the Committee he was involved in major legislative debates with respect to the long-term solvency of Social Security, health care reform, the constitutional amendment to balance the budget, the debt ceiling, plans to balance the budget, and the accuracy of inflation measures and other government statistics. Prior to serving with the Finance Committee he was a Senior Economist with the Joint Economic Committee and directed various research units in the Social Security Administration's Office of Research and Statistics. He has taught economics at the University of Massachusetts and the University of California at Santa Barbara. He received his Ph.D. in economics from the Massachusetts Institute of Technology and a B.B.A. from the City University of New York. Term of office: October 2000 to September 2006.

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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.

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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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Marketing communication

FEBRUARY 2023

Capital market assumptions

Raising our long-term capital market assumptions (CMAs)

- After a tumultuous year that saw double-digit declines in most equity and fixed income asset classes, our 20-year return assumptions are higher across the board. This is largely attributable to a positive impact from valuations, given that some of our growth expectations have actually declined from last year due to structural forces.
- We have raised our long-run expectations for U.S. equities to a 7.2% annualized return, relative to 5.8% at the end of 2021.
- We are building in slightly higher inflation expectations in the U.S., but there is greater uncertainty in our baseline forecasts. Our assumption for U.S. inflation (CPI) has increased to 2.25%, though we still expect the US Federal Reserve to be successful in the long run, maintaining its target of 2%.
- Non-U.S. developed markets equity return expectations have also risen to 7.1%. Higher-dividend yield, greater multiple expansion and assumptions of a tailwind from USD depreciation offset expectations of lower GDP growth. Meanwhile, emerging markets have the highest expected return at 9%.
- Fixed income saw sharp losses across nearly all sectors in 2022 amid rapidly rising rates, significantly higher inflation and a stronger dollar. We are likely to see some retracement of the rise in yields and a steeper yield curve.
- Yields at the end of the third quarter of 2022 in some areas, including emerging markets debt and high-yield bonds, reflected a high risk of recession and are above levels that should be extrapolated over our 20-year horizon, so we could see some mean reversion.
- In terms of currencies, we expect the U.S. dollar to depreciate over a long-term horizon.

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Past results are not a guarantee of future results. Estimates are shown for illustrative purposes only.

Raising expectations for long-term capital market assumptions, supported by valuations and high starting yields in fixed income

Our long-term return assumptions (20 years) at the start of 2023 are higher across the board after a tumultuous year that saw most equity and fixed income asset classes experience double-digit declines. Last year, broad stock and bond markets declined concurrently and by a similar amount. The Federal Reserve hiked rates the fastest since 1994, leaving bond investors reeling and increasing both the cost of capital and the discount rate for corporations, which helped to drive down stock prices, some quite meaningfully. Outside the U.S., continued COVID-related disruptions were accompanied by high inflation and rising rates.

The increase in expected returns relative to 2021 is largely attributable to the positive impact from valuations, given that some of our expectations for economic growth have actually declined from last year. Outside the U.S., we see a substantial tailwind from what we expect to be a prolonged period of U.S. dollar weakness. It's possible that, despite the recent decline, the dollar could resume its bull run for next year or so, but the long-term outlook undoubtedly calls for it to weaken.

In fixed income, our assumptions for a steeper yield curve and somewhat lower credit spreads are more than offset by a higher starting point in yields across all fixed income asset classes.

Economic backdrop

Underpinning our asset class expectations are lower economic growth assumptions for many regions around the world due to the more pessimistic assessment of labor supply growth in the U.S., U.K. and Europe; continued COVID impacts; and secular shifts in China's economy. We have increased our assumption for **U.S. inflation** to 2.25% for the Consumer Price Index (CPI), even though we still expect the Federal Reserve to successfully maintain its long-run target of 2% for the Personal Consumption Expenditures Price Index (PCE).

Overall, we assume inflation will rise, given secular changes to supply chain patterns, climate transition and rising geopolitical risk. We have lowered our U.S. GDP (gross domestic product) growth estimates to 2.3% (annualized) from 2.6% last year, driven largely by demographic forces. Our economists' view is that lower labor force growth and participation won't be fully offset by immigration. We maintain our productivity assumption of 2% largely because we expect society to be rewarded by today's technology advances over the next 10 to 20 years.

Non-U.S. markets: Inflation and labor shortages

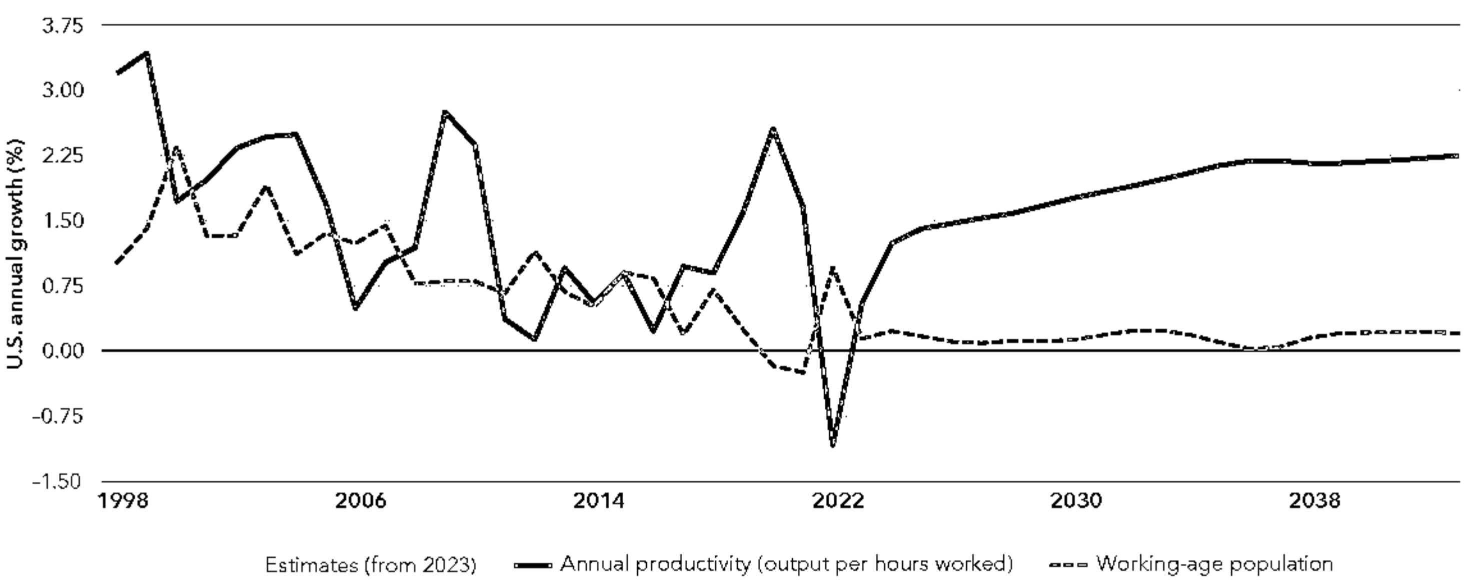
Similarly, both the European Union and the U.K. have struggled with labor shortages in the post-COVID era, reflecting a significant loss of older workers and an immigration slowdown. Combined with an assumption that the energy price shock will persist and the impact of Brexit in the U.K., we've lowered our growth outlook for the region.

In **Europe**, we assume that the European Central Bank (ECB) will hit its inflation target of 2% in the medium term, but the risks are now skewed to the upside given the energy shock, fiscal expansion and mounting political pressure on the ECB to temper rate hikes. Similarly, in the **U.K.**, we assume the Bank of England (BoE) will hit inflation targets but tolerate moderately higher inflation.

The outlook for **Japan** is unchanged, although the composition of real growth is different. We're assuming that higher productivity from digital transformation will be offset by even lower labor force growth. While sector-specific immigration in areas such as nursing, construction and agriculture is moving the needle, it has slowed post-COVID and is likely to grow at a slower pace. We expect the GDP growth rate for the non-U.S. developed world to be 1.1%.

For **China**, we have lowered our estimates for potential real growth for the next 20 years from 4% to 3%. Factors influencing the forecast are a maturing economy, a lack of market-oriented policy reforms from Beijing (including limited services-sector liberalization), the absence of additional funding for a social safety net, concerns about the stability of policies affecting private-sector investment, and a slow property market. Other secular forces having a dampening effect are the sharper-than-expected slowdown in the birthrate and a shift to "China+1" strategies at foreign companies invested in China, who are looking at ways to diversify their supply chain risk.

U.S. population and productivity estimates



As of 30 September 2022. This data has been generated with the help of NiGEM. The NiGEM economic model is the property of the National Institute of Economic and Social Research and NiGEM is a trade mark of the Institute. Population age is defined as the ages between 16 to 64. The estimated NiGEM annual productivity is defined as output per hour for all employed persons. There are a number of ways to define productivity, and this is one measure.

Past results are not a guarantee of future results. Estimates are shown for illustrative purposes only.

Equities

All expected equity returns are meaningfully higher than one year ago. With the shift in markets, the impact from valuations is the largest driver of the increase. Outside the U.S., the impact from currency exchange rates has had a substantial impact, as the U.S. dollar has been expensive against both developed and emerging market currencies.

In the **U.S.**, higher assumptions for inflation offset expectations for lower real GDP growth, leaving valuations as the biggest driver of the change in equity returns. We expect U.S. equities to return 7.2% annualized over the 20-year horizon, more than 1% higher than what we predicted at year-end 2021.

We also assume a slightly higher net accretion in the U.S., as lower valuations may offset some of the accounting considerations as companies can retire more shares. That said, given higher debt costs, it could be more difficult to finance buybacks with debt. Low interest rates in the period after the Global Financial Crisis (GFC) have enabled many companies to distribute dividends and buybacks at levels that are higher than their free cash flow. This overdistribution has led companies to increase their leverage over time. With the ultra-low interest-rate environment behind us, some companies may need to deleverage their balance sheets, and overdistributions of dividends will be more difficult to justify.

Non-U.S. developed markets equity return expectations have also increased and are slightly below expectations for the U.S. Higher-dividend yield, greater multiple expansion and assumptions of a tailwind from U.S.-dollar depreciation offset expectations of lower GDP growth. Without the FX (foreign exchange) tailwind, expected returns would be significantly lower. The aggregate number does mask substantial differences between countries – expected returns are higher for the U.K. and Japan and lower for Europe and Canada.

Emerging markets (EMs) have the highest expected return on a 20-year view, with greater multiple expansion, a weaker U.S. dollar and a higher dividend yield, outpacing assumptions for lower expected growth in China. Finally, we assume a 2.5% net dilution factor, assuming net new issuance has a dilutive effect on the existing shareholders' ownership of stocks.

20-year expected returns (%)	Year-end 2022	Year-end 2021
U.S. equity	7.2	5.8
Non-U.S. developed markets equity	7.1	6.3
Emerging markets equity	9.0	6.0

Source: Capital Group. Year-end expected returns 2022 are as of 31 December 2022, with valuations as of September 2022. Year-end expected returns 2021 are as of 30 November 2021. Returns in USD terms.

Fixed income

Fixed income returns have seen the largest net increase in expected returns from the 2021 year-end update across the board. Higher starting yields are the largest driver of forward long-term returns.

Overall, we expect some retracement of the rise in yields and **a steeper yield curve.** We're assuming a slightly steeper terminal yield curve relative to last year to reflect a higher term premium due to the uncertainty around inflation. We also assume that assets will no longer have the support of an open-ended quantitative easing (QE) program.

Our expectation for the **five- to 10-year U.S. Treasury** terminal yield is at 2.7%. At this level, given our assumptions for real yields, it still provides a 0.45% positive real yield with a terminal inflation breakeven of 2.4% against a backdrop of relatively high debt levels in developed economies, which is likely to keep monetary policy leaning to be more accommodative overall.

We also expect a slight increase in terminal credit spreads relative to last year. **Credit spreads** in the third quarter of 2022 in areas such as emerging markets and high yield reflected a high risk of recession and were above levels that should be extrapolated over a 20-year horizon. However, some mean reversion is likely.

Our **U.S. high-yield** expected returns have increased to 6.6% from 4% one year ago due to higher starting yields, even though we have increased our expectations for spreads and default losses considering a more volatile inflation and rate environment. We still believe that the higher quality composition of the index will persist, as CCC-rated credits have become a smaller portion of the index relative to BB-rated bonds. As such, we are not assuming mean reversion for spreads or defaults. Our expectation for high-yield spreads over intermediate Treasuries is at 425 basis points relative to a historical median spread of 475 basis points.

We expect the gap between U.S. and most non-U.S. rates to narrow, primarily because there is more room for the Fed to lower rates and be more active relative to the ECB and BoE. It is likely that the ECB's monetary policy will remain more accommodative than the Fed over the forecast horizon given structural shifts such as changing demographics and migration patterns, as well as the needs of weaker countries like Italy and Spain for monetary support.

On the other hand, **Japan** is already an outlier with yield curve control. While we maintain that Japanese government bond (JGB) spreads will stay wide, we have trimmed the range modestly given the very recent change to the yield curve range.

From a total return perspective, **emerging markets debt** continues to look the most attractive. Starting yields are higher than other fixed income asset classes at 7.2%. Looking at the asset class in aggregate, the tailwind from currencies in emerging markets local debt has helped to offset potential defaults in USD-denominated emerging markets debt.

In **major markets**, we are assuming that **real yields** will increase from current levels, but on a nominal basis, they will stay below nominal GDP growth. We are already at record-high debt levels in almost every major economy and almost every sector. If yields go above nominal growth rates and stay there, it risks creating unstable debt dynamics. Therefore, it's unlikely that we will see a 20-year period of nominal yields that are higher than nominal growth rates.

20-year expected returns (%)	Year-end 2022	Year-end 2021
Cash (USD)	2.3	1.1
U.S. Treasury intermediate term	3.4	1.6
U.S. TIPS	3.6	0.9
U.S. aggregate	4.2	2.0
U.S. high yield	6.6	4.0
Emerging markets debt (USD)	7.6	4.7

Source: Capital Group. Year-end expected returns 2022 are as of 31 December 2022, with valuations as of September 2022. Year-end expected returns 2021 are as of 30 November 2021. Returns in USD terms.

Currencies

We expect major currencies to appreciate against the U.S. dollar on average over our 20-year horizon. Our return estimates start with the observation that the dollar is currently significantly overvalued against major currencies, an assessment supported by two different currency models that we use. We assume that the dollar will depreciate gradually, eventually converging with its fair value.

We see the largest FX returns in the Japanese yen, which, at current levels, is considerably undervalued by our estimates. Assuming it eventually converges back to its fair value implies a 3.8% annualized appreciation against the dollar. Conversely, we see negative FX returns in the Turkish lira and the Brazilian real. Both currencies are assumed to be overvalued and fair value convergence would require a respective 4% and 2% depreciation per annum against the dollar.

Non-USD-based equity and fixed income assets are poised to experience a tailwind from foreign currency exposure. We expect currencies to add 1.4% per annum to the returns of the MSCI World ex USA Index for equities and 1.6% annualized to the Bloomberg Global Aggregate ex USD Index for fixed income over the long term.

Capital market assumptions (CMAs)

Asset class	Long-term expected returns (20 yrs) (%)	Standard deviation (%)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Cash (USD)	2.3	0.4	1.00																				
2 U.S. Treasury short term	3.1	2.1	0.24	1.00																			
3 U.S. Treasury intermediate term	3.4	5.6	0.11	0.87	1.00																		
4 U.S. Treasury long term	4.1	11.0	0.07	0.71	0.89	1.00																	
5 U.S. TIPS	3.6	6.0	0.04	0.57	0.68	0.61	1.00																
6 U.S. aggregate	4.2	3.8	0.09	0.76	0.85	0.82	0.77	1.00															
7 U.S. corporate	5.1	6.2	0.00	0.44	0.56	0.57	0.71	0.82	1.00														
8 U.S. corporate long duration	5.5	10.6	-0.01	0.46	0.64	0.72	0.67	0.85	0.91	1.00													
9 U.S. high yield	6.6	7.0	-0.05	-0.09	-0.04	-0.05	0.42	0.33	0.63	0.47	1.00												
10 Non-U.S. global aggregate	4.0	8.0	0.08	0.48	0.49	0.41	0.62	0.62	0.62	0.58	0.42	1.00											
11 Global aggregate	4.1	5.8	0.09	0.59	0.62	0.55	0.70	0.75	0.72	0.69	0.43	0.94	1.00										
12 Emerging markets debt USD	7.6	8.9	0.02	0.22	0.32	0.30	0.62	0.60	0.78	0.67	0.76	0.60	0.65	1.00									
13 Emerging markets debt local	7.8	11.7	0.10	0.15	0.18	0.12	0.45	0.40	0.56	0.47	0.63	0.68	0.66	0.77	1.00								
14 Municipal bonds	3.6	4.4	0.01	0.44	0.54	0.51	0.58	0.70	0.68	0.64	0.42	0.44	0.53	0.58	0.34	1.00							
15 U.S. equity	7.2	14.7	-0.04	-0.15	-0.11	-0.11	0.27	0.17	0.42	0.31	0.71	0.38	0.35	0.58	0.58	0.20							
16 U.S. small-cap equity	8.7	19.2	-0.05	-0.20	-0.17	-0.17	0.22	0.11	0.38	0.26	0.71	0.31	0.28	0.55	0.55	0.17	0.89	1.00					
17 Developed markets equity	7.2	15.3	0.00	-0.13	-0.11	-0.12	0.29	0.19	0.46	0.34	0.74	0.45	0.42	0.63	0.66	0.21	0.93	0.87	1.00				
18 All country world equity	7.4	15.5	0.01	-0.13	-0.11	-0.12	0.30	0.19	0.46	0.34	0.75	0.47	0.43	0.65	0.69	0.22	0.92	0.86	0.96	1.00			
19 All country world small-cap equity	7.5	18.0	-0.02	-0.17	-0.14	-0.15	0.29	0.17	0.46	0.33	0.77	0.43	0.39	0.64	0.66	0.22	0.89	0.92	0.92	0.92	1.00		
20 Non-U.S. developed markets equity	7.1	16.6	0.03	-0.11	-0.10	-0.12	0.30	0.19	0.46	0.34	0.73	0.51	0.46	0.65	0.71	0.22	0.85	0.81	0.93	0.93	0.90	1.00	
21 Emerging markets equity	9.0	20.7	0.08	-0.09	-0.08	-0.10	0.32	0.20	0.45	0.33	0.69	0.49	0.45	0.65	0.77	0.20	0.73	0.71	0.80	0.84	0.82	0.84	1.00
22 Inflation	2.3	1.8																					

As of 31 December 2022, with valuations as of 30 September 2022. Returns in USD terms. All assumptions are for market asset classes only and are reviewed at least annually. These figures represent the views of a small group of investment professionals based on their individual research and are approved by the Capital Market Assumptions Oversight Committee. They should not be interpreted as the view of Capital Group as a whole. As Capital Group employs The Capital System™, the views of other individual analysts and portfolio managers may differ from those presented here. They are provided for informational purposes only and are not intended to provide any assurance or promise of actual returns. They reflect long-term projections of asset class returns and are based on the respective indexes or other proxies and therefore do not include any outperformance gain or loss that may

result from active portfolio management. Note that the actual results will be affected by any adjustments to the mix of asset classes. All market forecasts are subject to a wide margin of error.

Past results are not a guarantee of future results. Estimates are shown for illustrative purposes only.

Long-term capital market assumptions – 2023

These assumptions are intended to reflect our forward-looking views over a long-term (20-year) horizon spanning multiple market cycles. We believe these are reasonable expectations to use as a starting point for strategic asset allocation recommendations. They are meant to capture the relative return/volatility of asset classes within a total portfolio context. Central to the design of our approach is that the starting point of the analysis matters and that a number of key asset class variables demonstrate some level of mean reversion over the long term.

Equities

We use a building blocks approach for our equity return assumptions, as defined by this formula.

Equity return		Earnings growth
	-/+	Dilution/accretion
	+	Dividend yield
	+	Valuation impact
	+	Currency impact

Earnings growth: We use expected real GDP growth plus inflation as the proxy for earnings growth, in line with standard practices. For inflation and real earnings growth assumptions, we seek the input of economists on our Capital Strategy Research (CSR) team and reference a global macro model.

Dividend yield: For the dividend yield component, we take an average of the prevailing dividend yield and the median historical yield for the corresponding MSCI regional or country index.

Net dilution/accretion: We account for net dilution/accretion to capture the expected gap between GDP growth and earnings-per-share growth, and the impact of earnings-per-share dilution or accretion. Net dilution is estimated as in Bernstein and Arnott (2003),* which suggests using the ratio of an index's market cap to its price level as a simple measure of the net impact of share issuance and buybacks. As markets grow through new issuance, the number of listed shares increases, diluting the ownership of existing shareholders. Hence, high economic growth doesn't necessarily translate to higher earnings-per-share growth, as we have seen in several emerging markets over the last decade.

We combine two approaches in determining our estimate: regression using various productivity measures (the theory being that productivity growth coincides with economic growth and has also empirically been shown to be meaningful to net dilution), and regression to estimate net buyback yield using cash, debt and tax-rate estimates as the variables and supplement that with views from our economist team.

Valuation: The impact of valuations is computed as the multiple expansion or contraction from current valuation levels to a target valuation. The valuation measures we consider are cyclically adjusted price-to-earnings ratios (CAPEs) of the corresponding MSCI regional or country indexes. This measures the real price as the numerator and the average of real earnings from the last 10 years as the denominator. The target valuations are mostly a 40/60 blend of mean reversion and change to reach a "fair value" CAPE calculated using a multivariate regression of CAPE to real GDP growth and the 10-year yield. The current CAPE ratio is measured against the target CAPE ratio to determine if a market is over or undervalued.

* Bernstein, W.J. and R.D. Arnott (2003), "Earnings Growth: The Two Percent Dilution," *Financial Analysts Journal,* 59:5, 47-55.

Additionally, for mean reversion, the impact of valuation for each country or region is not based on that country or region in isolation; rather, we assume that the broader regional and global context is important. Here, the target CAPEs are calculated as composites of country, regional and global CAPEs. For example, for the U.S. market, we compute the target CAPE as two-thirds of the U.S. CAPE and one-third of the global (MSCI World) CAPE. These ratios allow us to acknowledge the importance of global linkages and concurrently mitigate the impact of outliers on the impact of valuation figures.

Fixed income

To arrive at our expected returns for each fixed income asset class, we compute its projected annual return for each year over the investment horizon, which we then geometrically compound before calculating the annualized return for the full period.

Bond return building blocks:

Bond return	Yield to worst
	+ Valuation impact
	+ Default impact
	+ Currencies

Yield to worst: We start with the prevailing yield to worst for the corresponding proxy index (principally Bloomberg and J.P. Morgan indexes) and projected ending yields in 10 years' time.

The projected ending yields are based on historical spreads over U.S. intermediate-duration Treasuries (five- to 10-year maturities), with a view as to whether spreads will be tighter or wider in the future relative to where they are today. For years 11 through 20, we assume yields remain flat. The return for each year is calculated based on the prevailing duration of the index and assumes a linear change in yields, plus any impact from default losses and currencies.

Default impact: The assumptions we use for default losses are based on historical averages and the view from our fixed income analysts/portfolio managers on how the future may diverge from the past.

Currencies

Our currency projections are based around long-run currency fair values using our trade-weighted multilateral model. Fair values are determined by relative inflation and a proxy for productivity trends and assume that inflation/productivity trends will continue.

The expected nominal FX return calculations assume current spot rates revert to fair values in the medium term and track their respective currency fair value trends over the 10-year horizon. The annualized change (i.e., return) applied to various asset classes is calculated based on the underlying currency weights in the index proxies.

In addition to the trade-weighted multilateral model, this year we have incorporated a bilateral-USD model, which incorporates metrics and forecasts widely used across CMA equity and fixed income building blocks and integrates long-run inflation and productivity estimates. As a result, it more closely aligns our currency forecasts with the approach taken across other CMA asset classes.

Each model uses a standard framework to value in a way that it is globally consistent, coherent and easily interpretable. Both models assume that current FX spot rates will gradually converge to their implied fair values. We produce forecasts across a set of 25 currency pairs versus the U.S. dollar and 43 economies. Output from both models is averaged.

Volatility and correlation assumptions

Our assumptions about asset class volatilities and correlation figures are based largely on estimates from the historical return data series of the asset class proxies. The traditional approach in estimating the correlation matrix using asset class returns contains estimation error, magnified with the outliers in the sample data. As a result, we derive our estimates by transforming the sample matrix using a statistical method called shrinkage, which tends to pull the most extreme values toward the center, reducing estimation error.

Valuation-independent CMAs

We have created an alternative set of valuation-independent CMAs for long-horizon solutions. Our view is that for very long horizons of 40 to 50 years, it is also useful to look at a set of CMAs that strip out factors such as the impact of mean reverting valuations, the effect of market accretion or dilution and currency moves. These valuations are primarily used for the long-term strategic design of our solution offerings. We share here the valuation-independent CMAs for the major asset classes, assuming:

- Equity valuations do not revert
- There is no currency impact
- We do not account for net dilution or accretion
- We use only expected yields 10 years out to project bond returns and disregard starting yields

Asset Class	Long-horizon expected returns (%)	Volatility (%)	Historical proxy
Cash (USD)	1.9	0.4	FTSE 3-Month U.S. T-Bill Index Series
U.S. Treasury short term	2.4	2.1	Bloomberg 1–5 Year U.S. Treasury Index
U.S. Treasury intermediate term	2.7	5.6	Bloomberg 5–10 Year U.S. Treasury Index
U.S. TIPS	2.8	6.0	Bloomberg U.S. Treasury Inflation-Protected Securities (TIPS) Index
U.S. aggregate	3.4	3.8	Bloomberg U.S. Aggregate Bond Index
U.S. high yield	5.5	7.0	Bloomberg U.S. Corporate High Yield Index 2% Issuer Cap
Non-U.S. global aggregate	2.0	8.0	Bloomberg Global Aggregate ex-USD Index
Global aggregate	2.7	5.8	Bloomberg Global Aggregate Bond Index
U.S. equity	6.4	14.7	MSCI USA Index
U.S. small-cap equity	8.0	19.2	MSCI USA Small Cap Index
Developed markets equity	6.3	15.3	MSCI World Index
All country world equity	6.6	15.5	MSCI All Country World Index (ACWI)
All country world small-cap equity	7.5	18.0	MSCI All Country World Small Cap Index
Non-U.S. developed markets equity	6.3	16.6	MSCI World ex USA Index
Emerging markets equity	9.0	20.7	MSCI Emerging Markets Index

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Glossary

Capital market assumptions: Long-term projections of the future performance of asset class returns based on their respective indexes or other proxies that incorporate analysis and observations.

Yield to worst: The lowest yield that can be realized by either calling or putting on one of the available call/put dates or holding a bond to maturity.

Correlation: A statistical measure of how a security and an index move in relation to each other. A correlation ranges from –1 to 1. A positive correlation close to 1 implies that as one moved, either up or down, the other moved in lockstep, in the same direction. A negative correlation close to –1 indicates the two have moved in the opposite direction.

Standard deviation: A statistical measure of dispersion of the observed return that depicts how widely a stock or portfolio's returns varied over a certain period of time. When a stock or portfolio has a high standard deviation, the predicted range of performance is wide, implying greater volatility.

Currency impact: An increase or decrease in the value of a foreign investment or of something bought or sold in a foreign country caused by a change in the exchange rate.

Dividend yield: The dividends a company pays out to investors as a percentage of the share price.

Net dilution: The reduction of a shareholder's ownership percentage caused by the issuance of additional shares.

Net buyback yield: The amount of a company's net repurchase of outstanding shares, or buybacks, divided by its market capitalization. Please note that net buyback yield does not represent a dividend paid by the company.

Retracement: A technical term used to identify a minor pullback or change in the direction of a financial instrument, such as a stock or index.

Mean reversion: The assumption that an asset's price will tend to converge with its average price over time, despite long-term variations.

Index definitions

All indexes are unmanaged, and their results include reinvested distributions but do not reflect the effect of sales charges, commissions, account fees, expenses or U.S. federal income taxes.

Cash (USD): The **FTSE 3-Month U.S. T-Bill Index Series** is intended to track the daily performance of three-month U.S. Treasury bills. The indexes are designed to operate as a reference rate for a series of funds.

U.S. Treasury short term: The **Bloomberg 1-5 Year U.S. Treasury Index** measures USD-denominated, fixed-rate, nominal debt issued by the U.S. Treasury with maturities of one to five years.

U.S. Treasury intermediate term: The **Bloomberg 5–10 Year U.S. Treasury Index** measures USD-denominated, fixed-rate, nominal debt issued by the U.S. Treasury with maturities of five to 10 years.

U.S. Treasury long term: The **Bloomberg 10–20 Year U.S. Treasury Index** measures USD-denominated, fixed-rate, nominal debt issued by the U.S. Treasury with maturities of 10 to 20 years. The **Bloomberg 20+ Year U.S. Treasury Index** measures USD-denominated, fixed-rate, nominal debt issued by the U.S. Treasury with maturities of 20 years or more.

U.S. TIPS: The **Bloomberg U.S. Treasury Inflation-Protected Securities (TIPS) Index** consists of investment-grade, fixed-rate, publicly placed, USD-denominated and non-convertible inflation-protected securities issued by the U.S. Treasury that have at least one year remaining to maturity and US$250 million par amount outstanding.

U.S. aggregate: The **Bloomberg U.S. Aggregate Bond Index** represents the U.S. investment-grade fixed-rate bond market.

U.S. corporate: The **Bloomberg U.S. Corporate Investment Grade Index** represents the universe of investment-grade, publicly issued U.S. corporate and specified foreign debentures and secured notes that meet the specified maturity, liquidity and quality requirements.

U.S. corporate long duration: The **Bloomberg U.S. 20+ Year AAA-A Corporate Bond Liquid Index** measures fixed-rate, taxable corporate bonds with at least 20 years remaining to maturity. It includes USD-denominated securities issued by U.S. and non-U.S. industrial, utility and financial issuers with an index rating of at least AAA and at least US$750 million par amount outstanding and excludes subordinated debt.

U.S. high yield: The **Bloomberg U.S. Corporate High Yield Index 2% Issuer Cap** covers the universe of fixed-rate, non-investment-grade debt. The index limits the maximum exposure of any one issuer to 2%.

Non-U.S. global aggregate: The **Bloomberg Global Aggregate ex-USD Index** measures the performance of global investment-grade bonds, excluding the United States. This multicurrency index includes Treasury, government-related, corporate and securitized fixed-rate bonds from both developed and emerging market issuers.

Global aggregate: The **Bloomberg Global Aggregate Bond Index** measures the performance of global investment-grade bonds. This multicurrency index includes Treasury, government-related, corporate and securitized fixed-rate bonds from both developed and emerging market issuers.

Emerging markets debt USD: The **J.P. Morgan Emerging Market Bond Index (EMBI) Global Diversified** is a uniquely weighted emerging markets debt index that tracks total returns for USD-denominated bonds issued by emerging market sovereign and quasi-sovereign entities.

Emerging markets debt local: The **J.P. Morgan Government Bond Index – Emerging Markets (GBI-EM) Global Diversified** covers the universe of regularly traded, liquid fixed-rate, domestic-currency emerging markets government bonds to which international investors can gain exposure.

Municipal bonds: The **Bloomberg Municipal Bond Index** is a market-value-weighted index designed to represent the long-term investment-grade tax-exempt bond market.

U.S. equity: The **MSCI USA Index** is a free-float-adjusted, market-capitalization-weighted index that measures the U.S. portion of the world market. Results reflect dividends gross of withholding taxes.

U.S. small-cap equity: The **MSCI USA Small Cap Index** is a free-float-adjusted, market-capitalization-weighted index that measures the performance of the small-cap segment of U.S. markets.

Developed markets equity: The **MSCI World Index** is a free-float-adjusted, market-capitalization-weighted index that measures equity market results in global developed markets, consisting of 23 developed market country indexes.

All country world equity: The **MSCI All Country World Index (ACWI)** is a free-float-adjusted, market-capitalization-weighted index that measures equity market results in global developed and emerging markets, consisting of more than 40 developed and emerging market country indexes.

All country world small-cap equity: The **MSCI All Country World Small Cap Index** is a free-float-adjusted, market-capitalization-weighted index that measures equity market results of smaller capitalization companies in both developed and emerging markets. Results reflect dividends net of withholding taxes.

Non-U.S. developed markets equity: The **MSCI World ex USA Index** is a free-float-adjusted, market-capitalization-weighted index that measures equity market results in global developed markets, consisting of 22 of 23 developed market country indexes, excluding the United States.

Emerging markets equity: The **MSCI Emerging Markets Index** is a free-float-adjusted, market-capitalization index that measures equity market performance of emerging markets.

Important disclosures

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by Willard T. Carleton and Josef Lakonishok

Risk and Return on Equity: The Use and Misuse of Historical Estimates

The task of estimating a company's expected return typically involves an initial estimate of the market's expected return. This, in turn, is usually based on summary statistics about risk premiums drawn from historical average returns. The approach appears simple, but the underlying complexities may trip up unwary analysts.

The authors demonstrate how choice of measurement period, averaging method, portfolio weighting and risk-free rate can cause the equity risk premium to vary from 0.9 to 24.9 per cent. Over the 1926-80 period, for example, the arithmetic mean annual return on an equally weighted portfolio was 17.1 per cent; the geometric mean annual return on a corresponding value-weighted portfolio was 9.1 per cent. Furthermore, differences in historical returns between industries, and company size effects within industries, are also substantial.

FINANCIAL ANALYSTS HAVE come to rely heavily on summary statistics drawn from historical returns on common stocks.[1] Typically, these returns, aggregated over time and over securities, have been compared with historical returns on lower-risk assets such as Treasury bills or U.S. government bonds to provide estimates of the stock market's average risk premium on equities.[2] The considerable complexity underlying the aggregate data seems to have been ignored, for the most part, in practice.

The consequences of ignoring complexity can be substantial in dollar terms. For example, the book value of Duke Power Company's common equity is about $2.4 billion. Each percentage point in estimates of its cost of equity capital thus translates into $24 million of earnings per year, when applied as an earnings rate on book equity. And the differences between estimates of costs of equity generated by different "readings" of historical returns could easily amount to several percentage points—or multiples of $24 million per year—in required earnings.

This article attempts to introduce some caution into the uncritical acceptance and use of aggregated historical return differentials. Using return data for the period 1926–80, we present tables showing how mean or risk-adjusted stock returns are affected by the following dimensions of historical return measurement and presentation:

- geometric vs. arithmetic mean returns,
- equally weighted vs. value-weighted stock portfolios,
- time periods chosen,
- bills vs. bonds as the base for the market risk premium,
- industry risk-adjusted return differentials,
- effect of data point intervals on industry risk adjustments,
- the significance of some industry "alphas,"
- size effects within industries.

We used as our main data base the monthly

1. Footnotes appear at end of article.

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Table I Annualized Historical Returns and Standard Deviations on Market Portfolios

Period	Geometric Mean		Arithmetic Mean		Standard Deviation	
	Val. Wtd.	Eq. Wtd.	Val. Wtd.	Eq. Wtd.	Val. Wtd.	Eq. Wtd.
1926–80	9.1%	12.5%	11.4%	17.1%	21.9%	33.1%
1931–80	9.5	14.4	11.7	18.7	21.3	32.7
1936–80	10.2	13.4	11.8	16.6	18.7	26.8
1941–80	11.4	14.9	12.8	17.7	17.6	25.4
1946–80	10.6	12.2	12.0	14.7	17.7	23.8
1951–80	10.8	13.0	12.3	15.6	18.3	24.7
1956–80	8.9	11.9	10.3	14.7	18.0	25.4
1961–80	8.7	12.2	10.1	15.1	17.9	25.4
1966–80	7.2	11.2	8.9	14.6	19.3	28.2
1971–80	9.1	13.3	11.1	16.9	21.3	29.0
1976–80	15.9	26.3	16.7	27.1	15.2	15.0

CRSP tape, which contains monthly stock returns for all NYSE companies and for various monthly stock indexes. We used the Compustat tape, which provides summaries of financial statements of all major U.S. corporations, to construct firm size measures.[3] The monthly returns on Treasury bills and long-term government bonds constructed by Ibbotson and Sinquefield were also used.

Overall Equity Market Results

Assume that our analytical task is to forecast the expected rate of return (alternatively, the required rate of return) on a given stock. Most such forecasts involve estimation of the expected return on the market and the return on some "risk-free" asset (or, alternatively, the difference between the two as the market's risk premium) and the risk of the particular stock. We therefore start by estimating the expected return on the market as a whole, defining the market portfolio conventionally as a portfolio that includes only common stock.[4]

Table I presents data on annual historical returns and standard deviations for two widely used market portfolios—the value-weighted Fisher index and the equally weighted Fisher index.[5] The results are presented for various periods, all of which have 1980 as an ending date. We selected 1980 to reflect the point of view of an analyst today who is trying to decide how far back into historical data he must go to develop averages that validly represent current investors' beliefs about the future.

Computing Average Returns

The annual returns in Table I are aggregated across time based on both geometric mean and arithmetic mean computations. For example, the value-weighted geometric mean of 9.1 per cent for the 1926–80 period is derived in the following way:

$$[(1 + r_{1926})(1 + r_{1927}) \cdot \cdot \cdot (1 + r_{1980})]^{1/55} - 1,$$

where r denotes the annual rate of return. The comparable arithmetic mean of 11.4 per cent is derived as:

$$(r_{1926} + r_{1927} + \cdot \cdot \cdot \; r_{1980})/55.$$

The difference between the two means of 2.3 per cent is substantial and is directly related to the variability of the return series. The differences between the means would be more pronounced in the case of individual securities, because of their higher variability.

Which of the two means should be used? The truth is, each is appropriate under particular circumstances. The geometric mean measures changes in wealth over more than one period on a buy and hold (with dividends reinvested) strategy. If the average investor rebalanced his portfolio every period, the geometric mean would not be a correct representation of his portfolio's performance over time. The arithmetic mean would provide a better measure of typical performance over a single historical period (in the example, one year).

Portfolio Weights

The differences between returns on a value-weighted index, or portfolio, and those on an equally weighted index are even more striking than the differences between arithmetic and geometric means. For the 1926–80 period, the equally weighted market portfolio had an average mean return of 17.1 per cent versus 11.4 per cent for the value-weighted portfolio. The geometric means of the two portfolios are closer

Table II Annualized Historical Returns and Standard Deviations on Long-Term Government Bonds and Treasury Bills

	Bonds		*Bills*		*Standard Deviation*	
Period	*Geo. Mean*	*Arith. Mean*	*Geo. Mean*	*Arith. Mean*	*Bonds*	*Bills*
1926–80	3.0%	3.2%	2.8%	2.8%	5.7%	2.7%
1931–80	2.8	3.0	2.7	2.8	5.9	2.8
1936–80	2.6	2.7	3.0	3.0	5.6	2.8
1941–80	2.3	2.4	3.4	3.4	5.8	2.8
1946–80	2.0	2.2	3.8	3.9	6.0	2.7
1951–80	2.2	2.3	4.3	4.4	6.4	2.6
1956–80	2.3	2.5	4.9	4.9	6.8	2.5
1961–80	2.6	2.8	5.5	5.6	6.4	2.4
1966–80	2.6	2.9	6.3	6.4	7.3	2.2
1971–80	4.0	4.2	6.8	6.8	6.9	2.5
1976–80	1.9	2.1	7.8	7.8	8.3	2.9

(12.5 versus 9.1 per cent) because the equally weighted portfolio has a higher standard deviation than the value-weighted portfolio (33.1 vs. 21.9 per cent).[6]

Again, which index should be used? The value-weighted index obviously provides a better measure of stock market performance in general, hence of the experience of investors as a whole. The difference between AT&T and a small NYSE company cannot be ignored; investors have committed more funds to AT&T than they have to many smaller companies. Equally weighted indexes are very simple to construct and understand, but they probably make no more sense than an index constructed by weighting companies according to the length of their names. Nonetheless, equally weighted indexes may have their uses in determining expected rates of return for specific companies.

Equally weighted indexes give much more weight to smaller companies, and smaller companies are in general riskier than larger companies, so part of the average return difference between the two types of indexes can be explained by risk differences. However, only part of the small firm-large firm return difference can be explained by the conventional measures of risk, beta and unsystematic risk; for reasons still not fully understood, stocks of small companies have outperformed those of large companies on a risk-adjusted basis.[7] (Note that any use of historical return characteristics for forward-looking purposes requires a belief that history tends to repeat itself.) In determining expected rates of return, company size cannot therefore be ignored, and an equally weighted index may be appropriate for certain companies and for particular uses of expected market return estimates.[8] Clearly, investment strategies based on portfolios of small firms fall into this category.

Finally, Table I shows that, with the exception of the 1976–80 results, choice of starting year makes a difference of up to about 4 per cent per year in average equity return for each of the four portfolio measures. The 1976–80 period represents a special case noted by many analysts: During the later part of the decade, probably because of unanticipated changes in inflation and interest rates, average stock returns *and* their variability substantially exceeded their average long-term values.

Choice of Risk-Free Rates

To estimate the equity market's *expected* risk premium (or forward-looking average), one usually computes the *historical* average return on lower-risk securities such as Treasury bills or U.S. government bonds.[9] The difference between the equity and bill or bond historical average provides an estimate of the market risk premium.

The logic of this procedure is straightforward: Expected rates of return on bills, bonds and stocks vary over time, reflecting common underlying changes in interest rates. Over short periods of time, realized return differences between stocks and bills, or between stocks and bonds, will vary because of random and unanticipated repricing of assets. Over a sufficiently large number of observations (number of years), however, investors realize, on average, the return differential consistent with the greater risk of common stocks—i.e., an amount equal to the expected risk premium.

Table II provides historical returns on Treasury bills and long-term U.S. government bonds. For these fixed income securities, the differences between geometric and arithmetic

Table III Annualized Equity Premium Estimates

	Arithmetic Means				Geometric Means			
	– Bonds		– Bills		– Bonds		– Bills	
Period	*Val. Wtd*	*Eq. Wtd*	*Val. Wtd*	*Eq. Wtd*	*Val. Wtd.*	*Eq. Wtd.*	*Val. Wtd*	*Eq. Wtd*
1926–80	8.2%	13.9%	8.6%	14.3%	6.1%	9.3%	6.3%	9.7%
1931–80	8.7	15.7	8.9	15.9	6.7	11.4	6.8	11.7
1936–80	9.1	13.9	8.8	13.6	7.6	10.7	7.2	8.2
1941–80	10.4	15.2	9.4	14.2	9.1	10.4	8.0	8.0
1946–80	9.7	12.5	8.0	10.8	8.6	10.0	6.8	6.8
1951–80	9.9	13.3	7.8	11.2	8.6	10.7	6.5	6.5
1956–80	7.8	12.2	5.4	9.8	6.6	9.4	4.0	4.0
1961–80	7.3	12.3	4.5	9.5	6.1	9.4	3.2	3.2
1966–80	6.0	11.7	2.5	8.2	4.6	7.4	0.9	0.9
1971–80	6.9	12.7	4.3	10.1	5.1	9.1	2.3	2.3
1976–80	14.6	24.9	8.9	19.2	14.0	24.2	8.1	8.1

mean rates of return are very small, reflecting the small variability of the return series. For the total 1926–80 period, the arithmetic mean return on long-term government bonds is 3.2 per cent, versus 2.8 per cent for Treasury bills. For any period starting after 1936, however, Treasury bills show higher returns.

The superior performance of Treasury bills is especially striking in the more recent periods. From 1971 through 1980, for example, the average return on long-term government bonds was 4.2 per cent, versus 6.8 per cent for Treasury bills. The main contributor to this behavior was unexpected inflation, which led to higher than expected interest rates, hence lower bond prices. Unanticipated capital losses on bonds offset coupon income, producing lower realized returns.

Assuming that more history is better than less for purposes of estimating the market risk premium, there still remains the serious question of whether to base the premium on Treasury bills or on long-term government bonds. Again, the means will depend on the ends.

Advocates of the Capital Asset Pricing Model (CAPM) routinely employ the stock-bill average return differential. Aside from questions relating to the model's conceptual validity, the stock-bill spread is appropriate for uses involving short-term investment horizons. But the one-period CAPM is valid for multiperiod environments only under implausible and rigid assumptions. And expected market return estimates based on risk premium computations may be used to value expenditures for irreversible, long-term investments (nuclear power generating plants, for example); in these cases, the stock-bond return differential may provide a more appropriate measure of the average long-term risk premium.[10]

Table III presents annual risk premium estimates for equally weighted and value-weighted market portfolios based on Treasury bills and long-term government bonds. There are a number of choices and the differences between them are not trivial. Depending on the particular time period, method of weighting, method of averaging, and risk-free rate used, the market equity risk premium ranges from 0.9 to 24.9 per cent per year.[11]

Equity Returns and Risk Adjustments by Industry

Now that we have estimated the equity market portfolio's risk premium, we can make some adjustments for the difference in risk between our company and a typical company in the market portfolio. The CAPM relates return to risk as follows:

$$E(R_i) = R_f + [E(R_m) - R_f]\beta_i,$$

where:

$E(R_i)$ = the expected return on company i,
R_f = the risk-free rate,
$E(R_m)$ = the expected return on the market portfolio, and
β_i = the company's systematic risk, or beta.

The remaining task, under the CAPM, is to determine the company's beta. Our confidence in choice of any given historical data representation to estimate the market risk premium is at this point somewhat shaken, however. A natural step may be to examine the return experiences of similar firms, given that we are not sure about how to determine a market risk premium, hence expected return. In addition, even in the CAPM framework, it may be appropriate to look at groups of companies or industries, rather than at individual companies.

Thus, rather than concentrate on various issues critical in the case of individual securities (such as measurement error and coefficient instability), we will focus our analysis on the industry level. This will facilitate the presentation of results and enable us to demonstrate better the possible reason for differences in return experiences.[12]

We grouped the sample companies into 15 industries based on their two-digit Standard Industrial Classification codes. Table IV gives the number of companies in each industry. Table V provides for each industry annual geometric returns, arithmetic returns and standard deviations of returns for the 1926–80 period. Three beta coefficients, three intercept (alpha) coefficients, and three coefficients of determination (R-squares) are also presented. Table VI shows the same results for the 1971–80 period. These coefficients were estimated from the following regression:

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + e_{it},$$

where R_{it}, R_{ft} and R_{mt} are the period t returns for industry i (each security received the same weight), the risk-free rate (Treasury bill returns), and the return on the market portfolio (equally weighted Fisher index), respectively. Thus the differences between the three sets of coefficients result from differences in the estimation intervals (monthly, quarterly or annual).[13]

Table IV Industry Classifications

Industry	*SIC Code*
1. Mining	10-14
2. Construction	15-17
3. Food	20-21
4. Textile	22-23
5. Paper	24-27
6. Chemicals	28
7. Petroleum	29
8. Rubber	30-31
9. Metals	32-34
10. Machinery	35-39
11. Transportation	40-49
12. Wholesale Trade	50-51
13. Retail Trade	52-59
14. Finance	60-67
15. Services	70-89

Beta and Estimation Intervals

For the 1971–80 period, 10 of the 15 industries exhibit differences in betas of at least 0.1. For the mining industry, the monthly beta is 0.83, the annual 0.63; for the petroleum industry, the quarterly beta is 0.50, the annual 0.73. Assuming an annual risk premium of about 8 per cent, a 0.1 difference in betas will create a 0.8 per cent difference in expected returns; not much in the abstract, perhaps, but one that translates into $1.9 million per year in earnings for Duke Power if beta is used to determine its return on book equity.

The coefficients of determination at the indus-

Table V Returns and Risk Measures by Industries, 1926–1980

Industry	*Geom. Mean*[a]	*Arith. Mean*[a]	*Stan. Dev.*[a]	*Beta (1)*[b]	*Beta (3)*[b]	*Beta (12)*[b]	*Alpha (1)*[b]	*Alpha (3)*[b]	*Alpha (12)*[b]	*R^2 (1)*[b]	*R^2 (3)*[b]	*R^2 (12)*[b]
Mining	16.1	21.7	38.7	1.02	1.10	1.03	3.54[c]	2.91[d]	4.10	0.87	0.92	0.78
Construction	7.2	20.1	62.0	1.43	1.72	1.53	−3.17	−6.09	−4.80	0.60	0.78	0.66
Food	11.9	15.0	27.6	0.75	0.71	0.80	1.33[d]	1.45[d]	0.83	0.92	0.94	0.92
Textile	10.6	16.8	38.7	1.04	1.13	1.11	−1.66[d]	−2.22[c]	−1.93	0.90	0.95	0.89
Paper	13.0	18.4	37.6	1.01	1.07	1.10	0.60	0.12	−0.12	0.92	0.96	0.93
Chemicals	12.7	16.1	28.6	0.86	0.82	0.83	1.33[d]	1.61[c]	1.55[c]	0.92	0.96	0.92
Petroleum	14.7	18.9	31.3	0.80	0.74	0.81	4.28[c]	4.35[c]	4.65[c]	0.71	0.82	0.73
Rubber	10.6	16.8	39.2	1.06	1.10	1.12	−1.94	−2.02[d]	−2.10	0.89	0.95	0.89
Metals	12.2	17.8	38.9	1.11	1.13	1.13	−0.72	−0.96	−1.30	0.96	0.98	0.93
Machinery	12.3	18.4	37.6	1.09	1.07	1.11	−0.24	0.04	−0.40	0.97	0.98	0.96
Transportation	10.4	14.5	29.9	0.99	0.95	0.81	−1.33	−0.68	0.37	0.89	0.91	0.80
Wholesale Trade	11.4	16.7	35.9	0.83	0.91	1.02	1.33	0.28	−0.82	0.69	0.84	0.89
Retail Trade	10.7	16.3	36.1	0.90	0.87	1.01	−0.60	−0.28	−1.03	0.88	0.91	0.86
Finance	11.4	15.8	30.1	0.99	0.94	0.85	−0.60	0.00	1.02	0.94	0.95	0.84
Services	13.0	19.9	40.6	1.04	1.03	1.09	0.84	1.45	1.47	0.86	0.91	0.79
Average	11.9	17.5	36.8	0.99	1.02	1.02	0.24	0.08	0.10	0.86	0.92	0.85

[a] Annualized percentages.
[b] The number in parentheses is the length of the estimation interval—monthly, quarterly or yearly.
[c] Statistical significance of 5 per cent for a two-tailed test.
[d] Statistical significance of 10 per cent for a two-tailed test.

Table VI Returns and Risk Measures by Industry, 1971–1980

	Geo. Mean[a]	Arith Mean[a]	Stan. Dev.[a]	Beta (1)[b]	Beta (3)[b]	Beta (12)[b]	Alpha (1)[a,b]	Alpha (3)[a,b]	Alpha (12)[a,b]	R^2 (1)[b]	R^2 (3)[b]	R^2 (12)[b]
Mining	24.8	29.4	38.2	0.83	0.70	0.63	12.42[c]	13.43[c]	17.54	0.55	0.51	0.23
Construction	20.1	26.6	41.4	1.21	1.29	1.31	5.79[d]	6.01	6.65	0.86	0.88	0.83
Food	12.6	15.0	25.1	0.81	0.81	0.83	0.24	0.80	−0.15	0.92	0.92	0.91
Textile	7.6	14.3	41.9	1.13	1.17	1.34	−5.41[c]	−5.14[d]	−6.11	0.87	0.88	0.86
Paper	11.6	15.0	28.6	0.99	1.03	0.96	−1.33	−1.61	−1.64	0.94	0.96	0.95
Chemicals	13.7	15.4	20.0	0.81	0.77	0.66	1.33	1.29	1.94	0.86	0.91	0.91
Petroleum	20.7	24.4	31.5	0.69	0.50	0.73	9.25[d]	10.42[d]	10.16	0.49	0.40	0.45
Rubber	11.6	16.4	33.5	1.01	1.02	1.10	−1.45	−1.33	−1.53	0.88	0.89	0.90
Metals	14.8	17.3	25.0	1.01	0.94	0.83	1.33	1.89	2.02	0.94	0.95	0.93
Machinery	16.2	21.2	34.1	1.15	1.18	1.17	2.30	0.08	2.47[c]	0.96	0.96	0.99
Transportation	10.9	13.4	24.3	0.72	0.68	0.82	−0.84	−0.76	−1.83	0.87	0.87	0.97
Wholesale Trade	12.7	17.7	34.0	1.19	1.24	1.13	−1.09	−1.16	−0.50	0.94	0.94	0.92
Retail Trade	8.4	14.4	38.9	1.13	1.26	1.13	−4.91	−5.01[d]	−5.62	0.92	0.94	0.86
Finance	8.9	13.4	30.3	1.06	1.05	1.00	−4.41[d]	−4.06[d]	−3.46	0.89	0.92	0.91
Services	15.2	22.1	38.6	1.28	1.38	1.28	1.09	1.15	2.78	0.94	0.95	0.93
Average	14.0	18.4	32.4	1.00	1.00	1.00	0.84	0.96	1.52	0.86	0.86	0.84

[a] Annualized percentages.
[b] The number in parentheses is the length of the estimation interval—monthly, quarterly or yearly.
[c] Statistical significance of 5 per cent for a two-tailed test.
[d] Statistical significance of 10 per cent for a two-tailed test.

try level are extremely high. For the 1926–80 period, the averages across industry are 0.86, 0.92 and 0.85 for the monthly, quarterly and annual intervals, respectively. Although there is some indication of a better fit for quarterly data, the differences are not large enough to decide on the basis of statistical fit that quarterly data should be used to estimate betas.

We should note that the results in Tables V and VI probably underestimate the impact of estimation intervals on betas of individual companies. We used intervals of one month or longer. Betas estimated from daily or weekly data are subject to biases caused by trading patterns; there are no biases in estimated betas for NYSE securities when monthly data are used.[14] Furthermore, our betas are estimated at the level of industries, not individual securities; differences due to beta estimation intervals are partially suppressed when industry aggregates are employed.[15]

Estimation Intervals and Alpha

According to the CAPM, the theoretical intercept, or alpha, should be zero; estimated deviations from zero should be attributable to conventional estimation problems; and the intercept should be irrelevant in generating industry or company expected returns. Given that our beliefs in CAPM are somewhat shaken, however, the question is whether to retain or discard the intercept when expected returns are being generated.[16]

For the 1926–80 period and the monthly intercept, a two-tailed test shows two intercepts to be different from zero at the 5 per cent significance level and three at the 10 per cent level; 10 intercepts are not significantly different from zero. One approach to the development of an expected industry rate of return would be to discard the intercepts, especially the 10 that are not significantly different from zero, statistically. We feel that this procedure errs. What we want for an expected return estimate is an unbiased point estimate; if the regression equation were correctly specified, retaining estimated beta while discarding estimated alpha would obviously produce bias in estimated expected rate of return.[17]

Unfortunately, the size of the intercepts indicates that the effect on expected industry returns is substantial. For the rubber industry, for example, the monthly intercept is −1.94 per cent per year. Also, Table V indicates that differences in estimation intervals produce differences in intercepts. For the finance industry, the monthly intercept is −0.6 per cent, while the annual intercept is 1.02 per cent per year.

There is one other problem. A high (low) intercept may simply result from a series of unexpectedly favorable (unfavorable) circumstances in the past. For the 1971–80 period, the intercept of the oil industry was 9.25 per cent per year—but a 9.25 per cent intercept for the industry in the future is not a proposition most analysts would accept. The high intercept reflects the misspecification of the return-generating process being used; the intercept captures factors omitted by the model. Unfortunately, the market model regression cannot provide additional insight about the size and origin of such factors.

The intercept can have a substantial effect on expected returns. Table VII presents estimates of the expected return for the construction industry, under a CAPM framework. The returns—based on the results of Table VI, an assumed market risk premium of 8 per cent and a risk-free rate of 9 per cent—range from 18.68 to 26.13 per cent. At the level of individual securities, the effects will be even greater.

Industry Size and Risk Effects

Our examination of equally weighted and value-weighted portfolios suggested the existence of a company size effect on stock returns. Are the effects of size on historical return experience present within industries? The presence of size effects within industries would vastly complicate the estimation of company expected returns.

Tables VIII, IX and X describe in some detail the role of company size within industries. We analyzed the periods 1961–80, 1966–80, 1971–80 and 1976–80, but given the similarity of results, we present here only those for the whole period (Table VIII) and for the last 10 years (Table IX). We measured size by the market value of the common stock as of December 31, and estimated its effect by dividing the companies within the 13 given industries into four size groups, based on their size at the end of the previous year.[18]

Table VII Expected Return Estimates for the Construction Industry

	Without Intercept	*With Intercept*
Monthly Data Interval	18.68%	24.47%
Quarterly Data Interval	19.32%	25.33%
Annual Data Interval	19.48%	26.13%

Table VIII indicates an almost perfect relation between size and return. For *all* 13 industries, the smallest companies (designated size Group 1) had higher annual returns (on the basis of both arithmetic and geometric means) than the largest companies (size Group 4). Based on the summary in Table X, the difference between Groups 1 and 4 in arithmetic mean across industries for 1961–80 amounts to 11.1 per cent per year (22.3–11.2 per cent).

An almost perfect monotonic relation exists, not only between size and returns, but also between size and risk, as the betas and standard deviations in Tables IX and X indicate. From Table X, the average beta and standard deviation for the smallest companies are 1.14 and 36.7 per cent, respectively, for 1961–80; the corresponding numbers for the largest companies are 0.79 and 23.8 per cent.

Table VIII Returns and Risk Measures by Industries and Size, 1961–1980

Industry	*Size Group*	*Size*	*Geo. Mean*	*Arith. Mean*	*Stan. Dev.*	*Beta*	*Alpha*
Metals	1	29	16.9	20.3	28.9	1.17	0.31*
	2	66	12.4	15.2	25.2	1.04	0.02
	3	169	8.1	10.7	24.3	0.98	−0.28*
	4	822	7.2	8.8	19.0	0.86	−0.30*
Machinery	1	27	17.0	23.5	41.0	1.36	0.27*
	2	78	11.9	16.3	31.9	1.23	−0.08
	3	220	10.9	14.4	28.7	1.09	−0.11
	4	2356	9.1	11.9	24.6	0.88	−0.16**
Transportation	1	63	15.3	17.6	23.5	0.83	0.31*
	2	170	10.9	12.6	20.3	0.73	0.03
	3	396	8.1	9.6	18.1	0.66	−0.14
	4	1800	5.8	7.0	16.8	0.60	−0.28*
Trade	1	23	14.2	21.0	41.9	1.26	0.10
	2	62	12.4	18.0	36.9	1.16	−0.01
	3	157	10.2	14.9	33.8	1.02	−0.13
	4	1186	7.4	11.1	28.8	0.87	−0.28*
Finance	1	29	14.4	19.6	34.3	1.36	0.16
	2	88	14.2	18.9	33.9	1.06	0.18
	3	272	10.3	13.0	23.9	0.95	−0.09
	4	1362	10.3	12.0	19.7	0.78	−0.01
Services	1	36	16.6	22.9	38.9	1.33	0.31*
	2	74	12.0	18.1	37.7	1.28	−0.05
	3	141	12.0	17.0	32.9	1.21	−0.02
	4	381	7.9	14.8	40.9	1.14	−0.30*

(Table continued)

Table VIII continued

Industry	Size Group	Size	Geo. Mean	Arith. Mean	Stan. Dev.	Beta	Alpha
Mining	1	40	25.6	34.2	55.1	1.06	1.11*
	2	121	22.2	26.0	32.3	0.79	0.94*
	3	292	18.7	21.8	29.4	0.84	0.63*
	4	1341	16.6	19.5	26.7	0.77	0.49*
Food	1	29	16.6	19.9	29.3	0.92	0.40*
	2	101	13.9	17.0	27.2	0.90	0.19*
	3	363	9.4	12.0	25.0	0.81	−0.11
	4	1428	8.8	10.3	18.2	0.62	−0.07
Textile	1	18	13.1	20.8	45.4	1.22	0.07
	2	43	11.0	16.2	36.1	1.13	−0.08
	3	87	9.1	15.0	36.8	1.01	−0.18**
	4	265	7.9	13.0	33.2	0.96	−0.26*
Paper	1	34	17.4	22.4	38.4	1.18	0.36*
	2	91	11.0	14.4	27.5	1.02	−0.07
	3	300	10.6	13.1	24.2	0.94	−0.06
	4	1344	6.7	8.6	21.0	0.83	−0.32*
Chemicals	1	50	16.4	19.8	28.8	1.11	0.30*
	2	184	11.7	13.8	21.6	0.94	0.01
	3	565	12.3	13.8	18.6	0.80	0.12
	4	2537	6.3	7.2	14.2	0.61	−0.23*
Petroleum	1	134	19.6	24.4	34.5	0.94	0.67*
	2	906	20.4	23.3	26.2	0.72	0.81*
	3	2763	15.2	17.7	25.0	0.55	0.55**
	4	8369	13.5	15.6	22.9	0.50	0.43**
Rubber	1	25	19.1	24.4	37.1	1.12	0.54*
	2	57	9.0	12.9	27.9	1.06	−0.20**
	3	212	10.3	14.5	32.9	0.93	−0.07
	4	847	2.5	5.2	23.5	0.85	−0.63*

* Statistical significance of 5 per cent for a two-tailed test.
** Statistical significance of 10 per cent for a two-tailed test.

Table IX Returns and Risk Measures by Industries and Size, 1971–1980

Industry	Size Group	Size	Geo. Mean	Arith. Mean	Stan. Dev.	Beta	Alpha
Metals	1	27	18.6	21.2	27.2	1.22	0.35*
	2	64	17.1	19.4	24.2	1.00	0.30*
	3	162	10.5	13.6	26.7	0.96	−0.18
	4	730	9.8	11.6	21.1	0.83	−0.17
Machinery	1	24	20.8	27.1	40.0	1.40	0.47*
	2	77	16.4	21.4	34.4	1.22	0.18
	3	229	13.6	18.3	33.2	1.06	0.02
	4	2517	9.9	13.3	27.6	0.83	−0.16
Transportation	1	61	14.9	18.1	28.2	0.85	0.19
	2	163	12.0	14.7	25.9	0.72	0.03
	3	387	8.3	10.4	22.7	0.66	−0.22
	4	1660	6.1	8.0	20.7	0.57	−0.34**
Trade	1	22	12.2	19.5	43.2	1.35	−0.14
	2	63	12.3	18.7	40.9	1.25	−0.13
	3	167	9.1	14.9	38.8	1.04	−0.31
	4	1171	4.0	8.8	34.1	0.90	−0.64*
Finance	1	31	15.1	20.8	35.0	1.54	0.09
	2	91	10.3	15.5	33.2	1.06	−0.22
	3	299	8.3	12.2	28.6	0.94	−0.32**
	4	1352	9.3	11.5	22.0	0.74	−0.16
Services	1	27	17.1	24.5	40.8	1.35	0.25
	2	64	12.3	20.1	40.4	1.40	−0.13
	3	148	13.7	20.1	36.6	1.21	0.03
	4	502	11.0	18.5	41.2	1.13	−0.16
Mining	1	50	27.9	36.2	57.9	1.03	1.26*
	2	149	26.3	31.0	37.9	0.82	1.16*
	3	396	24.0	28.0	35.4	0.80	0.99*
	4	2039	18.2	21.9	30.8	0.69	0.58

(Table continued)

Table IX continued

Industry	Size Group	Size	Geo. Mean	Arith. Mean	Stan. Dev.	Beta	Alpha
Food	1	29	18.9	22.1	30.2	0.94	0.46*
	2	118	17.6	20.2	27.1	0.90	0.37*
	3	436	7.9	11.2	29.3	0.79	−0.30*
	4	1733	8.4	10.1	19.9	0.60	−0.17
Textile	1	17	11.5	20.9	52.0	1.30	−0.12
	2	40	4.5	9.9	38.5	1.10	−0.64*
	3	83	2.1	7.9	37.3	0.98	−0.80*
	4	276	4.5	10.8	37.2	0.97	−0.61*
Paper	1	34	15.2	18.9	30.3	1.21	0.12
	2	97	10.5	15.4	32.9	0.99	−0.18
	3	326	12.4	15.5	28.8	0.89	0.00
	4	1500	6.9	9.6	25.4	0.79	−0.36*
Chemicals	1	50	18.7	22.2	30.2	1.08	0.40*
	2	211	13.0	15.3	23.0	0.87	0.05
	3	682	13.8	15.7	21.0	0.73	0.18
	4	2969	5.9	7.0	15.9	0.56	−0.30
Petroleum	1	158	22.0	29.1	42.0	0.95	0.77**
	2	1134	20.4	24.5	32.0	0.73	0.75**
	3	3526	22.5	25.5	29.5	0.47	1.07*
	4	9044	16.2	19.2	28.3	0.49	0.57
Rubber	1	23	22.9	30.6	46.7	1.18	0.74*
	2	52	9.9	14.7	30.4	1.05	−0.20
	3	210	10.8	15.7	37.3	0.94	−0.12
	4	739	−0.6	3.2	28.9	0.85	−0.98*

* Statistical significance of 5 per cent for a two-tailed test.
** Statistical significance of 10 per cent for a two-tailed test.

Table X Returns and Risk Measures Averaged Across Industries, by Size Groups

Period	Size	Geo. Mean	Arith. Mean	Stan. Dev.	Beta	Alpha
1961–80	41	17.1	22.3	36.7	1.14	0.38*
	157	13.3	17.1	29.6	1.01	0.13
	457	11.1	14.4	27.2	0.91	0.01
	1849	8.5	11.2	23.8	0.79	−0.15**
1971–80	43	18.1	23.9	38.8	1.18	0.37*
	179	14.1	18.5	32.3	1.01	0.10
	542	12.1	16.1	31.1	0.88	0.00
	2019	8.4	11.8	27.1	0.77	−0.22*

* Statistical significance of 5 per cent by two-tailed test.
** Statistical significance of 10 per cent by two-tailed test.

Does Alpha Depend on Size?

Did small companies outperform large companies on a risk-adjusted basis? The last column in each table presents the industry alphas, which should theoretically equal zero. Higher intercepts for the smaller companies would suggest superior performance on a risk-adjusted basis. For both 1961–80 and 1971–80 periods, the smallest companies in all 13 industries outperformed the largest. The 1961–80 difference in intercepts between the smallest and the largest group sizes, summarized over all industries in Table X, is 0.53 per cent per month, which translates to 6.55 per cent per year (statistically significant at the 5 per cent level). For 1971–80, the difference is 7.31 per cent per year (also significant at the 5 per cent level).

Our results regarding the effect of size on industry returns are consistent with results of previous studies that did not examine differential returns within industries.[19] As noted, the presence of intraindustry size effects vastly complicates estimation of expected returns for individual companies. Whether the purpose is capital budgeting, rate of return regulation, or investment strategy, the analyst has to decide to include or ignore the size effect. We have no theory that adequately explains the phenomenon, so it is tempting to assume that it will not persist in the future. But discarding it is to deny historical reality and, in the framework of CAPM-based market model regressions, to produce biased return estimates.

Implications for Analysts

The practical applications of expected return estimates entail serious financial consequences (especially in the case of utility regulation). Given our incomplete understanding of how stock returns are determined, we think it is delusionary and misleading not to acknowledge the complexities just under the surface of simple historical average returns. On empirical grounds, if no other, it would appear that the popular recipe of, say, 8 per cent times company beta, added to a bill yield, may not be robust enough for general use.

Footnotes

1. For among other tasks, development of capital budgeting discount rates; estimation of equilibrium stock prices in order to measure deviations against which speculative trading can take place; and estimation of costs of equity capital for utilities, to be employed in rate hearings.
2. See, for example, R.G. Ibbotson and R.A. Sinquefield, *Stocks, Bonds, Bills, and Inflation: The Past (1926–1976) and the Future (1977–2000)* (Charlottesville, Va.: The Financial Analysts Research Foundation, 1977); *Stocks, Bonds, Bills, and Inflation: Historical Returns (1926–1978)* (Charlottesville, Va.: The Financial Analysts Research Foundation, 1979); and *Stocks, Bonds, Bills and Inflation: The Past and the Future* (Charlottesville, Va.: The Financial Analysts Research Foundation, 1982).
3. The Compustat tape provides data only for companies that exist currently. For example, the 1980 Compustat tape provides data only for companies that existed in 1980. The Research Compustat tape was used to provide data on companies that went out of existence.
4. For purposes of this article, we will not deal with the well known problems associated with the validity of a portfolio that excludes such important assets as bonds and real estate. For a comprehensive discussion of these issues see R.R. Roll, "A Critique of the Asset Pricing Theory's Tests, Part I: On Past and Potential Testability of the Theory," *Journal of Financial Economics*, March 1977, pp. 129–176.
5. For a complete description of the Fisher Index, see Lawrence Fisher and James Lorie, "Rates of Return on Investments in Common Stocks: The Year-by-Year Record, 1926–65," *Journal of Business*, July 1968, pp. 291–316. These indexes are available on the CRSP tapes and are adjusted for all changes in capitalization.
6. The difference between the equally weighted and value-weighted indexes would be even larger if AMEX and OTC companies had been included.
7. For a discussion of these issues, see Richard Roll, "A Possible Explanation of the Small Firm Effect," *Journal of Finance*, September 1981, pp. 879–888.
8. There is a further complication we do not pursue in this article, which arises in the context of estimation of expected rates of return for an average investor on an after-tax basis. Everything else constant, companies with high variability in returns provide investors with a higher tax subsidy. This subsidy is related to the distinction made by the IRS between long-term and short-term capital gains. These issues are discussed by George Constantinides, "Optimal Stock Trading with Personal Taxes: Implications for Prices and the Abnormal January Returns" (July 1982).
9. Note the greater returns of equities (Table I) over bonds (Table II) and bonds over bills (Table II), historically consistent with conventional descriptions of their relative risks.
10. For a discussion, see W.T. Carleton, "A Highly Personal Note on the Use of the CAPM in Public Utility Rate Cases," *Financial Management*, Autumn 1978, pp. 57–59, and W.T. Carleton, D.R. Chambers and J. Lakonishok, "Inflation Risk and Regulatory Lag," *Journal of Finance*, May 1983, pp. 419–436.
11. A further complication in the search for a market risk premium is that the variance of the market realized return series changes over time. We do not pursue this topic, as this article is addressed to the fairly typical user of historical returns observed in practice. For an exploration of the issues, see R.C. Merton, "On Estimating the Expected Return on the Market: An Exploratory Investigation," *Journal of Financial Economics*, December 1980, pp. 323–361.
12. It should be pointed out at this stage that a popular alternative to the CAPM for deriving expected returns is based on observing the past performance of similar companies—companies from the same industry.
13. All the computations were repeated for the various time intervals discussed in Table I. Because the results were qualitatively similar we present only the findings for the total period, 1926–80, and the last 10 years, 1971–80.
14. The biases arise from trading patterns and are discussed by E. Dimson, "Risk Measurement When Shares are Subject to Infrequent Trading," *Journal of Financial Economics*, June 1979, pp. 197–226 and M. Scholes and J. Williams, "Estimating Betas from Non-Synchronous Data," *Journal of Financial Economics*, December 1977, pp. 309–327. H. Stoll and R. Whaley ("Transactions Costs and

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RETHINKING THE EQUITY RISK PREMIUM

Edited by

P. Brett Hammond, Jr., Martin L. Leibowitz, and Laurence B. Siegel

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Rethinking the Equity Risk Premium

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Rethinking the Equity Risk Premium: An Overview and Some New Ideas

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Many investors regard the past decade as an unusual one for market returns. This view is no doubt based on their having experienced a sea change in equity market behavior, including much-lower-than-average returns, much higher volatility, two of the biggest bubbles (and their subsequent bursting) in stock market history, and rising correlations—cross-asset, cross-country, cross-sector, and intra-sector. Any longtime investment market participant will have encountered more extreme trends and events in the past 10 years than during any other 10-year period in the past seven decades.

One of the key features of this turbulent period is renewed uncertainty about what may be the most important measure in all of finance—namely, the equity risk premium, or the expected return for equities in excess of a risk-free rate:

$$ERP = E(re) - E(rf).$$

The equity risk premium, or ERP, plays a critical role for any investor in that it affects savings and spending behavior as well as the all-important allocation decision between riskless and risky assets. In that sense, it is an equilibrium concept that looks beyond any given period's specific circumstances to develop a fundamental, long-term estimate of return trends.

It should be noted that the equity risk premium, as the term is used here, is not identical to the historical excess return. For example, for the 10 years beginning in the middle of 2001, annualized geometric mean U.S. equity returns significantly trailed U.S. TIPS (Treasury Inflation-Protected Securities)—roughly 3 percent versus 6 percent. So, one measure of the historical excess return is –3 percent.[1] In this volume, Robert Arnott shows that, using rolling 20-year returns, the historical excess return has ranged from +20 percent to –10 percent,

[1]Please note that, by convention, the return is often expressed as a "percentage" rather than "percentage points."

a range that is not very helpful in forming a historical average. But these numbers do not say much about the equity risk premium, which is a forward-looking expectations-driven estimate of stock returns. In other words, what premium do we *expect* stocks to provide over a risk-free rate? This forward-looking premium is critical to fundamental activities in investing, especially strategic and tactical asset allocation but also in portfolio management, hedging, investment product development, and the formation of saving and spending plans.

The problem posed by recent history for all these activities is whether we can be confident in our understanding of equity risk. After several decades during which realized equity returns followed a welcome positive pattern, the past decade has seen a marked downturn in equities. This downturn has prompted some investors to suggest that we must permanently adjust our future expectations for equity returns versus other broad asset classes. Others argue that the same evidence suggests equities are poised for outstanding future excess returns. Which is it?

To investigate the ERP in more depth, we could evaluate forecasts, trends, and expected variations in forward-looking measures: P/Es, dividend payouts, debt, macroeconomic growth and inflation, investment horizon, demographic change, and other variables. We have at our disposal, arguably, more analytical techniques and sources of information than ever before that bear on asset class expectations and behavior, but we have less certainty than ever about the ERP.

This volume is the result of an effort to sort through and present some of the best recent thinking on the ERP in a way that practitioners may find useful in developing their own approach to the subject. It assembles leading practitioners and academics who have confronted the question of what the ERP might be going forward and, more importantly, what factors are the most important drivers of the premium.

Initial ERP Project

The present project arose out of an interest on the part of the Research Foundation of CFA Institute to revisit, in light of what has happened in asset markets, a similar but not identical effort that it sponsored in late 2001. This earlier effort emerged as the "dot-com" bubble burst and investors confronted, for the first time in many years, the possibility of an extended period of lower equity returns. The 2001 forum gathered a wide range of experts to discuss the theoretical foundations of the ERP, historical results, then-current estimates of the size of the premium, and implications for asset management (Association for Investment Management and Research 2002). It featured lively discussions of the definition of the ERP, rational expectations versus behavioral explanations for its existence, specific factors and models that explain its size and stability (or lack thereof), the possibility of structural change–driven effects on the premium, and ways in which institutions and individuals incorporate views on the ERP into asset allocation.

Rather than a firm consensus, a strong sense of diversity arose from this earlier forum regarding views on the ERP and possible explanations for differences among those views. For example, **Exhibit** 1 shows, as of 2001, a selected set of estimates of the ERP ranging from 0 to 7 percent, with an average of a little less than 4 percent.

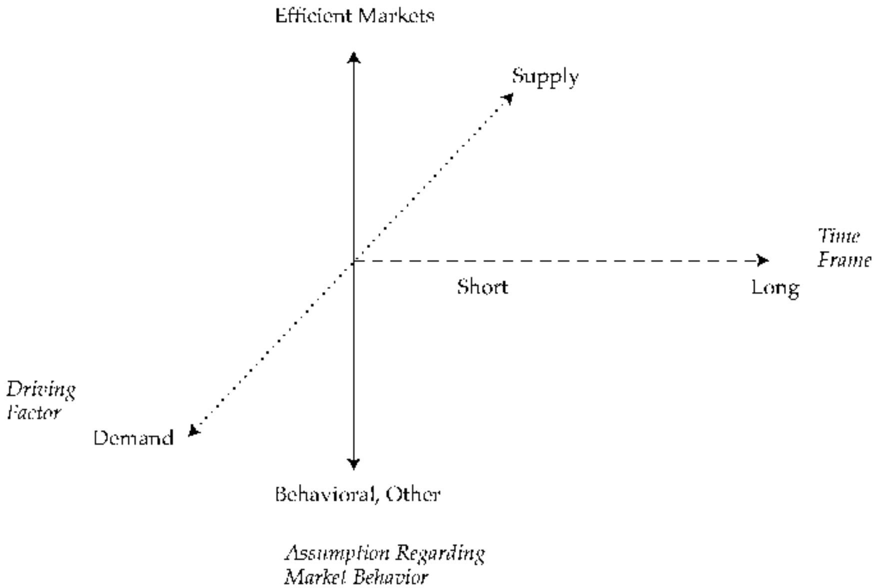
Exhibit 1. Estimates as of 2001 of the ERP

Source	ERP Estimate (%)
Arnott and Bernstein (2002)	0.0
Campbell and Shiller (2001)	0.0
McGrattan and Prescott (2001)	0.0
Ross, Goetzmann, and Brown (1995)	Low
Reichenstein (2001)	1.3
Campbell (2001)	1.5–2.5
Philips (2003)	1.0–3.0
Siegel (2002)	2.0
Bansal and Lundblad (2002)	2.5
Shoven (2001)	3.0
Siegel (1994)	3.0–4.0
Asness (2000)	4.0
Graham and Harvey (2001)	4.0
Ibbotson and Chen (2003)	4.0
Goyal and Welch (2002)	3–5
Fama and French (2002)	4.3
Cornell (1999)	5.0
Ibbotson and Sinquefield (1976)	5.0
Welch (2000)	6.0–7.0
Average	3.7
Range	0.0–7.0

Note: ERP estimates are the expected long-term geometric return of equities in excess of the real risk-free rate.

Figure 1 summarizes, in schematic form, some of the key dimensions that can help explain these estimates. On one dimension, differences in ERP estimates can be caused by the weight given to short-term versus long-term investment horizons, including an emphasis on mean reversion or cyclicality. (A related dimension, not shown here, for different regimes or macro environments could

Figure 1. Three-Dimensional Array of Views on the ERP



also be added—for example, whether prevailing interest rates are high or low.) ERP estimates can also vary according to whether supply or demand considerations are the dominant influence. Some investigators focus on the demand for a return that will compensate investors for the extra risk of equities, whereas others look at the supply of cash flows that companies can inject into the market.

Perhaps most fundamentally, the forum exposed different views on investor behavior, specifically whether markets exhibit rational expectations or suffer from behavioral distortions, such as myopic loss aversion (which can be nonlinear or noncontinuous). One area of general agreement was that, to their detriment, few institutions or individuals explicitly address these issues and even fail to consider the size of the equity premium itself in forming policy portfolios and determining asset allocation.

10th Anniversary Project

The current project started with leading academics and practitioners gathering for a daylong discussion on what new developments, if any, have occurred in thinking about the ERP as well as in estimating the size of the ERP that we can expect in the future. Following that discussion, participants were asked to set down their current thoughts in essay form. The result, contained in this volume, is a rich set of papers that illuminate the issues and speak to the conceptual and empirical sources of the various perspectives. What is interesting about the more recent effort is not only some commonality with respect to the emphasis on supply-driven considerations but also—quite naturally in light of recent history and theory—a great deal of variation among the authors on the stability and term structure of the ERP as well as on whether variations in the ERP, no matter what their source, matter much.

The opening paper by Roger Ibbotson lays out several ways of estimating the ERP, including supply, demand, historical extrapolation, and combinations thereof. Investors are not the only agents who are affected by the excess return on equities over bonds; corporations should consider the ERP as the most important ingredient in understanding their cost of capital, and equity analysts need to use the ERP as part of the discount rate when estimating the present value of a company's future cash flows. Moreover, although it may be the largest market premium, the ERP is not the only one. Other premiums are associated with investment horizon, company size, value, momentum, default risk, and inflation risk. Of particular interest is the liquidity premium, described by Ibbotson as the phenomenon in which unpopular stocks (those that do not trade much) can display significant excess returns compared with stocks traded more often. Most important, investors often fail to differentiate a short-term tactical view of the ERP from the more fundamental long-term supply-driven equilibrium equity premium, suggesting that short-term signals may not always provide accurate information about the "true" long-term ERP.

Focusing on the cyclical nature of returns and fundamental indicators, Clifford Asness notes that there is no evidence that high P/Es are an accurate forecast of high future earnings growth rates. Rather, the evidence runs in the opposite direction. Using his own estimates of earnings growth and drawing on the Shiller P/E, which is the current price divided by trailing 10-year average real earnings, Asness offers a future equity return estimate in the range of 4 percent. Because it is hard to agree on a benchmark for the risk-free rate, he does not make a specific forecast of the ERP.

Looking historically and adopting a broad geographical perspective, Elroy Dimson, Paul Marsh, and Mike Staunton report on their most recent update of realized excess equity returns, relative to both bills and bonds, in 19 different countries from 1900 to the start of 2011. Although they found considerable variation across countries, the realized excess return was substantial everywhere. For their world index, annualized geometric mean real returns were 5.5 percent, the excess return relative to Treasury bills was 4.5 percent, and the excess return relative to long-term government bonds was 3.8 percent. Based on a supply model of the ERP, with the addition of the change in the real exchange rate, they estimate that the forward-looking equity premium is lower, around 3–3.5 percent, largely because of lower expected dividend growth compared with the historical average. In addition, they suggest that mean reversion in the stock market may not be as strong a force as others would argue. And even if mean reversion is a force, it may not provide much comfort to an investor who still does not know what the average stock market return will be in the future, nor what the equity premium is today or what the other parameters of the return process are.

The paper by Richard Grinold, Kenneth Kroner, and Laurence Siegel develops and estimates a supply model of the ERP. It decomposes equity returns into three major components: income, earnings growth, and repricing:

$$R\underbrace{\frac{D}{P} - \Delta S}_{\text{Income}} + \underbrace{i + g}_{\text{Earnings growth}} + \underbrace{\Delta \text{PE}}_{\text{Repricing}},$$

where D/P is the dividend yield, ΔS is share repurchases net of (that is, minus) new issuance, i is inflation, g is real earnings growth (not earnings per share), and the last term is the change in the P/E multiple. To illustrate, if the current 10-year bond yield is 2 percent and the ERP is 4 percent, then income, earnings growth, and repricing components must sum to 6 percent. Looking forward, the authors estimate future income to be about 2 percent, composed of dividend yield of about 1.8 percent and net share repurchases at 0.2 percent (repurchases of 2.2 percent and dilution or new issues at 2 percent). Earnings growth is expected to be a little more than 5 percent, with 2.4 percent coming from inflation and a little less than 3 percent coming from real earnings growth (which they equate to real GDP growth). Finally, although repricing contributed significantly to equity returns in the 20th century, there is little reason to believe that it will continue to do so. If we put these figures together, equity returns are expected to be about 7.2 percent. If the long-term nominal bond yield is about 3 percent, then the ERP is in the range of 4 percent.

Robert Arnott supports a view of the ERP as cyclical, smaller, and more dynamic than the prevailing theory of a more stable and robust premium would suggest. He counters a series of "myths" by showing that bonds have outperformed stocks over a significant period, the realized excess return has often been lower than the forward-looking ERP, net stock buybacks are lower than is often assumed, lower earnings yields are empirically associated with lower subsequent stock returns and premiums, real earnings and stock prices grow with per capita GDP rather than total GDP, and dividend yields are lower now than ever before. When taking this more sobering evidence into account, he finds that the probability of future stock returns matching the 7 percent real historical average is slight. Arnott's estimate of the future ERP ranges from negative to slightly positive.

Antti Ilmanen directly addresses the issue of the stability of the ERP over time by considering what the premium might look like for the next decade and well beyond, including periods with regime and term structure variations. After helpfully reviewing a wide variety of approaches to the ERP, he makes three major points. First, term structure effects are more obvious on the bond side of the premium, where short-dated TIPS yields are currently negative but longer-dated TIPS are higher, implying a 2.7 percent forward TIPS yield for the decade starting in 2021. Second, abnormally high (or low) starting valuations for equity markets and related mean-reversion potential have strong implications for expected stock market returns for the next few years. However, if we consider prospective equity returns *after* the next decade, we have no clue what the starting valuation levels will be in 2021. Thus, if we assume below-average equity market returns for the next decade because of an expected normalization of the currently high Shiller P/E, our best forecast for real equity market returns beyond 2021 should be closer to our "unconditional" long-term return forecasts. That is, these forward forecasts should largely ignore starting valuations (or at least allow future higher starting yields in 2021 than in 2011). And third, many indicators besides valuation measures can be used to predict stock market returns. Regressions and other econometric techniques can be used to forecast returns over any investment horizon (admittedly having fewer independent data points in longer horizon regressions). It is thus possible to estimate a full term structure of expected returns.

Using a variation on the supply-driven approach, Peng Chen looks at whether bonds might outperform stocks over the long run as they have over the past decade. Although the bulk of bond returns comes from their yield or income, the recent outperformance of bonds is based on the decline in yield (price increase). Currently, long-term bond yields are so low (estimated at the time of writing to be less than 3 percent) that they are unlikely to decline much further, so expected capital gains from bonds are low to negative. In contrast, stock returns depend on earnings growth and the change in the ratio of price to earnings as well as their yield. If expected earnings growth and yields remain at roughly historical averages (5 percent and 2 percent, respectively), then P/Es have to decline to 5 to produce overall future stock returns less than the 4 percent expected bond yield—an outcome that seems highly unlikely.

Looking at the information contained in the P/E that might bear on the ERP, Andrew Ang and Xiaoyan Zhang conclude that the ERP is relatively stable over time. They decompose companies' future earnings into those associated with a perpetual, no-growth component and a component associated with future growth opportunities. In effect, movements in P/E reflect changes in discount rates, which contain the ERP, as well as growth opportunities, which involve the cash flow and earnings-generating capacity of company investments. Therefore, P/Es can be high (low) because growth opportunities are favorable and/or because expected returns are low. Using more than 50 years of data from the S&P 500 Index, Ang and Zhang show that macro variables—especially risk-free rates, earnings growth, and payout ratios—are important in explaining variations in P/E. Most important, although discount rates (which contain the ERP) are variable, they are also mean reverting; thus, changes in growth opportunities, rather than in the total discount rate, explain 95 percent of the variation in P/E.

Adopting a historical emphasis, as several of the other authors have, Jeremy Siegel looks back even further to emphasize continuities in the numbers that underlie the historical excess return and estimates of the ERP. He shows that the underperformance of real equity returns in the past 10 years relative to the historical average (6–7 percent) was just about offset by the outperformance of the previous 10 years. In addition, the average historical P/Es and earnings yields have changed very little in the past decade, further supporting the notion of stability in the forward-looking ERP. Siegel closes by observing, consistent with finance theory, that the dividend payout ratio has declined along with dividend yield but that it was offset by the growth of future earnings and dividends.

Rajnish Mehra looks back in a different way, asking whether the result of his original groundbreaking work, which predicted a very low ERP, is still warranted. Taking a long-term view that combines supply and demand considerations, he argues that higher estimates of the ERP typically depend on three basic assumptions that need rethinking because they lead to overestimations of aggregate risk. First, the risk-free rate of return should be matched to the duration of liabilities, which suggests using higher inflation-linked bond or mortgage returns rather than the more commonly used T-bill rate. Second, most estimates ignore the idea that households borrow considerably more than they lend, thus inflating the ERP. Third, younger investors have a higher demand for equities than middle-aged and older investors, but younger investors find it harder than older investors to borrow. These life-cycle and borrowing constraints artificially raise the ERP and the bond yield. Taken together, these corrections greatly reduce forward ERP estimates. One consequence of this analysis is that as the Baby Boomers retire and raise the demand for bonds, it is possible that the ERP will be higher in the future.

In sum, the papers collected in this volume share a general emphasis on supply factors and models for the historical excess return as well as the forward-looking equity risk premium. After 10 years of low and highly volatile equity returns, there is little consensus about the stability of the ERP over changing regimes and time horizons. Interestingly, the group appears to be in agreement more on the actual size of the ERP over the next few years (most agree that it is in the 4 percent range) than on its stability.

Another Perspective: Regimes and Circumstantial Drivers

Rather than try to resolve what may be unresolvable differences in perspective on the ERP, and given the understandable challenges of evidence, inference, and prediction in this area, it may be useful to adopt a different approach—one that acknowledges and reflects the inherent multiplicity and diversity among (1) interest rate and market regimes and (2) investor perspectives.

The ERP is typically discussed as an expected return increment needed to compensate a universal or typical investor for accepting equity risk. This simple, and thus attractive, definition tempts us to think of a single investor deciding, on the margin, whether to move from a "riskless" fixed-income base into equities. The higher the ERP, the more the investor can expect to gain from a move from fixed income to equities and the higher the expected allocation to stocks. The lower the risk premium, the lower the expected gain and the lower the allocation to equities.

One implication of this single-premium concept is the assumption that it is possible to forecast a single "headline" ERP. This assumption is built into most discussions of the risk premium and most applications. Of course, these discussions and applications must take into account variables that affect the headline number. **Exhibit 2** is a far-from-exhaustive list of these "objective" drivers, including the selection of the risk-free asset base, the type of equities under consideration, real interest rate regimes, inflation expectations, other macro trends, earnings expectations, variations in the premium over time, and other considerations that can affect the forecast of a risk premium.

Each of these important variables can drive differences in calculations of the ERP. These variables have received considerable attention from analysts as well as from academics in search of the actual risk premium, including many of the contributors to this volume. Some of the differences in perspectives may be better understood by noting that the dynamics among macroeconomic and valuation factors, and their effects on the ERP, may be nonlinear. This nonlinearity can be seen in an admittedly simplistic form in **Exhibit 3**, in which the analysis is tied to interest rate regimes, which are nonlinearly associated with equity valuations. In other words, one can observe a sweet spot in P/Es and other valuations associated with moderate real long-term interest rates (2–3 percent), with a drop in valuations for lower and higher interest rate regimes. The relationships among some of the factors listed here display loosely connected tendencies rather than strong tight unities (e.g., inflation).

Exhibit 2. Objective Drivers of ERP Differences

Risk-Free Asset	Equity Class	Real Interest Rate Trend	Inflation Expectations	Other Macro Assumptions	Earnings Expectations	Dividend Trend	ERP Variations
Treasury bills	U.S. equities	High	High	Macroeconomy	High	Rising	Volatility
Treasury notes	Global equities	Medium	Medium	Demographics	Medium	Falling	Volatility of volatility
Inflation-linked bonds	Large cap	Low	Low	Globalization	Low		
	Other:						
	Size						
	Value						
	Geography						
	Sector						

Exhibit 3. Real Interest Rate Regimes and the ERP

Factor	Low Rates 0–1%	Sweet Spot 2–3%	High Rates 6%+
Equity risk premium	High (6%)	Low (4% or less)	High (5%)
Probability of occurrence	Low	High	Low
Financial/economic environment	Dismal	Balanced	Overheated
Inflation expectations	Low (1–2%)	Low/medium (2–3%)	High (4%+)
Discount rate/cost of capital	Medium (7%)	Medium (7%)	High (11%)
Real growth rate	Very low (2.5%)	Good (4%)	Too high (7%)
Regime persistence	Hopefully brief	Sustainable	Almost surely brief
Sustainability of current earnings	Fair (0.4)	Fair (0.4)	Good (0.7)
New investment profitability	Good when available (6%)	Good (6%)	Squeezed (2%)
"Franchise" value (FV)	Low (4.8)	High (11.4)	Low (3.2)
"Ongoing" or "tangible" value (TV)	Fair (5.7)	Fair (5.7)	Fair (6.4)
Theoretical P/E (FV + TV)	Low (10.5)	Peak (17.1)	Low (9.6)

Notes: Specific functional values have no empirical validity. They are illustrative of relative values that might be associated with P/E and other valuation components corresponding to the three growth regimes.

Source: Based on Leibowitz and Bova (2007).

The main point is the relationship between the ERP and other economic and valuation factors. Note that although the middle, or medium, interest rate regime is the sweet spot for the economy and the equity market, the ERP could remain low in these circumstances. Whether we focus on supply or demand forces, excess return expectations may be low compared with those in more uncertain times when economies are troubled or overheated. So, some of the differences in views of the ERP could be attributed to specific regime forecasts or to whether regimes play a strong or weak role in determining the ERP.

One implication of looking at these sorts of objective determinants is that they are all, at least in theory, reducible. In other words, let's imagine it is possible to gather investors together to obtain a general agreement on selection of the risk-free asset, equity index, earnings and inflation expectations, and even the pattern by which the ERP varies over time or the list of forces that cause such variation. Although agreement on these matters might not be easy to obtain, discussions would focus on issues that are subject to measurement, analysis, and objective inference. With such a general agreement, some or maybe even a great portion of the differences among investors in their ERP estimates would be reduced. But not completely.

The differences in investors' ERP estimates would not, in the end, be eliminated. These differences are not fully reducible even with agreement on measurement and benchmarks. What remains are irreducible differences based on investors' varying conditions or circumstances. Each investor might have a unique combination of circumstances that differentiates her from all other investors, not in terms of her views on how to calculate the ERP but in terms of the circumstances in which she finds herself as an investor. In turn, those unique circumstances can then affect what we might call a "personal" or "institutional" ERP, one that is specific to an individual or institution. As shown in **Exhibit 4**, these circumstances could include investment horizon, need for liquidity, rebalancing requirement, sensitivity to changing market valuations, the capacity to evaluate those changing valuations, risk tolerance, and buyer or seller orientation.

All these circumstantial drivers of investor perceptions can affect the size of the equity premium that an investor might expect or experience at any point in time. Furthermore, this expected ERP is different from a "required" ERP in that it reflects what the investor actually experiences based on his or her individual circumstances (as opposed to an ERP that is required for the investor to act). For example, investment horizon can range from nearly perpetual (some foundations and endowments) to nearly immediate (an individual investor's current living expenses). A short-term investor might not experience the same ERP as a long-term investor, either in terms of expected return or expected volatility of that return. Similarly, liquidity needs can affect the return an investor can expect; sometimes there may be a positive or negative illiquidity premium built into the ERP. And rebalancing requirements can influence return, especially if we are aware that a large set of investors must rebalance in the same direction at the same time. In turn, the ERP may vary depending on whether one is a buyer or seller (such as during late 2008 in the equity markets, when bid–ask spreads or the differential returns required by buyers and sellers froze some markets and nearly destroyed others).

Take, for example, some combinations of these dimensions as illustrated in Exhibit 4. Many long-term investors are relatively premium insensitive in that they are interested in holding rather than buying or selling. Others, such as the LSB (long-horizon valuation-sensitive buyer), may be looking to add to positions if the price (premium) is right, although the LSS (long-horizon valuation-sensitive seller) is looking to lighten holdings based on receiving an adequate premium.[2] In contrast, a liquidity-sensitive investor (e.g., hedge funds in mid-2007 and late 2008), denoted by LLS, may need to sell at nearly any

[2]See the notes to Exhibit 4 for a full explanation of the acronyms used in this discussion.

Exhibit 4. Circumstantial Drivers of Investors' Perceptions of the ERP

Investor Type	Investment Horizon	Liquidity Bias	Rebalancing Requirement	Valuation Sensitivity	Ability to Evaluate Market	Risk Tolerance	Trade Orientation	Example
Long horizon								
LSB	Long			Sensitive	High		Buyer	Discretionary buyer looking for low premium
LSS	Long			Sensitive	Low		Seller	Discretionary seller looking for extra premium
LLB	Long	Liquidity bias					Buyer	Buyer at nearly any price
LLS	Long	Liquidity bias					Seller	Seller at nearly any price
LRB or LRS	Long		Rebalance				Buyer	Must rebalance when market moves
LCB or LCS	Long				High	Constant		Constant risk tolerance but evaluates and acts on changing market opportunities
LVB or LVS	Long				High	Variable		Risk tolerance depends on market conditions or changing personal circumstances
LRB or LRS	Long					Range bound		Constant risk tolerance, except in extreme market move
Short horizon								
SSB or SSS	Short			Sensitive				Daily, weekly, monthly, quarterly performance evaluation
SLB or SLS	Short	Liquidity bias						Must remain liquid

Notes: First letter: L = long horizon, S = short horizon. Second letter: S = valuation sensitive, L = liquidity bias, C = constant risk tolerance, V = variable risk tolerance, R = has rebalancing requirement. Third letter: B = buyer, S = seller.

price in order to raise cash. Other investors, such as pension funds, may need to put cash to work quickly as contributions come in the door (LLB). Still others may need to rebalance systematically as the market pushes their allocations away from a policy portfolio (LRB or LRS), and therefore, they may be relatively premium insensitive. Of course, the same individual or institution may exhibit more than one of these behaviors depending on the circumstances. The point is that these circumstances can influence the size and character of the ERP investors experience or require.

Shorter-term investors may be a smaller part of the overall equity market but may receive an outsize portion of media attention. If we put aside share repurchases and new issues, as well as the supply of equity substitutes, the term structure of the ERP and its volatility may be such that both variables have very different values over the short and long term. A high short-term volatility may look much more acceptable to a long-term investor because of his ability to ride it out. Similarly, a high short-term premium can coexist with a dreary long-term premium.

So, long-term and short-term investors might share a sensitivity to valuation metrics but in very different ways. Long-term valuation-sensitive investors (LSB and LSS) might respond to a sufficiently high long-term ERP (that is, the ERP in excess of the long-term fixed-income yield) by selling bonds to buy stocks in the belief that such an action will compensate them for long-term nominal as well as real risk. In contrast, short-term valuation-sensitive investors (SSB and SSS) may be more inclined to judge the ERP either on an absolute stand-alone basis or relative to returns from various fixed-income durations given expectations regarding yield curve movements. In these cases, price volatility looms large as a risk factor, so short-term investors need a much greater premium inducement to get them to prefer equities to bonds over their short horizon.

One should also consider not just the effects of circumstantial ERP on investor behavior but also the effects of investor behavior on the ERP. As buyers and sellers meet in the marketplace, the transaction size, urgency, other asset holdings, and other circumstances could dampen or exacerbate equity premium movements. Rebalancers and especially liquidity-sensitive sellers may be relatively insensitive to price and premium and thus have a moderating effect on ERP variations. Both valuation-sensitive and valuation-insensitive investors could affect the equity premium. Valuation-sensitive investors are looking for a desired or required price or premium, so their actions will tend to move the market in that direction. The impact of actions by valuation-insensitive investors may be unpredictable because they purchase or sell shares at times that could inadvertently push the equity premium up or down.

Some transactions, however, might have little effect on the marginal ERP. In general, the marginal ERP value is likely to be determined by one type of buyer interacting with one type of seller. Although we often think of both the marginal buyer and seller as savvy and valuation sensitive, an equally savvy investor on one side may not be able to exercise valuation sensitivity. For example, a long-term liquidity-sensitive buyer (LLB) might be content buying at a price set by a short-term valuation-sensitive seller (SSS) who thinks that equities are currently overpriced. The sum of all such forces would theoretically combine into a pair of supply and demand curves, which could be smooth, lumpy, kinked, and certainly multidimensional (e.g., with term structure characteristics and regime dependency). Thus, we can see how the interplay of these multiple circumstantial forces can lead to a risk premium that is far more multifaceted and complex than is typically envisioned in the standard discount models, even when we take into account structural and cyclical changes in the more objective factors cited in Exhibit 2.

Overlaid on all these issues may be behavioral effects, such as systematic investor misperceptions and behavioral anomalies, that affect buying and selling behavior (the behavioral versus efficient markets dimension in Figure 1). But these forces are in addition to the objective and circumstantial forces just described, and they may be more invariant. Finally, our investor categories are not all mutually exclusive, and depending on circumstances, investors may shift from one type to another.

Conclusion

The past 10 years have shown that the ERP, far from being a settled matter, continues to challenge analysts. The research and observations in this volume have a number of implications for investment practice and theory. First, investors and analysts should take care to be explicit about their estimates of the ERP. We still too often use different definitions of, assumptions about, and approaches to the ERP, or leave it altogether implicit in our analyses of asset markets and valuations. Further clarity may help reduce the number of occasions when we are talking past each other. Second, we should be clear about what model we are using when we offer a forecast or explanation of the ERP. We have seen that variations in our estimates can be the result of different approaches to objective, circumstantial, and behavioral factors. Third, differing circumstances among investors lead to true, irreducible differences in the ERP that each investor may face at any given time. This final consideration underscores how the interplay of these multiple circumstantial forces can lead to a risk premium that is far more multifaceted and complex than typically envisioned in the standard discount models, even when we take into account structural and cyclical changes in the more objective factors. The papers contained in this volume richly illustrate this interplay.

