WHAT STOCK MARKET RETURNS TO EXPECT FOR THE FUTURE?

BY PETER A. DIAMOND*

AN ISSUE IN BRIEF
CENTER FOR RETIREMENT RESEARCH AT BOSTON COLLEGE
SEPTEMBER 1999, NUMBER 2

Executive Summary

Over the long term, stocks have earned a higher rate of return than Treasury bonds. Therefore, many recent proposals to reform Social Security include a stock investment component. In evaluating these proposals, the Social Security Administration's Office of the Actuary (OACT) has generally used a 7.0 percent real return for stocks (based on a long-term historical average) throughout its 75-year projection period. For the return on Treasury bonds, it currently assumes some variation in the initial decade followed by a constant real return of 3.0 percent. Therefore, its current assumption for the equity premium, defined as the difference between yields on equities and Treasuries, is 4.0 percent in the long run. Some critics contend that the projected return on stocks—and the resulting equity premium—used by the OACT are too high.

It is important to recognize that there are two different equity-premium concepts. One is the *realized* equity premium, measured by the rates of return that actually occurred. The other is the *required* equity premium, which is the premium that investors expect to receive in order to be willing to hold available amounts of stocks and bonds. These are closely related but different concepts and can differ significantly in some circumstances.

Over the past two centuries, the realized equity premium was 3.5 percent on average, but it has increased over time. For example, between 1926 and 1998, it averaged 5.2 percent. The increase is mainly due to a significant decline in bond returns, since long-term stock returns have been quite stable. The decline in bond returns is not surprising given that the perceived risk of federal debt has dropped substantially since the early nineteenth century.

* Peter Diamond is an Institute Professor at the Massachusetts Institute of Technology. The author is grateful to John Campbell, Alicia Munnell and Jim Poterba for extended discussions and to Andy Abel, Dean Baker, Olivier Blanchard, John Cochrane, Andy Eschtruth, Steve Goss, Joyce Manchester, Peter Orszag, Bernie Saffran, Jeremy Siegel, Tim Smeeding, Peter Temin and Joe White for helpful comments. The views and remaining errors are those of the author.

INSIDE

Based on an initial look at historical trends, one could argue for a somewhat higher equity premium than the 4.0 percent used by the OACT. Critics argue, however, that the OACT's projections for stock returns and the equity premium are too high. These criticisms are based on three factors: (1) recent developments in the capital market that have reduced the cost of stock investing and led to broader ownership; (2) the current high value of the stock market relative to various benchmarks; and (3) the expectation of slower economic growth in the future.

The Equity Premium and Capital Market Developments

Several related developments in the capital market should lower the required equity premium in the future relative to historical values. First, mutual funds provide an opportunity for small investors to acquire a diversified portfolio at a lower cost by taking advantage of the economies of scale in investing. The trend toward increased investment in mutual funds suggests that the required equity premium in the future should be lower than in the past since greater diversification means less risk for the investor.

Second, the average cost of investing in mutual funds has declined due to the reduced importance of funds with high investment fees and the growth of index funds. While the decline in costs has affected both stock and bond mutual funds, stock funds have experienced a larger reduction. Thus, it is plausible to expect a decrease in the required equity premium relative to historical values. The size of the decrease is limited, however, since the largest cost savings do not apply to the very wealthy and to large institutional investors, who have always faced considerably lower charges.

Finally, a rising fraction of the American public is now investing in stocks either directly or indirectly through mutual funds and retirement accounts (41 percent in 1995 compared to 32 percent in 1989). Widening the pool of investors sharing in stock market risk should also lower the required risk premium. However, since these new investors do not hold a large share of the stock market's total value, the effect on the risk premium is limited.

These trends that have made investing in equities less expensive and less risky support the argument that the equity premium used for projections should be lower than the 5.2 percent experienced over the past 75 years. It is important to recognize that a period with a declining required equity premium is likely to have a temporary increase in the realized equity premium. This 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 higher realized return than the required return. For example, the high realized equity premium since World War II may be in part a result of the decline in the required equity premium. Therefore, it would be a mistake during this transition period to extrapolate what may be a temporarily high realized return.

The Equity Premium and Current Market Values

At present, stock prices are very high relative to a number of different indicators, such as earnings, dividends, and gross domestic product (GDP). Some critics argue that this high market value, combined with projected slow economic growth, is not consistent with a 7.0 percent return. For example, assuming a 7.0 percent return starting with today's stock market value and projecting a plausible level of "adjusted dividends" (dividends plus net share repurchases), the ratio of stock value to GDP would rise more than 20-fold over 75 years. Such an increase does not seem plausible to most observers.

Consideration of possible steady states supports the same basic conclusion. 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. In a steady state, the growth rate of prices can be assumed to equal the growth rate of GDP. Assuming an adjusted dividend yield of roughly 2.5 to 3.0 percent and projected GDP growth of 1.5 percent, the stock return implied by the Gordon equation is roughly 4.0 to 4.5 percent, not 7.0 percent. To make 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.

There are three ways out of the inconsistency between the assumptions used by the OACT for economic growth and stock returns. One is to adopt a higher assumption for GDP growth. Increasing the growth of GDP would decrease the implausibility of the implications with either calculation above. (The possibility of more rapid GDP growth is not explored further in this *issue in brief*.) A second way to resolve the inconsistency is to adopt a long-run stock return considerably less than 7.0 percent. A third alternative is to lower the rate of return during an intermediate period so that a 7.0 percent return could be applied to a lower base thereafter.

The Gordon equation can be used to compute how much the stock market would have to decline from its current value over, for example, the next 10 years in order for stock returns to average 7.0 percent over the remaining 65 years of the OACT's pro-

jection period. Using a 2.5-3.0 percent range for the adjusted dividend-price ratio suggests that the market would have to decline about 35-45 percent in real terms over the next decade. The required decline, however, is sensitive to the assumption for both the adjusted dividend-price ratio and the long-run stock return as shown in the Table below.

Required Percentage Decline in Real Stock Prices Over the Next 10 Years to Justify a 7.0, 6.5 and 6.0 Percent Return Thereafter

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

Source: Author's Calculations.
Note: Derived from the Gordon Formula. Dividends are assumed to grow in line with GDP, which the OACT assumes is 2.0 percent over the next 10 years. For long-run GDP growth, the OACT assumes 1.5 percent.

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). Diamond finds the former view more convincing, since accepting the "correctly valued" hypothesis implies an implausibly small equity premium. Moreover, when stock values (compared to 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.

Marginal Product of Capital and Slow Growth

In its long-term projections, the OACT assumes a slower rate of economic growth than the U.S. economy has experienced over an extended period. This projection reflects both the slowdown in labor force growth expected over the next few decades and the slowdown in productivity growth since 1973. Some experts 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.

The standard (Solow) model of economic growth does imply that slower long-run economic growth with a constant savings rate will yield a lower marginal product of capital and, therefore, lower returns to stocks and bonds. However, the evidence suggests that savings rates will decline as growth slows, partially or fully offsetting the effect of slower growth on the marginal product of capital. Since growth has fluctuated in the past, the long-term stability in real rates of return to capital supports the notion of an offsetting savings effect. Some also argue that any decline in returns will be mitigated by the fact that U.S. corporations earn income from production and trade abroad, and individual investors also invest abroad. But, the other advanced economies are aging as well, and it is unclear how much investment opportunities in the less-developed countries will increase.

On balance, slower projected growth should 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. So, any impact would tend to affect returns on both stocks and bonds similarly, with no directly implied change in the equity premium.

Conclusion

Of the three main bases for criticizing the assumptions used by the OACT, 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 financial market developments 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, the OACT 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. This 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, the OACT could adopt a lower rate of return for the entire 75-year period. While this approach may be more acceptable politically, 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.

Introduction

All three proposals of the 1994-96 Advisory Council on Social Security included investment in equities. For assessing the financial effects of these proposals, the Council members agreed to specify a 7.0 percent long-run real yield from stocks.[1] They devoted little attention to possibly different short-run returns from stocks.[2] The Social Security Administration's Office of the Actuary (OACT) used this 7.0 percent return, along with a 2.3 percent long-run real yield on Treasury bonds, to project the impact of Advisory Council proposals. Since then, the OACT has generally used 7.0 percent when assessing other proposals that include equities.[3] In the 1999 Social Security Trustees' Report,[4] the OACT used a higher long-term real rate on Treasury bonds of 3.0 percent. In the first 10 years of its projection period, the OACT makes separate bond rate assumptions for each year, with slightly lower assumed 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 on Treasuries, has declined to 4.0 percent in the long run. Some critics have argued that the assumed return on stocks—and the resulting equity premium—are still too high.[6]

This *issue in brief* examines the critics' arguments and considers a range of assumptions that seem reasonable rather than settling on a single recommendation.[7] First, the *brief* reviews the historical record on rates of return and the theory about how those rates are determined.[8] Then, it assesses the critics' arguments concerning why the future might be different from the past. The reasons include: (1) recent developments in the capital market that have reduced the cost of stock investing and led to broader ownership; (2) the current high value of the stock market relative to various benchmarks; and (3) the expectation of slower economic growth in the future. In this discussion, it is important to recognize that 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. Finally, the *brief* considers two additional issues: (1) the difference between gross and net returns; and (2) investment risk.

The research reported herein was performed pursuant to a grant from the U.S. Social Security Administration (SSA) funded as part of the Retirement Research Consortium. The opinions and conclusions expressed are solely those of the author and should not be construed as representing the opinions or policy of SSA or any agency of the Federal Government or the Center for Retirement Research at Boston College.

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

[2] In order to generate short-run returns on stocks, the Social Security Administration's Office of the Actuary 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 memo 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 the Federal Disability Insurance Trust Funds.

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

[6] See, e.g., Baker (1999a) and Baker and Weisbrot (1999). This *brief* only considers return assumptions given economic growth assumptions and does not consider growth assumptions.

[7] This *issue in brief* 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 (1999).

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

Historical Record

Realized rates of return on various financial instruments have been much studied and are presented in Table 1. Over the last two hundred years, stocks have produced a real (inflation-adjusted) 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).[9] Despite this long-run stability, there is great uncertainty about a projection for any particular period and great uncertainty about 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 *brief*. There are two different equity premium concepts. One is the realized equity premium, measured by the rates of return that actually occurred. The other is the required equity premium, which equals the premium that investors expect to get in order to be willing to hold available quantities of assets. These are closely related but different concepts and can differ significantly in some circumstances.

Table 2 shows the realized equity premium for stocks relative to bonds.[10] This equity premium was 3.5 percent for the two centuries of available data, but it has increased over time.[11] This increase has resulted from a significant decline in bond returns over the past two centuries. This decline is not surprising considering investors' changing perceptions of default risk as the U.S. went from a less-

Table 1: Compound Annual Real Returns (percent)
U.S. Data, 1802-1998

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: Jeremy J. Siegel, "The Shrinking Equity Premium: Historical Facts and Future Forecasts."

Table 2: Equity Premia—Differences in Annual Rates of Return between Stocks and Fixed Income Assets (percent)
U.S. Data, 1802-1998

Period	Equity Premium with Bonds	Equity Premium 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: Jeremy J. Siegel, "The Shrinking Equity Premium: Historical Facts and Future Forecasts."

9 Because annual rates of return on stocks fluctuate so much, there is a wide band of uncertainty around 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. Use of 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 *issue in brief* is not concerned with this uncertainty, but just the appropriate rate of return to use for a central (or intermediate) projection. For policy purposes, it is important also to look at stochastic projections. For stochastic projections, see Copeland, VanDerhei and Salisbury (1999) and Lee and Tuljapurkar (1998). Despite the value of stochastic projections, the central projection of the OACT plays an important role in thinking about policy and in the political process. Nevertheless, it is important to realize that there must be great uncertainty about any single projection and great uncertainty about the relevance of returns in any short period of time for making a long-run projection.

10 Table 2 also shows the equity premia relative to Treasury bills. These numbers are included only because they arise in other discussions; they are not referred to in this *issue in brief*.

11 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 this 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. This can be illustrated by considering a dollar that doubles in value in year one and then halves in value from year one to year two. The geometric average over this two-year period is zero, while the arithmetic average of +100 percent and –50 percent annual rates of return is +25 percent. For projection purposes, I am looking for an estimate of the 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 length of the average investment period within the projection period. Without having done any calculations, I suspect that this calculation would be close to the geometric average, since the variation in 35- or 40-year geometric rates of return would not be so large, and this variation is the source of the difference between arithmetic and geometric averages.

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.[12]

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, which is 2.2 percent. This choice would suggest an equity premium of around 5.0 percent. However, other evidence that is discussed below argues for a somewhat lower value.[13]

Equilibrium and Long-Run Projected Rates of Return

The historical data provide one way to think about rates of return. However, in order to think about how the future may be different from the past, it is necessary to have an underlying theory about the determination of these returns. 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.[14] 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 when it is recognized that investors base their asset portfolio decisions on their projections of future prices of assets and of future dividends.[15] 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 investor 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.[16]

Corporations not only determine the supplies of corporate stocks and bonds, but their choice of a debt-equity mix 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. This 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 so the equilibrium equity premium.[17]

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.[18] That is, assuming that

---

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

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

[14] 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 these 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.

[15] 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 Treasury inflation-protected bonds, investors can purchase bonds with a known real interest rate. Since these were introduced only recently, they do not play a role in interpreting the historical record for projection purposes. Moreover, their role in future portfolio choices is unclear.

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

[17] 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.

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, the possibility of equilibrium with a 70-basis-point premium (as suggested by Baker 1999a) seems improbable, especially when one also considers the higher transaction cost of stock than bond investment.

While 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 there are still inadequacies in the theory.[19] 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 a projection of 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 historically high valuation of stocks, 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, while the third is discussed in the context of physical assets. It is important to distinguish between arguments that suggest a lower equity premium and arguments that suggest lower returns to financial assets generally.

Equity Premium and Developments in the Capital Market

This section begins with two related trends in the capital market — the decrease in the cost of acquiring a diversified portfolio of stocks and the spread of stock ownership more widely in the economy. The equity premium relevant 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 are two developments that should lower the equity premium in the future relative to long-term historical values. Then the section discusses arguments that have been raised, but have less clear implications, involving investor time horizons and understanding of financial markets.

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 associated with marketing the

[18] 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. This 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, it has experienced a long decline from this 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. This should have moderated the impact of a declining equity premium on expected stock returns. He examines the importance of inflation expectations and attributes some of the recent trend to a decline in expected inflation. He concluded that the premium when he wrote appeared to be around 2-3 percent and that it should not be expected to move much if inflation expectations remain low. He also concluded that "decreases in the equity premium are likely to translate into both an increase in expected bond rates and a decrease in expected rates of return on stocks."

[19] Several explanations have been put forth, including: (1) the U.S. has been lucky, compared with stock investment in other countries, and realized returns include a premium for the possibility that the U.S. might have had a different experience; (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.

funds. Nevertheless, as the large growth of mutual funds indicates, many investors find them a valuable way to invest. This suggests that the equity premium in the future should be lower than in the past since greater diversification means less risk for the investor. However, the significance of this development depends on the importance in total equity demand of "small" investors who purchase mutual funds, 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 38-basis-point decline (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 this 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.

It is important to recognize that 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, this 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 higher realized return than the required return.[20] The high realized equity premium since World War II may be partially caused by a decline in the required equity premium over this period. Therefore, it would be a mistake during such a transition period 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 1999). The importance of this trend must be weighted by the low size of investment by such new investors.[21]

Investor 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.[22] While the question of how time horizon should affect asset demands raises subtle theoretical issues (Samuelson 1991), 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).[23]

The evidence on trends in investor time horizons is mixed. For example, the growth of explicit individual retirement savings vehicles, such as IRAs and 401(k)s, suggests that the average time horizons of individual investors may have lengthened.

---

[20] The timing of higher realized returns than required returns is somewhat more complicated, since any recognition and projection of such a trend will tend to produce a rise in the price of equities at the time of recognition of the trend, rather than as the trend is realized.

[21] 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 this portfolio to the beneficiaries of these institutions would further expand the pool sharing in this risk.

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

[23] 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.

However, some of this 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 plan asset managers, who may have career concerns that shorten the relevant horizon. Other developments may tend to lower the average horizon. While the retirement savings of baby boomers may add to the horizon currently, 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 as less wealthy investors might be less concerned about passing assets on to younger generations. Overall, without detailed calculations that would go beyond this *brief*, it is not clear how changing time horizons should affect projections.

Investor 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, the Siegel presentation highlights the risks in real terms of holding nominal bonds. While the creation of inflation-indexed Treasury bonds might have an effect on behavior, the lack of wide interest in these bonds (in both the U.S. and the U.K.) and the failure to 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 these bonds are riskier than previously believed would then tend to decrease the required equity premium.

On the other hand, popular perceptions may be excessively influenced by recent events, both the high equity returns 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 these 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 last 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 corporate earnings growth incorporate 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.[24] Other factors, such as investor time horizons and investor understanding, have less clear-cut implications for the equity premium.

[24] 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 (higher expected return) investments, thereby somewhat restoring the equity premium associated with investing in corporations.

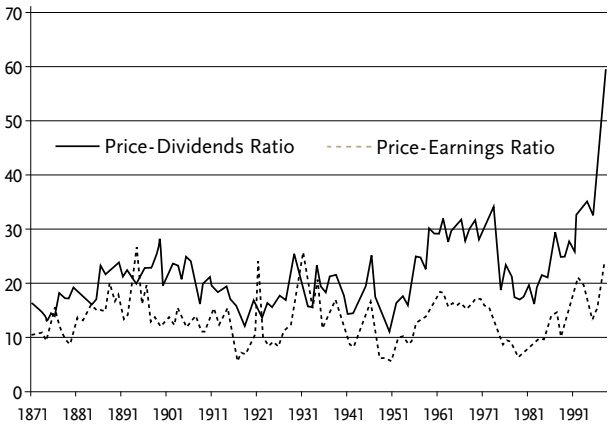
Equity Premium and Current Market Values

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). (See Figures 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 these high prices have also been the subject of considerable discussion in the finance community. (See, e. g., Campbell and Shiller 1998; Cochrane 1997; Philips 1999 and Siegel 1999.)

This section begins with two different ways of illustrating the inconsistency of current share prices and 7.0 percent real returns, given the OACT's assumptions for GDP growth. 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.

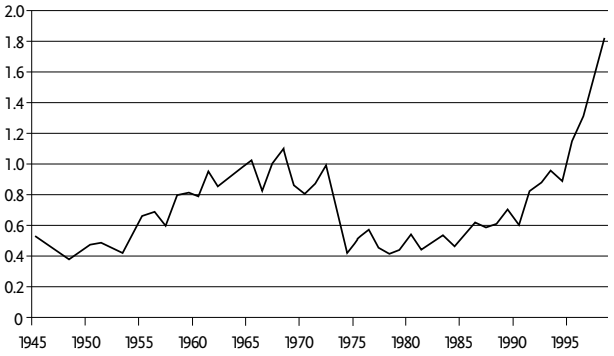
For the first calculation, assumptions are needed for stock returns, adjusted dividends (dividends plus net share repurchases, see box below),[25] and GDP growth. For stock returns, the 7.0 percent assumption is used. For GDP growth rates, the OACT's projections are used. For adjusted dividends, one 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 box below, the current ratio seems too low to use for projection purposes. Even adopting a higher, more plausible level of adjusted

Figure 1: Price-Dividend Ratio and Price Earnings Ratio, 1871-1998



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

Figure 2: Market Value of Stocks to Gross Domestic Product Ratio, 1929-1998



Source: Bureau of Economic Analysis, National Income and Product Accounts, and Federal Flow of Funds.

[25] 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. In addition to dividends, this includes net share repurchases by the firms. This 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 this 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 less 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 of these two approaches 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.

dividends, such as 2.5 or 3.0 percent, still leads to a rise in the ratio of stock value to GDP that is implausible—in this case a more than 20-fold increase over the next 75 years. The calculation is done by deriving each year's capital gains by subtracting projected dividends from the total cash flow to shareholders needed in order 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.[26] In a steady state, the growth rate of prices can be assumed to equal the growth rate of GDP. Assuming an adjusted dividend yield of roughly 2.5 to 3.0 percent and projected GDP growth of 1.5 percent, the stock return implied by the Gordon equation is roughly 4.0 to 4.5 percent, not 7.0 percent. These values would imply an equity premium of 1.0 to 1.5 percent, given the OACT's assumption of a 3.0 percent yield on Treasury bonds. To make 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.[27]

For such a large jump in the dividend yield to occur, one of two things would have to happen—adjusted dividends could grow much more rapidly than the economy or stock prices could grow much less rapidly than the economy (and might even decline). But, it would take a very large jump in adjusted dividends for a consistent projection, assuming that stock prices grow along with GDP starting at today's value. Estimates of recent values of the adjusted dividend yield range from 2.10 to 2.55 percent (Dudley et al. 1999 and Wadhwani 1998).[28] 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).

---

26 Gordon (1962). For an exposition, see Campbell, Lo and MacKinlay (1997).

27 The implausibility refers to total stock values, not the value of single shares — thus, the relevance of net share repurchases. For example, Dudley et al. (1999) view a steady equity premium in the range of 1.0-3.0 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 the OACT. Wadhwani (1998) finds that if the S&P 500 were 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. This still seems implausibly low.

28 Dudley et al. (1999) report a current dividend yield on the Wilshire 5000 of 1.3 percent. Then, they make an adjustment that is equivalent to adding 80 basis points to this rate for share repurchases, for which they cite Campbell and Shiller (1998). Wadwhani (1998) finds a current expected dividend yield of 1.65 percent for the S&P 500, which he adjusts to 2.55 percent in consideration of share repurchases. For discussion of share repurchases, see Cole, Helwege and Laster (1996).

BOX: PROJECTING FUTURE DIVIDENDS

This *issue in brief* 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 this also represents a cash flow to stockholders in aggregate. Then a further adjustment is made to reflect the extent to which the current situation might not be typical of the relationship between dividends and 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 to a historical average of 60 percent. Dividends tend to be much more stable over time than earnings, so it is not surprising that 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 would probably grow faster than GDP to move toward the historical ratio.[1] On the other hand, earnings might grow slower than GDP. Also relevant is the possibility that corporate earnings, which have a sizable international component, might grow faster than GDP.

Second, corporations are reported to be repurchasing their outstanding shares at an extraordinary rate, although there are no good data for the net value of share repurchases. As a result, some of the value of net share repurchases needs to be added to the current dividend ratio to measure the cash returns to shareholders. 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. A further complication is the growth (also unusual) of options to compensate employees, making net and gross share repurchases very different. Again, it is not clear how to project current numbers into the next decade.

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 *brief* will use 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 and 2.0 percent.)

---

[1] For example, Baker and Weisbrot (1999) appear to make no adjustment for share repurchases or for current dividends being low. On the other hand, they use a dividend payout of 2.0 percent, while Dudley et al. (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 an increase in dividends and an increase in borrowing, investment held constant. This 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 *brief*. If slower growth is associated with lower investment that leaves the return on capital relatively unchanged, then what does that require for consistency for the financial behavior of corporations? Baker (1999b) makes such a calculation; it is not examined here.

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 the OACT's assumptions for economic growth and stock returns. One is to adopt a higher assumption for GDP growth, which would decrease the implausibility of the calculations described above for either the market value to GDP ratio or the steady state under the Gordon equation. (The possibility of more rapid GDP growth is not explored further in this *brief*.)[29] A second way to resolve the inconsistency is to adopt a long-run stock return considerably less than 7.0 percent. A third alternative is to 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 these 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 the OACT's projection period. (See Appendix B.) As shown in Table 3, a 7.0 percent long-run return would require a drop in real prices of between 21 and 55 percent, depending on the assumed value of adjusted dividends.[30] This calculation is relatively sensitive to the rate-of-return assumption—for example, with a long-run return of 6.5 percent, the required drop in the market falls to a range of 13 to 51 percent.[31]

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 4.25 percent yield derived by using current values for the Gordon equation as described above (the "steady state" scenario) and a scenario where stock prices drop in half immediately and the yield on stocks is 7.0 percent thereafter (the "market correction" scenario).[32] First, dollars newly invested in the future (i. e., after any drop in share prices) earn only 4.25 percent per year under the "steady state" scenario, while they earn 7.0 percent per year under the "market correction" scenario. Second, even for dollars currently in the market, there is a difference in long-run yield 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, while under the "market correction" scenario, the annual rate of return depends on the time horizon used for the calculation.[33] After one year, the latter scenario has a rate of return of –46 percent. By the end of 10

Table 3: Required Percentage Decline in Real Stock Prices Over the Next 10 Years to Justify a 7.0, 6.5 and 6.0 Percent Return Thereafter

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

Source: Author's Calculations.
Note: Derived from the Gordon formula. Dividends are assumed to grow in line with GDP, which the OACT assumes is 2.0 percent over the next 10 years. For long-run GDP growth, the OACT assumes 1.5 percent.

29 Stock prices reflect the economic growth assumptions of investors. If these are different from those used by the OACT, then it becomes difficult to have a consistent projection that doesn't assume that investors will be surprised.

30 In considering these values, note that "typically, the U.S. stock market falls by 20-30 percent in advance of recessions" (Wadhwani 1998). With the OACT 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.

31 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 (of themselves).

32 Both of these 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.

33 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.

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 these 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, it is important to consider which one is more likely to occur. The key question 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. There is a range of views on this question.

One possible conclusion is that current stock prices signal a significant drop in the long-run required equity premium. For example, Glassman and Hassett (1998, 1999) have argued that the equity premium in the future will be dramatically less 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.[34] 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 this 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 historically 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.[35] Thus, one needs to argue that this historical pattern will not repeat itself in order to project a steady rate of return in the future. 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 (e.g., Campbell and Shiller 1998).

Thus, 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). While, 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 that investors have not adequately considered this possibility.[36] In my judgement, 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 to 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 the OACT's projected GDP growth.[37] However, the OACT could assume lower returns for a decade, followed by a

---

34 They appear to assume that the Treasury rate will not change significantly, so that changes in the equity premium and changes in the return to stocks are similar.

35 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 *brief*. 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. This ratio has fluctuated considerably and is currently unusually high. Robertson and Wright (1998) have analyzed this ratio and concluded that "there is a high probability of a cumulative real decline in the stock market over the first decades of the 21st century."

36 As Wadhwani (1998) notes: "Surveys of individual investors in the U.S. 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."

37 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.

return equal to or about 7.0 percent.[38] In this case, the OACT could treat equity returns as it does Treasury rates, using different projection methods for the first 10 years and 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, the OACT 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, the OACT assumes a slower rate of economic growth than the U.S. economy has experienced over an extended period. This projection reflects both the slowdown in labor force growth expected over the next few decades and the slowdown in productivity growth since 1973.[39] 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. This question can be approached by considering the return to stocks directly, as discussed above, or by considering the marginal product of capital in the context of a model of economic growth.[40]

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 does imply 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) "observe a persistent positive association between savings rates and long-term rates of income growth, both across countries and over time." This 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.[41]

Focusing directly on demographic structure and the rate of return, rather than labor force growth and savings rates, Poterba (1998) finds empirical relationships that "do not suggest any robust relationship between demographic structure and asset returns", although he recognizes that this "is partly due to the limited power of statistical tests based on the few 'effective degrees of freedom' in the historical record." The paper 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

---

38 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 amounts invested in the long term. This depends 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 switches 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.

39 "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, page 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, page 55).

40 Two approaches are available to answer this question. Since the Gordon formula, given above, shows the return to stocks equals the adjusted dividend yield plus the growth of stock prices, one would need to consider how the dividend yield would be affected by slower growth. In turn, this 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 *brief*.

41 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 (1999).

baby boomers save for retirement, and for projecting low future stock values, as they will finance retirement consumption.

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, other advanced economies are aging as well, so that increased economic connections with other advanced countries do not alter the basic analysis. While on the other hand, 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 does further weaken the argument for a significant drop in the marginal product of capital, but these 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. So, any impact would tend to affect returns on both stocks and bonds similarly, with no directly implied change in the equity premium.[42]

Other Issues for Consideration

In considering the prospect of equity investment for Social Security, it is useful to take into account two additional issues: (1) how gross returns depend on investment strategy and how net returns differ from gross returns; and (2) the degree of risk associated with adding stock investments to a current all-bond portfolio.

Gross and Net Returns

This *issue in brief* has considered the gross rate of return to equities and the equity premium generally, without considering the returns to particular investment strategies. Nor has it considered the net rate of return, which differs from a gross return because of transactions costs — brokerage charges, bid-ask spreads and fees for asset management.[43]

If the 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 U.S. Thus, the analysis above holds for this type of investment. While 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 done 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,

---

42 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. It is plausible that it will tend to lower rates of return. How large this effect is depends on the size of investment increases relative to available investment opportunities, both in the U.S. 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 *brief* does not explore it. Again, the argument speaks to the level of rates of return generally and not to the equity premium.

43 One can also ask how changed policies might affect future returns. It is plausible that a change in portfolio policy to include stocks (whether in the Trust Fund or in individual accounts) will lower the equity premium somewhat. This 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).

both in the composition of the stock portfolio and in the timing of purchases and sales. Given the opportunity, many individuals would engage in considerable 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). This suggests that different gross rates of return (before adjusting for administrative costs) should be assumed for different proposals to invest in stocks. 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 with whether there are individual accounts and how they are organized and regulated (National Academy of Social Insurance 1998; Diamond 1999). These cost estimates vary from 0.5 basis points for direct trust fund investment to 100-150 basis points for individually-organized individual accounts, with government-organized individual accounts somewhere in between.

Risk of Stocks

It is useful to remember that the projections of the OACT are projections of plausible long-run scenarios (ignoring fluctuations). These projections are useful for recognizing when there is 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.[44] Nor are the projections sufficient for normative evaluation of policies that have different distributional or risk characteristics. While it is important to recognize that investment in stocks entails riskiness in the rate of return, investment in Treasury bonds also entails risk. Therefore, a comparison of these 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 both the probabilities of doing better as a result of holding some stocks and of doing worse. Merely observing that stocks are risky is an inadequate basis for policy evaluation. Indeed, studies of the historical pattern of returns show that portfolio risk is decreased by adding some stocks to an all-nominal-bond portfolio (Siegel 1998). It is also useful to remember that many risks affect the financial future of Social Security and that investment of a small portion of the trust fund in stocks is a small risk for the system as a whole relative to the other risks, economic and demographic (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. Future beneficiaries and taxpayers bear 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 would 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).[45]

---

44 For stochastic projections, see Copeland, VanDerhei and Salisbury (1999) and Lee and Tuljapurkar (1998). The OACT generally provides sensitivity analysis by doing projections with several different rates of return on stocks.

45 This is similar to the conclusion of Cochrane (1997) 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" (page 32).

Conclusion

Of the three main bases for criticizing the assumptions used by the OACT, 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 financial market developments 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, the OACT 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. This 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, the OACT could adopt a lower rate of return for the entire 75-year period. While this approach may be more acceptable politically, 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.

References

Abel, Andrew B. 1999. "The Social Security Trust Fund, The Riskless Interest Rate, and Capital Accumulation." Cambridge, MA: National Bureau of Economic Research, Working Paper 6991.

Advisory Council on Social Security. 1997. *1994-1996 Advisory Council on Social Security: Findings and Recommendations: Volumes I and II*. Washington, DC.

Baker, Dean. 1998. "Saving Social Security in Three Steps." Washington, DC: Economic Policy Institute, Briefing Paper.

Baker, Dean. 1999a. "Two Cheers For Clinton's Social Security Plan." *The American Prospect,* (May/June).

Baker, Dean. 1999b. Letter to Martin Feldstein. (May 15). (available at www.preamble.org).

Baker, Dean and Mark Weisbrot. 1999. *Social Security: The Phony Crisis*. Chicago, IL: University of Chicago Press.

Blanchard, Olivier J. 1993. "Movements in the Equity Premium." *Brookings Papers on Economic Activity* (2): 75-138.

Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds. 1999. *1999 Annual Report*. Washington, DC: U.S. Government Printing Office.

Bohn, Henning. 1998. "Social Security Reform and Financial Markets." *Social Security Reform: Links to Saving, Investment, and Growth*. Boston, MA: Federal Reserve Bank of Boston.

Bosworth, Barry and Gary Burtless. 1998. "Social Security Reform in a Global Context." *Social Security Reform: Links to Saving, Investment, and Growth*. Boston, MA: Federal Reserve Bank of Boston.

Brav, A. and C. Geczy. 1996. "An Empirical Resurrection of the Simple Consumption CAPM with Power Utility." Unpublished. University of Chicago.

Campbell, John Y., Andrew W. Lo and A. Craig MacKinlay. 1997. *The Econometrics of Financial Markets*. Princeton, NJ: Princeton University Press.

Campbell, John Y. and Robert J. Shiller. 1998. "Valuation Ratios and the Long-Run Stock Market Outlook." *Journal of Portfolio Management* 24(2):11-26.

Campbell, John Y. and Luis M. Viceira. 1999. "Consumption and Portfolio Decisions When Expected Returns are Time Varying." *Quarterly Journal of Economics* (May): 433-495.

Carroll, Christopher D., Jody Overland and David N. Weil. 1999 forthcoming. "Saving and Growth with Habit Formation." *American Economic Review.*

Carroll, Christopher D. and David N. Weil. 1994. "Saving and Growth: a Reinterpretation." *Carnegie-Rochester Conference Series on Public Policy* (40): 133-192.

Case, Karl E. and Robert J.Shiller. 1988. "The Behavior of Home Buyers in Boom and Post-Boom Markets." *New England Economic Review* (November/December): 29-46.

Cochrane, John H. 1997 "Where is the Market Going? Uncertain Facts and Novel Theories." *Economic Perspectives XXI* (November/December): Federal Reserve Bank of Chicago. Also NBER Working Paper 6207.

Cole, Kevin, Jean Helwege and David Laster. 1996. "Stock Market Valuation Indicators: Is This Time Different?" *Financial Analysts Journal* 52(3) May/June: 56–64.

Copeland, Craig, Jack VanDerhei and Dallas L. Salisbury. 1999. "Social Security Reform: Evaluating Current Proposals: Latest Results of the EBRI SSASIM2 Policy Simulation Model." Washington, DC: EBRI Brief 210.

Diamond, Peter. 1999. "Administrative Costs and Equilibrium Charges with Individual Accounts." Cambridge, MA: National Bureau of Economic Research, Working Paper 7050.

Diamond, Peter and John Geanakoplos. 1999. "Social Security Investment in Equities I: Linear Case" Boston, MA: Center for Retirement Research at Boston College, Working Paper 2.

Dudley, William, Jan Hatzius, Joanne Hill, Rajib Pal and Maria Tsu. 1999. "An Analysis of Social Security Trust Fund Investment into Equities." Goldman Sachs Global Economics Paper 18.

Glassman, James and Kevin Hassett. 1998. "Are Stocks Overvalued? Not a Chance." *Wall Street Journal* (March 30).

Glassman, James and Kevin Hassett. 1999. "Stock Prices Are Still Far Too Low." *Wall Street Journal* (March 17).

Gordon, Myron. 1962. *The Investment, Financing, and Valuation of the Corporation*. Homewood, IL: Irwin.

Granger, C. W. J. 1969. "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods." *Econometrica* 37 (3): 424-38.

Heaton, John and Deborah Lucas. 1999. "Stock Prices and Fundamentals." *NBER Macro Annual*.

Investment Company Institute. 1999. *Mutual Fund Fact Book* (May): 22 (available at www.ici.org).

Kennickell, Arthur B., Martha Starr-McCluer and Annika Sundén. "Family Finances in the U.S.: Recent Evidence from the Survey of Consumer Finances." *Federal Reserve Bulletin* (83): 1-24.

Lee, Ronald and Shripad Tuljapurkar. 1998. "Stochastic Forecasts for Social Security." In David Wise, ed. *Frontiers in the Economics of Aging*. Chicago, IL: University of Chicago Press: 393-420.

Mehra, Rajnish and Edward Prescott. 1985. "The Equity Premium Puzzle." *Journal of Monetary Economics* (15): 145-161.

Mankiw, N. G. and S. Zeldes. 1991. "The Consumption of Stockholders and Non-Stockholders." *Journal of Financial Economics* (17): 211-219.

Munnell, Alicia and Annika Sundén with the Assistance of Cynthia Perry and Ryan Kling. 1999. "Investment Practices of State and Local Pension Funds: Implications for Social Security." Boston, MA: Center for Retirement Research at Boston College, Working Paper 1.

National Academy of Social Insurance. 1999. "Evaluating Issues in Privatizing Social Security." *Report of the Panel on Privatization of Social Insurance*. (available at www.nasi.org and as Diamond, editor. *"Issues in Privatizing Social Security."* Cambridge, MA: MIT Press).

Odean, Terrance. 1998. "Do Investors Trade Too Much?" Unpublished. University of California, Davis.

Philips, Thomas K. 1999 forthcoming. "Why Do Valuation Ratios Forecast Long-Run Equity Returns?" J*ournal of Portfolio Management* (Spring).

Poterba, James M. 1998. "Population Age Structure and Asset Returns: An Empirical Investigation." Unpublished. MIT.

Poterba, James M. and Andrew A. Samwick. 1995. "Stock Ownership Patterns, Stock Market Fluctuations, and Consumption." *Brookings Papers on Economic Activity* (2): 295-372.

Rea, John D. and Brian K. Reid. 1998. *Trends in the Ownership Cost of Equity Mutual Funds*. Washington DC: Investment Company Institute Perspective (4): 3.

Rea, John D. and Brian K. Reid. 1999. *Total Shareholder Cost of Bond and Money Market Mutual Funds*. Washington, DC: Investment Company Institute Perspective (5): 3.

Robertson, Donald and Stephen Wright. 1998. "The Good News and the Bad News about Long-Run Stock Market Returns." Unpublished. University of Cambridge.

Shafir, Eldar, Peter Diamond and Amos Tversky. 1997. "Money Illusion." *Quarterly Journal of Economics* 112 (2): 341-374.

Sharpe, Steven. 1999. "Stock Prices, Expected Returns, and Inflation." Unpublished. Federal Reserve Board.

Siegel, Jeremy J. 1994 and 1998. *Stocks for the Long Run*. New York, NY: McGraw Hill: 318.

Siegel, Jeremy J. 1999. "The Shrinking Equity Premium: Historical Facts and Future Forecasts." Unpublished. University of Pennsylvania.

Thompson, Lawrence. 1998. *Older and Wiser: The Economics of Public Pensions*. Washington, DC: Urban Institute Press.

Vissing-Jorgensen, Annette. 1997. "Limited Stock Market Participation." Unpublished. MIT.

Wadhwani, Sushil B. 1998. "The U.S. Stock Market and the Global Economic Crisis." Unpublished. Tudor Investment Corporation.

Appendix A

Variables

r .....rate of return on stocks
g .....rate of growth of both GDP and dividends
a .....adjusted dividend yield at time 0
P(t) ....aggregate stock value at time t
Y(t) ....GDP at time t
D(t) ....dividends at time t

Equations

$Y(t)=Y(0)e^{gt}$
$D(t)=D(0)e^{gt}=aP(0)e^{gt}$
$dP(t)/dt=rP-D(t)=rP-aP(0)e^{gt}$

Solving the differential equation, we have:

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

Taking the ratio of prices to GDP, we have:

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

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

Appendix B

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 ten 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:

$P'/P=(1+G')D'/((R-G')P)=(1+G')D(1+G)^{10}/((R-G')P)=X(1+G')(1+G)^{10}/(R-G')$

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

$P'/P=22.5\ X$

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 these numbers from 1 yields the required decline in the real value of stock prices as shown in the first column of Table 3. Converting these 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 are the decline in real values; the decline in nominal terms would be less.

Appendix C

Consider 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 + blog[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:

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

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

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 U.S. change less because some of the effect occurs abroad.

CENTER FOR
RETIREMENT
RESEARCH
AT BOSTON COLLEGE

About the Center

The Center for Retirement Research at Boston College, part of a consortium that includes a parallel center at the University of Michigan, was established through a 5-year $5.25 million grant from the Social Security Administration. The goals of the Center are to promote research on retirement issues, to transmit new findings to the policy community and the public, to help train new scholars, and to broaden access to valuable data sources. Through these initiatives, the Center hopes to forge a strong link between the academic and policy communities around an issue of critical importance to the nation's future.

Affiliated Institutions

Boston University School of Management
Massachusetts Institute of Technology
Syracuse University
The Brookings Institution
National Academy of Social Insurance
The Urban Institute

Contact Information

Center for Retirement Research
Boston College
Fulton Hall 550
Chestnut Hill, MA 02467–3808
Phone: (617) 552-1762
Fax: (617) 552-1750
E-mail: crr@bc.edu
Website: http://www.bc.edu/crr