

The U.S. Equity Return Premium: Past, Present and Future

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ABSTRACT

Since the 1920, at least, it has been known that American investors with long time horizons profit immensely with little risk by investing in equities rather than debt. Since World War II the average premium return on equities in the U.S. has been some 5.8% per year. Attempts by different groups of investors to take advantage of this extraordinary long-run profit opportunity have been far too small to eliminate it. This extraordinary equity risk premium still persists today—although it is probably not of the exceptionally large magnitude it has taken in the post-World War II period. Economists' attempts to explain this equity return premium have produced an impressive body of useful and ingenious work that has, nevertheless, failed to make much progress. The U.S. equity return premium continues to largely elude satisfactory explanation.

Because the market has failed to arbitrage this premium equity return over the past eighty years, we forecast that the equity premium will continue to exist in the future. As of this writing—Wednesday April 11, 2007, 11:13 AM PDT—the annual earnings yield on the value-weighted S&P composite index is 5.7%. Comparing this to an annual yield on 10-year Treasury inflation-protected bonds of 2.2% suggests an expected future equity return premium of 3.5% per year.

We speculate that a fundamental reason for this failure of the market to reduce the equity return premium to levels that fit comfortably with representative-agent expected utility theory is that investors and their agents are by and large incapable of the psychological discipline needed either to buy-and-hold for the long run or to construct institutions to buy-and-hold for the long run for them. As John Maynard Keynes (1936) wrote: the craft of managing investments is "intolerably boring and over-exacting to any one who is entirely exempt from the gambling instinct; whilst he who has it must pay to this propensity the appropriate toll."

In 1924 financial analyst Edgar L. Smith's *Common Stocks as Long-Term Investments* publicized that long-horizon investors in *diversified* equities got a very good deal relative to investors in debt, whether in the form of long-term bonds or short-term bills. Equity investments offered higher average returns. While each individual company's stock had a significant risk of a very large loss, "subject to the temporary hazard of hard times, and [to the hazard of] a radical change in the arts or of poor corporate management," these risks could be diversified away across companies and over time. They could be "effectively eliminated through the application of the same principles which make the writing of fire and life insurance policies profitable." By contrast, diversification did not significantly diminish bond risk. Thus the higher average returns that long-horizon investors in diversified equity portfolios received were not counterbalanced by any higher risk of truly significant long-horizon loss.

Edgar L. Smith was right about both his past and our past: common stocks have been extremely attractive as long-term investments.

Over the half century before Smith wrote, the Cowles Commission index of American stock prices deflated by consumer prices shows an average real return on equities of 6.5 percent per year— compared to an average real long-term government bond return of 3.6 percent and an average real bill return of 4.5 percent in the data set of

Robert Shiller (2006, <http://www.econ.yale.edu/~shiller/data.htm>). Since the start of the twentieth century the Cowles Commission index linked to the Standard and Poor's Composite shows an average real equity return of 6.0 percent per year, compared to a real bill return of 1.6 percent per year and a real long-term government bond return of 1.8 percent per year. Since the end of World War II, American equity returns have averaged 6.9 percent per year, bill returns 1.4 percent per year, and bond returns 1.1 percent per year.

Similar gaps between stock and bond and bill returns have typically existed in other economies. Rajnish Mehra (2003)¹ reports an annual equity return premium of 4.6 percent in post-World War II Britain, 3.3 percent in Japan since 1970, and 6.6 percent and 6.3 percent respectively in Germany and Britain since the mid-1970s.

We judge that Edgar Smith was right about our future too. As of this rewriting—Wednesday April 11, 2007, 11:13 AM PDT—the annual earnings yield on the value-weighted S&P composite index is 5.7%. Comparing this to the annual yield on 10-year Treasury inflation-protected bonds of 2.2% suggests an expected future equity return premium of about 3.5% per year.²

¹ Citing Jeremy Siegel (1998) and John Campbell (2001).

² “About” because of a great many uncertainties and biases in using earnings yields as estimates of future returns. One must make adjustments for the extent to which reported accounting earnings overstate or understate true Haig-Simons economic earnings and the extent to which retained earnings reinvested in firms earn higher or lower rates of return than outside equity investments, among other factors.

Rajnish Mehra and Edward Prescott (1985) saw this wide gap between stock and bond returns as a puzzle given the small or nonexistent amount of extra systematic and undiversifiable risk borne by long-horizon investors in diversified stock-heavy portfolios? As the late Fisher Black once put it in conversation, the value of the equity return premium called for a representative agent with such a high degree of risk aversion it would be too risky to get into the bathtub in the morning—a coefficient of relative risk aversion of 50 or so. And if the economy’s asset prices contain such a high degree of risk aversion, then the existence of economic growth over time implies that safe real interest rates should be very high, which they are not—the equity return premium puzzle is also a low risk-free rate puzzle, as has been pointed out by Philippe Weil (1989) and others.

We begin this paper by outlining the quantitative magnitude of the equity return premium and its puzzle: in the United States, diversified equity investments have outperformed bonds and bills by a substantial margin at every time horizon. And equities have outperformed bonds and bills with extremely high probability and extremely small losses relative to the potential gains as long as the position is allowed to ride for 20 years or more. Investors in stocks typically quadruple their real wealth over such a horizon. Investors in long-term bonds typically see their real wealth grow by a third, and investors in bills see their real wealth grow by a fifth—all the while exposed to substantial inflation risk,³ for nominal interest rates typically do not adjust point-for-point with inflation.⁴

³ Investors in bonds lose 43% of their initial wealth in the 20 years ending in 1981. Investors in bills lose 40% of their initial wealth in the 20 years ending in 1952. There is no 20-year horizon for which equity investments in the Cowles linked to the S&P composite index lose real wealth. It is not clear to us how to think about inflation risk in this context. Clearly not all of it is systematic. But equally clearly some of it is:

We consider possible explanations that have been proposed by economists for why the equity return premium might have existed in the past. We first turn to possible reasons why rational investors might exhibit an equity premium based in preferences or transaction costs. Again, the magnitude and persistence of the equity premium over time makes such an explanation quite difficult. Another potential explanation is that risks not captured in past data might cause the equity premium, but such unmeasured risks are likely to affect bond values and returns as well, so this argument also has a hard time accounting for the equity premium.

We then turn to economists' explanations that have relied on irrational beliefs or behavior by agents. For example, Thomas Macurdy and John Shoven (1992) and others have suggested that the equity return premium might be due to investors' confusion about relative safety over the long run; Franco Modigliani and Richard Cohn (1979) and others have pointed to confusion between real and nominal returns;⁵ Eugene Fama and Kenneth French (2002) and others have argued that investors early in the post-World War II period overestimated stock market risk, but that current investors no longer do so; or perhaps the equity return premium has been due, as Olivier Blanchard (1993) argues, to a

times of macroeconomic distress that reduce stock prices also impair government finances and strengthen government's incentive to inflate the currency.

⁴ See Robert Barsky and J. Bradford DeLong (1993), and Lawrence Summers (1983).

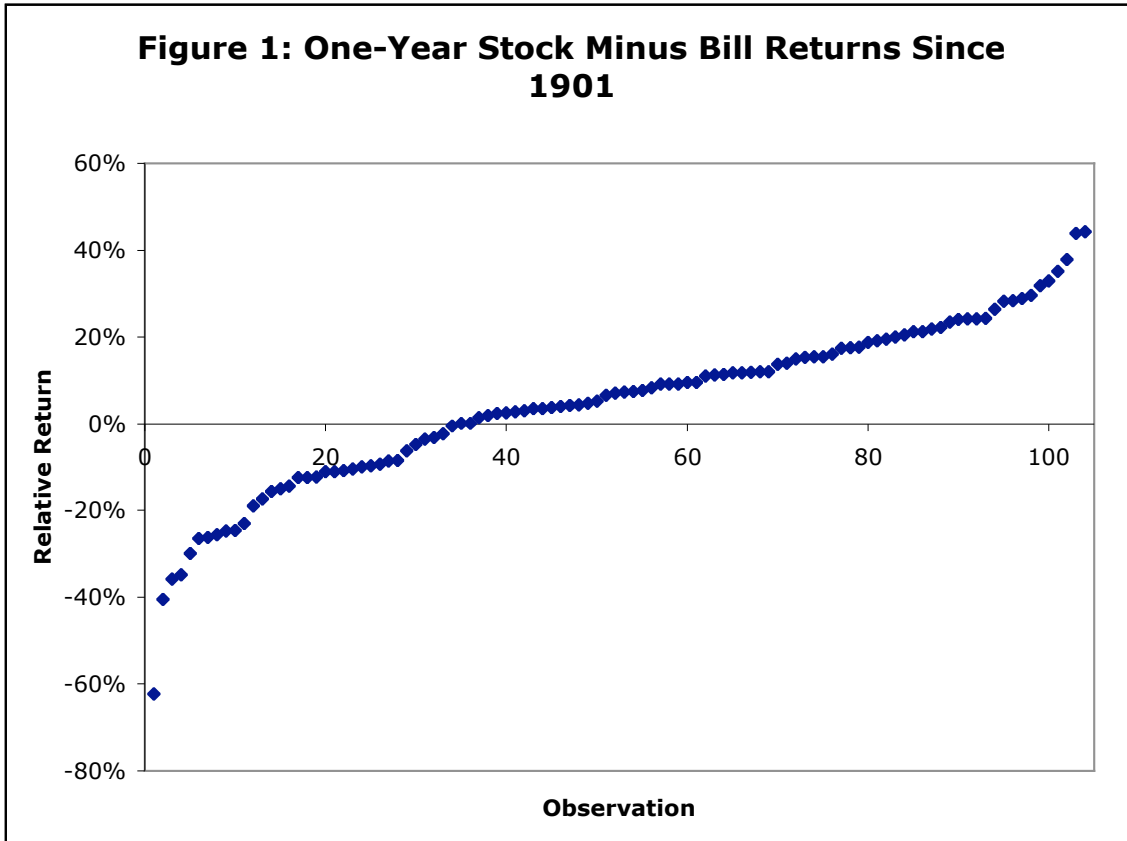
⁵ Confusion that still exists. Crossing DeLong's desk right now is Georgia Bush (2007), who writes that "European stocks are particularly attractive" because the "gap between [real] expected corporate earnings yields and 10-year [nominal] bond yields is about 2.95 percentage points, considerably greater than the 15-year average..."

combination of an excessive fear of another Great Depression coupled with underestimations of inflation and some confusion of nominal and real returns.

However, the equity return premium has been known for 80 years. Any substantial shrinkage of it over time is uncertain and speculative. Ultimately, we believe that the explanations for the equity return premium that will prove fruitful must lie in the investigation of psychological and institutional biases that make financial markets relatively unfriendly to investment in equities. This conclusion carries the implication that, barring major institutional changes, the equity premium is here to stay—although we judge it likely to be smaller in the next few decades than a simple extrapolation of the past century's experience.

The Market Arithmetic of the Equity Premium

As a starting point, consider an investor with some wealth to invest for one year who is deciding whether to invest it in relatively safe one-year government bills or in a riskier diversified portfolio of stocks. Figure 1 below plots the difference in returns for these two strategies since the start of the twentieth century for each year from 1901 to 2004—with the return differentials ranked from lowest to highest. Thus 1931 with its return differential of -60 percent is at the far left, while 1933 and 1935 are at the far right.



For this distribution, a representative investor with a constant relative risk aversion utility function is indifferent between stocks and bills only if he or she had a marginal utility of wealth in the good state 83% of the way up the return distribution that was half that of marginal utility in the bad state 17% of the way up the return distribution. This is difficult to manage given the small variability in aggregate consumption: Rajnish Mehra and Edward Prescott (2003) report an annual standard deviation of consumption growth of only 3.6%, which would lead one to expect an equity return premium of at most tenths of a percentage point per year. The basic point is that of Richard Thaler and Matthew Rabin (2001). Expected utility theory tells us that agents should be nearly risk-neutral on all bets that do not involve a substantial fraction of lifetime wealth: only

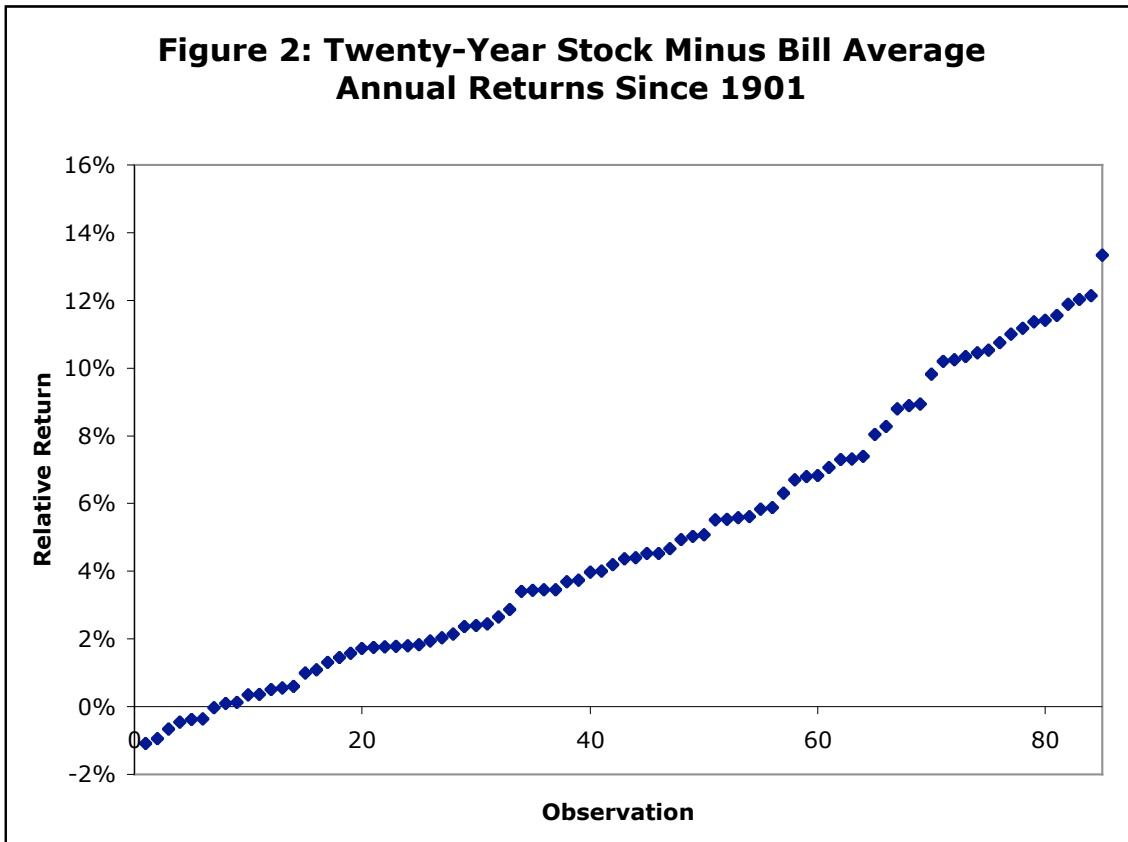
substantial variations in lifetime wealth and thus in current consumption can produce the variation in the marginal utility of wealth needed to justify risk aversion. And annual stock market returns simply do not covary enough with current consumption and lifetime wealth to count.

It looks as though investors with a one-year horizon during the twentieth century look like they should have held more money in stocks and less in bills, and so driven stock returns lower and bill returns higher. But their failure to do so does not mean that they turned their backs on nearly riskless opportunities for profit.⁶ The lower tail of Figure 1 shows significant risk in one-year stock market investments, especially in 1931. For investors with a time horizon of one year, stocks *are* much more risky than bills.

However, a substantial share of year-to-year variability in the stock market is transitory. Stock prices are mean reverting: at the level of the stock market as a whole, past performance is not only not a guarantee of future results, past performance is negatively correlated with future results. The variance of 20-year stock returns is only 0.45 of what it would be if returns were serially uncorrelated (see, for example, Cochrane, 1994; Cochrane, 2006; Campbell and Shiller, 1989). For investors with long

⁶ It is important to distinguish between two different kinds of violations of our expectations of how efficient markets behave. In one kind, market inefficiency means that a large number of investors are passing up the opportunity to make relatively small risk-adjusted profits by making modest adjustments to their portfolios in order to exploit the inefficiency. In the second kind, the market inefficiency means that almost every investor is passing up the opportunity to make enormous profits while running little risk by making large adjustments to their portfolio in order to exploit the inefficiency. The one-year equity return premium appears to be a market inefficiency of the first kind.

time horizons, mean reversion makes equity investments even more attractive because investments made at one moment insure against investments made at another.



Consider investors with a 20-year horizon— somebody in their 30s with young children putting money away to spend on their children's college, somebody age 50 contemplating living beyond age 70 and fearing medical bills, or simply wanting to leave a bequest. Figure 2 plots the 20-year return differential between stocks and bills since the start of the twentieth century. This time the lower tail is very small indeed: stocks do worse than bills in less than 9 percent of the cases. The worst observation is the 20 years

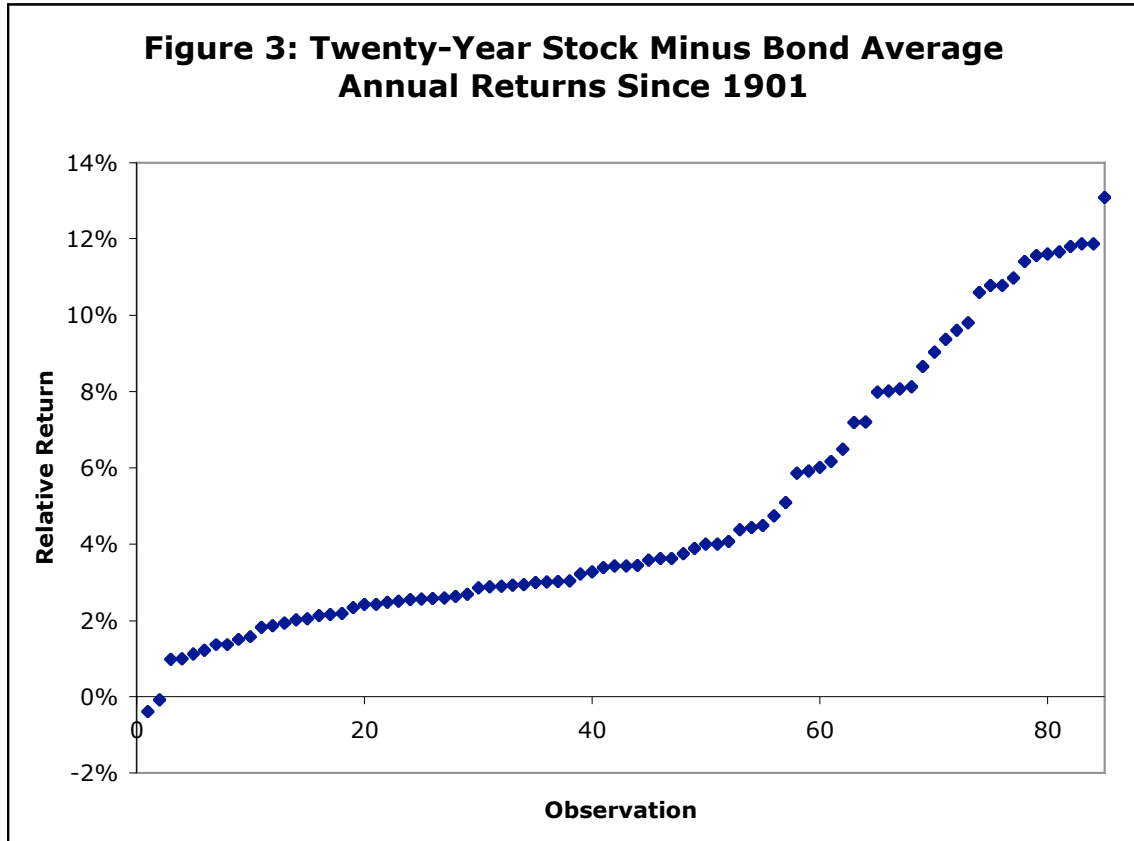
starting in 1965, when investing in stocks yields a relative cumulative wealth loss of only 17 percent, compared to investing in bills.

The average compounded geometric return differential since 1901 is some 4.9 percent per year. Over 20 years, in other words, an investment in a diversified stock portfolio would be expected to be 2.67 times as large as an investment in short-term Treasury bills (that is, $e^{(20 \times .049)} = 2.67$). Along with the expected 2.67-fold increase in relative wealth, the distribution in Figure 2 suggests a 60 percent chance of a doubling of relative wealth; a 30 percent chance of a quadrupling of relative wealth; and an upper tail that gives a 17 percent chance of a more than seven-fold multiplication of relative wealth.⁷

This result is not driven by the special liquidity characteristics of short-term Treasuries. Figure 3 shows the distribution analogous to that of Figure 2, with this time the marginal 20-year investors considering the relative returns to investing in a diversified stock portfolio (and reinvesting the dividends) as opposed to investing in a long-term Treasury bond portfolio (and rolling maturing bonds over into new issues). This time the lower tail is even smaller: in only 2 percent of the cases in the twentieth century would investing in bonds for 20 years outperformed investing in stocks; and in that year—1929—the 20-year returns to bonds would be only 8 percent ahead of the 20-

⁷ The long-horizon equity premium puzzle is thus a market efficiency failure of the second kind: nearly every investor with a sufficiently long time horizon could have profited enormously while bearing very little risk by choosing a more equity-heavy portfolio.

year returns to stocks. The equity return premium cannot be understood as a liquidity premium.



The equity return premium puzzle is a very hard problem. A very large number of economists have done excellent work investigating and assessing the viability of different potential explanations. The next several sections explore some of the explanations that economists have offered for the equity premium puzzle: a high degree of risk aversion or

other non-standard preferences; transactions costs; lower-tail risk; persistent mistakes or confusion among agents; and others.⁸

A Preferences Explanation?

The first potential explanation for the equity return premium puzzle is simply that investors prefer the portfolios they hold: that investors really are averse enough to risk that the observed configuration of returns does not leave any unexploited profit opportunities. The difficulty with this explanation are twofold: first, that the low average return debt securities used as a yardstick in measuring the equity return premium are not really riskfree, and second that—even taking debt to be riskfree—the degree of risk aversion that must be assumed so that long-term investors are willing to forego the gains from equities must be extremely and unrealistically high.

The coefficient of relative risk aversion is a common way of measuring tolerance for risk. Fisher Black suggested that, given the observed return premium and the observed correlation of stock market returns and consumption, the coefficient of relative risk aversion necessary to explain the puzzle would be about 50. However, both observed purchases of insurance and our intuitions about the coefficient of relative risk aversion

⁸ And, of course, space prevents us from even noting the existence of more than a very small fraction of even the important contributions to the literature.

suggest a parameter more in the range of 1 to 3.⁹ Consider what such coefficients of relative risk aversion mean. Think of an agent offered a choice between (a) their current lifetime wealth and (b) a gamble where with probability p they obtain twice and with probability $1-p$ half their lifetime wealth. Such an agent would reject (b) in favor of (a) for all values of p less than some critical value. For an agent with a coefficient of relative risk aversion of 1 the critical value of p is 50%; for a coefficient of 2 the critical value is 80%; for a coefficient of 10 the critical value is 99.8%; and for a coefficient of 50 the critical value is 99.9999999995%.

Such a very high degree of relative risk aversion has other implausible implications. A utility function with the extremely high level of risk aversion necessary to lead to the observed equity premium would also generate a high risk-free rate of return—not the low 1 percent or so real return on short-term government bonds that we have typically seen. Moreover, in standard models a very high coefficient of relative risk aversion implies a very low intertemporal elasticity of substitution—that is, people will not alter their consumption path over time in response to changes in rates of return—which is not observed.

Another line of research—exemplified by papers like Lawrence Epstein and Stanley Zin (1991), George Constantinides (1990), Andrew Abel (1990), and John Campbell and John Cochrane (1995)—considered the consequences of assuming non-

⁹ See, for example, Partha Dasgupta (2007).

standard preferences. One approach is to make utility dependent not just on consumption but on consumption relative to the consumption of others or to one's own consumption in the past—"keeping up with the Joneses" or habit formation. A second approach is to separate preferences for risk from preferences for income growth over time. These approaches do allow one to account for the coexistence of a high degree of effective risk aversion with a low risk-free interest rate: the features of the utility function that make investors extremely averse to stock-market losses do not have any bearing on the connection between economic growth and the safe real interest rate. But these approaches leave high effective risk aversion largely unaccounted for.

As Narayana Kocherlakota (1996) summed up the results from this approach a decade ago:

The risk-free rate puzzle can be resolved as long as the link between individual attitudes toward risk and growth contained in the standard preferences is broken.... [T]he equity premium puzzle is much more robust: individuals must either be highly averse to their own consumption risk or to per capita consumption risk...

The underlying issue is clear. The gains to long-horizon investors equities relative to bonds are so large that investors should have flocked to equities much more than they did—unless an extreme and unrealistic level of aversion to losses sharply limits their

willingness to make substantial decades-long bets on stocks. Unless one believes in extraordinary aversion to downside risk, such attempts to understand the equity premium are not going to get us very far. And even if one does believe in such aversion, for long-horizon investors inflation risk makes not equities but bonds unattractive, and should lower rather than raise the observed equity return premium vis-à-vis bonds and bills.

A Transaction Cost Explanation?

Attempts to explain the equity premium as due to transactions costs have fared little better. Gregory Mankiw and Stephen Zeldes (1991) pointed out that two-thirds of Americans have next to no stock market investments, presumably because of transaction costs. This means that a substantial proportion of society's risk-bearing capacity is not being mobilized. Mankiw and Zeldes found that the consumption of stockholders does covary considerably more in relative terms with the stock market than does consumption as a whole. But they also found that stockholders' consumption does not vary enough to account for the equity premium.

Authors like George Constantinides, John Donaldson, and Rajnish Mehra (2002) suggest that the equity premium may be due to borrowing constraints. The relatively young—whether as parents, workers, or as future payers of medical copayments—cannot

borrow because they have the option of declaring bankruptcy, and lenders fear such moral hazard. These borrowing constraints induce investors to build up their stocks of liquid wealth in advance so as not to be bound by such constraints (see, for example, Mark Huggett, 1993; John Heaton and Deborah Lucas, 1995). This argument can have a powerful effect in explaining why the risk-free rate of return is so low: in effect, people's desire to have positive net worth increases saving and pushes down the rate of interest. However, it is difficult for borrowing constraints to have much of an effect on the equity premium. After all, these built-up stocks of wealth could be invested in either stocks or bonds, and stocks offer higher returns with little extra long-horizon risk.

It is also difficult to see how transaction costs of purchasing stocks and bonds per se as providing much traction on the equity premium puzzle, either. Transaction costs make it difficult for those with short time horizons to play in the market. However, the transaction costs associated with multi-decade buy-and-hold strategies are relatively low. The most vivid advantages of stock investments produced by the equity return premium arise over these long time horizons, when transactions costs should have the smallest effect.

The transaction costs approach that in our view comes closest to accounting for the equity premium puzzle is that of George Constantinides and Darryl Duffie (1996). They propose that investors are subject to idiosyncratic income shocks that, because of information and moral hazard problems, they cannot buy insurance against that are

correlated with returns on equities. In effect, the investors in Constantinides and Duffie (1996) are already bearing the very large amount of equity-related risk embedded in their labor income path, and are uninterested in further leveraging their total implicit portfolios. But this model would require much more consumption variation on the micro level than we in fact see. We ought to be able to identify some groups of people whose labor income is subject to such large and permanent shocks correlated with equity returns, and then observe that those investors' portfolios drive the lack of investment in equities that lies behind the equity premium puzzle. But we cannot identify such groups.

Lower-Tail Risk?

What if we were to drop the assumption that the ex post return distribution over the twentieth century is an adequate proxy for the ex ante distribution? If investors have reason to believe that future returns on equities run some risk of being much less attractive than even the worst outcome seen in the historical record, this might explain why investors shy away from equities to a greater degree than the historical return pattern would justify. Solutions to the equity premium puzzle along these lines have been put forward by authors like Thomas Rietz (1988); Stephen Brown, William Goetzmann, and Stephen Ross (1995); and Robert Barro (2005). The driving assumption in this approach is that there is a chance of an outcome in which stocks do far worse than bonds. This

chance is small enough that we have not observed it in the last century. Yet it is large enough to have substantial effect on stock prices and on the equity premium.¹⁰

This story has considerable attractiveness, but one significant difficulty.¹¹ What are the low-probability economic catastrophes would have powerful negative impacts on real equity returns and not affect the real returns on bonds? The equity premium return is measured against yardsticks that are not truly riskfree assets. Risks that affect both stock and bond returns cannot be used to account for the observed equity risk premium.

A great many potential political and economic catastrophes are possible: defeat in a major war; a populist unraveling of government finances generating hyperinflation; an exhaustion of technological possibilities for innovation; or a banking-sector collapse or other financial crisis that generates a steep but transitory collapse in profits. However, these catastrophes do not affect stock values and leave bond values untouched. A permanent decline in the rate of total factor productivity and consumption growth ought to affect stock and bond returns similarly. War-defeat or populist-crisis crashes of government finances are highly likely to produce rapid inflation, which is poison to debt returns. A transitory collapse in corporate profitability has little effect on far-sighted

¹⁰ There is a delicate dance here. Too great a risk of a collapse in the stock market and in consumption will not only produce a high equity premium but a negative real interest rate. The risk of collapse must be knife-edge in these models: large enough to create the observed equity premium, but small enough to leave a positive real interest rate.

¹¹ A second difficulty is that, as Barro (2005) notes, this explanation carries the implication that the greater the chance of a collapse in output, consumption, and equity values, the higher are equity prices. 2000 is thus a year in which investors expected a high, and 1982 a year in which investors expected a low, probability of macroeconomic disaster. This is a somewhat disturbing artifact of the Lucas (1978) model that underpins Rietz (1988), Barro (2005), Weitzmann (2006), and Mehra and Prescott (1985).

valuations of equities unless it is accompanied by a collapse in consumption as well, in which case the reduced tax base is likely to lead to substantial money printing.

A large deflationary episode like the Great Depression itself could serve as a source of risk to stocks but not bonds. Few, however, believe that any future central bank would allow such a steep and persistent deflation as the Federal Reserve allowed in the 1930s. And the Great Depression is already in our sample. It is hard to argue that its absence from our sample is the cause of the observed equity return premium puzzle.

We can think of one other potential low-possibility event that could cause a collapse in real equity values without affecting the real values of government bonds. If governments were to decide to put extraordinarily heavy taxes on corporate profits or to impose extraordinarily heavy regulatory burdens on corporations, those policies could redirect a substantial amount of cash flow away from shareholders without affecting bond values.

Ellen McGrattan and Edward Prescott (2001) offer an argument that can be interpreted along these lines. They attribute a doubling of equity prices between 1960 and 2000—a nearly 2 percent per year excess return—to the unexpected decline in top income tax rates and increased opportunity to defer taxes on savings that arose in the 1970s and 1980s. That swing could be reversed. While we do not see the fear of future tax increases targeted on corporate profits as large enough to support anything like the

observed equity premium, perhaps we overestimate the competence of our governments and underestimate the strength of a social democracy that believes that the government should be funded by taxing big corporations which can afford to pay rather than individuals.

Public finance economists like James Hines (2005), however, point to the power of tax competition in restraining governments from pursuing tax policies very different from those of other nations. U.S. corporate income tax rates, while lower than they were, are still very high compared to other OECD countries. In a world of highly mobile capital, these differentials are likely to put downward pressure on U.S. tax rates on corporate profits. A radical failure of such tax competition would have to be required for the U.S. to shift its tax system to place very heavy burdens on corporate shareholders.

A more subtle but somewhat analogous argument to Rietz (1988) and Barro (2005) is made by Marty Weitzman (2006). Weitzman argues not so much that lower tail risk is large, but that investors do not and cannot know what the lower tail risk truly is. Once again, the principal problem with this theoretical formulation is that the actual underlying economic risks are unclear. What are the events that investors believe might generate the fat lower tail of equity returns, and yet leave the real value of government debt untouched?

If the arguments for heretofore unobserved lower-tail risk hold true, then the appearance of an equity premium puzzle will not persist forever. At some point the risks that underpin the asset price configuration would manifest themselves, at which point it will become very clear that the equity premium puzzle never really existed at all.

Will the Equity Premium Fade Away?

Yet another alternative is that economic agents found it difficult to interpret several large macroeconomic events in the twentieth century, and ended up interpreting these events in a way that, in retrospect, turned out to be mistaken. These mistakes created the equity premium. This argument carries a corollary: the equity premium has a past, but it will not have a future, because investors have learned and will continue learn from experience over time.

One powerful attempt to flesh out this alternative is Fama and French (2002). Over the medium run, they argue, a fall in the risk premium on stocks coming from a correction of misapprehensions about their riskiness shows up as a jump in stock prices. Learning that the equity premium should be lower produces a higher estimated equity premium in the recent past. They thus argue that one should estimate the post-World War II ex ante equity premium by adding dividend yields to the rate of growth of earnings,

and not by adding dividend yields to the rate of growth of stock prices, which includes this unanticipated windfall from learning about the world.¹² They estimate a post-World War II U.S. equity premium of 4.3% per year, and point out that this itself is likely to be an overstatement to the extent that earnings growth since 1950 has exceeded expected earnings growth formed in the shadow of the Great Depression.

McGrattan and Prescott (2003) point to changing institutions rather than learning about the likelihood of economic catastrophe as a source of the equity premium in the past. They argue that regulatory restrictions used to encourage over-investment in debt by pension funds. Until the passage of ERISA in the mid-1970s, it was unclear what a pension fund trustee could not do, but it was clear that a trustee who invested in investment-grade bonds was in a safe harbor with respect to any possible legal liability for maladministration. Thus ex ante returns to stocks were high. And the rise in price-earnings ratios produced by the creation of better financial institutions produced a windfall for post-World War II investors.

A second exploration of this alternative is Olivier Blanchard (1993), who sees two major macroeconomic events driving the movements of the equity premium from 1927 until the early 1990s. First, he sees high values of the equity premium in the 1930s and 1940s, and thereafter a steady declining to the early 1990s. His hypothesis is that the high

¹² They also consider estimating the equity premium by adding dividend yields to the rate of growth of dividends, but this understates the ex ante equity premium if companies shift from dividend payments to share repurchases as a way of getting cash out of the corporation.

equity premiums initially are a reaction to the shock of the Great Crash of 1929-1933, and that the premium has fallen as the memory and thus the perceived likelihood of a repetition of that extraordinary event has dimmed and as “long-horizon investors such as pension funds” have taken a larger role in the market.

Second, Blanchard (1993) sees a strong correlation of the equity premium with inflation, especially in the 1970s and the 1980s: “A high [equity] premium in the 1970s is associated with a sharp increase in inflation, while a low premium in the 1980s is associated with a sharp decline in inflation” (see also Modigliani and Cohn, 1979; Randolph Cohen, Chris Polk, and Tuomo Vuolteenaho, 2005). These changes in the equity premium may not appear justifiable after the fact. But it’s worth remembering that in the 1970s, it was not clear that inflation would be brought under effective control. John Campbell and Tuomo Vuolteenaho (2004) call this effect of inflation on the equity premium a “mispricing” attributed to expectations implicit in market prices “deviating from the rational forecast.” They point to Wall Street traders’ use of the ‘Fed model’ to value stocks—believing that the *nominal* coupon yield on debt ought to be in some equilibrium relationship with the *real* earnings yield on equity—as a conceptual error that plays an important role in generating this inflation illusion.

These factors led Blanchard back in 1993 to predict that the future equity premium would “remain small,” because inflation was likely to remain low—a correct forecast—leaving little room for inflation illusion to depress stock prices and hence raise

returns; because the memory of the Great Depression and thus the fear of its repetition would continue to erode; and because the number and relative wealth of prudent and informed long-horizon investors would continue to grow.

However, we do not find the argument that the equity return premium has substantially faded away and will continue to fade away to be convincing. Over the fourteen years from 1993 to 2007, the real return on Treasury bills has been 2.1 percent, while the real return on stocks has been 7.6 percent, for an equity premium of 5.5 percent per year. An 18 year-old runner from the floor of the New York Stock Exchange in 1929 would have turned 96 in 2007. The start of the early 1980s disinflation under Federal Reserve Chairman Volcker lies almost three decades ago. Perhaps these estimates of the equity premium are overly large because of the stock market boom of the late 1990s. But there is little evidence that the equity premium has faded away.

The Future of the Equity Premium

The modern literature on the equity premium puzzle is now more than two decades old. The historical literature is more than eight decades old. In the end, the failure of any critical mass of investors to take enough advantage of the equity return premium to substantially arbitrage it away points to a deep fact about the world. The

equity premium remains sizeable and the problem of explaining it remains very hard. This fact has led Rajnish Mehra (2003), at least, to bet that the equity premium in its standard post-1940 strength is here for the foreseeable future:

The data used to document the equity premium over the past 100 years are as good an economic data set as analysts have, and 100 years is long series when it comes to economic data. Before the equity premium is dismissed, not only do researchers need to understand the observed phenomena, but they also need a plausible explanation as to why the future is likely to be any different from the past. In the absence of this explanation, and on the basis of what is currently known, I make the following claim: Over the long term, the equity premium is likely to be similar to what it has been in the past and returns to investment in equity will continue to substantially dominate returns to investment in T-bills for investors with a long planning horizon.

Wall Street appears to agree with Ranish Mehra. Ivo Welch (2000) surveyed 226 financial economists, asking them to provide their estimates of the future equity premium. Their consensus was that stocks will outperform bills by 6-7% per year for the next ten to thirty years. But we believe that many if not most of these financial economists earn their living working for organizations that recommend that people buy stocks, and those who are on the pessimistic side of stock returns are unlikely to seek

such jobs, or to keep them. Gram and Harvey (2007) surveyed nonfinancial corporations' Chief Financial Officers (CFOs). Their 7,316 responses produce an expected annual equity premium of 3.2% per year. We can think of no compelling reason why CFOs' expectations should be biased in one direction or another.

A rough-and-ready method of estimating the future equity premium is to look at the implied current level. As of this rewriting—Wednesday April 11, 2007, 11:13 AM PDT—the annual earnings yield on the value-weighted S&P composite index is 5.7%. Comparing this to the annual yield on 10-year Treasury inflation-protected bonds of 2.2% suggests an expected future equity return premium of about 3.5% per year.

One needs to make adjustments. Do accounting earnings overstate or understate the true Haig-Simons earnings of the corporation, and by how much? By how much do stock options granted but not yet exercised dilute ownership, and so reduce earnings per share? What proportion of the current earnings yield is a cyclical phenomenon? To what extent do retained earnings reinvested inside of firms earn higher rates of return than outside investments subject to information and incentive problems? To what extent do retained earnings reinvested inside of firms earn lower rates of return than outside investments because of corporate control issues?

Staring at this Gordian Knot of issues, we simply cut through it and state that the current market estimate of the future equity return premium is 3.5% per year. It is very

difficult for us to see what long-term risks this premium is appropriate compensation for. We, at least, find convincing the expected utility theoretic arguments that the economy has the risk-bearing capacity to make an appropriate equity return premium equal tenths of a percent per year.

Thus while we agree with Mehra (2003) that an equity premium of some kind is likely to persist into the future, we suspect that it will be smaller in the present than the estimated Mehra and Prescott (1985) equity premium of 6 percent per year. Institutional changes in the past several decades have been favorable to investments in equities. ERISA, as noted by McGrattan and Prescott (2003), removed an institutional restraint on investing pension funds in equities. Before ERISA it was clear that a trustee who invested in investment-grade bonds was in a safe harbor with respect to any possible legal liability for maladministration. Many individual investors now control their own retirement planning through some form of defined contribution pension plan, and especially after the experience of the rising stock market in the 1990s, many of them seem to have increased their personal exposure to equities. The spread of mutual funds has made holding a broad portfolio of stocks easier. 401ks and IRAs are prevalent. The rise of hedge funds and private equity has channeled a significant fraction of investment money into vehicles that can be used for equity investments. It would be astonishing if these institutional developments had no effect on the equity return premium. And they would serve to both raise the ex post equity premium return in the recent past, and to lower the expected equity return premium in the future.

Concluding Thoughts

Yet the equity premium does persist today.

The existence of the equity return premium has offered long-horizon investors a chance to make very large returns in return for bearing little risk. The fact that such opportunities have existed for a century and appear to still exist today suggests some form of market failure. The covariance of equity risk with factors that should affect marginal utility—chiefly consumption—is not that large. The systematic risk-bearing capacity of the economy as a whole is huge. The amount of equity risk that is systematic that needs to be borne is not that large. A well-functioning market that mobilizes the risk-bearing capacity of the economy “ought” to produce an equity return premium measured in the tenths if not hundredths of a percent per year. Yet that is not what the market does.

How damaging is this market failure to mobilize risk-bearing capacity? Perhaps the equity premium puzzle means that the cost of capital is higher because capital ownership involves risk and a lot of the economy’s risk-bearing capacity is thrown away. In this case, the economy’s capital-output ratio is likely to be much too low. Institutional changes that mobilized some of this absent risk-bearing capacity would then promise enormous dividends. Another possibility is that the equity premium puzzle represents a

favoring of debt-heavy and disfavoring of equity-heavy organizational modes—that it is not the case that firms must overpay for equity capital, but instead investors must overpay for low-risk debt investments. In this case the distortions created are more subtle ones of organizational form and the willingness to embrace risk, and are presumably smaller in magnitude. Innovative activities that cannot be financed by debt are not being undertaken, and organizations are adopting inefficient and insufficiently risk-loving and entrepreneurial organizational forms.

A great many agents and institutions in the economy should have a strong interest in profiting from the extremely high value of the equity return premium. There are lots of long-horizon investors who know that they will not need the money they are investing now until twenty or thirty years in the future. Think of parents of newborns looking forward to their children's college, the middle-aged looking at rapidly-escalating health-care costs, the elderly looking forward to bequeathing some of their wealth, workers with defined-contribution pensions, businesses with defined-benefit pensions, life insurance companies, governments facing an aging population, the rapidly-growing exchange reserve accounts of the world's central banks. On the other side of the market, there are companies that appear underleveraged: replacing high-priced equity capital with low-priced debt capital would seem to be as profitable a strategy for a long-lived company as investing in high-return equity rather than low-return debt is for a long-lived investor.

It is understandable that some of these groups chose the aggregate debt-heavy portfolios that they must have done in order to generate the equity return premiums observed over the past century. We can build models about principal-agent problems in financial institutions that make portfolio managers seek trades that have high payoffs in a small fraction of a career rather than a large fraction of a lifetime. We can understand how imperatives of organizational survival lead managers to be strongly averse to putting themselves in a position where they could be bankrupted by unlikely risks that are unknown to them. And we can point to institutions and portfolio managers that do borrow long-term to invest in equities: many leveraged buyouts, junk bonds, private equity partnerships, Warren Buffett's career at Berkshire-Hathaway spent buying up insurance companies and putting their reserves to work buying equities. But that some institutions are blocked from taking advantage of the equity return premium and that other institutions have done so and are doing so does not add up to a satisfactory explanation.

We are driven to the belief that there is a strong case for revisiting issues of financial institution design in order to give the market a push toward equities. Economists need to think about institutions that would make long-run buy-and-hold bets on equities easier and more widespread. Mandatory personal retirement or savings accounts with default investments in equity index funds? Automatically investment of tax refunds into diversified equity funds in personal savings accounts? Investing the Social Security Trust Fund in equities?

Perhaps John Maynard Keynes had it right when he observed that the types of people who would choose careers as agents investing other people's money—and their own—in financial markets were those for whom it would be psychologically nearly impossible for them to pursue the disciplined buy-and-hold-for-the-long-term strategy suggested by the existence of the equity return premium. As Keynes (1936) wrote, the craft of managing investments is "intolerably boring and over-exacting to any one who is entirely exempt from the gambling instinct; whilst he who has it must pay to this propensity the appropriate toll."

References

Abel, Andrew. 1990. "Asset Prices under Habit Formation and Catching Up with the Joneses." *American Economic Review* 80:2, pp. 38-42.

Alvargari, S. Rao and Mark Gertler. 1991. "Asset Returns with Transactions Costs and Uninsured Individual Risk." *Journal of Monetary Economics* 27:3, pp. 311-31.

Barro, Robert. 2005. "Rare Events and the Equity Premium." Cambridge: NBER Working Paper 11310.

Barsky, Robert and J. Bradford DeLong. 1993. "Why Does the Stock Market Fluctuate?" *Quarterly Journal of Economics*.

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

Brown, Stephen, William Goetzmann, and Stephen Ross. 1995. "Survival." *Journal of Finance* 50:3, pp.853-73

Bush, Georgia. 2007. "Volatility Makes a Comeback." New York: Citi Global Wealth Management Investment Research.

Campbell, John. 2003. "Consumption Based Asset Pricing." In Constantinides, George, Mark Harris, and Rene Stulz, eds. *Handbook of the Economics of Finance*. Amsterdam: North Holland.

Campbell, John and John Cochrane. 1995. "By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior." Cambridge: NBER Working Paper 4995.

Campbell, John and Robert Shiller. 1989. "The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors." *Journal of Financial Studies*. 1, pp. 195-228.

Campbell, John and Tuomo Vuolteenaho. 2004. "Inflation Illusion and Stock Prices." Cambridge: NBER working paper 10263.

Cochrane, John. 1994. "Permanent and Transitory Components of GDP and Stock Prices." *Quarterly Journal of Economics* 109, pp. 241-65.

Cochrane, John. 2006. "The Dog that Did Not Bark: A Defense of Return Predictability." Cambridge: NBER working paper 12026.

Randolph Cohen, Christopher Polk, and Tuomo Vuolteenaho, 2005. "Money Illusion in the Stock Market: The Modigliani-Cohn Hypothesis." Cambridge: NBER working paper 11018.

Constantinides, George. 1990. "Habit Formation: A Resolution of the Equity Premium Puzzle." *Journal of Political Economy* 98:3, pp. 519-543.

Constantinides, George and Darrel Duffie. 1996. "Asset Pricing with Heterogeneous Consumers." Bonn: University of Bonn Discussion Paper Series A 1992.

Constantinides, George, John Donaldson, and Rajnish Mehra. 2002. "Junior Can't Borrow: A New Perspective on the Equity Premium Puzzle." *Quarterly Journal of Economics*, 117:1, pp. 269-96.

Dasgupta, Partha. 2007. "Discounting Climate Change." Cambridge: University of Cambridge working paper.

Epstein, Larry and Stanley Zin. 1990. "'First-Order' Risk Aversion and the Equity Premium Puzzle." *Journal of Monetary Economics* 26:3, pp. 387-407.

Fama, Eugene F. and Kenneth R. French (1988), Permanent and Temporary Components of Stock Prices, *Journal of Political Economy*, April 1988; 96(2): 246-73

Friedman, Milton and Anna Jacobson Schwartz. 1963. *A Monetary History of the United States, 1857-1960*. Princeton: Princeton University Press.

Graham, John R. and Campbell Harvey. 2007. "The Equity Risk Premium in January 2007: Evidence from the Global CFO Outlook Survey." Durham: Duke University
<<http://ssrn.com/abstract=959703>>

Heaton, John and Deborah Lucas. 1995. "The Importance of Investor Heterogeneity and Financial Market Imperfections for the Behavior of Asset Prices." *Carnegie-Rochester Conference Series on Public Policy*. 42, pp. 1-32.

Hines, James R. 2005. "Corporate Taxation and International Competition." Ann Arbor: University of Michigan.

Huggett, Mark. 1993. "The Risk-Free Rate in Heterogeneous-Agent Incomplete-Insurance Economies." *Journal of Economic Dynamics and Control*. 17:5, pp. 953-69.

Keynes, John Maynard. 1936. *The General Theory of Employment, Interest and Money*. London: Macmillan.

Kocherlakota, Narayana. 1996, "The Equity Premium: It's Still a Puzzle." *Journal of Economic Literature* 34:1, pp. 42-71.

Lucas, Robert. 1978. "Asset Prices in an Exchange Economy." *Econometrica* 46:6.

Macurdy, Thomas and John Shoven. 1992. "Stocks, Bonds, and Pension Wealth." In Wise, David, ed. *Topics in the Economics of Aging*. Chicago: University of Chicago Press, pp. 61-75.

Mankiw, N. Gregory and Stephen Zeldes. 1991. "The Consumption of Stockholders and Nonstockholders." *Journal of Financial Economics* 29:1, pp. 97-112.

McGrattan, Ellen R. and Edward C. Prescott. 2003. "Average Debt and Equity Returns: Puzzling?" Minneapolis: Federal Reserve Bank of Minneapolis, Research Department Staff Report 313.

Mehra, Rajnish. 2003. "The Equity Premium: Why Is It a Puzzle?" Cambridge: NBER Working Paper 9512.

Mehra, Rajnish and Edward C. Prescott. 1985. "The Equity Premium: a Puzzle." *Journal of Monetary Economics* 15:2, pp. 145-162.

Mehra, Rajinish and Edward C. Prescott. 2003. "The Equity Premium in Retrospect." Cambridge: NBER Working Paper 9525.

Modigliani, Franco and Richard A. Cohn. 1979. "Money Illusion in the Stock Market." *Financial Analysts Journal* pp. 3-23.

Polk, Christopher, Samuel Thompson, and Tuomo Vuolteenaho, 2004. "New Forecasts of the Equity Premium." Cambridge: NBER working paper 10406.

Quiggin, John.

Rietz, Thomas. 1998. "The Equity Risk Premium: A Solution." *Journal of Monetary Economics*.

Shiller, Robert. 2006. Updated Data Set from Chapter 26 of *Irrational Exuberance* <<http://www.econ.yale.edu/~shiller/data.htm>>.

Siegel, Jeremy. 2002. *Stocks for the Long Run, Second ed.* New York: McGraw Hill.

Smith, Edgar L. 1924. *Common Stocks as Long-Term Investments.* New York: Macmillan.

Summers, Lawrence H. 1983. "The Nonadjustment of Nominal Interest Rates: A Study of the Fisher Effect." In James Tobin, ed., *A Symposium in Honor of Arthur Okun*. Washington: Brookings Institution, pp. 201-241.

Weil, Philippe. 1989. "The Equity Premium Puzzle and the Risk-Free Rate Puzzle." *Journal of Monetary Economics* 24:3, pp.401-21.

Weitzman, Martin L. 2005. "A Unified Bayesian Theory of Equity 'Puzzles'." Draft

Welch, Ivo. 2000. "Views of Financial Economists on the Equity Premium and on Professional Controversies." *Journal of Business* 73:4, pp. 501-537.

