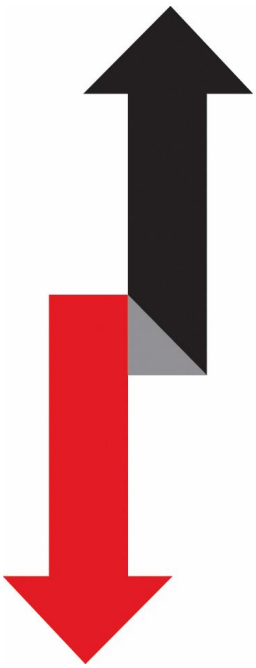

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The U.S. Equity Return Premium: Past, Present and Future

J. Bradford DeLong, University of California Berkeley
Konstantin Magin, University of California Berkeley

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J. Bradford DeLong and Konstantin Magin

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J. Bradford DeLong is Professor of Economics, University of California at Berkeley, Berkeley, California; Research Associate, National Bureau of Economic Research, Cambridge, Massachusetts; and Visiting Scholar, Federal Reserve Bank of San Francisco, San Francisco, California.

Konstantin Magin is visiting professor at the University of California at Berkeley, Berkeley, California.

Their e-mail addresses are <delong@econ.berkeley.edu> and <magin@berkeley.edu>, respectively.

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I. Introduction

For more than a century, diversified long-horizon investors in America's stock market have invariably received much higher returns than investors in bonds: a return gap averaging some six percent per year that Rajnish Mehra and Edward Prescott (1985) labeled the "equity premium puzzle." The existence of this equity return premium has been known for generations: more than eighty years ago financial analyst Edgar L. Smith (1924) publicized the fact that long-horizon investors in diversified equities got a very good deal relative to investors in debt: consistently higher long-run average returns with less risk. It was true, Smith wrote three generations ago, that each individual company's stock was very risky: "subject to the temporary hazard of hard times, and [to the hazard of] a radical change in the arts or of poor corporate management." But these risks could be managed via diversification across stocks: "effectively eliminated through the application of the same principles which make the writing of fire and life insurance policies profitable."

Edgar L. Smith was right.

Common stocks have consistently 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.[1] 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 World War II 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. Mehra (2003)[2] 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.

Edgar Smith was right about both his past and our past. We believe[3] that Smith is right about our future as well. The arguments that the equity return premium should not be a puzzle in the future appear to us to imply that the equity return premium should not have existed in the past. As of this draft—October 16, 2007, 11.44 PDT—the annual earnings yield on the value-weighted S&P composite index is 5.53%. If we compare this to the annual yield on 10-year Treasury inflation-protected bonds of 2.31%, we arrive at a market-expected future equity return premium of about 3.22% per year:[4] the equity return

[1]In the data set of Robert Shiller (2006): http://www.econ.yale.edu/~shiller/data.htm.

[2]Citing Jeremy Siegel (1998) and John Campbell (2001).

premium still exists, and we see no reason not to believe the market's judgment that it is likely to persist—albeit at a value about half of its twentieth-century average.

We make our argument in six additional sections. The second section presents the arithmetic of the equity premium: the magnitude and reliability with which long-term diversified portfolios of equity have outperformed bonds and bills. Section III considers investor preferences and reaches the standard conclusion: to account for the equity premium via investor preferences, they must produce an extreme level of aversion to losses to sharply limit willingness to make long-term bets on stocks. A preference-based explanation of the equity premium implies a future equity premium like that seen in the past. Section IV considers explanations of the equity return premium as the result of transaction costs, agent heterogeneity, and other factors that do not necessarily imply a large future premium. However, we judge transaction costs of the magnitude needed as even less plausible than extraordinarily high effective risk aversion, and investor heterogeneity fares little better as a reason to expect a reduction in the equity premium

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[3]Along with Rajnish Mehra (2006).

[4]Following Siegel (2007) in taking earnings yields as about equal to expected real returns: "about" because of great many uncertainties and biases. Reported accounting earnings may overstate or understate true Haig-Simons economic earnings. Retained and reinvested earnings may earn higher or lower rates of return than outside equity investments. See DeLong (2008). Dimson et al. (2006) infer that investors should expect a premium on the world stock index of around 3-3.5% on a geometric mean basis, or 4.5-5% on an arithmetic basis.

going forward.

Section V focuses on what we judge to be the most promising non-behavioral explanations of the equity premium: lower-tail risk, i.e., the existence in the return distribution of a low-probability chance of a large-magnitude economic catastrophe. Its principal defect is that the possible economic catastrophe must affect stock returns much more strongly than bond returns, which poses a significant difficulty. If correct, this line of thought implies that we will think we see a puzzling equity premium return in the future—until The Day comes and we realize that we never really did

Section VI considers alternative learning and behavioral based explanations of the equity premium. If investors have taken a very long time indeed to learn and act on the true parameters of the return distribution, the past ex post equity premium might be significantly greater than the past ex ante premium, which in turn will be greater than the expected future premium. This explanation fares the best: it does account for why the market now anticipates half the premium seen on average in the past. But it leaves the half of the premium that remains still as a puzzle. If behavioral biases drive the remaining equity premium, what reason is there to anticipate a further decline? There is none—absent major institutional changes to compensate for such biases.

The equity return premium has existed in the American stock market since it consisted of a few canal and railroad companies and John Jacob Astor's fur-trading empire. Its

existence has been broadly known for 80 years. It is one of the most durable macroeconomic facts in the economy. We thus conclude that the equity return premium has a future as well as a past, for the market today anticipates a forward-looking equity return premium of about 3.2% per year, and we see little or no reason for us economists to believe that in this case we know better than the market.

II. The Arithmetic of the Equity Premium

To pose the equity premium return puzzle, consider a marginal investor with a 20-year horizon—somebody in elementary school receiving a bequest from grandparents, somebody in their 30s with children putting money away to spend on college, somebody age 50 contemplating medical bills or wanting to leave a bequest, a life-insurance company collecting premiums from the middle-aged, or a company offering its workers a defined-benefit pension.

One margin such an investor must consider is the choice between:

(1) investing in a diversified portfolio of equities, reinvesting payouts and rebalancing periodically to maintain diversification;
(2) investing in short-term safe bills, rolling the portfolio over into similar short-term debt instruments as pieces of it mature.

The marginal investor must expect that their marginal dollars would be equally attractively employed in each of these strategies.

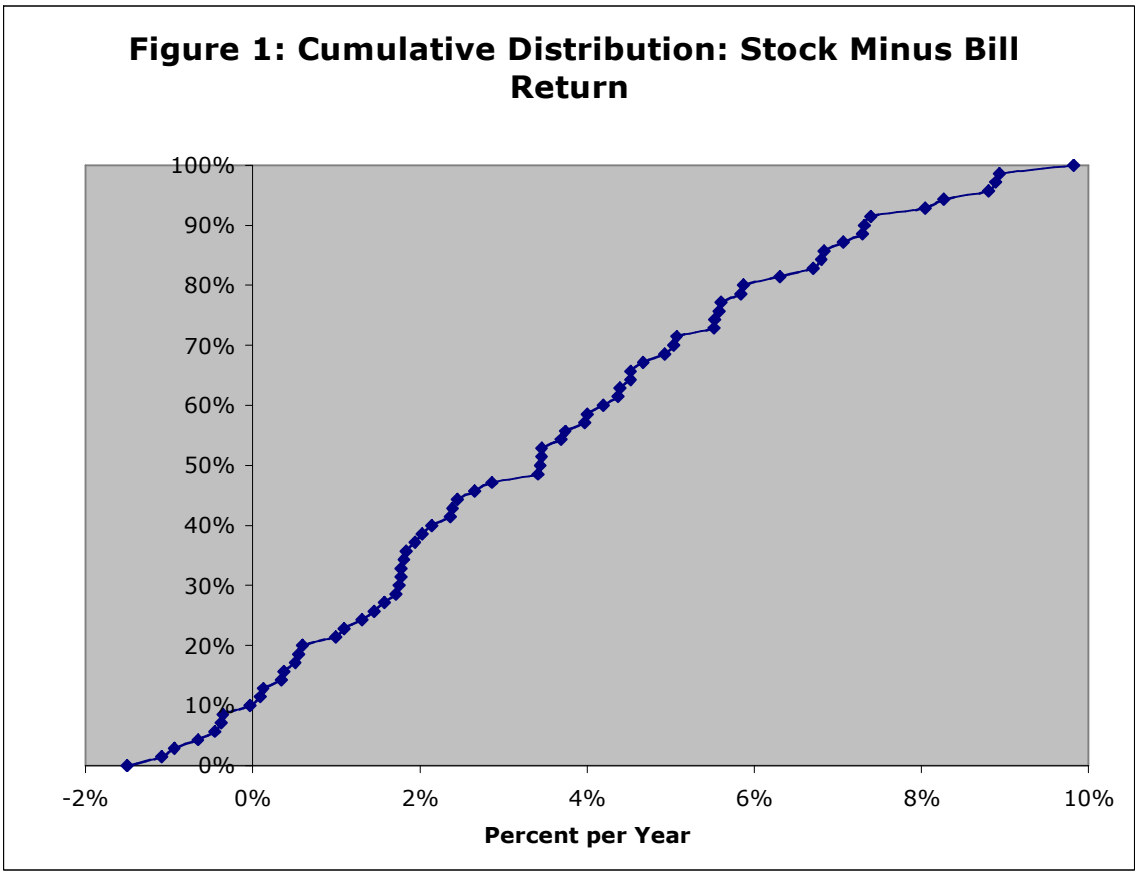
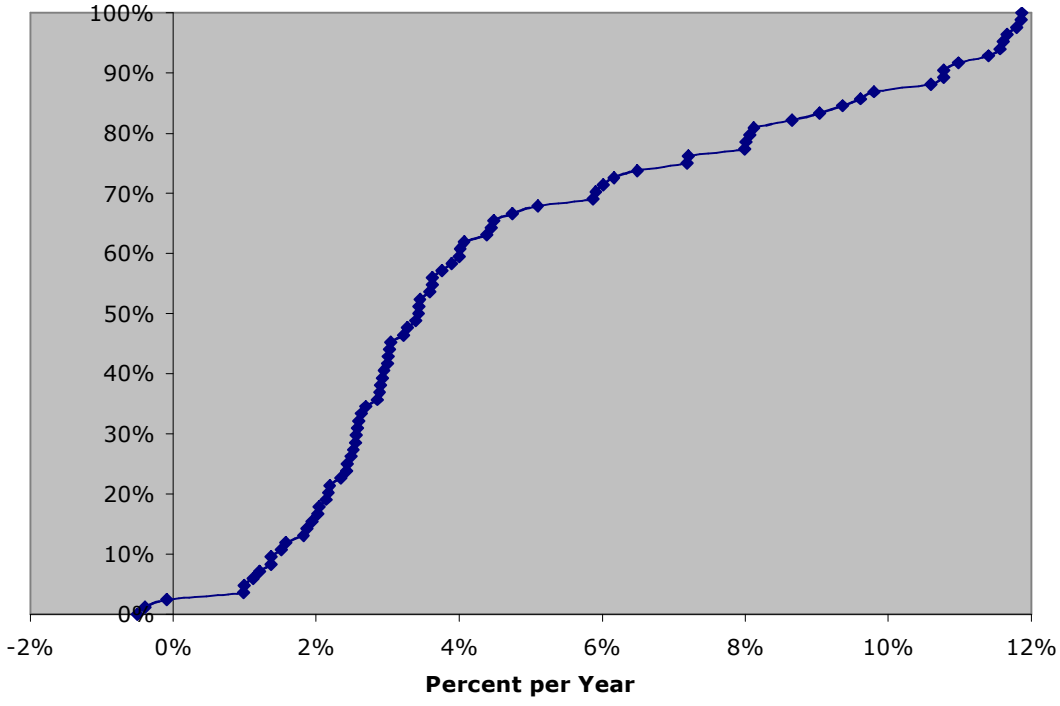


Figure 1 plots the cumulative return distribution for the relative returns for these two twenty-year portfolio strategies starting in each year since the start of the twentieth century. The average geometric return differential since 1901 is some 4.9 percent per year. When the portfolios are cashed in after twenty years, investments in diversified

stock portfolios are on average 2.67 times as large as an investment in short-term Treasury bills after twenty years. Stock investors more than double their relative wealth 60 percent of the time, more than quadruple their relative wealth 30 percent of the time, and have a 17 percent chance of a more than seven-fold multiplication of relative wealth. The downside is small: the empirical CDF finds that stocks do worse than bills less than 9 percent of the time. The very worst case observed is the 20 years starting in 1965, when investing in stocks yields a relative cumulative wealth loss of 17 percent compared to investing in bills.

Figure 2: Cumulative Distribution: Stock Minus Bond Return



This equity return premium is not a liquidity effect driven by the special ease with which short-term bills can be turned into cash even in emergencies. Figure 2 shows the CDF of relative returns from the twenty-year strategies of investing in a diversified stock portfolio and investing in a long-term Treasury bond portfolio. This time 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. In the worst relative case—1929—the returns to bonds would have been only 8 percent more than stocks when the portfolios were cashed in 1949.

If the actual twentieth-century CDF is a good proxy for the true underlying *ex ante* return distribution, these return patterns have powerful implications for investors' expectations about their relative marginal utility of wealth. If the marginal investor's marginal dollar is no more advantageously employed in stocks than bonds, it must be the case that:

$$\frac{(\text{chance of loss})\left[Average\ \left[(\text{amount of loss}) \times (\text{marginal utility of wealth if loss})\right]\right]}{(\text{chance of gain})\left[Average\ \left[(\text{amount of gain}) \times (\text{marginal utility of wealth if gain})\right]\right]} = 1$$

Over the twentieth century, the chance of relative gain is ten times the chance of loss. The average amount of gain—167%—is seventeen times the average amount of loss. If the marginal utility in gain states is perfectly correlated with the amount of gain and the marginal utility in loss states uncorrelated with the amount of loss, then the average

marginal utility of wealth in "stocks lose" states must be 50 times as great as in "stocks gain" states. This is the equity return premium puzzle at its sharpest: how is one to account for this extraordinary divergence?

The equity premium puzzle appears softer if we restrict our attention to short-horizon investors who invest for one year only. Stocks are very risky in the short run. 1931 sees a return differential of –60%. And bonds have outperformed stocks in some 35% of the past century's years. Twenty-year investors appear to have turned their backs on nearly riskless opportunities for profit. One-year investors did not. For investors with a time horizon of one year, stocks *are* much more risky than bills[5].

Yet even on a year-to-year scale the equity premium return remains. And there are no visible large year-to-year fluctuations in the consumption of investors correlated with stock returns that would create a high marginal utility of wealth in "stocks lose" states and so account for the premium. At the one-year horizon an investor would be indifferent

[5]One reason that the puzzle is softer at short horizons is that a substantial share of year-to-year variability in the stock market appears to be transitory. Stock prices look as though they are somewhat 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 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 time horizons, mean reversion makes equity investments even more attractive because investments made at one moment insure against investments made at another.

at the margin between stocks and bills only if he or she had a marginal utility of wealth in the gain state 83% of the way up the return distribution that was half that of marginal utility in the loss state 17% of the way up. Such a difference in marginal utilities is very difficult to square with the low variability in aggregate consumption: Rajnish Mehra and Edward Prescott (2003) report an annual standard deviation of consumption growth of only 3.6%, which they believe could support an equity return premium for a representative investor of at most two-tenths of a percentage point per year—not six.

The basic point is Richard Thaler and Matthew Rabin (2001): expected utility theory pushes us toward the view that agents should be nearly risk-neutral on all bets that do not involve a substantial fraction of lifetime wealth, for only substantial variations in lifetime wealth and thus in current consumption produce enough variation in marginal utility to justify substantial risk aversion. And annual stock market returns do not covary enough with current consumption and lifetime wealth.

Thus order to solve the equity premium puzzle, an economist must propose an explanation that does at least one of:

- providing a reason for a very large gap in the marginal utility of wealth between states of the world in which stocks do well and states of the world in which stocks do poorly.
- demonstrating that the *ex-post* return distribution seen over the twentieth century

is very different from the true *ex*-ante distribution in important ways that make stocks no real bargain.

- explaining why it is that, even though stocks have been an extremely attractive investment relative to bonds and bill, money has not flowed out of bonds and bills and into stocks—pushing equity prices up and equity returns down.

A very large number of economists have done excellent work investigating and assessing different potential explanations. Among the most promising lines of work have been investigations of the implications of risk aversion, non-standard preferences; transactions costs; lower-tail risk; persistent mistakes; investor confusion; and cognitive biases.[6] A full and satisfactory explanation of the equity premium return puzzle continues to elude economists. However, none of what we regard as the live possibilities would lead us to anticipate the disappearance of the premium in the future.

III. A Preferences Explanation?

A first potential explanation is simply that rational investors prefer the portfolios they hold: investors truly are risk averse enough that the observed configuration of returns does not leave unexploited profit opportunities. The difficulties are twofold: first, the low

[6]Of course, space prevents us from even noting the existence of more than a very small fraction of even the most important contributions to the literature. We can only glance at those we regard as most promising.

average return debt securities used as a yardstick in measuring the equity return premium are not really low in risk; second, even taking debt to be risk free the degree of risk aversion needed to keep long-term investors from seeing large gains from further investments in equities must be extremely high.

As the late Fisher Black once put it in conversation, in terms of the coefficient of relative risk aversion—the standard way of measuring tolerance for risk—explaining the configuration of asset returns requires a coefficient of about 50. Consider 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. An agent with a coefficient of 2 would reject (b) if p were less than 80%; for a coefficient of 10 the critical value is 99.8%; and for a coefficient of 50 the critical value is 99.99999999995%. Many economists argue that both observed purchases of insurance and our intuitions suggest a coefficient of relative risk aversion parameter not of 50 but more in the range of 1 to 3,[7] which corresponds to Mehra-Prescott's estimate of a warranted equity premium of about 0.2 percentage points per year.

Moreover, as we learned from Philippe Weil (1989), a standard time-separable utility function with a high degree of risk aversion also generates both a high risk-free rate of return (in economies with the roughly two percent per year consumption growth of our own economy) and smooth consumption paths that do not respond to changes in rates of

[7]See, for example, Partha Dasgupta (2007).

return. Neither of these is observed

The most promising preference-based 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)—considers non-standard preferences, making utility dependent not just on consumption but on consumption relative to the consumption of others or to one's own past consumption and separating preferences for risk from preferences for income growth over time. These approaches account for the coexistence of a high degree of effective risk aversion and a low risk-free interest rate: the features of the utility function that make investors extremely averse to stock-market losses have no bearing on the connection between economic growth and the safe real interest rate. But these approaches still require something to generate very high effective risk aversion.

Narayana Kocherlakota (1996) summed up the results from this line of research:

> 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 modern finance literature on the equity premium puzzle is now more than two decades old. The historical investment literature looking back into observers' pasts and noting the existence of a very large equity return premium is now more than eight decades old. Yet to date no critical mass of long-term investors has taken large-enough long-enough-run positions to try to profit from the equity return premium to substantially arbitrage it away.

It is premature to say that these lines of research will never be able to satisfactorily account for the equity premium that we have observed in the past. But we believe that they have not done so. It is not clear to us how they might do so. If, however they turn out to be correct, they imply a future equity return premium likely to be about the six percent or so a year observed in the past.

An alternative is offered by behavioral finance economists, for example Benartzi and Thaler (1995), see investors—even professional and highly-compensated investors in it for the long run—as institutionally and psychologically incapable of framing their portfolio-choice problem in a way that allows them to appropriately discount and thus ignore the high short-term risks of equities. If investors could focus instead on the long-term returns of stocks they would realize that there is very little long-term risk in stocks relative to bonds. But they cannot. Rabin and Thaler (2001) argue that expected utility maximization cannot account for most behavior economists label "risk averse," and should be replaced by "loss aversion" as a model of investor behavior—individuals

simply feel the pain of a loss more acutely than the pleasure of an equal-sized gain. Hong and Stein point to "disagreement models" that motivate high trading volumes as a potential explanation for other asset pricing anomalies like the equity premium. Glamor stocks exhibit greater than average turnover rates, high trading volumes, tend to be overpriced and exhibit low rates of return; value stocks exhibit lower than average turnover rates, low trading volumes, tend to be underpriced, and exhibit high rates of return: perhaps this could be built into an explanation of the equity return premium.

It is not clear to us whether these are explanations of the puzzle or reframings of it. Humans know that they have psychological biases, and build social and economic institutions to compensate for them and to guide them into framing problems in a way that is in their long-term interest. Humans have built mechanisms like automatic payroll deductions, like inducing caution by valuing assets at the lower of cost and market, like entails and trusts. A bias-based psychological explanation must account not just for the bias but for the failure of investors to figure out ex ante how to bind themselves to the mast like Ulysses did with the Sirens.

IV. Transaction Costs and Investor Heterogeneity

Another line of research has attempted to explain the equity premium as due to

transaction costs and investor heterogeneity.[8] Gregory Mankiw and Stephen Zeldes (1991) were among the very first to point out that two-thirds of Americans have next to no stock market investments—presumably because of some form of transaction cost that keeps them from being able to recognize and act on the fact that equity investments have a substantial place in every optimal portfolio. Transactions costs keeping a substantial share of the population at a zero position lock up what representative-agent models see as society's risk-bearing capacity, which then cannot be tapped and mobilized to bear equity risk.

Mankiw and Zeldes found that stockholders' consumption does not vary nearly enough to account for the equity premium. If standard representative agent models suggest that the warranted equity return premium should be on the order of 0.2 percentage points per year, a transactions-cost model in which only one-third of agents hold stocks suggests a warranted equity premium on the order of three times as large. This line of research could diminish the magnitude of the equity premium puzzle, but still leaves an order of magnitude gap to be accounted for.

This line of research also leaves unanswered the question of just what these transaction costs are. Even back in the nineteenth century "bucket shops"—most of them honest—

[8]These go together: if investors are effectively identical they do not trade and transactions costs are irrelevant; if there are no transactions costs than investor heterogeneity does not reduce the net risk-bearing capacity of the economy.

allowed people with very small amounts of money to "invest:" as little as one dollar could "buy" or "sell" a fractional share at the last ticker price. A bucket shop was not a brokerage. It did not invest its clients' money in the market: it paid today's withdrawals out of yesterday's deposits and relied on commissions and the law of large numbers to make it profitable.[9] And even if there were large transaction costs to buying and selling stocks, could this account for the equity premium puzzle? High costs of buying and selling are amortized over decades when investors follow multi-decade buy-and-hold strategies, and the most vivid advantages of stock investments produced by the equity return premium accrue to those who follow such strategies.

More recently, Constantinides, Donaldson, and Mehra (2002) suggest that the equity premium may be due to transaction costs in the form of borrowing constraints. The relatively young with the option of declaring bankruptcy have difficulty borrowing on a large scale. Because of such borrowing constraints, investors find it optimal to build up stocks of liquid wealth (see, for example, Mark Huggett, 1993; John Heaton and Deborah Lucas, 1995). This argument takes us far toward explaining why the risk-free rate of return might be low: people's unwillingness to have even temporarily negative net worth increases saving, increases the capital stock, and so pushes down the rate of interest and profit. But could such borrowing constraints bear much of the weight of accounting for

[9]Nineteenth-century speculator Daniel Drew found when young that he did better at bucket shops than on Wall Street. His actual purchases and sales generated price pressure against himself, while his notional bucket shop transactions did not.

the equity premium? Built-up stocks of wealth could be invested in either stocks or bonds, and stocks offer higher returns with little extra long-horizon risk.

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 uninsurable idiosyncratic income shocks correlated with returns on equities. Thus investors bear a large amount of equity risk embedded in their human capital, and are uninterested in further leveraging their total implicit portfolios. Advancing this explanation would require identifying groups of people whose labor income is subject to shocks correlated with equity returns and demonstrating that those investors' portfolios drive the lack of investment in equities. This has not yet been accomplished.

V. Lower-Tail Risk?

The equity premium return puzzle might be resolved by breaking the assumption that the ex post return distribution over the twentieth century is an adequate proxy for the ex ante return distribution. A high equity premium might be observed in the sample that is our past if that sample does not contain low-probability but large-magnitude economic catastrophe. A small chance of winding up truly far out in the lower tail of a return distribution can have a significant effect on ex ante and—if unobserved in sample—an

even more significant effect on ex post return premia. Proposed solutions 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). If correct, this family of solutions would imply that we will continue to observe a large equity premium in-sample for a while—until The Day when the long run arrives while some of us at least are still alive, the economic catastrophe occurs, and investors find their stocks nearly worthless.

This explanation must pass a camel through the eye of a needle. The unobserved-in-sample low-probability catastrophe must occur with a probability small enough that it is plausible that it has not observed. Yet the chance and magnitude of the catastrophe must be large enough to have substantial effects on prices and returns. And the catastrophe must diminish the value of stocks but not of bonds or bills—for a catastrophe that hits stocks and bonds equally has no effect on the equity premium return.[10]

This theory has considerable attractiveness but one principal difficulty: it is not obvious what the low-probability economic catastrophes with powerful negative impacts on real equity returns and little effect on bond returns are. Investors and economists can envision

[10]There is a fourth requirement, for 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 size of collapse must be on a knife-edge in these models: large but not too large—large enough to create the observed equity premium, but small enough to leave a positive safe real interest rate.

a great many potential political and economic catastrophes: 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 are likely to affect both stock and bond values. A permanent decline in the rate of total factor productivity and consumption growth ought to affect stock and bond returns proportionately. War defeat or populist-crisis crashes of government finance are highly likely to produce rapid inflation, which is poison to real debt returns. A transitory collapse in corporate profitability has little effect on far-sighted 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 and inflation.

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 envision one collapse in real equity values that would not much affect the real values of government bonds. If the U.S. government 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. We do not see the fear of future tax increases or regulatory burdens narrowly targeted on corporate profits as large enough to support anything like the observed equity premium. But perhaps we overestimate the competence of our government, and underestimate the strength of a populism that really does believe that when the government taxes corporations no individual pays. Moreover, as public finance economists like James Hines (2005) point out, in a world of mobile capital tax competition restrains governments from pursuing tax policies very different from those of other nations. A radical failure of such tax competition would have to be required as well.

An analogous argument to Rietz (1988) and Barro (2005) is made by Martin Weitzman (2006). Weitzman argues not that lower tail risk is large, but that investors do not and cannot know what the lower tail risk truly is: Knightian uncertainty rather than von Neumann-Morgenstern risk. Once again, the principal difficulty is to identify the potential the events that investors believe might generate a long fat lower tail of equity returns and yet leave real government debt returns unaffected.

A final unresolved difficulty with the unobserved lower-tail hypothesis is that, as Barro (2005) points out, this explanation carries the implication that the greater the chance of a collapse the higher are equity prices. In this theory, 2000 is a year in which investors expected a high, and 1982 a year in which investors expected a low, probability of macroeconomic disaster.[11]

[11]This is a somewhat disturbing artifact of the Lucas (1978) model that underpins papers like Rietz (1988),

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.

VI. Learning About the Return Distribution

Yet another path assumes that economic agents are not extraordinarily risk averse, that economic agents are not limited in their risk-bearing capacity by transactions costs and heterogeneity, that the in-sample return distribution is a good proxy to the ex-ante return distribution, but that investors early in the twentieth century mistook the parameters of the fundamental return distribution, and that it has taken them a very long time indeed to learn what the true parameters of the fundamental return distribution are. Thus misperceptions created the equity premium. And the process of correcting these misperceptions has given a boost to stock prices that has further driven up the in-sample equity premium. This argument carries a corollary: the equity premium has a solid past, but it will not have as much of a future: investors have learned and will continue learn from experience over time, and if there is an equity return premium still in existence

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Barro (2005), Weitzmann (2006), and Mehra and Prescott (1985).

today it is likely to shrink relatively rapidly.

McGrattan and Prescott (2003) develop this argument by pointing to changing institutions as a source of the equity premium in the past that is not present today. Regulatory restrictions imposed by legislatures and courts that had too great a fear of the riskiness of equities 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 and could not do without risking legal liability. 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. And it was clear that a trustee who invested in stocks was not in a safe harbor. As time passed and as even government officials learned that the riskiness of stocks had been overstated, these regulatory restrictions fell. Thus changing expectations working through the channel of the creation of better financial institutions greatly contributed to this fall in the market risk premium on stocks.

Yet another 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. He sees high equity premiums as a reaction to the shock of the Great Crash of 1929-1933, and a subsequent decline as the memory and thus the perceived likelihood of a repetition of that extraordinary event has dimmed. He also sees, as do others like Modigliani and Cohn (1979), Campbell and Vuolteenaho (20040), and Randolph Cohen, Chris Polk, and Tuomo Vuolteenaho (2005), a strong correlation of the

equity premium and inflation in the 1970s and the 1980s. 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 generates inflation illusion.[12]

These factors led Blanchard back in 1993 to predict that the future equity premium would "remain small," because inflation was likely to remain low and because the memory of the Great Depression was dim and would continue to erode. But Blanchard's regressions were reduced forms, and changing economic institutions and structures would lead us to fear that reduced forms might not track their future very well, and indeed this did not. 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. Perhaps post-1993 estimates of the equity premium are high because of the stock market boom of the late 1990s, but the data since the early 1990s provides little evidence that the equity premium faded away with the vanishing of the memory of the Great Depression and the inflation of the 1970s. An 18 year-old runner from the floor of the New York Stock Exchange in 1929 would have turned 96 in 2007.

[12]It is not clear whether Campbell and Vuoleenaho view this as a misperception to be corrected by learning or as the result of psychological biases that cause confusion between real and nominal magnitudes that will persist.

What we regard as the most powerful attempt to flesh out this alternative is Fama and French (2002). Over the medium run, they argue, the risk premium on stocks has fallen as a result of the correction of misapprehensions about riskiness. Such a fall in the risk premium shows up as a jump in stock prices. Thus learning that the ex-ante equity premium should be lower than in the past produces an in-sample past equity premium even higher than its misperceived ex-ante value.

Fama and French argue that one should not estimate the post-World War II ex ante equity premium by looking at ex-post returns—that is, adding dividend yields to the rate of growth of stock prices. That procedure is biased because it includes this unanticipated windfall from learning about the world. One should, instead, estimate expected stock returns via the Gordon Equation:

$$r = D/P + g$$

where D/P is the dividend yield and g is the expected rate of capital gain. The dividend yield is directly observable. The expected capital gain is not.

Estimating the expected capital gain by averaging past capital gains will be biased upward when—as Fama and French argue—the past contains learning about reduced risks that lowered required rates of return. Estimating the expected capital gain by

averaging past rates of dividend growth will be biased downward when—as has happened over the past two generations—firms have substituted stock buybacks for dividends as a wa y of pushing money out of the firm. Estimating the expected capital gain in the Gordon mode from the average of past rates of earnings growth avoids much but not all of this last bias: today's higher rate of retained earnings should fuel somewhat faster earnings growth than was generated by lower rates of retained earnings in the past.

Estimating future stock returns via the Gordon model from today's dividend yield and using the post-WWII average rate of earnings growth to forecast expected capital gains produces an expected equity premium of 4.3% per year. Fama and French observe that we have had good macroeconomic news over the past century: earnings growth since 1950 has probably exceeded what would have been rational expectations formed in the shadow of the Great Depression. They assess the likely equity premium going forward to be less than this 4.3% per year. Today's market agrees: its current estimate of the equity premium return appears to be more like 3.2% per year.

VII. The Future of the Equity Premium

The modern finance literature on the equity premium puzzle is now more than two decades old. The historical investment literature looking back into observers' pasts and noting the existence of a very large equity return premium is now more than eight

decades old. Yet to date no critical mass of long-term investors has taken large-enough long-enough-run positions to try to profit from the equity return premium to substantially arbitrage it away.

Keynes (1936) proposed an explanation. He believed that we select for financial professionals who are especially vulnerable to these behavioral-finance biases. He wrote that the craft of managing investments is "intolerably boring and over-exacting to any one who is entirely exempt from the gambling instinct." Thus those who would be able to ignore the short-run risks of equities do not stay in the profession. And for those who do have "the gambling instinct"? "He who has it must pay to this propensity the appropriate toll." From Keynes's proto-behavioral-finance perspective, our collective failure to date to build institutions that will curb psychological propensities for long-run investors to overweight the short-run risks of equity investments is not a thing of the past that we can learn was a mistake, but rather a sign that the equity premium return is here for a long run to come.

Rajnish Mehra (2003) reaches a similar conclusion—based not on his commitment to a particular model of the equity return premium but rather on agnostic uncertainty about the sources of the equity return property. Mehra bets 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.

Many Wall Street observers appears to agree with Rajnish 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. 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 writing— October 16, 2007, 11.44 PDT—the annual earnings yield on the value-weighted S&P composite index is 5.530%. This is a wedge of

3.220 percent per year when compared to the annual yield on 10-year Treasury inflation-protected bonds of 2.310%.

The wedge between accounting earnings yields and bond rates is not necessarily the expected equity premium. 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 to retained earnings reinvested inside of firms earn lower rates of return than outside investments because of corporate control issues? Are there expectations of changes in expected rates of return which thus induce expected capital gains and losses that drive a further wedge between accounting profitability and expected real returns?

We cut through this Gordian knot of issues and guess that these biases cancel out. If expected rates of return are constant, accounting earnings equal Haig-Simons earnings, stock options do not much dilute ownership, earnings are not much boosted or depressed by the business cycle, and retained earnings yield the same return as outside investments, then the accounting earnings yield is the expected rate of return. As of this writing the gap between the earnings yield on the S&P and the ten-year inflation-protected Treasury is 3.22% per year—that is the market's current estimate of the equity premium return,

and we do not see any sources of information at our disposal that give us confidence that we can outguess it. Thus while we agree with Mehra (2003) that the equity premium is likely to persist into the future, we trust the market which takes it to be smaller than the estimated Mehra and Prescott (1985) 6 percent per year.

It would, we think, be very surprising if the equity premium were as large today as it has been over the past century. The memory of the Great Depression *has* faded. Institutional changes like ERISA *have* removed constraints on investing in equities. Private equity *does* lock investors' money away and so rescues it from the propensity to churn. Individual investors who control their own retirement planning through defined-contribution pension plans *do* find it easier to invest in equities, and the rise in mutual funds *has* in theory made it easier to achieve the benefits of diversification—even if a look at the spread of mutual fund returns shows that the typical mutual fund carries an astonishing amount of idiosyncratic risk.

It would be astonishing if these institutional developments had no effect on the equity return premium.

Yet if we trust the market, the equity premium persists today at a level that we at least find it very difficult to account for as compensation for the long-term risks of equity investment. We find convincing the expected utility theoretic arguments that the economy has the risk-bearing capacity to make an appropriate equity return premium for

the long-run risks that we see equal to no more than tenths of a percent per year.

The existence of the equity return premium in the past offered long-horizon investors a chance to make very large returns in return for bearing little risk. We believe that the current configuration of market prices offers a similar opportunity to long-horizon investors today.

How damaging to the economy is this market failure to mobilize its risk-bearing capacity and drive the equity premium down by orders of magnitude? If the failure makes the cost of capital higher because capital ownership involves risk, then the throwing-away of the economy's risk-bearing capacity implies that 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. But there is another possibility: perhaps we have not an equity return premium but instead a debt return discount puzzle. Firms must then overpay for equity only to the extent that investors overpay for debt. In this case the distortions created are more subtle ones of organizational form—a disfavoring of equity and a favoring of debt-heavy modes—and are presumably smaller in magnitude.

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-term 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 does this add up to an 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 being more willing to invest in 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? Automatical investment of tax refunds into diversified equity funds via personal savings accounts? Investing the Social Security trust fund balance in equities as well?

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Figure 1: One-Year Stock Minus Bill Returns Since 1901

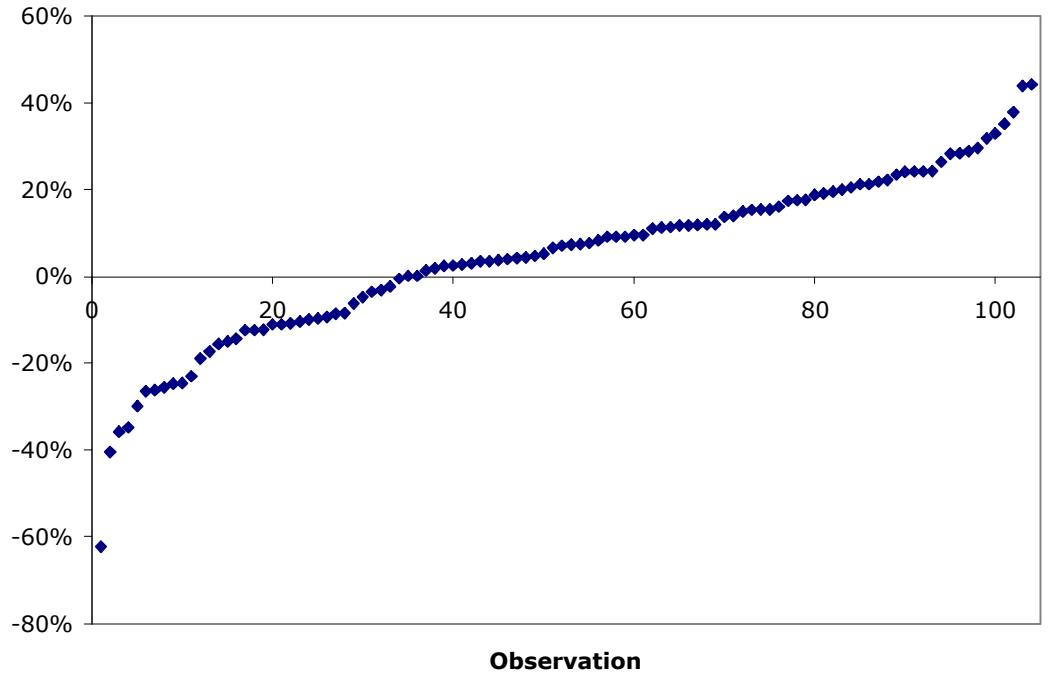

Figure 2: Twenty-Year Stock Minus Bill Average Annual Returns Since 1901

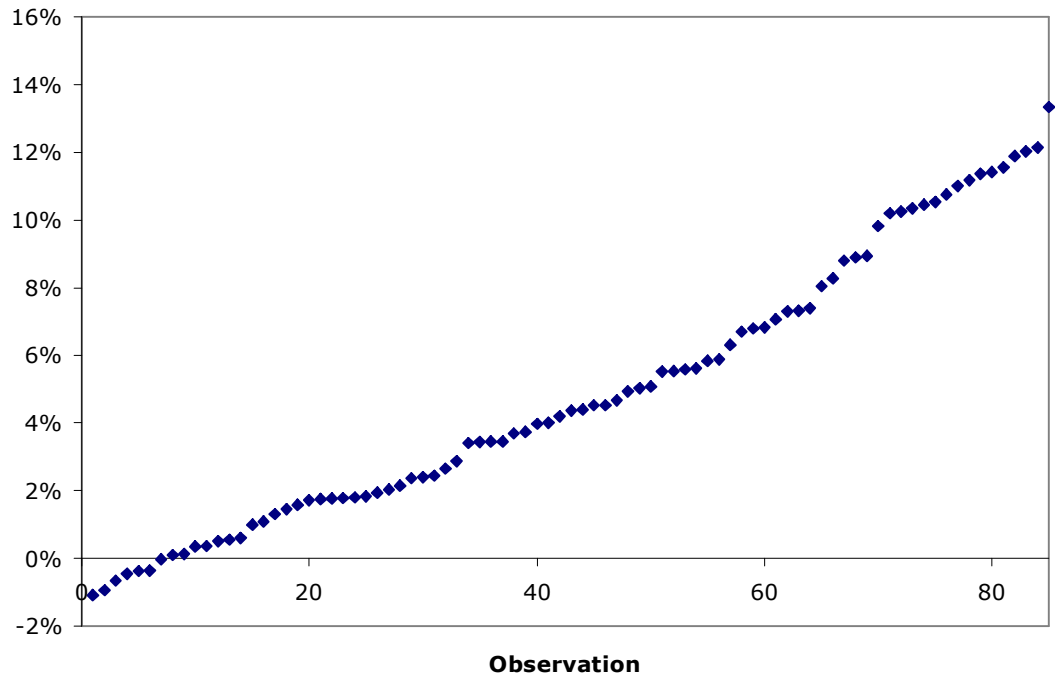

Figure 3: Twenty-Year Stock Minus Bond Average Annual Returns Since 1901