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

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For more than a century, diversified long-horizon investments in America's stock market have consistently received much higher returns than investors in bonds: a return gap averaging 6 percent per year. Rajnish Mehra and Edward Prescott (1985) name this pattern the "equity premium puzzle." An enormous amount of creative and ingenious work by a great many economists has gone into seeking explanations for the equity premium return puzzle, but so far without a fully satisfactory answer.

The existence of this equity return premium has been known for generations. More than 80 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 no more 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, or as Smith wrote, "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 for his day. Common stocks had consistently been attractive as long-term investments. The Cowles index of American stock prices with which Shiller extends the Standard and Poor's data, deflated by consumer prices,

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showed 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. Since the start of the twentieth century, this 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.[1] 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), citing Siegel (1998) and Campbell (2003), 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 first review the facts about the equity premium and then discuss a range of explanations that have been proposed. We conclude that it is highly likely that the equity premium return is not just part of our past, but of our present and future as well. It is reasonable to anticipate the equity return premium to continue—albeit at a somewhat lower level than the historical pattern—at perhaps 4 percent per year.

Between the time we submitted the final draft of this paper and the end of October 2008, the Standard and Poor's composite index dropped by 25 percent. This decline was not due to any increase in expected future real interest rates on bonds: long-term real rates on Treasury inflation-protected securities (TIPS) held steady, and short-term nominal Treasury rates fell to infinitesimal levels. We see no signs anywhere that expected future profits of American companies and cash flows to American shareholders have fallen by 25 percent. Thus as of the end of October 2008, the case for a substantial future equity premium is stronger, and the point estimate of the size of that premium higher by more than a quarter than we had previously estimated.

The Arithmetic of the Equity Premium

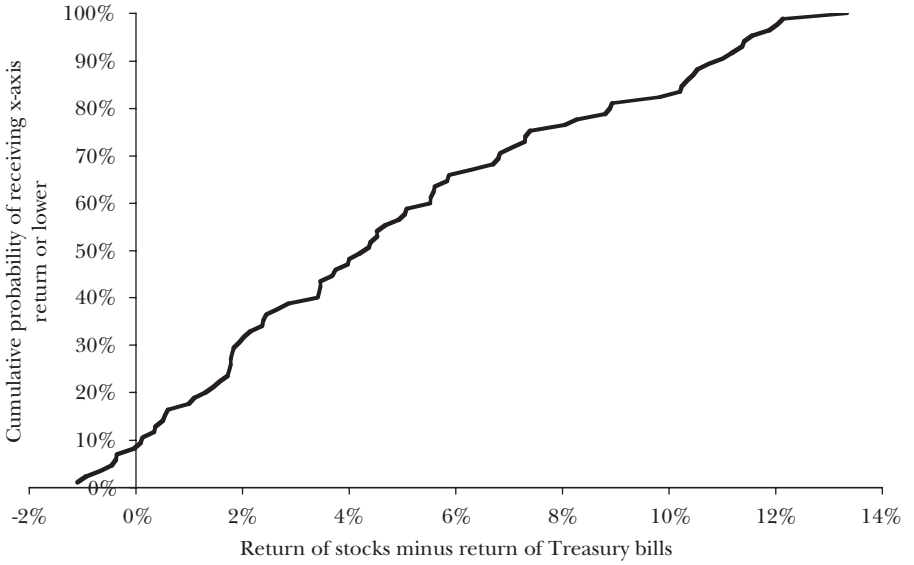
To see the equity premium return puzzle in its sharpest form, consider a marginal investor with a 20-year horizon—somebody in elementary school receiving a bequest from grandparents, somebody in their 30s with children putting money away to spend on college, somebody age 50 contemplating medical bills 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; and (2) investing in short-term, safe Treasury bills, rolling

[1] This data was compiled by Shiller (2006), and an updated version is available at ⟨http://www.econ.yale.edu/~shiller/data.htm⟩.

Figure 1

Cumulative Distribution Function for the Relative Returns of a Diversified Equity Portfolio Strategy versus a Short-term Treasury Bill Portfolio Strategy

(across cases starting in each year since the start of the twentieth century)



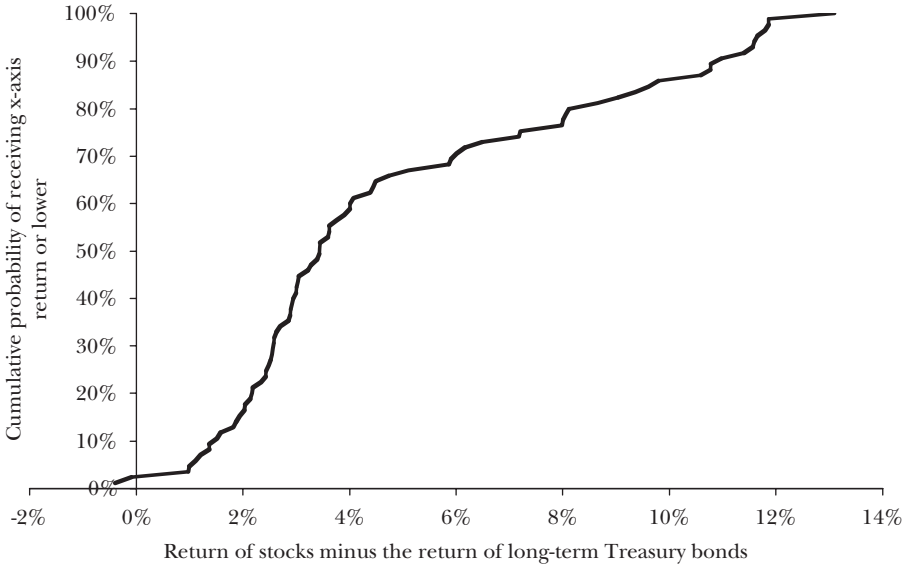
Source: The source of the underlying data is Shiller (2006), and an updated version is available at ⟨http://www.econ.yale.edu/~shiller/data.hem⟩.

Note: Consider the choice between: 1) investing in a diversified portfolio of equities, reinvesting payouts, and rebalancing periodically to maintain diversification; and 2) investing in short-term, safe Treasury bills and rolling the portfolio over into similar short-term debt instruments as pieces of the portfolio mature. Figure 1 plots the cumulative distribution function for the relative returns for these two 20-year portfolio strategies starting in each year since the start of the twentieth century. The horizontal axis shows the returns of stocks minus the return of Treasury bills over these 20-year horizons, expressed as an annual rate. The vertical axis shows the cumulative probability in this data of receiving that return or a lower outcome.

the portfolio over into similar short-term debt instruments as pieces of the portfolio mature. Marginal investors must expect that their marginal dollars would be equally attractively employed in each of these strategies.

Figure 1 plots the cumulative distribution function for the relative returns for these two 20-year portfolio strategies starting in each year since the start of the twentieth century. The horizontal axis shows the returns of stocks minus the return of Treasury bills over these 20-year horizons, expressed as an annual rate. The vertical axis shows the cumulative probability in this data of receiving that or a lower outcome. Thus, there is a 100 percent chance of receiving an equity premium of 13.5 percent per year or less; there is about a 9 percent chance of receiving an equity premium of zero percent or less. The average geometric return differential since 1901 is some 4.9 percent per year. When the portfolios are cashed in after 20 years, investments in diversified stock portfolios are on average 2.67 times as large as an investment in short-term Treasury bills. Stock investors more than

Figure 2
Cumulative Distribution Function for the Relative Returns of a Diversified Equity Portfolio Strategy versus a Long-term Treasury Bill Portfolio Strategy
(across cases starting in each year since the start of the twentieth century)



Source: The source of the underlying data is Shiller (2006), and an updated version is available at ⟨http://www.econ.yale.edu/~shiller/data.hem⟩.
Note: Consider the choice between: 1) investing in a diversified portfolio of equities, reinvesting payouts, and rebalancing periodically to maintain diversification; and 2) investing in long-term, safe Treasury bills and rolling the portfolio over into similar short-term debt instruments as pieces of the portfolio mature. Figure 2 plots the cumulative distribution function for the relative returns for these two 20-year portfolio strategies starting in each year since the start of the twentieth century. The horizontal axis shows the returns of stocks minus the return of Treasury bills over these 20-year horizons, expressed as an annual rate. The vertical axis shows the cumulative probability in this data of receiving that return or a lower outcome.

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 appears small: again, the empirical cumulative distribution function finds that stocks do worse than bills less than 9 percent of the time. The probability that the equity return premium is going to be more than 3 percent is large: 75 percent. The 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.

This equity return premium is not a short-term asset liquidity effect, driven by the special ease with which, say, short-term Treasury bills can be turned into cash even in financial panic emergencies. Figure 2 shows the cumulative distribution function of relative returns from the 20-year strategies of investing in a diversified stock portfolio and investing in a long-term Treasury bond portfolio. 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 outperform investing in stocks. The probability that the equity return premium is going to be more than 3 percent is still very high: 65 percent. 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 pattern of returns is a good proxy for the true underlying set of returns that investors should expect, powerful implications follow for investors' beliefs about their relative marginal utility of wealth. Over the twentieth century, the chance of relative gain through the equity premium is ten times the chance of loss. The average amount of gain conditional on their being a gain—167 percent—is 17 times the average amount of loss. If the marginal investor's marginal dollar is no more advantageously employed in stocks than bonds, then it becomes necessary to explain why investors view these risks of gains and losses as balanced in utility terms. Under the (simplifying, if unreasonable and indefensible) assumption that marginal utility is a step function with one fixed value in the "loss" and another fixed value in the "gain" states of the world, the marginal utility of wealth in the "loss" states of the world would have to be 10 (the odds ratio of gain) times 17 (the relative magnitude of gain) equals 170 times the marginal utility of wealth in the "gain" states of the world: the average dollar lost relative to the risk-free return would have to be 170 times more painful than the average dollar gained (relative to the risk-free return) is pleasurable.

The equity premium puzzle appears softer if attention is focused on short-horizon investors who invest for one year only. Stocks *are* very risky in the short run. 1931 sees a return differential of −60 percent. And bonds have outperformed stocks in some 35 percent of the past century's years.[2] Yet even on a year-to-year scale, the equity premium return puzzle remains. If there were large year-to-year fluctuations in the consumption of marginal investors correlated with stock returns, this would account for the premium by creating a high marginal utility of wealth in "stocks lose" states. But where are these fluctuations in consumption? They remain elusive. At the one-year horizon, a marginal investor would be indifferent between stocks and bills only if that investor had a marginal utility of wealth in the gain state 83 percent of the way up the return distribution that was half that of marginal utility in the loss state 17 percent of the way up.

The basic point is that expected utility theory pushes economists toward the

[2] 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 appear 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 percent of what it would be if returns were serially uncorrelated (for example, Cochrane, 1994; Cochrane, 2006; Campbell and Shiller, 1989). Thus, the conditions underlying Samuelson's (1969) proof that horizon is irrelevant for asset allocation do not hold in this situation. For relatively risk-averse agents, the return predictability created by mean reversion can make equity investments more attractive by providing implicit insurance: losses made in the short term are counterbalanced by the opportunity to make later gains thereby opened up.

view that agents should be nearly risk-neutral on all bets that do not involve a substantial fraction of lifetime wealth, because only substantial variations in lifetime wealth and thus in current consumption produce enough variation in marginal utility to justify substantial risk aversion (Thaler and Rabin, 2001). Annual stock market returns do not covary enough with current consumption and lifetime wealth to justify the substantial risk aversion toward stock returns that would explain a large equity premium, as Mehra and Prescott (for example, 2003) have consistently pointed out since the beginning of this literature. They report an annual standard deviation of consumption growth of only 3.6 percent, which they argue could support an equity return premium for a representative investor of at most two-tenths of a percentage point per year—not six percentage points.

Thus, to solve the equity premium puzzle, an economist must propose an explanation that takes one of two approaches: The explanation might seek to provide 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. Alternatively, the explanation might seek to demonstrate that the actual return distribution seen over the twentieth century differs in important ways from the true distribution that should have been expected such that stocks are no real bargain. Among the most promising lines of work have been investigations of the implications of risk aversion; nonstandard preferences; transactions costs; lower-tail risk; persistent mistakes; investor confusion; and cognitive biases. The sections that follow will sketch the strengths and weaknesses of these arguments.

Preferences Explanations: Risk and Loss Aversion

One set of potential explanations begins with the presumption that rational investors prefer the portfolios they hold. To justify the observed equity premium, it must then be true that investors as a group are risk averse enough to justify the observed configuration of returns.

The difficulty with this line of explanation is that the degree of risk aversion needed to support the existing equity return premium seems 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 an agent offered a choice between (a) current lifetime wealth and (b) a gamble where, with probability p, the agent obtains twice the current lifetime wealth and, with probability $1 - p$, half the current lifetime wealth. An agent with a coefficient of 2 would reject the gamble (b) if p were less than 80 percent; for a coefficient of 10, the critical value is 99.8 percent; and for a coefficient of 50, the critical value is 99.99999999995 percent. Many economists argue that both observed purchases of insurance and our intuition suggest a coefficient of relative risk aversion parameter not of 50, but more in the range of 1 to 3 (for example, Dasgupta, 2007); the

lower-range coefficient is part of the calculation that produces the Mehra–Prescott estimate of a warranted equity premium of about 0.2 percentage points per year.

Moreover, as Weil (1989) appears to have been the first to point out, a standard time-separable utility function with a high degree of risk aversion also generates a high risk-free rate of return (in economies with the roughly 2 percent per year consumption growth of our own economy). In other words, assuming a very high degree of risk aversion would address the equity premium but then create a puzzle as to why the risk-free rate is so low.

These insights do not mean that it is impossible to construct an explanation of the equity premium based on risk aversion. But it is difficult. The most consistently promising preference-based line of research—exemplified by papers like Epstein and Zin (1991), Constantinides (1990), Abel (1990), and Campbell and Cochrane (1995)—seeks to break this Weil linkage of the equity premium puzzle to the risk-free rate puzzle in two ways: by hypothesizing that investors have preferences different from those of the standard time-separable model, making utility dependent, not just on consumption, but on consumption relative to the consumption of others or to one's own past consumption (habit formation); and, also, by separating preferences for risk from preferences for income growth over time. These approaches allow the coexistence of a high degree of effective risk aversion and a low risk-free interest rate; in effect, 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. This line of research achieved significant gains in decoupling the equity premium puzzle from the risk-free rate puzzle. But as Kocherlakota (1996) summarized: "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."

Other economists find more appealing the alternative offered by behavioral finance economists like Barberis, Huang, and Santos (2001) or Benartzi and Thaler (1995) who see investors—even professional and highly compensated investors in it for the long run—as institutionally and psychologically incapable of formulating their portfolio-choice problem in a fully appropriate way. In this view, investors find it difficult to discount appropriately and thus they pay too much attention to the high short-term risks of equities ("myopia"). Investors also find it difficult to avoid having a greater sensitivity to losses than to gains ("loss aversion"). 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) are among the most aggressive in arguing that standard expected utility maximization cannot account for most behavior that economists label as "risk averse" and that it should be replaced by "loss aversion" as a model of investor behavior. The "loss aversion" model would be based on the assumption that individuals feel the pain of a loss more acutely than the pleasure of an equal-sized gain. Hong and Stein (2007) point to "disagreement

models" that motivate high-trading volumes as an explanation for other asset pricing anomalies like the equity premium. Maenhout (2003) proposes another behavioral approach to the equity premium puzzle based on ambiguity aversion. The stock market is an ambiguous gamble—investors do not know its probability distribution for sure—and so an ambiguity-averse investor may require a high equity premium.

The dominant assessment of this line of research appears similar to that of the literature on nonstandard preferences: promising, but not yet a complete explanation. Humans know that they have psychological biases. Humans build social and economic institutions to compensate for such biases and to guide them into framing problems in a way that is in their long-term interest. Humans have built a variety of mechanisms that can compensate for the cognitive biases that produce myopia and imprudence: some examples include automatic payroll deductions, inducing caution by valuing assets at the lower of cost and market, and putting assets into trusts. A bias-based psychological explanation must account not just for the bias, but for the failure of investors to deal with their biases the way that Ulysses dealt with the Sirens—by building institutions that tie themselves to the mast. That issue remains largely unanswered.

Transaction Costs and Investor Heterogeneity

Another appealing line of research has attempted to explain the equity premium as due to transaction costs and investor heterogeneity.[3] Mankiw and Zeldes (1991) were among the 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. Transaction costs keep a substantial share of the population at a zero position; this locks up what representative-agent models see as society's risk-bearing capacity, which then cannot be tapped and mobilized to bear equity risk.

More recently, Constantinides, Donaldson, and Mehra (2002) suggested that the equity premium may be due to transaction costs in the form of borrowing constraints. The relatively young (who have the option of declaring bankruptcy) have difficulty borrowing on a large scale, and thus are blocked from making large-scale equity investments early in life.

The transaction costs approach that in our view does the best job at accounting for the equity premium puzzle is that of Constantinides and Duffie (1996), who propose that investors are subject to uninsurable idiosyncratic income shocks that are correlated with returns on equities. Thus, investors bear a large amount of

[3] These two factors go hand in hand: if investors are effectively identical then they do not trade and transactions costs are irrelevant; if there are no transactions costs, then investor heterogeneity does not reduce the net risk-bearing capacity of the economy.

equity risk effectively embedded in their human capital in their total implicit portfolio; so they are uninterested in taking further equity risks in their explicit financial portfolios.

Lower-Tail Risk?

Perhaps the most promising and appealing potential resolution of the equity premium return puzzle is to invoke a small-numbers problem: that is, to argue that our sample of returns over the last century or so contains fewer low-probability but large-magnitude economic catastrophes than a rational investor should expect. Solutions along these lines have been proposed by authors like Rietz (1988); Brown, Goetzmann, and Ross (1995); Barro (2005); and Barro and Ursua (2008). Essentially, these authors argue that a long enough sample would display a sufficient number of collapses in stock and consumption values in such a way that the equity premium would no longer appear as a puzzle. In a similar spirit, Weitzman (2007) argues that lower-tail risk is large, but that investors do not and cannot know the true lower-tail risk. This argument emphasizes Knightian uncertainty rather than von Neumann–Morgenstern risk, because the data does not pin down the size of the lower tail, and so any estimate of lower-tail risk is simply an a prior belief about the likelihood and severity of seeing a "black swan."

Although this line of explanation is attractive, it presents its own difficulties. The unobserved-in-sample catastrophe must occur with a probability small enough that it is plausible that it has not been observed. However, the chance and magnitude of the catastrophe must be large enough to have substantial effects on prices and returns. Moreover, 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. Further, too great a risk of a collapse in the stock market and in consumption will not only produce a high equity premium but also a negative real interest rate. The size of collapse must be finely-tuned to lie near a knife-edge: large enough to create the observed equity premium, but small enough to leave a positive safe real interest rate. The explanation thus must pass a camel through the eye of a needle.

Certain low-probability events could drive a collapse in real equity values that would not much affect the real values of government bonds. The Great Depression was one such shock. Another is social-democratic political risk: if the U.S. government were to impose heavy taxes on corporate profits or heavy regulatory burdens on corporations, those policies could redirect a substantial amount of cash flow away from shareholders without affecting bond values. Yet is the chance of future tax increases or regulatory burdens that are narrowly targeted on corporate profits large enough to support the observed equity premium over more than a century? Public finance economists like Hines (2007) point out that, 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 before such burdens are imposed.

Learning About the Return Distribution

Yet another possible explanation assumes 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 to learn the true parameters. Thus, misperceptions that equity returns were very risky created the equity premium. The process of correcting these misperceptions, so that equities are now perceived to be less risky, has given a boost to stock prices in the last few decades 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 to learn from experience over time, and if an equity return premium remains in existence today, it is likely to shrink relatively rapidly.

McGrattan and Prescott (2003) develop this argument by pointing to an institutional source of the equity premium. In the past, legislatures and courts overly fearful of the riskiness of equities imposed regulatory restrictions that encouraged overinvestment in debt by pension funds. Until the passage of the Employee Retirement Income Security Act of 1974 (ERISA), it was unclear what a pension fund trustee could 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; conversely, it was also clear that a trustee who invested in stocks was not necessarily in a safe harbor. As time passed and 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, contributed to a fall in the market risk premium on stocks.

Another exploration of this alternative is Blanchard (1993), who sees two major macroeconomic events driving the movements of the equity premium from 1927 until the early 1990s. In the earlier part of this time period, he sees high equity premiums as a reaction to the shock of the Great Crash of 1929–1933; he attributes a subsequent decline in equity premiums to the dimming of the perceived likelihood of a repetition of that extraordinary event. Blanchard also sees—as do others like Modigliani and Cohn (1979), Campbell and Vuolteenaho (2004), and Cohen, Polk, and Vuolteenaho (2005)—a strong correlation between the equity premium and inflation in the 1970s and the 1980s. For example, Campbell and Vuolteenaho call this effect of inflation on the equity premium a "mispricing" attributed to

expectations implicit in market prices "deviating from the rational forecast."[4] There is an alternative: Inflation can be viewed as a signal that the government is likely to follow unattractive policies in the future. Real corporate profits are unaffected by today's inflation, but what about tomorrow's? A government that runs high inflation today might face greater temptations to impose price controls, high taxes on capital, and burdensome regulation in the future. In this way, an association of inflation with low equity returns does not have to reflect money illusion.

Fama and French (2002) argue that over the medium run, 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 equity premium should be lower than in the past makes the in-sample past equity premium appear even higher! Fama and French therefore argue that one should not estimate the post–World War II equity premium by looking at actual realized returns. That procedure is biased upward because it includes this unanticipated windfall from learning about the world.

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 noting the existence of a very large equity return premium is now more than eight decades old. Many Wall Street observers appear to agree that a substantial equity premium remains, and will persist. 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 percent per year for the next ten to 30 years. More recently, Graham and Harvey (2007) surveyed chief financial officers of nonfinancial corporations. Their 7,316 responses produce an expected annual equity premium of 3.2 percent per year. There appears to be no compelling reason why the expectations of chief financial officers should be biased in one direction or another.

Economists still do not have a complete explanation for the equity premium. Each of these explanations we have reviewed—risk aversion, non–time-separable utility, loss aversion, myopia, investor heterogeneity and transaction costs, lower-tail risk, and initial misperceptions about the return distribution that are then corrected by learning—has a well-developed research literature. Yet none of these

[4] Specifically, they point to how Wall Street traders used 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. It is not clear whether Campbell and Vuolteenaho (2004) view this as a misperception to be corrected by learning, or as the result of psychological biases that cause permanent confusion between real and nominal magnitudes that will persist indefinitely into the future.

explanations has achieved even rough consensus: the plurality opinion is that the equity return premium remains a puzzle.

What do these proposed explanations have to tell us about the future of the equity premium? Consider first Fama and French's (2002) hypothesis that the outsized equity premium has been generated by initial misperceptions about the return distribution that were then corrected by learning. In this case, estimating the expected capital gain by averaging past capital gains will be biased upward when learning has occurred. One should, instead, estimate expected stock returns from a backward-looking version of the "Gordon equation," in which the expected return is based on a current dividend/price ratio along with past average rates of dividend growth. Using today's dividend yield and the average growth rate of dividends to forecast expected capital gains produces an expected equity premium of 2.55 percent per year.[5]

However, estimating the expected *future* capital gain by looking at *past* average 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 way of pushing cash out of the firm to investors. Using the current dividend yield (of 3.70 percent) and the average growth rate of earnings (2.82 percent over the last 50 years) to forecast expected capital gains produces an expected equity premium of 4.33 percent per year. But this estimate is subject to offsetting biases as well. Firms that pay out less to investors in recent years than in past are reinvesting more, which implies faster earnings growth rates in the future than in the past. But relative to the experience of the Great Depression generation, luck has been running in America's favor since 1950; it is plausible to think that America will have worse luck again in the future, which would imply a slower earnings growth rate.

Other models of the equity premium imply a higher value for the future than does the Gordon equation approach. Risk aversion, non–time-separable utility, loss aversion, myopia, and investor heterogeneity all imply that the equity premium we have observed in the past is best understood as an equilibrium phenomenon. Unless some process makes the marginal investor less risk averse, or less loss averse, or less myopic, then the future equity premium should be anticipated to be about the same as it has been in the past. Thus, Mehra's (2003) survey of the research argues that the equity premium is likely to persist into the future. As Mehra

[5] In a basic version of the Gordon equation, the return is the sum of the current dividend/price level D/P plus the past average rate of dividend growth g_d:

$$r = D/P + g_d.$$

For basic exposition, see Gordon (1962) and Williamson (1938). The current D/P ratio is 3.70 percent, and the real growth rate of dividends over the past 50 years has been 1.05 percent, which implies a return r of 4.75 percent. Compared with the historical real annual return over the past 50 years in six-month commercial paper of 2.19 percent, the expected equity premium looking forward would be the 2.55 percent given in the text. The calculation in the next paragraph uses the growth rate of earnings, 2.82 percent, instead of the growth rate of dividends.

wrote—based not on his commitment to a particular model of the equity return premium but rather on his agnostic uncertainty about the sources of the equity return:

> 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 a 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.

What are the chances that some process will make the marginal investor less risk averse, or less loss averse, or less myopic in the future than in the past? Keynes (1936) thought that the chances were low. He believed that the marginal investor was likely to be a financial professional and that the finance profession selects 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 what of those who do have "the gambling instinct"? Keynes wrote: "[H]e who has it must pay to this propensity the appropriate toll." One manifestation of Keynes' "appropriate toll" is the equity return premium. 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 the finance practitioners can learn was a mistake and adjust for, but rather a sign that the equity premium return is here for a long time to come.

Yet it seems unreasonable to believe that the equity premium will persist in the future at the same size as over the past century. First of all, institutional changes have occurred. The memory of the Great Depression *has* faded. ERISA and other changes *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 than in the past. The rise in mutual funds *has* in theory made it easier to achieve the benefits of diversification. It seems implausible that these institutional developments will have no effect on the equity return premium going forward.

Second, a great many actors in the economy should have an interest in profiting from the equity return premium. Many investors know that they will not need the money they are investing now until 20 or 30 years in the future: parents of newborns looking forward to their children's college; the middle-aged

looking at rapidly-escalating healthcare 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; and the rapidly growing foreign exchange reserve accounts of many of the world's central banks. On the other side of the market, many companies appear underleveraged: over the long term, replacing high-priced equity capital with low-priced debt capital would seem to be as profitable a strategy for them.

Our necessarily impressionistic guess, balancing these estimates and factors together, is that the equity premium will continue over the next few decades, but at a lower level—perhaps at 4 percent per year rather than the historical rate of 6 percent. From the perspective of the overall economy, the persistence of an equity premium suggests that the risk-bearing capacity of society is not being fully utilized, and that social welfare gains might be achieved by the design of financial institutions that give financial markets a push toward being more willing to invest in equities long term. What institutions 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? Default automatic investment of tax refunds into diversified equity funds via personal savings accounts? Investing the Social Security trust fund balance in equities?

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