History and the Equity Risk Premium[1]

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Abstract: We summarize some of our own past findings and place them in the context of the historical development of the idea of the equity risk premium and its empirical measurement by financial economists. In particular, we focus on how the theory of compensation for investment risk developed in the 20th century in tandem with the empirical analysis of historical investment performance. Finally, we update our study of the historical performance of the New York Stock Exchange over the period 1792 to the present, and include a measure of the U.S. equity risk premium over more than two centuries. This last section is based upon indices constructed from individual stock and dividend data collected over a decade of research at the Yale School of Management, and contributions of other scholars.

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[1] This is a draft of a chapter intended for a collection of essays on the equity risk premium edited by Rajnish Mehra . It summarizes our past research related to the equity premium, and places it in historical context. We thank Mehra for the opportunity to contribute, and for his feedback on the research. Please direct all correspondence to about the paper to william.goetzmann@yale.edu.

I. **Introduction**

The equity premium puzzle posed in Mehra and Prescott (1985) was, in part, motivated by historical evidence on the return of U.S. stocks in excess of the riskless rate. Much of our own research has focused on estimating the equity risk premium using long-term historical data, and examining how historical accident may relate to the classic puzzle. While the equity premium is a fascinating topic for scholarship it is also one of the most important economic topics in modern finance. The equity risk premium is widely used to forecast the growth of investment portfolios over the long term. It is also used as an input to the cost of capital in project choice, and employed as a factor in the expected rate of return to stocks. Given its prevalence in practice and its importance to academic thought, it is interesting to discover that the calculation of the equity risk premium is a fairly new phenomenon. Reliable data to estimate the historical premium of stocks over bonds were only collected in the mid 20th Century, and precise econometric estimates of the equity premium only came after the development of the theory that uses it as a central input – the Capital Asset Pricing Model, or CAPM.

The chapter in part is intended to review our own contributions to the literature on the equity risk premium. Working both separately and together on a series of empirical research studies conducted with colleagues through the years, we have looked at the equity risk premium from a few different perspectives. First, research by Roger Ibbotson and Rex Sinquefield provided some of the first accurate calculations of the annual rate of return on U.S. asset classes over long investment horizons with specific measures of the equity and other risk premiums. These calculations have come into widespread academic and industrial use as inputs to research and investment decision-making through numerous works that Ibbotson has produced. Second, Will Goetzmann and co-authors Stephen Brown and Stephen Ross proposed and examined the hypothesis that the equity premium estimated from U.S. financial data alone is subject to a bias due to analysis of a winning market rather than losing ones. Third, both of us together with our co-author Liang Peng have constructed one of the most complete long-term databases of U.S. financial returns yet developed and have used it to study the variations in the

equity risk premium through nearly 200 years. Finally, both of us have them contributed to the literature on other ways of measuring the equity risk premium and on various ways of applying the concept. This chapter will summarize this past work and place it the historical context of the evolution of the concept of the equity premium.

The chapter is structured as follows. We first review the historical development of the idea of the equity risk premium in financial economics as the theory of compensation for investment risk developed in tandem with the empirical analysis of historical investment performance. Next we summarize some of our past findings about the historical equity risk premium and present further analysis on potential survival biases. Finally, we update our analysis of the historical performance of the New York Stock Exchange over the period 1792 to the present, and include a measure of the U.S. equity risk premium over more than two centuries. This last section is based upon indices constructed from individual stock and dividend data collected over a decade of research at the Yale School of Management.

II. **Historical Conception and Measurement of the Equity Risk Premium**

One of the earliest and must succinct expressions of the concept of the equity risk premium came from John Stuart Mill in his 1848 classic *Principles of Political Economy*. Writing about a farmer considering investment in the land, Mill argues that:

> …he will probably be willing to expend capital on it (for an immediate return) in any manner which will afford him a surplus profit, however small, beyond the value of the risk, and the interest which he must pay for the capital if borrowed, or can get for it elsewhere if it is his own.[2]

[2] Book 2, Chapter 16, *The Principles of Political Economy*, 1848. See also J. S. Mill, Essays on Some Unsettled Questions of Political Economy Essay IV: On Profits, And Interest. " The profits of stock are the surplus which remains to the capitalist after replacing his capital: and the ratio which that surplus bears to the capital itself, is the rate of profit. The gross profits from capital, the gains returned to those who supply the funds for production, must suffice for these three purposes. They must afford a sufficient

Mill thus separates profit into three parts: first, the interest that must be paid for the capital borrowed, determined in terms of alternative opportunity cost of money. This is equivalent to the riskless rate. The second component is the "value of the risk" associated with the investment. This is equivalent to the equity risk premium. Mill's third component is a surplus profit, no matter how small. In modern parlance, the "alpha" – a portion of compensation expected to be small in a competitive market.

Despite Mill's early formulation of the idea, the concept of equity profit as compensation for risk did not develop quickly. Economists at the turn of the century tended to focus instead on the apparent paradox of profit and perfect competition rather than risk and return. Columbia University professor John Bates Clark, for example, asserted that returns in excess of the riskless rate were due to monopolistic advantage, rather than compensation for insurable risk. In his view, innovation led to a comparative advantage which was in turn rewarded by excess return.[3]

Chicago economist Frank Knight responded to Clark's formulation by asserting the importance of risk. In his famous 1921 work *Risk, Uncertainty and Profit*, he noted the lack of useful models of risk and return in economic research. Knight reviewed the role of risk in the economic theory of profit up to the 1920's and took exception to the lack of distinction in previous analyses between quantifiable and unquantifiable risk – the latter he termed uncertainty, but both of which he asserted should command an investment premium. Knight's philosophical treatise did little, however, to clarify how the different roles of risk and uncertainty would affect prices and business ventures in a practical

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equivalent for abstinence, indemnity for risk, and remuneration for the labour and skill required for superintendence." It is somewhat unclear whether he is referring only to a return that covers a probability of expected loss instead of the equity risk premium's increase of expected return to cover systematic risk.

[3] Clark, J. B., 1892, "Insurance and Business Profit," *The Quarterly Journal of Economics*, 7(1) 40-54. See a response to Clark by Fredrick B. Hawley, 1893, "The Risk Theory of Profit," *The Quarterly Journal of Economics*, 7(4) 459-479.

manner, and he was completely silent on the issue of how one might quantify the equity risk premium.

As theorists debated the role of risk in the expected return to investment, empirical researchers in the early 20th century began to collect historical performance data from the markets. The earliest attempts to construct stock price indices were motivated by the need for a "barometer" of current market trends, or as an indicator of fluctuating macroeconomic conditions. Charles Henry Dow's famous index of 30 stocks was not originally intended as a measure of long term investment performance, but rather as a daily measure of the market. A number of macroeconomists began to create stock price indexes in the early 20th Century. Mitchell (1910, 1916), Persons (1916, 1919), Cole and Frickey (1928) are among the number of scholars who collected U.S equity prices and constructed indices as a means to study the interaction between economic cycles and the financial markets. Likewise, Smith and Horne (1934) and Bowley, Schwartz and Smith (1931) built similar indices for Great Britain. None of them addressed the obvious question – at least from our modern perspective -- of long-term investment returns.[4]

Edgar Lawrence Smith's 1924 book *Common Stocks as Long Term Investments* is the first significant attempt to advocate equity investing as a means to achieve higher investment returns. Smith collected historical price and dividend data for stocks and corporate bonds over the period 1866 through 1923 from the Boston and New York Stock Exchanges. He formed stock and bond investment portfolios of ten securities each as the basis for simulating investor performance over four different time periods. He studied the relative appreciation returns and income returns from both asset classes and documented fairly convincingly that over a variety of sub-periods equities yielded higher income than bonds and also provided significant capital appreciation.

[4] For an excellent discussion of the development of early equity indices, see Hautcoeur, Pierre-Cyrille and Muriel Petit-Koñczyk (2005). For a complete list of indices developed before Cowles (1938), see Cowles own discussion and notes in his volume.

Smith simulated the performance of these portfolios in a number of ways. The simplest was to treat the income and capital appreciation returns from the stock and bond portfolios separately and show that stocks nearly always dominated in both measures. He came close to developing a total return measure for the equity premium by the mechanical process of taking the income return each year from stocks and "paying" out of it the amount generated by the bond portfolio and then re-investing the residual back into shares. The relative growth of the stock portfolio through this procedure can be interpreted as a measure of the equity premium – at least with respect to corporate bonds.

Smith's book was not only widely read by investors but also closely studied by scholars. It was immediately cited by Yale's Irving Fisher as an argument for investing in a diversified portfolio of equities over bonds.[5] Based on Smith's findings, Fisher theorized that the trend towards investment in diversified portfolios of common stock had actually changed the equity premium in the 1920's. His views on the factors influencing the equity risk premium are worth quoting at length.

> Studies of various writers, especially Edgar Smith and Kenneth Van Strum have shown that in the long run stocks yield more than bonds. Economists have pointed out that the safety of bonds is largely illusory since every bondholder runs the risk of a fall in the purchasing power of money and this risk does not attach to the same degree to common stock, while the risks that do attach to them may be reduced, or insured against, by diversification…
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> It is in this way that investment trusts and investment council tend to diminish the risk to the common stock investor. This new movement has created a new demand for such stocks and raised their prices, at the same

[5] Fisher, Irving, 1925, "Stocks vs. Bonds", *American Review of Reviews*, July issue.

time it has tended to decrease the demand for, and to lower the price of, bonds.[6]

Smith's empirical approach to measuring the relative performance of the two asset classes was widely imitated in later studies. In 1937, Brown University Professor Chelcie Bowland published a synthesis of research following Smith's book and showed how the common stock investment strategy performed through the worst years of the depression.[7] Bowland concluded on considerable empirical evidence that the theory of common stock investment survived the crash. An interesting feature of the studies cited in Bowland's book is that none of them produced what we now think of as a measure of the equity premium – that is, the difference in total return between a portfolio of equities and the riskless rate over the same period.

The most carefully crafted early empirical analysis of the long term performance of the stock market was *Common Stock Indices*, by Alfred Cowles III, published in 1938. This ambitious study, undertaken before the advent of computers, but assisted by the invention of Holerith cards, collected individual stock prices (actually monthly highs and lows by stock) and dividends from 1872 to 1937 for stocks on the NYSE. Its stated goal was to "portray the average experience of those investing in this class of security in the United States from 1871 to 1937" [8]

Cowles improved upon Smith's work by developing a methodology which reinvested the dividend proceeds from stocks into the purchase of shares, thus avoiding the complexities of comparing income and capital appreciation returns separately. Two other important features of the Cowles study were that he collected data on virtually all of the stocks on the New York Stock Exchange, and that he capital-weighted them, a procedure that

[6] Fisher, Irving, 1930, *The Theory of Interest*, The Macmillan Company, New York, pp. 220-221.
[7] Bowland, Chelcie, 1937, *The Common Stock Theory of Investment*, The Ronald Press Company, New York.
[8] Cowles, Alfred, 1938, Common Stock Indices, Cowles Commission for Research in Economics, Monograph number 3, Principia Press, Bloomington, p. 2.

allowed the index to simulate a passive buy and hold investment strategy. The one serious limitation of the Cowles study is that it relied on the average of high and low prices during the month as a proxy for end-of-month stock prices. This had a smoothing effect on the returns, downward biasing the volatility and muddying up any econometric analysis of the data.[9] Oddly enough, given such widespread interest in Edgar Smith's earlier study, the Cowles analysis was silent on the relative performance of stocks and bonds.

The first book to explicitly define, model and estimate an equity risk premium was John Burr Williams' *The Theory of Investment Value*, also published in 1938. According to Williams "The customary way to find the value of a risky security has always been to add a 'premium for risk'".[10] He provides a table of "Interest Rates, Past Present and Future" which takes the riskless rate as the long-term government bond rate of 4% and the expected return to "Good stocks" as 5 1/2%.[11] Williams' estimated the forward equity premium from a dividend discount model, and he was careful to explain that historical (i.e. past) estimates provide a good forecast of the future, even when they deviate from present conditions.

In sum, by the end of the 1930's, economists had developed a clear conception of the equity risk premium, a means to measure rates of return on investments, and had collected historical data extending back through American financial history for several decades. The first empirical estimate of the equity premium by Smith is generally regarded as a major factor in the rush by retail investors into the stock market in the 1920's, and Irving Fisher is often taken to task for his theory that stock prices increased

[9] Cowles, Alfred, 1960, "A Revision of Previous Conclusions Regarding Stock Price Behavior," *Econometrica*, Vol. 28, No. 4. pp. 909-915.
[10] Williams, John Burr, 1938, *The Theory of Investment Value*, Harvard University Press, Cambridge, page 67. Of interest to those interested in financial history is that Williams solves algebraically for the discount rate on the common stock of a firm as a function of the discount rate for the all-equity firm and the firm debt – preceding Modigliani and Miller in arguing that "The investment value of an enterprise … in no way depends upon what the company's capitalization is." (p.72).
[11] Ibid. p. 387.

to new levels in the 1920's as a result of a decreasing equity risk premium. Alfred Cowles created the first relatively accurate long-term index of total return to investing in common stocks, and J.B. Williams provided the first numeric estimate of the forward-looking equity risk premium. Their work provided a valuable foundation for the next generation of financial research.

The next major attempt to empirically quantify the equity returns was undertaken at the University of Chicago. Beginning in 1960, CRSP, the Chicago Center for Research on Security Prices, headed by economists Lawrence Fisher and James H. Lorie, systematically began to collect stock prices and dividends from U.S. capital market history. Fisher and Lorie published the results of their study of returns to U.S. stocks in 1964, as "Rates of Return on Investments in Common Stocks"[12] and in 1977 as a volume including returns to U.S. government securities as well. [13] Like Cowles, they based their analysis of individual share prices and re-investment of dividends of U.S. stocks.

The theoretical developments in financial economics in the 1950's and 1960's made these empirical estimates of rates of return particularly interesting. In 1952, Harry Markowitz published his famous model of portfolio selection which explicitly linked investment return and risk. Markowitz proposed taking as inputs to his model the historical means, variances and covariances of individual securities, although he regarded this as a method which could be improved upon with better forecasting tools.

The Markowitz model, as it is now applied, identifies an optimal portfolio of assets in expected return and standard deviation space by the point of tangency formed by a ray extending from the expected return of the riskless (zero standard deviation) asset to the continuous frontier of portfolios providing the highest return for each level of standard deviation. The difference between the return of the riskless asset and the expected return

[12] Fisher, Lawrence and James H. Lorie, 1964, "Rates of Return on Investments in Common Stocks," *Journal of Business* 37, 1-21, covered the period 1926-60 which in 1968 they updated through 1965.
[13] Fisher and Lorie, 1977, "*A Half Century of Returns on Stocks and Bonds*," University of Chicago Graduate School of Business.

of the tangency portfolio in this model is the equity risk premium. [14] In the Markowitz framework, the size of the equity risk premium is an empirical question. Later scholars took a theoretical approach to its estimation.

The Sharpe-Lintner-Mossin Capital Asset Pricing Model [CAPM] was independently developed in the 1960's in part as a means to identify the optimal portfolio of risky assets in the Markowitz framework. As such, the CAPM takes an analytical approach to the equity risk premium. The theory endogenizes asset prices as a function of the risk aversion of the representative investor and the variance-covariance structure of the universe of assets. The shape of the representative investor's utility function, parameterized by a coefficient of risk aversion for the market as a whole is central to identification of the equity premium.

In the framework of the CAPM, if the form of the utility function and the coefficient of risk aversion are both known, then knowledge of the variance-covariance of the universe of assets (or the variance of the portfolio of risky assets) is sufficient to identify the spread between risky and riskless asset portfolios.

An important feature of the Markowitz model and the CAPM is that they provide a theoretical foundation for estimating the magnitude of the equity risk premium directly from investor preferences. It was not until Mehra and Prescott (1985), however that anyone attempted to compare the equity premium implied by preferences with the empirical measures provided by historical returns.

III. **Stocks, Bonds, Bills and Inflation**

In 1976, Ibbotson and Sinquefield published "Stocks, Bonds, Bills and Inflation: Year-by Year Historical Returns (1926-1974)." The stock market returns were calculated as

[14] The Markowitz framework is a single-period model. As such, the arithmetic return and the geometric return are the same.

total returns from the S&P 500 index, which up to this time did not include dividends. The authors also used CRSP government bond data to include U.S. Treasury bond and bill indexes. They also included a corporate bond index constructed from bond yields, as well as an inflation rates. Besides displaying total returns across all yearly hold periods, the paper was unique in that it explicitly measured historical risk premiums, not only for equities, but also including the horizon (maturity) premium, the default premium, and real interest rate. Results were presented in real (inflation adjusted) terms as well. In Ibbotson Associates Yearbooks, they later added the small stock premium, the value premium, as well as various other data. These historical premiums came to be used in practice and theory as the risk premium input into the CAPM model, as well as for other models.

Later in 1976, Ibbotson and Sinquefield showed how historical data could be used to simulate probability distributions of future returns. They started with the then current yield curve with its implicit forward interest rate structure. They added the various historical premiums using bootstrapping methods that retained the correlation structure among the asset classes. They used a historical equity risk premium which was measured during the previous half century to be 6.3% geometrically relative to U.S. Treasury Bills, but a lesser number relative to longer-term bonds which contained horizon risk premiums.

Interestingly, 1976 was also the year that Vanguard launched its market index trust, a passive, value-weighted portfolio of large-cap U.S. stocks designed to match the performance of the S&P 500. The excellent excess performance of stocks from 1926 to 1974 reported in Ibbotson and Sinquefield may have helped build demand for a passive portfolio that sought to capture these historical returns. Just as the empirical study by Edgar Lawrence Smith demonstrated to investors in the 1920's the superiority of stocks over bonds and motivated a move towards equities, indexation made a lot of sense to investors in the 1970's when they had five decades of historical performance upon which to base their expectations for the future.

An important historical note is that the decade of the 1970's was one of the worst periods in U.S. capital market history for stocks. The crash of 1973-74, the experience of double digit inflation and the erosion of capital was fresh in the public imagination in 1976. Equity returns had not exceeded debt returns over nearly the preceding decade. Thus the historical equity premium appeared to most as a wildly optimistic forecast of the future expected return of stocks over T-bills. In fact it was not – the equity risk premium since 1976 has nearly matched the estimate made at the time.

There are several ways one might estimate an expected risk premium used for forecasting. One way is to extrapolate historical risk premiums as Ibbotson and Sinquefield did. Another is to use investor demand models based upon investor risk aversion, as Mehra and Precott did. In Ibbotson, Siegel, and Diermeier (1984), demand is shown to be impacted not only by systematic risk, but also by liquidity, taxation, and idiosyncratic risk. A third way is to look at the type of returns that the corporate sector supplies. Diermeier, Ibbotson, and Siegel (1984) and then later Ibbotson and Chen (2003) use this supply approach. They extrapolate the cash flows and earnings growth generated by companies themselves. These forecasts tend to give somewhat lower forecasts than historical risk premiums, primarily because part of the total returns of the stock market have come from price-earnings ratio expansion. This expansion is not predicated to continue on indefinitely, and should logically be removed from the expected risk premium.

IV. History as Written by the Winners?

A major conceptual problem with equating the *ex post* historical realization of the equity premium with its *ex ante* expectation is that history could simply have turned out better than people expected. Recall that in 1938, J.B. Williams calculated the market forecast of the equity risk premium as a mere 1 1/2 percent. He might have been shocked to see the realized premium over the following five decades exceed his forecast by a multiple of four. A more subtle problem is that historical records of successful markets tend to get preserved, but it is difficult to dig up the records of failed markets. To study these issues,

Brown, Goetzmann and Ross (1997) built a model of stock market performance which examined the ex post historical return conditional upon survival. Their analytical results showed that when a market is confronted with the continuous possibility of failure (modeled statistically as an absorbing lower bound) the ex post realized growth can be substantially higher than the unconditional mean. The fact that the U.S. survived two world wars and periods of global political unrest that caused other major markets to fail would suggest that the historical mean return of the U.S. market is an overestimate of its expectation.

It is important to point out that this view of the equity risk premium is quite different than the critique of the equity premium puzzle posed by economist Thomas Reitz. Reitz (1988) theorized that a high *ex ante* equity premium could be justified by a fear of a huge crash. An equity premium of 6% would thus reflect the potential for an event which may not have been realized in America's financial history but which nevertheless was a possibility in people's minds. One limitation of the Reitz critique is that it conflicts with historical expectations of stock returns – most notably the J.B. William's forward-looking premium in 1938 of 1 1/2 percent. The survivorship story, on the other hand, is entirely consistent with low historical expectations of the future, although it would be unlikely to reduce the equity risk premium to such a low number.

In order to estimate the potential scale of the survival bias, and to look for empirical evidence that the U.S. market was an unusual performer in the global economy, Jorion and Goetzmann (1999) collected capital appreciation and inflation data for a large sample of the world's equity markets from 1921 forward. They found that the U.S. was the top performer out of 39 markets, in terms of real capital appreciation of stocks. Studying this effect subsequently with a smaller but richer sample, Dimson, Marsh and Staunton (2002) collect total real returns for twelve countries over the entire century and found that the U.S. was in the top quartile of performers in real terms – inched out by Sweden and Australia over the first couple of decades of the century.[15] The Jorion and Goetzmann

[15] Dimson, Elroy, Paul Marsh and Mike Staunton, 2000, *The Millenium Book: A Century of Investment Returns,* ABN-AMRO and London Business School, p. 55.

GDP-weighted index of the 44 non-U.S. equity markets had an arithmetic real return of 3.84% per year compared to the U.S. value of 5.48%, suggesting a survival bias on the order of 1.5% per annum. The geometric return values were closer (roughly 90 basis points) because the world market index was less volatile over the period due to diversification. Thus the work found evidence that the equity premium estimate is affected by survival issues, however the magnitude is insufficient to explain away the equity premium puzzle.

V. The Equity Premium Over the Very Long Term

One of the major issues with statistical estimation of the realized equity risk premium is that a very long time series of stationary returns is required to achieve a high degree of confidence in the estimate. The longer the data series, the more accurate the equity risk premium calculation, as long as the fundamental expectations have remained the same. In order to estimate the U.S. equity premium using total returns over the longest possible time period we have collected the most complete dataset of U.S. stock prices and dividends assembled to date.[16] Working with University of Cincinnati economist Liang Peng, we gathered individual security data from U.S. financial periodicals on a monthly basis, beginning with the official list of the New York Stock Exchange in 1815, and collected available dividends from 1825 to 1872. Among other things, this direct data collection enabled us to collect month ending prices, avoiding the Cowles data problem of averaging high and low prices for the month. It also allowed us to avoid the heterogeneity problems of Ibbotson and Brinson (1987), Schwert (1990), Goetzmann (1993), and Siegel (1998) all of whom had to rely upon chained indices constructed by earlier researchers.[17]

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[16] Goetzmann, William, Roger G. Ibbotson and Liang Peng, 2000, "A New Historical Database for the NYSE 1815 to 1925: Performance and Predictability", *The Journal of Financial Markets* 4(1), 1-32,

[17] The NYSE database is available for download on the website of the International Center for Finance at the Yale School of Management. www.icf.yale.edu.

Recently, Richard Sylla of NYU completed the collection of weekly NYSE stock prices over the late 18th and early 19th centuries. He generously shared this data with us, and from it we are able to construct a complete index of capital appreciation returns for the New York Stock Exchange from 1792 (its inception) to the present. In this chapter, using the combined databases of Sylla, and Goetzmann, Ibbotson and Peng (2000), as well as annual bond yield data from Homer and Sylla's *The History of Interest Rates*, we are able to estimate an equity premium for the New York Stock Exchange over its pre-1925 history.

Capital appreciation returns in this study are based on a price-weighted index of all stocks trading in the year, using the last price observation in the year. Income returns from 1825 to 1871 are constructed in two ways and then averaged. The first method is to sum all the dividends paid in that year and divide by the prices of all firms from the previous year. This probably underestimates the income return because some actual dividend payments may not be in the data set. The second method focuses solely on the income return of firms that paid regular dividends and for which prices were collected – this likely overestimates returns because some stocks may not have paid any dividends. It is important to note that no previous researchers collected actual dividend data on U.S. stocks before 1872. All analyses before our own was based upon econometric methods to fill in income returns. Thus, although our two methodologies sometimes diverge, they are at least based upon empirical observation. However, like previous analysts, in order to estimate the pre-1825 dividends, we employ a linear forecasting model using next year's dividend and this year's capital appreciation as forecasting variables.[18] Our dividend returns from 1872 to 1925 were taken from Cowles (1938).

The most problematic variable in our study is the riskless rate. In 1792, the United States was an emerging market and U.S. securities were considered far from riskless. Homer and Sylla report yields on U.S. government and U.S. municipal debt in the 18th and 19th centuries. For long stretches of time the yields on municipals were less than yields of treasuries, and this difference was not due to tax treatment. We took the minimum yield

[18] The R-square of this model was .17, suggesting it has some power.

of the two series' each year as a measure of a (nearly) riskless rate and the pre-1798 data was set to the 1798 value. Of course yields are not returns when the debt is not held to maturity. Thus using them to capture the riskless rate ignores the capital appreciation component of bond returns. Returns to shorter maturity instruments are available for periods of U.S. financial history before 1926. Mehra and Prescottt (1985) used commercial paper rates reported in the earlier edition of Sylla and Homer back to 1883. We report these in our analysis as well. Homer (1963) notes that these are quite volatile in the early years, perhaps reflecting the lack of an organized money market.[19] Commercial paper rates from 1830 to 1857 are from the Boston money market, and afterwards from the New York market. We econometrically estimated commercial paper rates from 1792 to 1834 by projecting them on bond yields.[20] Other types of short term rates in the early 19th Century are dubious due to regulation of interest rates. Inflation data is taken from Ibbotson and Brinson (1987).

Table I presents the results of the analysis for the period 1792 to 1925. Note that the arithmetic equity premium measured by the spread over bonds is about 3.8% and the geometric spread is 2.72%. A major issue, however is that the interest rate series we have constructed is not riskless. Comparing the returns instead to inflation indicates an arithmetic real return of about 7%. The bond returns would appear to be anomalous with respect to expectations, not the equity returns.

The low capital appreciation returns to stocks prompted us to test the hypothesis that for much of U.S. financial history investors expected their equity returns to come in the form of dividend payouts rather than capital appreciation. We found that that vast majority of stock in our sample traded around par value, implying an expectation of payout. If this were strictly the case, it would allow the *ex ante* measurement of the equity risk premium through financial history. Unfortunately we cannot verify that expected returns carried no anticipated long-term price growth. The 1.91% appreciation we document in Table 1 exceeds the realized inflation over the period, and thus may have been ex ante expected.

[19] Homer p. 317.
[20] The regression yielded and R-square of 22% with a t-statistic of 5.

On the other hand, in our paper we show that through most of U.S. capital market history, dividend yields were higher than bond yields, suggesting that differential income flow was a major part of the compensation for equity risk during the early period.

Table I

Summary Statistics for New York Stock Exchange Total Returns, U.S. Bond Yields, Call Money Rates and Inflation,

1792 – 1925

	Arithmetic Return	Geometric Return	Standard Deviation
Stocks TR	7.93%	6.99%	14.64%
Cap Ap	1.91%		
Income	6.01%		
Bonds	4.17%	4.16%	4.17%
Comm. Paper	7.62%	7.57%	3.22%
Inflation	0.85%	0.61%	7.11%

Table II presents summary statistics for the major U.S. asset classes over the period 1926 through 2004. The arithmetic average return to common stocks over the second period is 400 basis point per year higher than in the first. In real terms, however, this differential is slightly less dramatic: 7.08% to 9.27%.

Table II

Summary Statistics for Total Returns in U.S. Stocks, Bonds, Bills and Inflation

1926 - 2004

	Arithmetic Return	Geometric Return	Standard Deviation

Stocks TR	12.39%	10.43%	20.31%
Cap Ap	7.85%		
Income	4.27%		
LT Govt. Bonds	5.82%	5.44%	9.30%
T-Bills	3.76%	3.72%	3.14%
Inflation	3.12%	3.04%	4.32%

Source: *Stocks, Bonds, Bills and Inflation, 2005 Yearbook*, Ibbotson Associates, Chicago.

VI. Conclusion

The concept of the equity risk premium is fundamental to modern financial theory and a basic building block in most forecasting models of long term expected investment returns. A review of the economic literature after the turn of the 19th century suggests that the concept of the equity risk premium was not clearly formulated until the late 1930's. While the notion of return as a premium for risk above and beyond the pure time value of money dates at least to the work of John Stuart Mill, the basic technique of calculating the total return to investing in equities vs. debt developed relatively slowly, with the key insight provided by Alfred Cowles – a calculation of investment return in equities requires regular re-investment of income through the purchase of shares.

The historical development of the concept and measurement of the equity risk premium provides the context for our own research contributions. The first Ibbotson and Sinquefield study represented a culmination of research on the basic building blocks of expected returns for different asset classes. The notion of building up expected returns from blocks of risk premia was viewed by J. B. Williams as a natural approach, however it is surprising how long to took for the basic empirical calculus of risk and return to come into use. The Ibbotson and Sinquefield numbers as reported in 1976 were striking evidence that common stock investment, so avidly proposed by Smith and Fisher five decades earlier, was in fact a wise course of action to take. A new generation of investors in the 1970's used these numbers as a guide to expectations of future returns to

equity investment, and twenty-five years later they were not disappointed. History proved an accurate forecast.

The sheer magnitude of the equity premium in U.S. capital markets over the 20th Century has caused both scholars and practitioners to ask whether these returns were simply an accident of history or evidence of a different kind of attitude towards risk than seems justified by theoretical models. The importance of Mehra and Prescott (1985) is that it pointed out the apparent contradiction between the U.S. market experience and academic models of human behavior.

A part of our own inquiry into the equity premium puzzle has been the question of whether the history we examine is an unusual path – one unlikely to be realized in the future. Most Americans who lived through a significant portion of the 20th Century count themselves fortunate compared to large sectors of the global populace who suffered catastrophic loss of savings as a result of the political tumult of two world wars and widespread redistribution of wealth. In light of America's political and economic success in the 20th Century, it is not surprising to find that its markets dominated as well. A test of this "survivor" story in our research finds some empirical support, but does not fully explain the high equity risk premium enjoyed through U.S. capital market history.

The survival hypothesis suggests that the American experience may not be the best example on which to base future expectations – then again, maybe it is for those who plan to continue investing in the U.S. capital markets. Perhaps the positive American experience was actually due to our particular configuration of laws, political system, cultural mixture and practical orientation.

A longer look at the American financial experience affords a chance to test this proposition. Although the 20th century may be the American Century, the 19th century was not. Europe's financial markets were dominant through the First World War. American finance was parochial and limited. One important qualification to this, however, was the comparative freedom of American equity markets. Britain severely

limited the issuance of corporate shares until the mid-19th Century, and full corporate access to the capital markets did not exist until the British Companies Acts of the 1860's. By that time, American equity markets had been operating in New York, Philadelphia and Boston for many decades. Indeed the U.S. might have been the best market to study the early development of unfettered capitalism in the early 19th Century.

What do we find when we look at the 19th century numbers? First, the measurement of the equity risk premium in the U.S. before 1925 is nearly impossible due to largely to the fact that there was no meaningful riskless rate as a benchmark. Had the Capital Asset Pricing Model been transported back from the 1960's to the 1860's, the challenge would have been to determine Rf, not Rm. When we look at the premium of stocks over inflation, however, we find that the real rate of equity returns in the first 125 years of its history pretty nearly resembles the real rate of equity returns in the last eighty years. Through that trajectory of time, the U.S. went from being an emerging market to a capital importer to a capital exporter. Given what would seem to be major regime changes in the U.S. economy, it is extraordinary to find such stability in the rate of return on investment capital. Is that stability due to a "country factor" in modern asset pricing terminology? This will have to await further tests using data from global capital market history.

Our research together and separately has focused to a large degree on measurement and interpretation of history. Despite decades of research on early capital markets, however, much remains to be done. Our understanding of the historical experience of investors is relatively limited once we step beyond a few well-studied markets. Basic information about investor returns is lacking and may never be recovered. Nevertheless, efforts to quantify the equity risk premium are well rewarded by insights into both the stability and dynamics of long term investment performance.

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