

Revisiting the Equity Risk Premium

Stephen G. Hill, C.R.R.A.

Principal, Hill Associates

Society of Utility and Regulatory Financial Analysts

39th Annual Financial Forum

April 19-20, 2007

Revisiting the Equity Risk Premium

Three Types of Risk Premium Estimates

- Historical Averages of Realized Returns
(Ibbotson Assoc., Dimson, Marsh, & Staunton)
- Forward-looking Risk Premium Estimates
(Fama & French, Harris & Marston)
- Surveys of Investor/CFO Expectations
(Welch, Graham & Harvey)

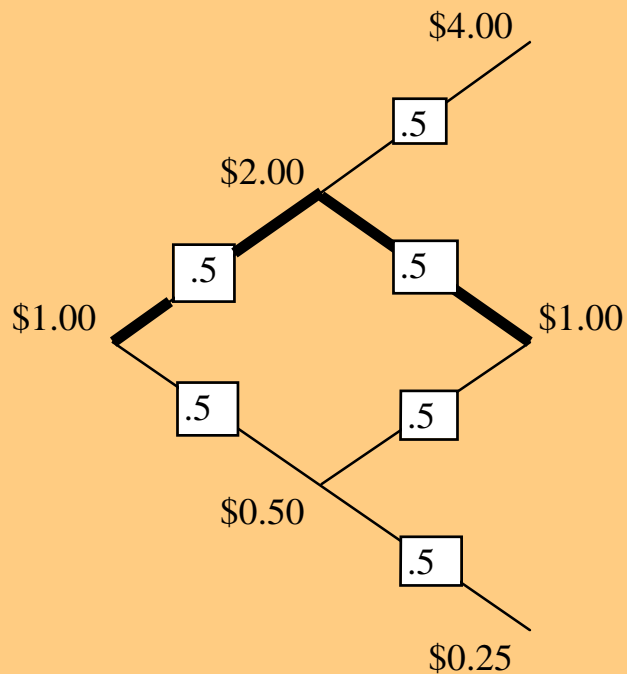
Revisiting the Equity Risk Premium

Technical Aspects of A Risk Premium Estimate

- Risk-free Rate, T-bonds or T-Bills?
- Academic research relies primarily on T-Bills as risk-free rate
- 5%-8% MRP based on T-Bills is 3.8%-6.8% MRP based on T-Bonds, according to long-term historical return differences
- Arithmetic or Geometric Averages of historical data?

Revisiting the Equity Risk Premium

Arithmetic v. Geometric Averages



Arithmetic Mean Return $(100\% - 50\%) / 2 = 25\%$

Geometric Mean Return $(1 + 100\%)(1 - 50\%) - 1 = 0\%$

Expected Return = $(0.5)^2(\$4.00) + 2(0.5)^2(\$1.00) + (0.5)^2(\$0.25)$

Expected Return = \$1.5625

Can only get the expected result with Arithmetic Mean

Expected Return = $\$1.00 (1.25)(1.25) = \1.5625

Revisiting the Equity Risk Premium

Arithmetic v. Geometric Averages

“If we are willing to make the strong assumption that each return [in the decision tree] is an independent observation from a stationary underlying probability distribution then we can infer that four equally likely return paths exist.” [On that basis, arithmetic mean appropriate.]

“Empirical research indicates that a significant long-term negative autocorrelation exists in stock returns. The implication is that the true market risk premium lies between the arithmetic and geometric averages.”

“The arithmetic average depends on the interval chosen. For example, an average of monthly returns will be higher than an average of annual returns.”

(Copeland, Koller, Murrin, Valuation, Measuring and Managing the Value Of Companies, 3rd Ed., Wiley & Sons, New York, 2006, pp. 218-221)

Revisiting the Equity Risk Premium

Arithmetic v. Geometric Averages

“When returns are negatively serially correlated, however, the arithmetic average is not necessarily superior as a forecast of long-term future returns.”

“The point here is not just a theoretical curiosity, because in the historical data summarized by Siegel, there is strong evidence that the stock market is mean-reverting. That is, periods of high returns tend to be followed by periods of lower returns. This suggests that the arithmetic average return probably overstates expected future returns over long periods.”

(Campbell, J.Y, “Forecasting U.S. Equity Returns in the 21st Century,” Estimating the Real Rate of Return on Stocks Over the Long Term, Presented to the Social Security Advisory Board, August 2001, pp. 3, 4)

Revisiting the Equity Risk Premium

Arithmetic v. Geometric Averages

In Mehra and Prescott (1985), we reported arithmetic averages, since the best available evidence indicated that stock returns were uncorrelated over time. When this is the case, the expected future value of a \$1 investment is obtained by compounding the arithmetic average of the sample return, which is the correct statistic to report if one is interested in the mean value of the investment. If, however, the objective is to obtain the *median* future value of the investment, then the initial investment should be compounded at the geometric sample average. When returns are serially correlated, then the arithmetic average can lead to misleading estimates and thus the geometric average may be the more appropriate statistic to use.

(Mehra, R., Prescott, E., “The Equity Premium in Retrospect,” Handbook of the Economics of Finance, Constantinides, Harris, Stultz, Editors, 2003, pp. 889-890)

Revisiting the Equity Risk Premium

Historical Data

- Ibbotson, Sinquefeld, Stocks, Bonds, Bills and Inflation: The Past (1926-1976) and The Future (1977-2000), Financial Analysts Research Foundation, Charlottesville VA, 1977 (based on CSRP data, annual updates through 2007) MRP = 6%-8%
- Mehra, R., Prescott, E., “The equity premium: a puzzle,” *Journal of Monetary Economy*, (1985) 15:145-161 (“neoclassical economics” based on utility function, not only monetary return) MRP = 0%-1%

Revisiting the Equity Risk Premium

Historical Data

“...assets that pay off when times are good and consumption levels are high—when the marginal utility of consumption is low—are less desirable than those that pay off an equivalent amount when times are bad and additional consumption is more highly valued.”

“A high-beta security tends to pay off more when the market return is high—when times are good and consumption is plentiful; it provides less incremental utility than a security that pays off when consumption is low, is less valuable and consequently sells for less.”

“A five-course dinner after a heavy lunch yields considerably less satisfaction than a similar dinner when one is hungry!”

—Mehra, explaining utility theory

Revisiting the Equity Risk Premium

Historical Data

- Mehra's "risk premium puzzle" spawned many research papers in both financial and "neoclassical/behavioral" economics. **Handout: The Equity Risk Premium: An Annotated Bibliography**
- Seigel, J., Stocks for the Long Run, A Guide to Selecting Markets for Long-term Growth [Irwin Professional Publishing, Chicago, IL, 1994 (MRP 1802-1992 = 4.9%; U.S. Stocks less T-Bonds, arithmetic)]
- Dimson, Marsh, Staunton, Triumph of the Optimists, 101 Years of Global Investment Returns, Princeton University Press, Princeton NJ, 2002 [MRP = 5.0%; U.S. Stocks less T-Bonds, arithmetic; 4.6% World Stocks less G-Bonds, arithmetic; Forward-Looking Premium lower: 4%-5% (arithmetic), 2.5%-4% (geometric)] **Handout: Global Evidence on the Equity Risk Premium**

Revisiting the Equity Risk Premium

Forward-looking Estimates (DCF-based)

- Fama and French, “The Equity Premium,” *The Journal of Finance*, Vol. LVII, No. 2, April 2003, pp. 637-659
 - The estimate of the expected real equity premium for 1872 to 2000 from the dividend growth model is 3.54 percent per year. The estimate from the average stock return, 5.57 percent, is almost 60 percent higher. The difference between the two is largely due to the last 50 years.
 - Three types of evidence suggest that the lower equity premium estimates for 1951 to 2000 from fundamentals [DCF] are closer to the expected premium:
 - Fundamentals are more precise (standard error lower);
 - Sharpe ratio consistent over entire period w/ fundamentals;
 - Fundamental risk premium estimates comport w/ valuation theory.
- Harris, Marston, Mishra and Obrien, “Ex Ante cost of Equity Estimates of the S&P 500 Firms: The Choice between Global and Domestic CAPM,” *Financial Management*, Autumn 2003 (MRP = 7.3%, 1982-1998, Stocks less T-Bonds)

Revisiting the Equity Risk Premium Surveys

- Ivo Welch (surveys of academic financial economists)
 - 2000, MRP expectation = 7% (T-Bills) (survey undertaken in 1998)
 - 2001, MRP expectation = 5% (T-Bills)
- Graham & Harvey (quarterly surveys of corporate financial executives, w/ CFO Magazine) **Handout**
 - 2000-2007, average MRP expectation above 10-year T-bonds = 3.5%
 - MRP directly related to interest rates

Revisiting the Equity Risk Premium

Summation of Current Evidence

Brealey & Meyers, in 2006 textbook, Principles of Corporate Finance, review MRP research and conclude:

- “Do not trust anyone who claims to *know* what returns investors expect.”
- “MRP of 5%-8% (above T-Bills) is reasonable”
- MRP of 3.8%-6.8% above T-Bonds reasonable, based on Dimson, et al, historical data cited by Brealey & Meyers

MRP mid-point $\approx 5.3\%$ (arithmetic)

Utility beta ≈ 0.85

Current T-bond yield $\approx 5\%$

CAPM = $5\% + 0.85 (5.3\%) = 9.5\%$

Revisiting the Equity Risk Premium

Stephen G. Hill, C.R.R.A.

Principal, Hill Associates

Society of Utility and Regulatory Financial Analysts

39th Annual Financial Forum

April 19-20, 2007