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Equity Risk Premiums: Looking backwards and forwards...

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What is the Equity Risk Premium?

- Intuitively, the equity risk premium measures what investors demand over and above the riskfree rate for investing in equities as a class.
- It should depend upon
 - The risk aversion of investors
 - The perceived risk of equity as an investment class

How equity risk premiums lose their meaning...

<i>Model</i>	<i>Expected Return</i>	<i>Inputs Needed</i>
CAPM	$E(R) = R_f + \beta (R_m - R_f)$	Riskfree Rate Beta relative to market portfolio Market Risk Premium
APM	$E(R) = R_f + \sum_{j=1} \beta_j (R_j - R_f)$	Riskfree Rate; # of Factors; Betas relative to each factor Factor risk premiums
Multi factor	$E(R) = R_f + \sum_{j=1,.,N} \beta_j (R_j - R_f)$	Riskfree Rate; Macro factors Betas relative to macro factors Macro economic risk premiums
Proxy	$E(R) = a + \sum_{j=1..N} b_j Y_j$	Proxies Regression coefficients

Why equity risk premiums matter...

- Every statement about whether equity markets are over or under valued is really a statement about the prevailing equity risk premium.
- Every valuation of an individual stock that you do has embedded in it your implicit or explicit assumptions about the equity risk premium. To the degree that your equity risk premium is incorrect, every valuation that you do will be contaminated.

What is your risk premium?

- Assume that stocks are the only risky assets and that you are offered two investment options:
 - a riskless investment (say a Government Security), on which you can make 4%
 - a mutual fund of all stocks, on which the returns are uncertain

How much of an expected return would you demand to shift your money from the riskless asset to the mutual fund?

- Less than 4%
- Between 4- 6%
- Between 6 - 8%
- Between 8- 10%
- Between 10 - 12%
- More than 12%

Risk Aversion and Risk Premiums

- If this were the capital market line, the risk premium would be a weighted average of the risk premiums demanded by each and every investor.
- The weights will be determined by the magnitude of wealth that each investor has. Thus, Warren Buffett's risk aversion counts more towards determining the "equilibrium" premium than yours' and mine.
- As investors become more risk averse, you would expect the "equilibrium" premium to increase.

How equity risk premiums are estimated in practice...

- Survey investors on their desired risk premiums and use the average premium from these surveys.
- Assume that the actual premium delivered over long time periods is equal to the expected premium - i.e., use historical data
- Estimate the implied premium in today's asset prices.

The Survey Approach

- Surveying all investors in a market place is impractical.
- However, you can survey a few investors (especially the larger investors) and use these results. In practice, this translates into surveys of money managers' expectations of expected returns on stocks over the next year.
- The limitations of this approach are:
 - there are no constraints on reasonability (the survey could produce negative risk premiums or risk premiums of 50%)
 - they are extremely volatile
 - they tend to be short term; even the longest surveys do not go beyond one year

Everyone uses historical premiums, but..

- The historical premium is the premium that stocks have historically earned over riskless securities.
- Practitioners never seem to agree on the premium; it is sensitive to
 - How far back you go in history...
 - Whether you use T.bill rates or T.Bond rates
 - Whether you use geometric or arithmetic averages.
- For instance, looking at the US:

Historical Period	<i>Arithmetic average</i>		<i>Geometric Average</i>	
	Stocks - T.Bills	Stocks - T.Bonds	Stocks - T.Bills	Stocks - T.Bonds
1928-2006	7.87%	6.57%	6.01%	4.91%
1966-2006	5.57%	4.13%	4.34%	3.25%
1996-2006	6.91%	5.14%	5.42%	3.90%

If you choose to use historical premiums....

- Go back as far as you can. A risk premium comes with a standard error. Given the annual standard deviation in stock prices is about 25%, the standard error in a historical premium estimated over 25 years is roughly:

$$\text{Standard Error in Premium} = 25\% / \sqrt{25} = 25\% / 5 = 5\%$$

- Be consistent in your use of the riskfree rate. Since we argued for long term bond rates, the premium should be the one over T.Bonds
- Use the geometric risk premium. It is closer to how investors think about risk premiums over long periods.

The perils of trusting the past.....

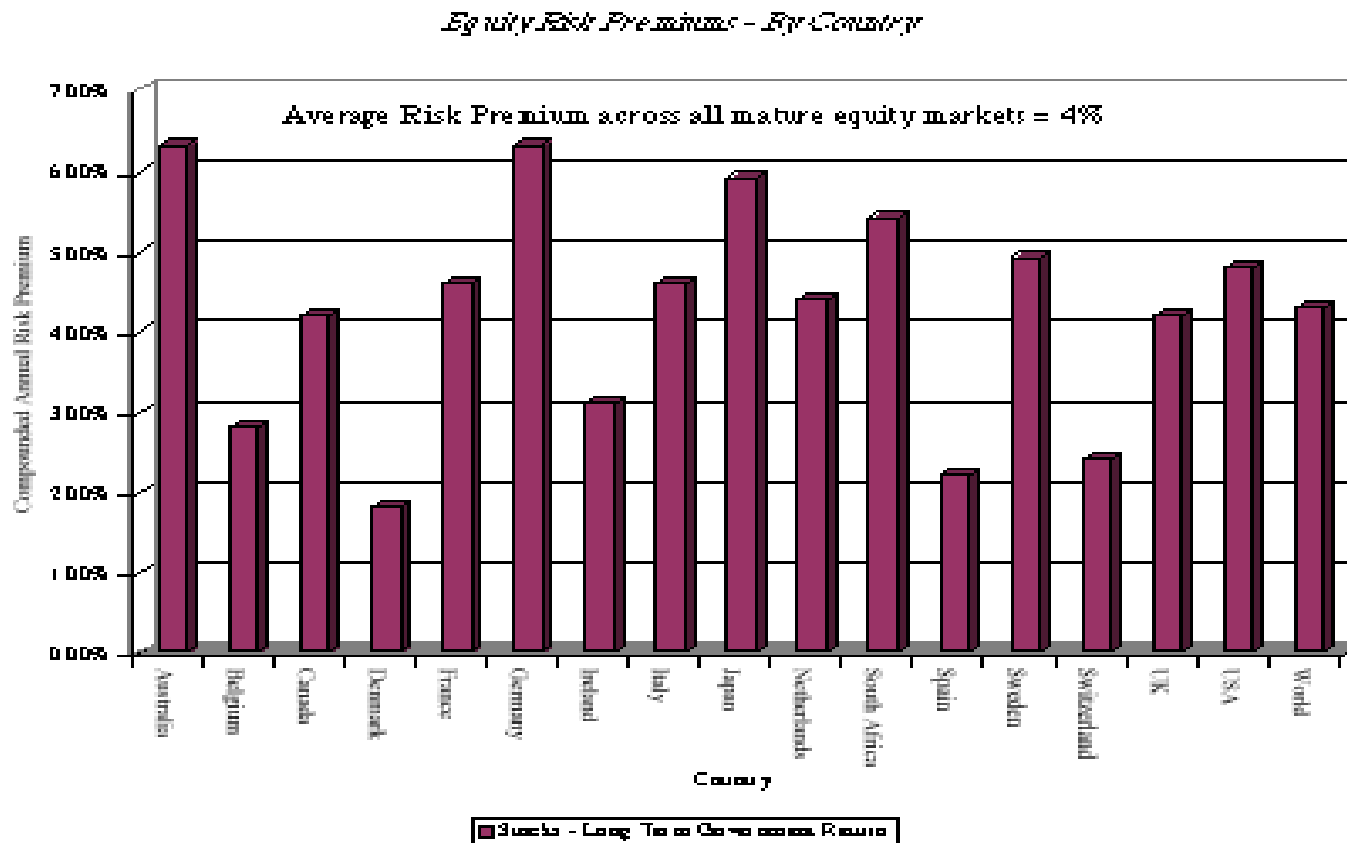
- Noisy estimates: Even with long time periods of history, the risk premium that you derive will have substantial standard error. For instance, if you go back to 1928 (about 78 years of history) and you assume a standard deviation of 20% in annual stock returns, you arrive at a standard error of greater than 2%:

$$\text{Standard Error in Premium} = 20\% / \sqrt{78} = 2.26\%$$

- Survivorship Bias: Using historical data from the U.S. equity markets over the twentieth century does create a sampling bias. After all, the US economy and equity markets were among the most successful of the global economies that you could have invested in early in the century.

Risk Premium for a Mature Market?

Broadening the sample



Implied Equity Premiums

- If we assume that stocks are correctly priced in the aggregate and we can estimate the expected cashflows from buying stocks, we can estimate the expected rate of return on stocks by computing an internal rate of return. Subtracting out the riskfree rate should yield an implied equity risk premium.
- This implied equity premium is a forward looking number and can be updated as often as you want (every minute of every day, if you are so inclined).

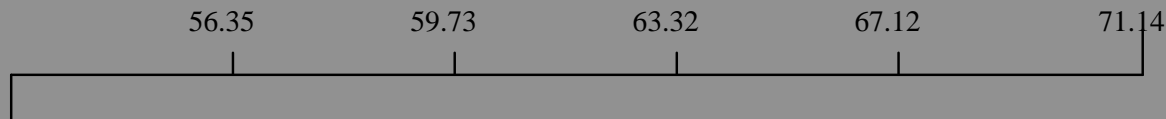
Implied Equity Premiums

- We can use the information in stock prices to back out how risk averse the market is and how much of a risk premium it is demanding.

Between 2001 and 2006, dividends and stock buybacks averaged 3.75% of the index each year.

Analysts expect earnings (53.16) to grow 6% a year for the next 5 years .

After year 5, we will assume that earnings on the index will grow at 4.7%, the same rate as the entire economy



January 1, 2007
S&P 500 is at 1418.3
3.75% of 1418.3 = 53.16

- If you pay the current level of the index, you can expect to make a return of 8.86% on stocks (which is obtained by solving for r in the following equation)

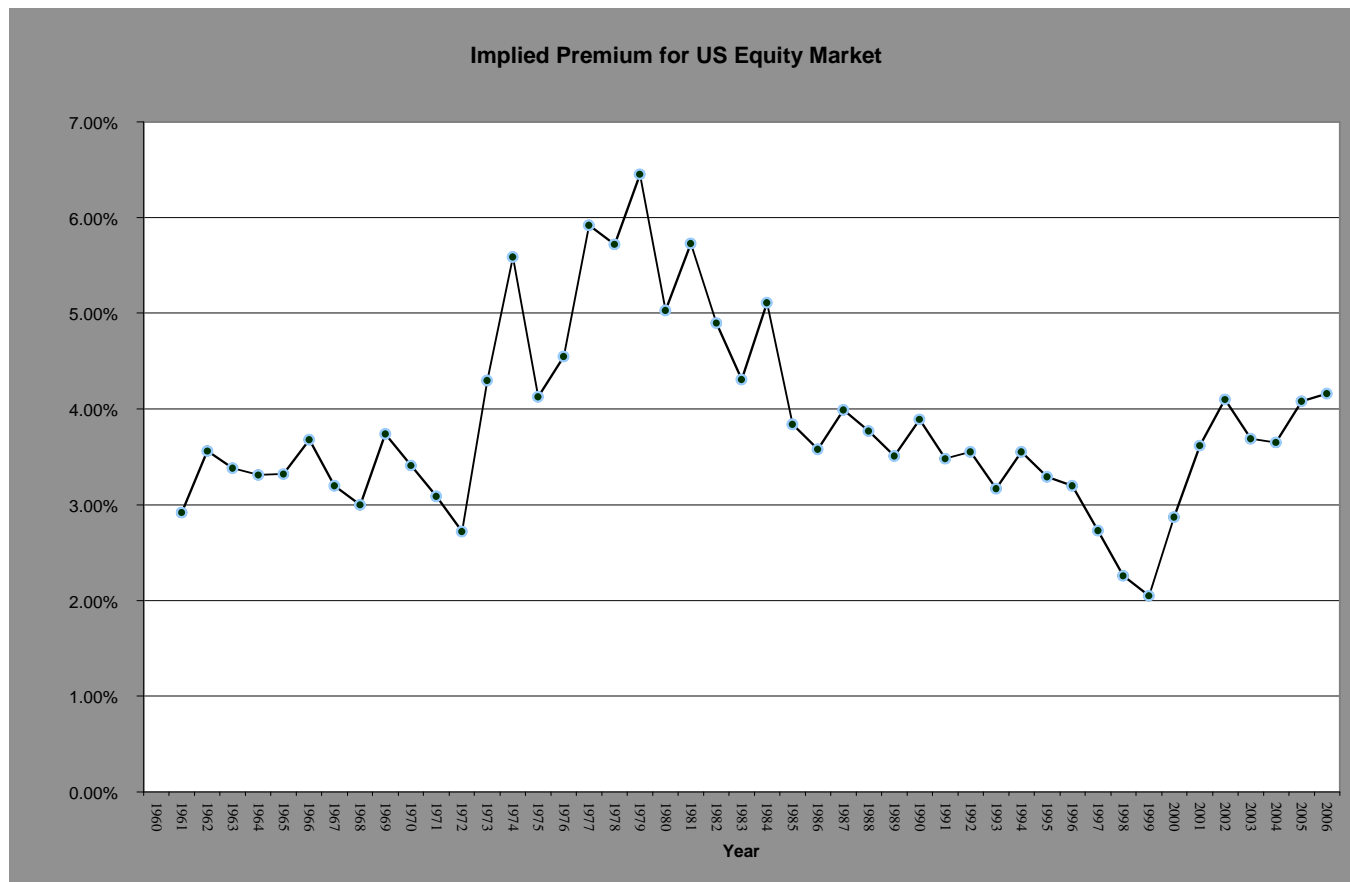
$$1418.3 = \frac{56.35}{(1+r)} + \frac{59.73}{(1+r)^2} + \frac{63.32}{(1+r)^3} + \frac{67.12}{(1+r)^4} + \frac{71.14}{(1+r)^5} + \frac{71.14(1.047)}{(r-.047)(1+r)^5}$$

- Implied Equity risk premium = Expected return on stocks - Treasury bond rate = 8.86% - 4.7% = 4.16%

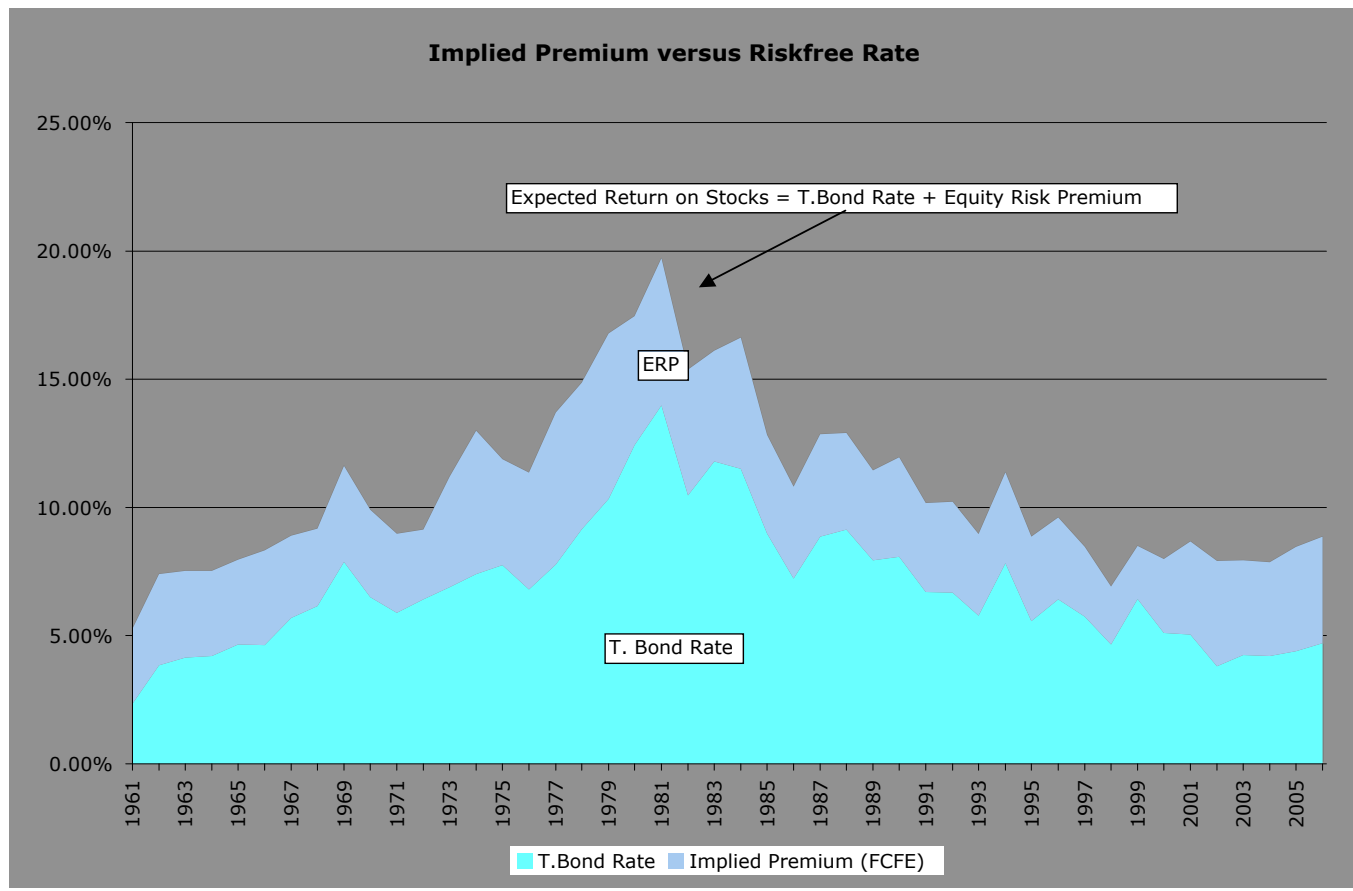
Implied Risk Premium Dynamics

- Assume that the index jumps 10% on January 2 and that nothing else changes. What will happen to the implied equity risk premium?
 - Implied equity risk premium will increase
 - Implied equity risk premium will decrease
- Assume that the earnings jump 10% on January 2 and that nothing else changes. What will happen to the implied equity risk premium?
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- Assume that the riskfree rate increases to 5% on January 2 and that nothing else changes. What will happen to the implied equity risk premium?
 - Implied equity risk premium will increase
 - Implied equity risk premium will decrease

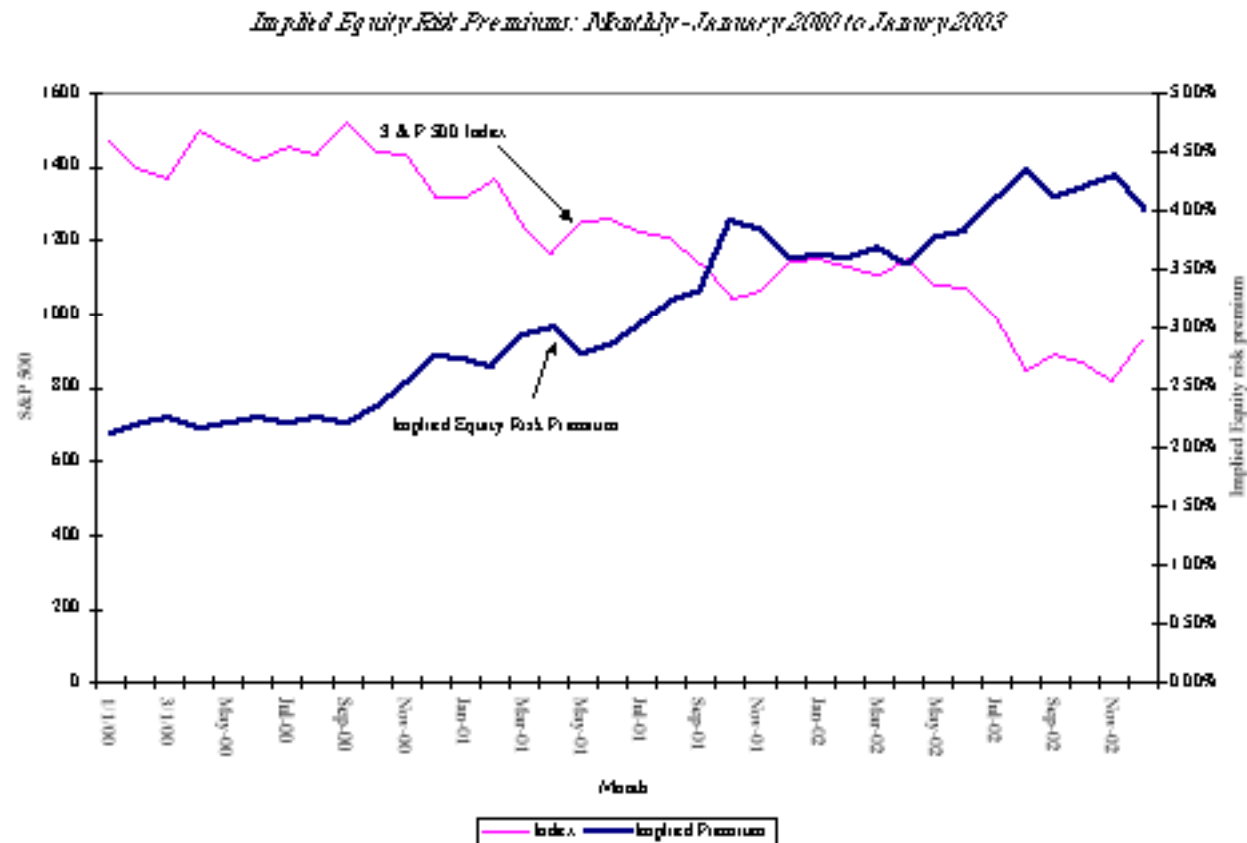
Implied Premiums in the US



Implied Premium versus RiskFree Rate



Implied Premiums: From Bubble to Bear Market... January 2000 to January 2003



Effect of Changing Tax Status of Dividends on Stock Prices - January 2003

- Expected Return on Stocks (Implied) in Jan 2003 = 7.91%
- Dividend Yield in January 2003 = 2.00%
- Assuming that dividends were taxed at 30% (on average) on 1/1/03 and that capital gains were taxed at 15%.
- After-tax expected return on stocks = $2\%(1-.3)+5.91\%(1-.15) = 6.42\%$
- If the tax rate on dividends drops to 15% and the after-tax expected return remains the same:

$$2\% (1-.15) + X\% (1-.15) = 6.42\%$$

$$\text{New Pre-tax required rate of return} = 7.56\%$$

$$\text{New equity risk premium} = 3.75\%$$

$$\text{Value of the S\&P 500 at new equity risk premium} = 965.11$$

$$\text{Expected Increase in index due to dividend tax change} = 9.69\%$$