Equity Risk Premiums (ERP): Determinants, Estimation and Implications - A post-crisis Update

October 2009

Aswath Damodaran

Stern School of Business

adamodar@stern.nyu.edu

Equity Risk Premiums (ERP): Determinants, Estimation and Implications

Equity risk premiums are a central component of every risk and return model in finance and are a key input into estimating costs of equity and capital in both corporate finance and valuation. Given their importance, it is surprising how haphazard the estimation of equity risk premiums remains in practice. We begin this paper by looking at the economic determinants of equity risk premiums, including investor risk aversion, information uncertainty and perceptions of macroeconomic risk. In the standard approach to estimating equity risk premiums, historical returns are used, with the difference in annual returns on stocks versus bonds over a long time period comprising the expected risk premium. We note the limitations of this approach, even in markets like the United States, which have long periods of historical data available, and its complete failure in emerging markets, where the historical data tends to be limited and volatile. We look at two other approaches to estimating equity risk premiums – the survey approach, where investors and managers ar asked to assess the risk premium and the implied approach, where a forward-looking estimate of the premium is estimated using either current equity prices or risk premiums in non-equity markets. We also look at the relationship between the equity risk premium and risk premiums in the bond market (default spreads) and in real estate (cap rates) and how that relationship can be mined to generated expected equity risk premiums. We close the paper by examining why different approaches yield different values for the equity risk premium, and how to choose the "right" number to use in analysis. (In an addendum, we also look at equity risk premiums during the market crisis, starting on September 12, 2008 through December 31, 2008, and then track the shift the changes through September 30, 2009.)

The notion that risk matters, and that riskier investments should have higher expected returns than safer investments, to be considered good investments, is both central to modern finance and intuitive. Thus, the expected return on any investment can be written as the sum of the riskfree rate and a risk premium to compensate for the risk. The disagreement, in both theoretical and practical terms, remains on how to measure the risk in an investment, and how to convert the risk measure into an expected return that compensates for risk. A central number in this debate is the premium that investors demand for investing in the 'average risk' equity investment, i.e., the equity risk premium.

In this paper, we begin by examining competing risk and return models in finance and the role played by equity risk premiums in each of them. We argue that equity risk premiums are central components in every one of these models and consider what the determinants of these premiums might be. We follow up by looking at three approaches for estimating the equity risk premium in practice. The first is to survey investors or managers with the intent of finding out what they require as a premium for investing in equity as a class, relative to the riskfree rate. The second is to look at the premiums earned historically by investing in stocks, as opposed to riskfree investments. The third is to back out an equity risk premium from market prices today. We consider the pluses and minuses of each approach and how to choose between the very different numbers that may emerge from these approaches.

Equity Risk Premiums: Importance and Determinants

Since the equity risk premium is a key component of every valuation, we should begin by looking at not only why it matters in the first place but also the factors that influence its level at any point in time and why that level changes over time. In this section, we look at the role played by equity risk premiums in corporate financial analysis, valuation and portfolio management, and then consider the determinants of equity risk premiums.

Why does the equity risk premium matter?

The equity risk premium reflects fundamental judgments we make about how much risk we see in an economy/market and what price we attach to that risk. In the process, it affects the expected return on every risky investment and the value that we estimate for that investment. Consequently, it makes a difference in both how we allocate wealth across different asset classes and which specific assets or securities we invest in within each asset class.

A Price for Risk

To illustrate why the equity risk premium is the price attached to risk, consider an alternate (though unrealistic) world where investors are risk neutral. In this world, the value of an asset would be the present value of expected cash flows, discounted back at a risk free rate. The expected cash flows would capture the cash flows under all possible scenarios (good and bad) and there would be no risk adjustment needed. In the real world, investors are risk averse and will pay a lower price for risky cash flows than for riskless cash flows, with the same expected value. How much lower? That is where equity risk premiums come into play. In effect, the equity risk premium is the premium that investors demand for the average risk investment, and by extension, the discount that they apply to expected cash flows with average risk. When equity risk premiums rise, investors are charging a higher price for risk and will therefore pay lower prices for the same set of risky expected cash flows.

Expected Returns and Discount Rates

Building on the theme that the equity risk premium is the price for taking risk, it is a key component into the expected return that we demand for a risky investment. This expected return, is a determinant of both the cost of equity and the cost of capital, essential inputs into corporate financial analysis and valuation.

While there are several competing risk and return models in finance, they all share some common views about risk. First, they all define risk in terms of variance in actual returns around an expected return; thus, an investment is riskless when actual returns are always equal to the expected return. Second, they argue that risk has to be measured from the perspective of the marginal investor in an asset, and that this marginal investor is well diversified. Therefore, the argument goes, it is only the risk that an investment adds on to a diversified portfolio that should be measured and compensated. In fact, it is this view of risk that leads us to break the risk in any investment into two components. There is a firm-specific component that measures risk that relates only to that investment or to a few investments like it, and a market component that contains risk that affects a large subset or all investments. It is the latter risk that is not diversifiable and should be rewarded.

All risk and return models agree on this fairly crucial distinction, but they part ways when it comes to how to measure this market risk. In the capital asset pricing model (CAPM), the market risk is measured with a beta, which when multiplied by the equity risk premium yields the total risk premium for a risky asset. In the competing models, such as the arbitrage pricing and multi-factor models, betas are estimated against

individual market risk factors, and each factor has it own price (risk premium). Table 1 summarizes four models, and the role that equity risk premiums play in each one:

Table 1: Equity Risk Premiums in Risk and Return Models

	Model	*Equity Risk Premium*
The CAPM	Expected Return = Riskfree Rate + $\text{Beta}_{\text{Asset}}$ (Equity Risk Premium)	Risk Premium for investing in the market portfolio, which includes all risky assets, relative to the riskless rate.
Arbitrage pricing model (APM)	$\text{Expected Return} = \text{Riskfree Rate} + \sum_{j=1}^{j=k} \beta_j (\text{Risk Premium}_j)$	Risk Premiums for individual (unspecified) market risk factors.
Multi-Factor Model	$\text{Expected Return} = \text{Riskfree Rate} + \sum_{j=1}^{j=k} \beta_j (\text{Risk Premium}_j)$	Risk Premiums for individual (specified) market risk factors
Proxy Models	Expected Return = a + b (Proxy 1) + c (Proxy 2) (where the proxies are firm characteristics such as market capitalization, price to book ratios or retuen momentum)	No explicit risk premium computation, but coefficients on proxies reflect risk preferences.

All of the models other than proxy models require three inputs. The first is the riskfree rate, simple to estimate in currencies where a default free entity exists, but more complicated in markets where there are no default free entities. The second is the beta (in the CAPM) or betas (in the APM or multi-factor models) of the investment being analyzed, and the third is the appropriate risk premium for the portfolio of all risky assets (in the CAPM) and the factor risk premiums for the market risk factors in the APM and multi-factor models. While we examine the issues of riskfree rate and beta estimation in companion pieces[1], we will concentrate on the measurement of the risk premium in this paper.

Note that the equity risk premium in all of these models is a market-wide number, in the sense that it is not company specific or asset specific but affects expected returns on all risky investments. Using a larger equity risk premium will increase the expected returns for all risky investments, and by extension, reduce their value. Consequently, the choice of an equity risk premium may have much larger consequences for value than firm-specific inputs such as cashflows, growth and even firm-specific risk measures (such as betas).

[1] See *Estimating Riskfree Rates* and *Estimating Risk Parameters*, A. Damodaran". Working paper, http://www.stern.nyu.edu/~adamodar.

Investment and Policy Implications

It may be tempting for those not in the midst of valuation or corporate finance analysis to pay little heed to the debate about equity risk premium, but it would be a mistake to do so, since its effects are far reaching.

- The amounts set aside by both corporations and governments to meet future pension fund and health care obligations are determined by their expectations of returns from investing in equity markets, i.e., their views on the equity risk premium. Assuming that the equity risk premium is 6% will lead to far less being set aside each year to cover future obligations than assuming a premium of 4%. If the actual premium delivered by equity markets is only 2%, the fund's assets will be insufficient to meet its liabilities, leading to fund shortfalls which have to be met by raising taxes (for governments) or reducing profits (for corporations) In some cases, the pension benefits can be put at risk, if plan administrators use unrealistically high equity risk premiums, and set aside too little each year.
- Business investments in new assets and capacity is determined by whether the businesses think they can generate higher returns on those investments than the cost that they attach to the capital in that investment. If equity risk premiums increase, the cost of equity and capital will have to increase with them, leading to less overall investment in the economy and lower economic growth.
- Regulated monopolies, such as utility companies, are often restricted in terms of the prices that they charge for their products and services. The regulatory commissions that determine "reasonable" prices base them on the assumption that these companies have to earn a fair rate of return for their equity investors. To come up with this fair rate of return, they need estimates of equity risk premiums; using higher equity risk premiums will translate into higher prices for the customers in these companies.[2]
- Judgments about how much you should save for your retirement or health care and where you should invest your savings are clearly affected by how much return you think you can make on your investments. Being over optimistic about equity risk premiums will lead you to save too little to meet future needs and to over investment in risky asset classes.

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[2] The Society of Utility and Regulatory Financial Analysts (SURFA) has annual meetings of analysts involved primarily in this debate. Not surprisingly, they spend a good chunk of their time discussing equity risk premiums, with analysts working for the utility firms arguing for higher equity risk premiums and analysts working for the state or regulatory authorities wanting to use lower risk premiums.

Thus, the debate about equity risk premiums has implications for almost every aspect of our lives.

What are the determinants of equity risk premiums?

Before we consider different approaches for estimating equity risk premiums, we should examine the factors that determine equity risk premiums. After all, equity risk premiums should reflect not only the risk that investors see in equity investments but also the price they put on that risk.

Risk Aversion

The first and most critical factor, obviously, is the risk aversion of investors in the markets. As investors become more risk averse, equity risk premiums will climb, and as risk aversion declines, equity risk premiums will fall. While risk aversion will vary across investors, it is the collective risk aversion of investors that determines equity risk premium, and changes in that collective risk aversion will manifest themselves as changes in the equity risk premium. While there are numerous variables that influence risk aversion, we will focus on the variables most likely to change over time.

a. Investor Age: There is substantial evidence that individuals become more risk averse as they get older. The logical follow up to this is that markets with older investors, in the aggregate, should have higher risk premiums than markets with younger investors, for any given level of risk. Bakshi and Chen (1994), for instance, examine risk premiums in the United States and noted an increase in risk premiums as investors aged.[3]
b. Preference for current consumption: We would expect the equity risk premium to increase as investor preferences for current over future consumption increase. Put another way, equity risk premiums should be lower, other things remaining equal, in markets where individuals are net savers than in markets where individuals are net consumers. Consequently, equity risk premiums should increase as savings rates decrease in an economy.

Relating risk aversion to expected equity risk premiums is not as easy as it looks. While the direction of the relationship is fairly simple to establish – higher risk aversion should translate into higher equity risk premiums- getting beyond that requires us to be more precise in our judgments about investor utility functions, specifying how investor utility relates to wealth (and variance in that wealth). As we will see later in this paper, there has

[3] Bakshi, G. S., and Z. Chen, 1994, *Baby Boom, Population Aging, and Capital Markets*, The Journal of Business, LXVII, 165-202.

been a significant angst among financial economics that most conventional utility models do not do a good job of explaining observed equity risk premiums.

Economic Risk

The risk in equities as a class comes from more general concerns about the health and predictability of the overall economy. Put in more intuitive terms, the equity risk premium should be lower in an economy with predictable inflation, interest rates and economic growth than in one where these variables are volatile. Lettau, Ludwigson and Wachter (2007) link the changing equity risk premiums in the United States to shifting volatility in the real economy.[4] In particular, they attribute that that the lower equity risk premiums of the 1990s (and higher equity values) to reduced volatility in real economic variables including employment, consumption and GDP growth. One of the graphs that they use to illustrate the correlation looks at the relationship between the volatility in GDP growth and the dividend/ price ratio (which is the loose estimate that they use for equity risk premiums), and it is reproduced in figure 1.

Figure 1: Volatility in GDP growth and Equity Risk Premiums (US)

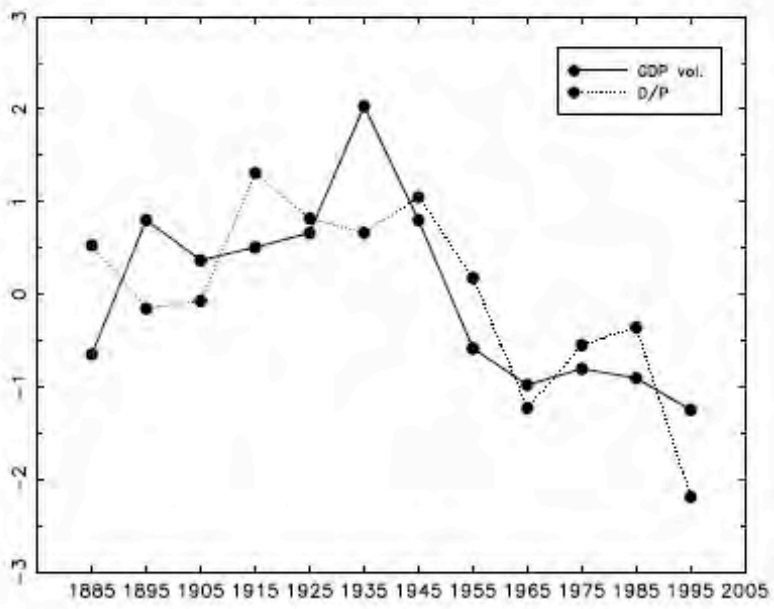

Figure 3
GDP volatility and the D/P ratio—Prewar evidence
This figure plots the standard deviations of GDP growth and the mean D/P ratio by decade starting in 1880 until 2000. Both series are demeaned and divided by their standard deviation. The GDP data are from Ray Fair's website (http://fairmodel.econ.yale.edu/RAYFAIR/PDF/2002DTBL.HTM) based on Balke and Gordon (1989). The dividend yield data is from Robert Shiller's website (http://aida.econ.yale.edu/~shiller/data/ie_data.htm).

[4] Lettau, M., S.C. Ludvigson and J.A. Wachter, 2008. *The Declining Equity Risk Premium: What role does macroeconomic risk play?* Review of Financial Studies, v21, 1653-1687.

Note how closely the dividend yield has tracked the volatility in the real economy over this very long time period.

A related strand of research examines the relationship between equity risk premium and inflation, with mixed results. Studies that look at the relationship between the level of inflation and equity risk premiums find little or no correlation. In contrast, Brandt and Wang (2003) argue that news about inflation dominates news about real economic growth and consumption in determining risk aversion and risk premiums.[5] They present evidence that equity risk premiums tend to increase if inflation is higher than anticipated and decrease when it is lower than expected. Reconciling the findings, it seems reasonable to conclude that it is not so much the level of inflation that determines equity risk premiums but uncertainty about that level.

Information

When you invest in equities, the risk in the underlying economy is manifested in volatility in the earnings and cash flows reported by individual firms in that economy. Information about these changes is transmitted to markets in multiple ways, and it is clear that there have been significant changes in both the quantity and quality of information available to investors over the last two decades. During the market boom in the late 1990s, there were some who argued that the lower equity risk premiums that we observed in that period were reflective of the fact that investors had access to more information about their investments, leading to higher confidence and lower risk premiums in 2000. After the accounting scandals that followed the market collapse, there were others who attributed the increase in the equity risk premium to deterioration in the quality of information as well as information overload. In effect, they were arguing that easy access to large amounts of information of varying reliability was making investors less certain about the future.

As these contrary arguments suggest, the relationship between information and equity risk premiums is complex. More precise information should lead to lower equity risk premiums, other things remaining equal. However, precision here has to be defined in terms of what the information tells us about future earnings and cash flows. Consequently, it is possible that providing more information about last period's earnings may create more uncertainty about future earnings, especially since investors often disagree about how best to interpret these numbers. Yee (2006) defines earnings quality

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[5] Brandt, M.W., K.Q. Wang (2003). *Time-varying risk aversion and unexpected inflation*, Journal of Monetary Economics, v50, pp. 1457-1498.

in terms of volatility of future earnings and argues that equity risk premiums should increase (decrease) as earnings quality decreases (increases).[6]

Empirically, is there a relationship between earnings quality and observed equity risk premiums? The evidence is mostly anecdotal, but there are several studies that point to the deteriorating quality of earnings in the United States, with the blame distributed widely. First, the growth of technology and service firms has exposed inconsistencies in accounting definitions of earnings and capital expenditures – the treatment of R&D as an operating expense is a prime example. Second, audit firms have been accused of conflicts of interest leading to the abandonment of their oversight responsibility. Finally, the earnings game, where analysts forecast what firms will earn and firms then try to beat these forecasts has led to the stretching (and breaking) of accounting rules and standards. If earnings have become less informative in the aggregate, it stands to reason that equity investors will demand large equity risk premiums to compensate for the added uncertainty.

Information differences may be one reason why investors demand larger risk premiums in some emerging markets than in others. After all, markets vary widely in terms of transparency and information disclosure requirements. Markets like Russia, where firms provide little (and often flawed) information about operations and corporate governance, should have higher risk premiums than markets like India, where information on firms is not only more reliable but also much more easily accessible to investors.

Liquidity

In addition to the risk from the underlying real economy and imprecise information from firms, equity investors also have to consider the additional risk created by illiquidity. If investors have to accept large discounts on estimated value or pay high transactions costs to liquidate equity positions, they will be pay less for equities today (and thus demand a large risk premium).

The notion that market for publicly traded stocks is wide and deep has led to the argument that the net effect of illiquidity on aggregate equity risk premiums should be small. However, there are two reasons to be skeptical about this argument. The first is that not all stocks are widely traded and illiquidity can vary widely across stocks; the cost of trading a widely held, large market cap stock is very small but the cost of trading an over-the-counter stock will be much higher. The second is that the cost of illiquidity in

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[6] Yee, K. K., 2006, *Earnings Quality and the Equity Risk Premium*, Working Paper, Columbia University.

the aggregate can vary over time, and even small variations can have significant effects on equity risk premiums. In particular, the cost of illiquidity seems to increase when economies slow down and during periods of crisis, thus exaggerating the effects of both phenomena on the equity risk premium.

While much of the empirical work on liquidity has been done on cross sectional variation across stocks (and the implications for expected returns), there have been attempts to extend the research to look at overall market risk premiums. Gibson and Mougeot (2002) look at U.S. stock returns from 1973 to 1997 and conclude that liquidity accounts for a significant component of the overall equity risk premium, and that its effect varies over time.[7] Baekart, Harvey and Lundblad (2006) present evidence that the differences in equity returns (and risk premiums) across emerging markets can be partially explained by differences in liquidity across the markets.[8]

Catastrophic Risk

When investing in equities, there is always the potential for catastrophic risk, i.e. events that occur infrequently but can cause dramatic drops in wealth. Examples in equity markets would include the great depression from 1929-30 in the United States and the collapse of Japanese equities in the last 1980s. In cases like these, many investors exposed to the market declines saw the values of their investments drop so much that it was unlikely that they would be made whole again in their lifetimes.[9] While the possibility of catastrophic events occurring may be low, they cannot be ruled out and the equity risk premium has to reflect that risk.

Rietz (1988) uses the possibility of catastrophic events to justify equity risk premiums and Barro (2006) extends this argument. In the latter's paper, the catastrophic risk is modeled as both a drop in economic output (an economic depression) and partial default by the government on its borrowing.[10] Both models yield equity risk premiums close to what we have observed in the United States over the last few decades.

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[7] Gibson R., Mougeot N., 2004, *The Pricing of Systematic Liquidity Risk: Empirical Evidence from the US Stock Market*. Journal of Banking and Finance, v28: 157–78.

[8] Bekaert G., Harvey C. R., Lundblad C., 2006, *Liquidity and Expected Returns: Lessons from Emerging Markets*, The Review of Financial Studies.

[9] An investor in the US equity markets who invested just prior to the crash of 1929 would not have seen index levels return to pre-crash levels until the 1940s. An investor in the Nikkei in 1987, when the index was at 40000, would still be facing a deficit of 50% (even after counting dividends) in 2008,

[10] Rietz, T. A., 1988, *The equity premium~: A solution*, Journal of Monetary Economics, v22, 117-131; Barro R J., 2006, *Rare Disasters and Asset Markets in the Twentieth Century*, Quarterly Journal of Economics, August, 823-866

The banking and financial crisis of 2008, where financial and real estate markets plunged in the last quarter of the year, has provided added ammunition to this school. As we will see later in the paper, risk premiums in all markets (equity, bond and real estate) climbed sharply during the weeks of the market crisis.

The behavioral/ irrational component

Investors do not always behave rationally, and there are some who have argued that equity risk premiums are determined, at least partially, by quirks in human behavior. While there are several strands to this analysis, we will focus on two:

a. The Money Illusion: As equity prices declined significantly and inflation rates increased in the late 1970s, Modigliani and Cohn (1979) argued that low equity values of that period were the consequence of investors being inconsistent about their dealings with inflation. They argued that investors were guilty of using historical growth rates in earnings, which reflected past inflation, to forecast future earnings, but current interest rates, which reflected expectations of future inflation, to estimate discount rates.[11] When inflation increases, this will lead to a mismatch, with high discount rates and low cash flows resulting in asset valuations that are too low (and risk premiums that are too high). In the Modigliani-Cohn model, equity risk premiums will rise in periods when inflation is higher than expected and drop in periods when inflation in lower than expected. Campbell and Voulteenaho (2004) update the Modigliani-Cohn results by relating changes in the dividend to price ratio to changes in the inflation rate over time and find strong support for the hypothesis.[12]
b. Narrow Framing: In conventional portfolio theory, we assume that investors assess the risk of an investment in the context of the risk it adds to their overall portfolio, and demand a premium for this risk. Behavioral economists argue that investors offered new gambles often evaluate those gambles in isolation, separately from other risks that they face in their portfolio, leading them to over estimate the risk of the gamble. In the context of the equity risk premium, Benartzi and Thaler (1995) use this "narrow framing" argument to argue that

[11] Modigliani, Franco and Cohn, Richard. 1979, *Inflation, Rational Valuation, and the Market*, Financial Analysts Journal, v37(3), pp. 24-44.

[12] Campbell, J.Y. and T. Vuolteenaho, 2004, *Inflation Illusion and Stock Prices,* American Economic Review, v94, 19-23.

investors over estimate the risk in equity, and Barberis, Huang and Santos (2001) build on this theme.[13]

The Equity Risk Premium Puzzle

While many researchers have focused on individual determinants of equity risk premiums, there is a related question that has drawn almost as much attention. Are the equity risk premiums that we have observed in practice compatible with the theory? Mehra and Prescott (1985) fired the opening shot in this debate by arguing that the observed historical risk premiums (which they estimated at about 6% at the time of their analysis) were too high, and that investors would need implausibly high risk-aversion coefficients to demand these premiums.[14] In the years since, there have been many attempts to provide explanations for this puzzle:

1. Statistical artifact: The historical risk premium obtained by looking at U.S. data is biased upwards because of a survivor bias (induced by picking one of the most successful equity markets of the twentieth century). The true premium, it is argued, is much lower. This view is backed up by a study of large equity markets over the twentieth century, which concluded that the historical risk premium is closer to 4% than the 6% cited by Mehra and Prescott.[15] However, even the lower risk premium would still be too high, if we assumed reasonable risk aversion coefficients.
2. Disaster Insurance: A variation on the statistical artifact theme, albeit with a theoretical twist, is that the observed volatility in an equity market does not fully capture the potential volatility, which could include rare but disastrous events that reduce consumption and wealth substantially. Reitz, referenced earlier, argues that investments that have dividends that are proportional to consumption (as stocks do) should earn much higher returns than riskless investments to compensate for the possibility of a disastrous drop in consumption. Prescott and Mehra (1988) counter than the required drops in consumption would have to be of such a large magnitude to explain observed premiums that this solution is not viable. [16]

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[13] Benartzi, S. and R. Thaler, 1995, *Myopic Loss Aversion and the Equity Premium Puzzle*, Quarterly Journal of Economics.

[14] Mehra, Rajnish, and Edward C.Prescott, 1985, *The Equity Premium: A Puzzle*, Journal of Monetary Economics, v15, 145–61. Using a constant relative risk aversion utility function and plausible risk aversion coefficients, they demonstrate the equity risk premiums should be much lower (less than 1%).

[15] Dimson, E., P. March and M. Staunton, 2002, *Triumph of the Optimists*, Princeton University Press.

[16] Mehra, R. and E.C. Prescott, 1988, *The Equity Risk Premium: A Solution?* Journal of Monetary Economics, v22, 133-136.

3. Taxes: One possible explanation for the high equity returns in the period after the Second World War is the declining marginal tax rate during that period. McGrattan and Prescott (2001), for instance, provide a hypothetical illustration where a drop in the tax rate on dividends from 50% to 0% over 40 years would cause equity prices to rise about 1.8% more than the growth rate in GDP; adding the dividend yield to this expected price appreciation generates returns similar to the observed equity risk premium.[17] In reality, though, the drop in marginal tax rates was much smaller and cannot explain the surge in equity risk premiums.
4. Alternative Preference Structures: There are some who argue that the equity risk premium puzzle stems from its dependence upon conventional expected utility theory to derive premiums. In particular, the constant relative risk aversion (CRRA) function used by Mehra and Prescott in their paper implies that if an investor is risk averse to variation in consumption across different states of nature at a point in time, he or she will also be equally risk averse to consumption variation across time. Epstein and Zin consider a class of utility functions that separate risk aversion (to consumption variation at a point in time) from risk aversion to consumption variation across time. They argue that individuals are much more risk averse when it comes to the latter and claim that this phenomenon explain the larger equity risk premiums.[18] Put in more intuitive terms, individuals will choose a lower and more stable level of wealth and consumption that they can sustain over the long term over a higher level of wealth and consumption that varies widely from period to period. Constantinides (1990) adds to this argument by noting that individuals become used to maintaining past consumption levels and that even small changes in consumption can cause big changes in marginal utility. The returns on stocks are correlated with consumption, decreasing in periods when people have fewer goods to consume (recessions, for instance); the additional risk explains the higher observed equity risk premiums.[19]
5. Myopic Loss Aversion: Myopic loss aversion refers to the finding in behavioral finance that the loss aversion already embedded in individuals becomes more pronounced as the frequency of their monitoring increases. Thus, investors who

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[17] McGrattan, E.R., and E.C. Prescott. 2001, *Taxes, Regulations, and Asset Prices*, Working Paper No. 610, Federal Reserve Bank of Minneapolis.

[18] Epstein, L.G., and S.E. Zin. 1991. *Substitution, Risk Aversion, and the Temporal Behavior of Consumption and Asset Returns: An Empirical Analysis*, Journal of Political Economy, v99, no. 2 (April):263–286.

[19] Constantinides, G.M. 1990. *Habit Formation: A Resolution of the Equity Premium Puzzle*, Journal of Political Economy, v98, no. 3 (June):519–543.

receive constant updates on equity values actually perceive more risk in equities, leading to higher risk premiums. The paper that we cited earlier by Benartzi and Thaler yields estimates of the risk premium very close to historical levels using a one-year time horizon for investors with plausible loss aversion characteristics (of about 2, which is backed up by the experimental research).

In conclusion, it is not quite clear what to make of the equity risk premium puzzle. It is true that historical risk premiums are higher than could be justified using conventional utility models for wealth. However, that may tell us more about the dangers of using historical data and the failures of classic utility models than they do about equity risk premiums.

Estimation Approaches

There are three broad approaches used to estimate equity risk premiums. One is to survey subsets of investors and managers to get a sense of their expectations about equity returns in the future. The second is to assess the returns earned in the past on equities relative to riskless investments and use this historical premium as the expectation. The third is to attempt to estimate a forward-looking premium based on the market rates or prices on traded assets today; we will categorize these as implied premiums.

Survey Premiums

If the equity risk premium is what investors demand for investing in risky assets today, the most logical way to estimate it is to ask these investors what they require as expected returns. Since investors in equity markets number in the millions, the challenge is often finding a subset of investors that best reflects the aggregate market. In practice, se see surveys of investors, managers and even academics, with the intent of estimating an equity risk premium.

Investors

When surveying investors, we can take one of two tacks. The first is to focus on individual investors and get a sense of what they expect returns on equity markets to be in the future. The second is to direct the question of what equities will deliver as a premium at portfolio managers and investment professionals, with the rationale that their expectations should matter more in the aggregate, since they have the most money to invest.

a. Individual Investors: The oldest continuous index of investor sentiment about equities was developed by Robert Shiller in the aftermath of the crash of 1987 and

has been updated since.[20] UBS/Gallup has also polled individual investors since 1996 about their optimism about future stock prices and reported a measure of investor sentiment.[21] While neither survey provides a direct measure of the equity risk premium, they both yield broad measure of where investors expect stock prices to go in the near future. The Securities Industry Association (SIA) surveyed investors from 1999 to 2004 on the expected return on stocks and yields numbers that can be used to extract equity risk premiums. In the 2004 survey, for instance, they found that the medina expected return across the 1500 U.S. investors they questioned was 12.8%, yielding a risk premium of roughly 8.3% over the treasury bond rate at that time.[22]

b. Institutional Investors/ Investment Professionals: Investors Intelligence, an investment service, tracks more than a hundred newsletters and categorizes them as bullish, bearish or neutral, resulting in a consolidated advisor sentiment index about the future direction of equities. Like the Shiller and UBS surveys, it is a directional survey that does not yield an equity risk premium. Merrill Lynch, in its monthly survey of more than 300 institutional investors globally, explicitly poses the question about equity risk premiums to these investors. In its February 2007 report, for instance, Merrill reported an average equity risk premium of 3.5% from the survey, but that number jumped to 4.1% by March, after a market downturn.[23] As markets settled down in 2009, the survey premium has also settled back to 3.8%.

While survey premiums have become more accessible, very few practitioners seem to be inclined to use the numbers from these surveys in computations and there are several reasons for this reluctance:

1. Survey risk premiums are responsive to recent stock prices movements, with survey numbers generally increasing after bullish periods and decreasing after market decline. Thus, the peaks in the SIA survey premium of individual investors occurred in the bull market of 1999, and the more moderate premiums of 2003 and 2004 occurred after the market collapse in 2000 and 2001.

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[20] The data is available at http://icf.som.yale.edu/Confidence.Index.

[21] The data is available at http://www.ubs.com/1/e/about/research/indexofinvestoroptimism/pressroomeu_5/uspressroom/archive.html

[22] See http://www.sifma.org/research/surveys/Surveys.html . The 2004 survey seems to be the last survey done by SIA. The survey yielded expected stock returns of 10% in 2003, 13% in 2002, 19% in 2001, 33% in 2000 and 30% in 1999.

[23] See http://www.ml.com/index.asp?id=7695_8137_47928.

2. Survey premiums are sensitive not only to whom the question is directed at but how the question is asked. For instance, individual investors seem to have higher (and more volatile) expected returns on equity than institutional investors and the survey numbers vary depending upon the framing of the question.[24]
3. Studies that have looked at the efficacy of survey premiums indicate that if they have any predictive power, it is in the wrong direction. Fisher and Statman (2000) document the negative relationship between investor sentiment (individual and institutional) and stock returns.[25] In other words, investors becoming more optimistic (and demanding a larger premium) is more likely to be a precursor to poor (rather than good) market returns.

As technology aids the process, the number and sophistication of surveys of both individual and institutional investors will also increase. However, it is also likely that these survey premiums will be more reflections of the recent past rather than good forecasts of the future.

Managers

As noted in the first section, equity risk premiums are a key input not only in investing but also in corporate finance. The hurdle rates used by companies – costs of equity and capital – are affected by the equity risk premiums that they use and have significant consequences for investment, financing and dividend decisions. Graham and Harvey have been conducting annual surveys of Chief Financial Officers (CFOs) or companies for roughly the last decade with the intent of estimating what these CFOs think is a reasonable equity risk premium (for the next 10 years over the ten-year bond rate). In the 2009 survey, they report an average equity risk premium of 4.74% across survey respondents and a median premium of 4.3%, up from 3.8% and 4.2% a year prior.[26] They also report significant dispersion with the expected return on the market ranging from 1.27% to 12.4% at the tenth percentile at each end of the spectrum.

To get a sense of how these assessed equity risk premiums have behaved over time, we have graphed the average and median values of the premium and the cross

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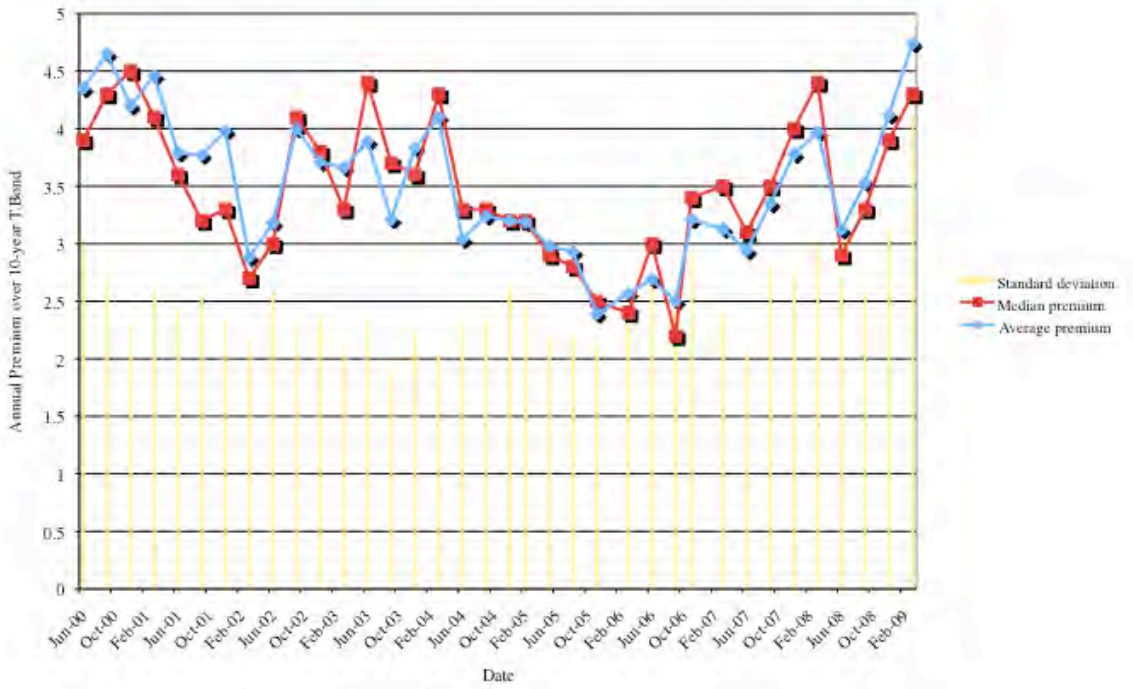
[24] Asking the question "What do you think stocks will do next year?" generates different numbers than asking "What should the risk premium be for investing in stocks?"

[25] Fisher, K.L., and M. Statman, 2000, *Investor Sentiment and Stock Returns*, Financial Analysts Journal, v56, 16-23.

[26] Graham, J.R. and C.R. Harvey, 2008, *The Equity Risk Premium in 2008: Evidence from the Global CFO Outlook Survey*, Working paper, SSRN. See also Graham, J.R. and C.R. Harvey, 2009, *The Equity Risk Premium amid a Global Financial Crisis*, Working paper, SSRN

sectional standard deviation in the estimates in each CFO survey, from 2001 to 2009, in Figure 2.

Figure 2: CFO Survey Premiums



Note the previous survey premium peak was in September 2000 at 4.65% and had its lowest recording (2.47%) in September 2006. The average across all 8 years of surveys (about 9000 surveys) was 3.51%, but the standard deviation in the survey responses has crept up in recent years.

Academics

Academics are neither big players in equity markets nor do they make many major corporate finance decisions. Notwithstanding this lack of real world impact, what they think about equity risk premiums may matter for two reasons. The first is that many of the portfolio managers and CFOs that were surveyed in the last two sub-sections received their first exposure to the equity risk premium debate in the classroom and may have been influenced by what was presented as the right risk premium in that setting. The second is that practitioners often offer academic work (textbooks and papers) as backing for the numbers that they use.

Welch (2000) surveyed 226 financial economists on the magnitude of the equity risk premium and reported interesting results. On average, economists forecast an average annual risk premium (arithmetic) of about 7% for a ten-year time horizon and 6-

7% for one to five-year time horizons. As with the other survey estimates, there is a wide range on the estimates, with the premiums ranging from 2% at the pessimistic end to 13% at the optimistic end. Interestingly, the survey also indicates that economists believe that their estimates are higher than the consensus belief and try to adjust the premiums down to reflect that view.[27] Fernandez (2009) examined widely used textbooks in corporate finance and valuation and noted that equity risk premiums varied widely across the books and that the moving average premium has declined from 8.4% in 1990 to 5.7% in 2008.[28]

At the risk of sounding harsh, the risk premiums in academic surveys indicate how far removed most academics are from the real world of valuation and corporate finance and how much of their own thinking is framed by the historical risk premiums they were exposed to back when they were graduate students. The risk premiums that are presented in classroom settings are not only much higher than the risk premiums in practice but also contradict other academic research (see the equity risk premium puzzle) that indicates that even the more moderate premiums used by practitioners in too high. In fact, if academics were investors and CFOs, not only would we seldom invest in equities, but few firms would ever make real investments and fewer still would add value by doing so.

Historical Premiums

While our task is to estimate equity risk premiums in the future, much of the data we use to make these estimates is in the past. Most investors and managers, when asked to estimate risk premiums, look at historical data. In fact, the most widely used approach to estimating equity risk premiums is the historical premium approach, where the actual returns earned on stocks over a long time period is estimated, and compared to the actual returns earned on a default-free (usually government security). The difference, on an annual basis, between the two returns is computed and represents the historical risk premium. In this section, we will take a closer look at the approach.

Estimation Questions and Consequences

While users of risk and return models may have developed a consensus that historical premium is, in fact, the best estimate of the risk premium looking forward, there are surprisingly large differences in the actual premiums we observe being used in

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[27] Welch, I., 2000, *Views of Financial Economists on the Equity Premium and on Professional Controversies*, Journal of Business, v73, 501-537.

[28] Fernandez, P., 2009, *The Equity Premium in 150 Textbooks*, Working Paper, SSRN. He notes that the risk premium actually varies within the book in as many as a third of the textbooks surveyed.

practice, with the numbers ranging from 3% at the lower end to 12% at the upper end. Given that we are almost all looking at the same historical data, these differences may seem surprising. There are, however, three reasons for the divergence in risk premiums: different time periods for estimation, differences in riskfree rates and market indices and differences in the way in which returns are averaged over time.

1. Time Period

Even if we agree that historical risk premiums are the best estimates of future equity risk premiums, we can still disagree about how far back in time we should go to estimate this premium. Ibbotson Associates, which is the most widely used estimation service, has stock return data and risk free rates going back to 1926,[29] and there are other less widely used databases that go further back in time to 1871 or even to 1792.[30]

While there are many analysts who use all the data going back to the inception date, there are almost as many analysts using data over shorter time periods, such as fifty, twenty or even ten years to come up with historical risk premiums. The rationale presented by those who use shorter periods is that the risk aversion of the average investor is likely to change over time, and that using a shorter and more recent time period provides a more updated estimate. This has to be offset against a cost associated with using shorter time periods, which is the greater noise in the risk premium estimate. In fact, given the annual standard deviation in stock prices[31] between 1926 and 2008 of 20%, the standard error[32] associated with the risk premium estimate can be estimated in table 2 follows for different estimation periods:

Table 2: Standard Errors in Historical Risk Premiums

Estimation Period	*Standard Error of Risk Premium Estimate*
5 years	20%/ √5 = 8.94%
10 years	20%/ √10 = 6.32%

[29] Ibbbotson Associates, Stocks, Bonds, Bills and Inflation, 2007 Edition.

30 Siegel, in his book, Stocks for the Long Run, estimates the equity risk premium from 1802-1870 to be 2.2% and from 1871 to 1925 to be 2.9%. (Siegel, Jeremy J., Stocks for the Long Run, Second Edition, McGraw Hill, 1998). Goetzmann and Ibbotson estimate the premium from 1792 to 1925 to be 3.76% on an arithmetic average basis and 2.83% on a geometric average basis. Goetzmann. W.N. and R. G. Ibbotson, 2005, History and the Equity Risk Premium, Working Paper, Yale University.

[31] For the historical data on stock returns, bond returns and bill returns check under "updated data" in www.stern.nyu.edu/~adamodar

[32] The standard deviation in annual stock returns between 1928 and 2008 is 20.36%; the standard deviation in the risk premium (stock return – bond return) is a little higher at 21.6%. These estimates of the standard error are probably understated, because they are based upon the assumption that annual returns are uncorrelated over time. There is substantial empirical evidence that returns are correlated over time, which would make this standard error estimate much larger.

25 years	20% / √25 = 4.00%
50 years	20% / √50 = 2.83%
80 years	20% / √80 = 2.23%

Even using the entire Ibbotson data (approximately 80 years) yields a substantial standard error of 2.23%. Note that that the standard errors from ten-year and twenty-year estimates are likely to be almost as large or larger than the actual risk premium estimated. This cost of using shorter time periods seems, in our view, to overwhelm any advantages associated with getting a more updated premium.

What are the costs of going back even further in time (to 1871 or before)? First, the data is much less reliable from earlier time periods, when trading was lighter and record keeping more haphazard. Second, and more important, the market itself has changed over time, resulting in risk premiums that may not be appropriate for today. The U.S. equity market in 1871 more closely resembled an emerging market, in terms of volatility and risk, than a mature market. Consequently, using the earlier data may yield premiums that have little relevance for today's markets.

There are two other solutions offered by some researchers. The first is to break the annual data down into shorter return intervals – quarters or even months – with the intent of increasing the data points over any given time period. While this will increase the sample size, the effect on the standard error will be minimal.[33] The second is to use the entire data but to give a higher weight to more recent data, thus getting more updated premiums while preserving the data. While this option seems attractive, weighting more recent data will increase the standard error of the estimate. After all, using only the last ten years of data is an extreme form of time weighting, with the data during that period being weighted at one and the data prior to the period being weighted at zero.

2. Riskfree Security and Market Index

The second estimation question we face relates to the riskfree rate. We can compare the expected return on stocks to either short-term government securities (treasury bills) or long term government securities (treasury bonds) and the risk premium for stocks can be estimated relative to either. Given that the yield curve in the United States has been upward sloping for most of the last eight decades, the risk premium is larger when estimated relative to short term government securities (such as treasury bills) than when estimated against treasury bonds.

[33] If returns are uncorrelated over time, the variance in quarterly (monthly) risk premiums will be approximately one-quarter (one-twelvth) the variance in annual risk premiums.

Some practitioners and a surprising number of academics (and textbooks) use the treasury bill rate as the riskfree rate, with the alluring logic that there is no price risk in a treasury bill, whereas the price of a treasury bond can be affected by changes in interest rates over time. That argument does make sense, but only if we are interested in a single period equity risk premium (say, for next year). If your time horizon is longer (say 5 or 10 years), it is the treasury bond that provides the more predictable returns.[34] Investing in a 6-month treasury bill may yield a guaranteed return for the next six months, but rolling over this investment for the next five years will create reinvestment risk. In contrast, investing in a ten-year treasury bond, or better still, a ten-year zero coupon bond will generate a guaranteed return for the next ten years.[35]

The riskfree rate chosen in computing the premium has to be consistent with the riskfree rate used to compute expected returns. Thus, if the treasury bill rate is used as the riskfree rate, the premium has to be the premium earned by stocks over that rate. If the treasury bond rate is used as the riskfree rate, the premium has to be estimated relative to that rate. For the most part, in corporate finance and valuation, the riskfree rate will be a long-term default-free (government) bond rate and not a short-term rate. Thus, the risk premium used should be the premium earned by stocks over treasury bonds.

The historical risk premium will also be affected by how stock returns are estimated. Using an index with a long history, such as the Dow 30, seems like an obvious solution, but returns on the Dow may not be a good reflection of overall returns on stocks. In theory, at least, we would like to use the broadest index of stocks to compute returns, with two caveats. The first is that the index has to be market-weighted, since the overall returns on equities will be tilted towards larger market cap stocks. The second is that the returns should be free of survivor bias; estimating returns only on stocks that have survived that last 80 years will yield returns that are too high. Stock returns should incorporate those equity investments from earlier years that did not make it through the estimation period, either because the companies in question went bankrupt or were acquired.

Finally, there is some debate about whether the equity risk premiums should be computed using nominal returns or real returns. While the choice clearly makes a difference, if we estimate the return on stocks or the government security return standing

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[34] For mor on risk free rates, see Damodaran, A., 2008, *What is the riskfree rate,* Working Paper, SSRN.

[35] There is a third choice that is sometimes employed, where the short term government security (treasury bills) is used as the riskfree rate and a "term structure spread" is added to this to get a normalized long term rate.

alone, it is less of an issue, when computing equity risk premiums, where we look at the difference between the two values.

3. Averaging Approach

The final sticking point when it comes to estimating historical premiums relates to how the average returns on stocks, treasury bonds and bills are computed. The arithmetic average return measures the simple mean of the series of annual returns, whereas the geometric average looks at the compounded return[36]. Many estimation services and academics argue for the arithmetic average as the best estimate of the equity risk premium. In fact, if annual returns are uncorrelated over time, and our objective was to estimate the risk premium for the next year, the arithmetic average is the best and most unbiased estimate of the premium. There are, however, strong arguments that can be made for the use of geometric averages. First, empirical studies seem to indicate that returns on stocks are negatively correlated[37] over time. Consequently, the arithmetic average return is likely to over state the premium. Second, while asset pricing models may be single period models, the use of these models to get expected returns over long periods (such as five or ten years) suggests that the estimation period may be much longer than a year. In this context, the argument for geometric average premiums becomes stronger. Indro and Lee (1997) compare arithmetic and geometric premiums, find them both wanting, and argue for a weighted average, with the weight on the geometric premium increasing with the time horizon.[38]

In closing, the averaging approach used clearly matters. Arithmetic averages will be yield higher risk premiums than geometric averages, but using these arithmetic average premiums to obtain discount rates, which are then compounded over time, seems internally inconsistent. In corporate finance and valuation, at least, the argument for using geometric average premiums as estimates is strong.

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[36] The compounded return is computed by taking the value of the investment at the start of the period ($Value_0$) and the value at the end ($Value_N$), and then computing the following:

$$\text{Geometric Average} = \left(\frac{\text{Value}_N}{\text{Value}_0}\right)^{1/N} - 1$$

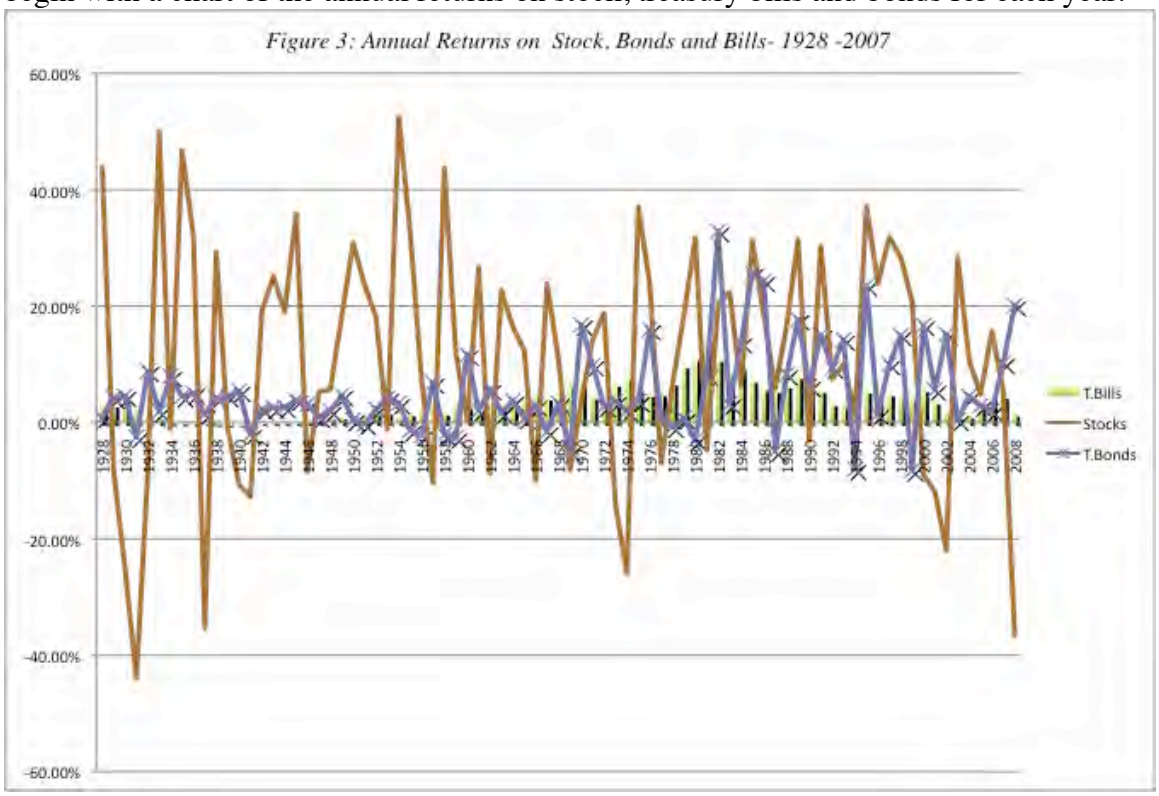
[37] In other words, good years are more likely to be followed by poor years, and vice versa. The evidence on negative serial correlation in stock returns over time is extensive, and can be found in Fama and French (1988). While they find that the one-year correlations are low, the five-year serial correlations are strongly negative for all size classes. Fama, E.F. and K.R. French, 1992, *The Cross-Section of Expected Returns*, Journal of Finance, Vol 47, 427-466.

[38] Indro, D.C. and W. Y. Lee, 1997, *Biases in Arithmetic and Geometric Averages as Estimates of Long-run Expected Returns and Risk Premium*, Financial Management, v26, 81-90.

Estimates for the United States

The questions of how far back in time to go, what riskfree rate to use and how to average returns (arithmetic or geometric) may seem trivial until you see the effect that the choices you make have on your equity risk premium. Rather than rely on the summary values that are provided by data services, we will use raw return data on stocks, treasury bills and treasury bonds from 1928 to 2008 to make this assessment.[39] In figure 3, we begin with a chart of the annual returns on stock, treasury bills and bonds for each year:

Figure 3: Annual Returns on Stock, Bonds and Bills- 1928 -2007



It is difficult to make much of this data other than to state the obvious, which is that stock returns are volatile, which is at the core of the demand for an equity risk premium in the first place. In table 3, we present summary statistics for stock, 6-month treasury bill and ten-year treasury bond returns from 1928 to 2008:

Table 3: Summary Statistics- Annual Returns n U.S. Stocks, T.Bills and T. Bonds- 1928-2008

	Stocks	T.Bills	T.Bonds
Mean	11.09%	3.79%	5.45%
Standard Error	2.27%	0.34%	0.85%

[39] The raw data for treasury rates is obtained from the Federal Reserve data archive at the Fed site in St. Louis, with the 6-month treasury bill rate uses for treasury bill returns and the 10-year treasury bond rate used to compute the returns on a constant maturity 10-year treasury bond. The stock returns represent the returns on the S&P 500. Appendix 1 provides the returns by year on stocks, bonds and bills.

Median	12.40%	3.26%	3.61%
Standard Deviation	20.39%	3.02%	7.61%
Kurtosis	-8.11%	98.00%	188.34%
Skewness	-37.03%	95.57%	123.04%
Minimum	-43.84%	0.03%	-8.25%
Maximum	52.56%	14.30%	32.81%
10th percentile	35.82%	7.78%	16.66%
90th percentile	-12.77%	0.32%	-2.26%

While U.S. equities have delivered much higher returns than treasuries over this period, they have also been more volatile, as evidenced both by the higher standard deviation in returns and by the extremes in the distribution. Using this table, we can take a first shot at estimating a risk premium by taking the difference between the average returns on stocks and the average return on treasuries, yielding a risk premium of 7.30% for stocks over T.Bills (11.09%-3.79%) and 5.64% for stocks over T.Bonds (11.09%-5.45%). Note, though, that these represent arithmetic average, long-term premiums for stocks over treasuries.

How much will the premium change if we make different choices on historical time periods, riskfree rates and averaging approaches? To answer this question, we estimated the arithmetic and geometric risk premiums for stocks over both treasury bills and bonds over different time periods in table 4:

Table 4: Historical Equity Risk Premiums (ERP) –Estimation Period, Riskfree Rate and Averaging Approach

	ERP: Stocks minus T.Bills		*ERP: Stocks minus T.Bonds*	
	Arithmetic	*Geometric*	*Arithmetic*	*Geometric*
1928-2008	7.30%	5.65%	5.32%	3.88%
1967-2008	5.14%	3.33%	3.77%	2.29%
1997-2008	-2.52%	-6.26%	-4.52%	-7.95%

Note that even with only three slices of history considered, the premiums can range from -7.95 to 7.30%, depending upon the choices made. If we take the earlier discussion about the "right choices" to heart, and use a long-term geometric average premium over the long-term rate as the risk premium to use in valuation and corporate finance, the equity risk premium that we would use would be 3.88%. The caveats that we would offer, though, are that this estimate comes with significant standard error (about 2.2%) and is reflective of time periods (such as 1920s and 1930s) when the U.S. equity market (and investors in it) had very different characteristics.

There is one more troublesome (or at least counter intuitive) characteristic of historical risk premiums. The geometric average equity risk premium through the end of 2007 was 4.79%, higher than the 3.88% estimated though the end of 2008; in fact, every single equity risk premium number in this table would have been much higher, if we had stopped with 2007 as the last year. Adding the data for 2008, an abysmal year for stocks and good year for bonds, lowers the premium dramatically, even over very long periods. In effect, the historical risk premium approach would lead investors to conclude, after one of worst stock market crisis in several decades, that stocks were less risky than they were before the crisis and that investors should therefore demand lower premiums.

Global Estimates

If it is difficult to estimate a reliable historical premium for the US market, it becomes doubly so when looking at markets with short, volatile and transitional histories. This is clearly true for emerging markets, where equity markets have often been in existence for only short time periods (Eastern Europe, China) or have seen substantial changes over the last few years (Latin America, India). It also true for many West European equity markets. While the economies of Germany, Italy and France can be categorized as mature, their equity markets did not share the same characteristics until recently. They tended to be dominated by a few large companies, many businesses remained private, and trading was thin except on a few stocks.

Notwithstanding these issues, services have tried to estimate historical risk premiums for non-US markets with the data that they have available. To capture some of the danger in this practice, Table 5 summarizes historical arithmetic average equity risk premiums for major non-US markets below for 1976 to 2001, and reports the standard error in each estimate:[40]

Table 5: Risk Premiums for non-US Markets: 1976- 2001

Country	*Weekly average*	*Weekly standard deviation*	*Equity Risk Premium*	*Standard error*
Canada	0.14%	5.73%	1.69%	3.89%
France	0.40%	6.59%	4.91%	4.48%
Germany	0.28%	6.01%	3.41%	4.08%
Italy	0.32%	7.64%	3.91%	5.19%
Japan	0.32%	6.69%	3.91%	4.54%
UK	0.36%	5.78%	4.41%	3.93%
India	0.34%	8.11%	4.16%	5.51%

[40] Salomons, R. and H. Grootveld, 2003, *The equity risk premium: Emerging vs Developed Markets,* Emerging Markets Review, v4, 121-144.

Korea	0.51%	11.24%	6.29%	7.64%
Chile	1.19%	10.23%	15.25%	6.95%
Mexico	0.99%	12.19%	12.55%	8.28%
Brazil	0.73%	15.73%	9.12%	10.69%

Before we attempt to come up with rationale for why the equity risk premiums vary across countries, it is worth noting the magnitude of the standard errors on the estimates, largely because the estimation period includes only 25 years. Based on these standard errors, we cannot even reject the hypothesis that the equity risk premium in each of these countries is greater than zero, let alone attach a value to that premium.

If the standard errors on these estimates make them close to useless, consider how much more noise there is in estimates of historical risk premiums for some emerging market equity markets, which often have a reliable history of ten years or less, and very large standard deviations in annual stock returns. Historical risk premiums for emerging markets may provide for interesting anecdotes, but they clearly should not be used in risk and return models.

The survivor bias

Given how widely the historical risk premium approach is used, it is surprising that the flaws in the approach have not drawn more attention. Consider first the underlying assumption that investors' risk premiums have not changed over time and that the average risk investment (in the market portfolio) has remained stable over the period examined. We would be hard pressed to find anyone who would be willing to sustain this argument with fervor. The obvious fix for this problem, which is to use a more recent time period, runs directly into a second problem, which is the large noise associated with historical risk premium estimates. While these standard errors may be tolerable for very long time periods, they clearly are unacceptably high when shorter periods are used.

Even if there is a sufficiently long time period of history available, and investors' risk aversion has not changed in a systematic way over that period, there is a final problem. Markets such as the United States, which have long periods of equity market history, represent "survivor markets". In other words, assume that one had invested in the largest equity markets in the world in 1926, of which the United States was one.[41] In the period extending from 1926 to 2000, investments in many of the other equity markets would have earned much smaller premiums than the US equity market, and some of them

[41] Jorion, Philippe and William N. Goetzmann, 1999, *Global Stock Markets in the Twentieth Century*, Journal of Finance, 54(3), 953-980. They looked at 39 different equity markets and concluded that the US was the best performing market from 1921 to the end of the century. They estimated a geometric average premium of 3.84% across all of the equity markets that they looked at, rather than just the US.

would have resulted in investors earning little or even negative returns over the period. Thus, the survivor bias will result in historical premiums that are larger than expected premiums for markets like the United States, even assuming that investors are rational and factor risk into prices.

How can we mitigate the survivor bias? One solution is to look at historical risk premiums across multiple equity markets across very long time periods. In the most comprehensive attempt of this analysis, Dimson, Marsh and Staunton (2002, 2006) estimated equity returns for 17 markets from 1900 to 2005 and their results are summarized in table 6 below:[42]

Table 6: Historical Risk Premiums across Equity Markets – 1900 – 2005

	Stocks minus Short term Governments				*Stocks minus Long term Governments*			
Country	*Geometric Mean*	*Arithmetic Mean*	*Standard Error*	*Standard Deviation*	*Geometric Mean*	*Arithmetic Mean*	*Standard Error*	*Standard Deviation*
Australia	7.08	8.49	1.65	17.00	6.22	7.81	1.83	18.80
Belgium	2.80	4.99	2.24	23.06	2.57	4.37	1.95	20.10
Canada	4.54	5.88	1.62	16.71	4.15	5.67	1.74	17.95
Denmark	2.87	4.51	1.93	19.85	2.07	3.27	1.57	16.18
France	6.79	9.27	2.35	24.19	3.86	6.03	2.16	22.29
Germany*	3.83	9.07	3.28	33.49	5.28	8.35	2.69	27.41
Ireland	4.09	5.98	1.97	20.33	3.62	5.18	1.78	18.37
Italy	6.55	10.46	3.12	32.09	4.30	7.68	2.89	29.73
Japan	6.67	9.84	2.70	27.82	5.91	9.98	3.21	33.06
Netherlands	4.55	6.61	2.17	22.36	3.86	5.95	2.10	21.63
Norway	3.07	5.70	2.52	25.90	2.55	5.26	2.66	27.43
South Africa	6.20	8.25	2.15	22.09	5.35	7.03	1.88	19.32
Spain	3.40	5.46	2.08	21.45	2.32	4.21	1.96	20.20
Sweden	5.73	7.98	2.15	22.09	5.21	7.51	2.17	22.34
Switzerland	3.63	5.29	1.82	18.79	1.80	3.28	1.70	17.52
U.K.	4.43	6.14	1.93	19.84	4.06	5.29	1.61	16.60
U.S.	5.51	7.41	1.91	19.64	4.52	6.49	1.96	20.16
World-ex U.S.	4.23	5.93	1.88	19.33	4.10	5.18	1.48	15.19
World	4.74	6.07	1.62	16.65	4.04	5.15	1.45	14.96

Note that the risk premiums, averaged across the markets, are much lower than risk premiums in the United States. For instance, the geometric average risk premium across the markets is only 4.04%, lower than the 4.52% for the US markets. The results are similar for the arithmetic average premium, with the average premium of 5.15% across

[42] Dimson, E.,, P Marsh and M Staunton, 2002, *Triumph of the Optimists: 101 Years of Global Investment Returns,* Princeton University Press, NJ and *Global Investment Returns Yearbook,* 2009, ABN AMRO/London Business School.

markets being lower than the 6.49% for the United States. In effect, the difference in returns captures the survivorship bias, implying that using historical risk premiums based only on US data will results in numbers that are too high for the future.

Dimson, Marsh, Staunton and Wilmot (2009) provide an update of these risk premiums, post 2008, in the most recent version of their global return database. Table 7 summarizes the arithmetic average equity risk premiums for 17 markets:[43]

Table 7: Global Equity Risk Premiums – Updated through 2008

Country	*1999-2008*	*1969-2008*	*1990-2008*
Australia	0.10%	3.30%	5.70%
Belgium	-6.30%	0.60%	2.00%
Canada	-1.90%	1.00%	3.70%
Denmark	-1.70%	0.20%	1.50%
France	-4.10%	0.10%	3.40%
Germany	-5.70%	1.00%	4.70%
Ireland	-9.60%	3.50%	2.40%
Italy	-6.00%	-0.30%	3.70%
Japan	-5.20%	0.10%	5.00%
Netherlands	-8.50%	3.10%	3.20%
Norway	1.70%	2.00%	2.00%
South Africa	2.50%	6.60%	5.20%
Spain	0.10%	2.90%	2.10%
Sweden	-3.30%	4.10%	4.60%
Switzerland	-3.30%	2.90%	1.50%
UK	-3.90%	3.40%	3.60%
US	-8.40%	1.70%	3.80%
World	-6.60%	0.10%	3.40%
World ex US	-4.50%	0.10%	3.50%
Europe	-4.90%	1.60%	3.60%

Note the havoc wreaked by the market collapse in 2008 is visible across most of these markets, with ten-year premiums becoming negative in many of the markets and the longer terms premiums declining from 2005 levels.

Historical Premium Plus

If we accept the proposition that historical risk premiums are the best way of estimating future risk premiums and also come to terms with the statistical reality that we need long time periods of history to get reliable estimates, we are trapped when it comes to estimating risk premiums in most emerging markets, where historical data is either

[43] *Credit Suisse Global Investment Returns Yearbook,* 2009, Credit Suisse, London. The raw data on returns is not provided in the yearbook and thus the geometric average premiums and other statistics were not updated.

non-existent or unreliable. Furthermore, the equity risk premium that we estimate becomes the risk premium that we use for all stocks within a market, no matter what their differences are on market capitalization and growth potential; in effect, we assume that the betas we use will capture differences in risk across companies.

In this section, we consider one way out of this box, where we begin with the US historical risk premium (3.88%) or the global premium from the DMSW data (3.4%) as the base premium for a mature equity market and then build additional premiums for riskier markets or classes of stock. For the first part of this section, we stay within the US equity market and consider the practice of adjusting risk premiums for company-specific characteristics, with market capitalization being the most common example. In the second part, we extend the analysis to look at emerging markets in Asia, Latin American and Eastern Europe, and take a look at the practice of estimating country risk premiums that augment the US equity risk premium. Since many of these markets have significant exposures to political and economic risk, we consider two fundamental questions in this section. The first relates to whether there should be an additional risk premium when valuing equities in these markets, because of the country risk. As we will see, the answer will depend upon whether we think country risk is diversifiable or non-diversifiable, view markets to be open or segmented and whether we believe in a one-factor or a multi-factor model. The second question relates to estimating equity risk premiums for emerging markets. Depending upon our answer to the first question, we will consider several solutions.

Small cap and other risk premiums

In computing an equity risk premium to apply to all investments in the capital asset pricing model, we are essentially assuming that betas carry the weight of measuring the risk in individual firms or assets, with riskier investments having higher betas than safer investments. Studies of the efficacy of the capital asset pricing model over the last three decades have cast some doubt on whether this is a reasonable assumption, finding that the model understates the expected returns of stocks with specific characteristics; small market cap companies and companies low price to book ratios, in particular, seem to earn much higher returns than predicted by the CAPM. It is to counter this finding that many practitioners add an additional premium to the required returns (and costs of equity) of smaller market cap companies.

The CAPM and Market Capitalization

In one of very first studies to highlight the failure of the traditional capital asset pricing model to explain returns at small market cap companies, Banz (1981) looked returns on stocks from 1936-1977 and concluded that investing in the smallest companies (the bottom 20% of NYSE firms in terms of capitalization) would have generated about 6% more, after adjusting for beta risk, than larger cap companies.[44] In the years since, there has been substantial research on both the origins and durability of the small cap premium, with mixed conclusions. First, there is evidence of a small firm premium in markets outside the United States as well. Studies find small cap premiums of about 7% from 1955 to 1984 in the United Kingdom,[45] 8.8% in France and 3% in Germany,[46] and a premium of 5.1% for Japanese stocks between 1971 and 1988.[47] Second, while the small cap premium has been persistent in US equity markets, it has also been volatile, with large cap stocks outperforming small cap stocks for extended periods. In figure 4, we look at the difference in returns between small cap (defined as bottom 10%of firms in terms of market capitalization) and all US stocks between 1927 and 2008; note that the premium was pronounced in the 1970s and disappeared for much of the 1980s.[48]

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[44] Banz, R., 1981, *The Relationship between Return and Market Value of Common Stocks*, Journal of Financial Economics, v9.

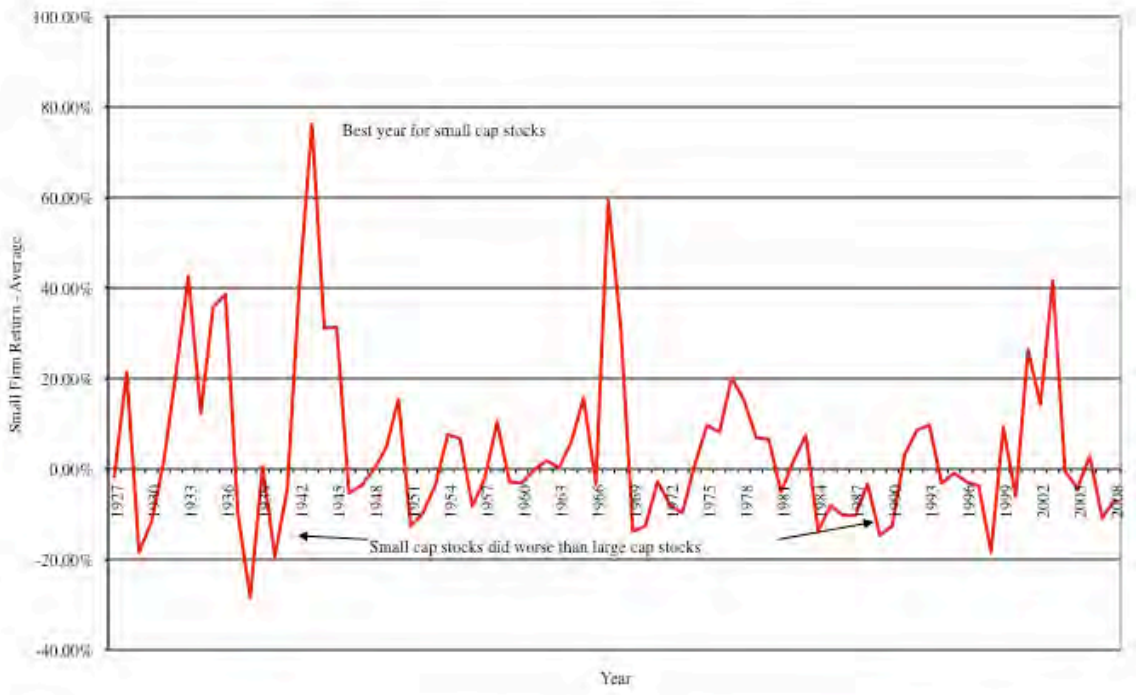
[45] Dimson, E. and P.R. Marsh, 1986, *Event Studies and the Size Effect: The Case of UK Press Recommendations*, Journal of Financial Economics, v17, 113-142.

[46] Bergstrom,G.L., R.D. Frashure and J.R. Chisholm, 1991, *The Gains from international small-company diversification* in Global Portfolios: Quantiative Strategies for Maximum Performance, Edited By R.Z. Aliber and B.R. Bruce, Business One Irwin, Homewood.

[47] Chan, L.K., Y. Hamao, and J. Lakonishok, 1991, *Fundamentals and Stock Returns in Japan*, Journal of Finance. v46. 1739-1789.

[48] The raw data for this table is obtained from Professor Ken French's website at Dartmouth.

Figure 4: Small Firm Premium over time- 1927 -2008



The average premium for stocks in the bottom decile, in terms of market capitalization, between 1927 and 2007 was 4.57%, but the standard error in that estimate is 2.01%. Third, much of the premium is generated in one month of the year: January. As Figure 5 shows, eliminating that month from our calculations would essentially dissipate the entire small stock premium. That would suggest that size itself is not the source of risk, since small firms in January remain small firms in the rest of the year, but that the small firm premium, if it exists, comes from some other risk that is more prevalent or virulent in January than in the rest of the year.

Figure 5: The Small Firm Effect- January vs Rest of the Year

Finally, a series of studies have argued that market capitalization, by itself, is not the reason for excess returns but that it is a proxy for other ignored risks such as illiquidity and poor information.

In summary, while the empirical evidence supports the notion that small cap stocks have earned higher returns after adjusting for beta risk than large cap stocks, it is not as conclusive, nor as clean as it was initially thought to be. The argument that there is, in fact, no small cap premium and that we have observed over time is just an artifact of history cannot be rejected out of hand.

The Small Cap Premium

If we accept the notion that there is a small cap premium, there are two ways in which we can respond to the empirical evidence that small market cap stocks seem to earn higher returns than predicted by the traditional capital asset pricing model. One is to view this as a market inefficiency that can be exploited for profit: this, in effect, would require us to load up our portfolios with small market cap stocks that would then proceed to deliver higher than expected returns over long periods. The other is to take the excess returns as evidence that betas are inadequate measures of risk and view the additional returns are compensation for the missed risk. The fact that the small cap premium has endured for as long as it has suggests that the latter is the more reasonable path to take.

If CAPM betas understate the true risk of small cap stocks, what are the solutions? The first is to try and augment the model to reflect the missing risk, but this would require being explicit about this risk. For instance, there are models that include additional factors for illiquidity and imperfect information that claim to do better than the CAPM in predicting future returns. The second and simpler solution that is adopted by many practitioners is to add a premium to the expected return (from the CAPM) of small cap stocks. To arrive at this premium, analysts look at historical data on the returns on small cap stocks and the market, adjust for beta risk, and attribute the excess return to the small cap effect. Using the data from 1926-2008, we would estimate a small cap premium of about 4.57%. Duff and Phelps presents a richer set of estimates, where the premiums are computed for stocks in 25 different size classes (with size measured on eight different dimensions including market capitalization, book value and net income). Using the Fama/French data, we present our own version of this data for firms broken down by ten market value classes in Table 7, with the standard error for each estimate.

Table 7: Excess Returns by Market Value Class: US Stocks from 1927 – 2008

Decile	Average	Standard Error	Maximum	Minimum
Smallest	4.57%	2.01%	76.28%	-28.42%
2	1.87%	1.16%	41.25%	-17.96%
3	1.46%	0.79%	41.98%	-13.54%
4	0.84%	0.56%	15.56%	-7.50%
5	0.01%	0.54%	11.63%	-16.05%
6	-0.13%	0.52%	15.21%	-14.01%
7	-0.64%	0.55%	7.56%	-19.50%
8	-1.71%	0.83%	10.81%	-29.73%
9	-2.29%	1.05%	21.96%	-36.30%
Largest	-3.99%	1.59%	31.35%	-65.57%

Note that the market capitalization effect shows up at both extremes – the smallest firms earn higher returns than expected whereas the largest firms earn lower returns than expected. The small firm premium is statistically significant only for the lowest and three highest size deciles.

Perils of the approach

While the small cap premium may seem like a reasonable way of dealing with the failure of the CAPM, there are significant costs to using the approach.

a. Standard Error on estimates: One of the dangers we noted with using historical risk premiums is the high standard error in our estimates. This danger is

magnified when we look at sub-sets of stocks, based on market capitalization or any other characteristic, and extrapolate past returns. The standard errors on the small cap premiums that are estimated are likely to be significant, as is evidenced in table 7.

b. Small versus Large Cap: At least in its simplest form, the small cap premium adjustment requires us to divide companies into small market companies and the rest of the market, with stocks falling on one side of the line having much higher required returns (and costs of equity) than stocks falling on the other side.
c. Understanding Risk: Even in its more refined format, where the required returns are calibrated to market cap, using small cap premiums allows analysts to evade basic questions about what it is that makes smaller cap companies riskier, and whether these factors may vary across companies.
d. Small cap companies become large cap companies over time: When valuing companies, we attach high growth rates to revenues, earnings and value over time. Consequently, companies that are small market cap companies now grow to become large market cap companies over time. Consistency demands that we adjust the small cap premium as we go further into a forecast period.
e. Other risk premiums: Using a small cap premium opens the door to other premiums being used to augment expected returns. Thus, we could adjust expected returns upwards for stocks with price momentum and low price to book ratios, reflecting the excess returns that these characteristics seem to deliver, at least on paper. Doing so will deliver values that are closer to market prices, across assets, but undercuts the rationale for intrinsic valuation, i.e., finding market mistakes.

There is one final reason why we are wary about adjusting costs of equity for a small cap effect. If, as is the practice now, we add a small cap premium of 4-5% to the cost of equity of small companies, without attributing this premium to any specific risk factor, we are exposed to the risk of double counting risk. For instance, assume that the small cap premium that we have observed over the last few decades is attributable to the lower liquidity (and higher transactions costs) of trading small cap stocks. Adding that premium on to the discount rate will reduce the estimated values of small cap and private businesses. If we attach an illiquidity discount to this value, we are double counting the effect of illiquidity.

Country Risk Premiums

As both companies and investors get acclimatized to the reality of a global economy, we have also been forced to confront the consequences of globalization for equity risk premiums and hurdle rates. Should an investor putting his money in Indian stocks demand a higher risk premium for investing in equities that one investing in German stocks? Should a US consumer product company investing in Brazil demand the same hurdle rates for its Brazilian investments as it does for its US investments? In effect, should we demand one global equity risk premium that we use for investments all over the world or should we use higher equity risk premiums in some markets than in others?

Should there be a country risk premium?

Is there more risk in investing in a Malaysian or Brazilian stock than there is in investing in the United States? The answer, to most, seems to be obviously affirmative, with the solution being that we should use higher equity risk premiums when investing in riskier emerging markets. There are, however, three distinct and different arguments offered against this practice.

1. Country risk is diversifiable

In the risk and return models that have developed from conventional portfolio theory, and in particular, the capital asset pricing model, the only risk that is relevant for purposes of estimating a cost of equity is the market risk or risk that cannot be diversified away. The key question in relation to country risk then becomes whether the additional risk in an emerging market is diversifiable or non-diversifiable risk. If, in fact, the additional risk of investing in Malaysia or Brazil can be diversified away, then there should be no additional risk premium charged. If it cannot, then it makes sense to think about estimating a country risk premium.

But diversified away by whom? Equity in a publicly traded Brazilian, or Malaysian, firm can be held by hundreds or even thousands of investors, some of whom may hold only domestic stocks in their portfolio, whereas others may have more global exposure. For purposes of analyzing country risk, we look at the marginal investor – the investor most likely to be trading on the equity. If that marginal investor is globally diversified, there is at least the potential for global diversification. If the marginal investor does not have a global portfolio, the likelihood of diversifying away country risk declines substantially. Stulz (1999) made a similar point using different terminology.[49] He differentiated between segmented markets, where risk premiums can be different in

[49] Stulz, R.M., *Globalization, Corporate finance, and the Cost of Capital,* Journal of Applied Corporate Finance, v12.

each market, because investors cannot or will not invest outside their domestic markets, and open markets, where investors can invest across markets. In a segmented market, the marginal investor will be diversified only across investments in that market, whereas in an open market, the marginal investor has the opportunity (even if he or she does not take it) to invest across markets.

Even if the marginal investor is globally diversified, there is a second test that has to be met for country risk to be diversifiable. All or much of country risk should be country specific. In other words, there should be low correlation across markets. Only then will the risk be diversifiable in a globally diversified portfolio. If, on the other hand, the returns across countries have significant positive correlation, country risk has a market risk component, is not diversifiable and can command a premium. Whether returns across countries are positively correlated is an empirical question. Studies from the 1970s and 1980s suggested that the correlation was low, and this was an impetus for global diversification. Partly because of the success of that sales pitch and partly because economies around the world have become increasingly intertwined over the last decade, more recent studies indicate that the correlation across markets has risen. In fact, there is evidence that the correlation across equity markets increases during periods of extreme stress or high volatility.[50] This is borne out by the speed with which troubles in one market, say Russia, can spread to a market with little or no obvious relationship to it, say Brazil. The contagion effect, where troubles in one market spread into others is one reason to be skeptical with arguments that companies that are in multiple emerging markets are protected because of their diversification benefits. In fact, the market crisis in the last quarter of 2008 illustrated how closely bound markets have become, as can be seen in figure 6:

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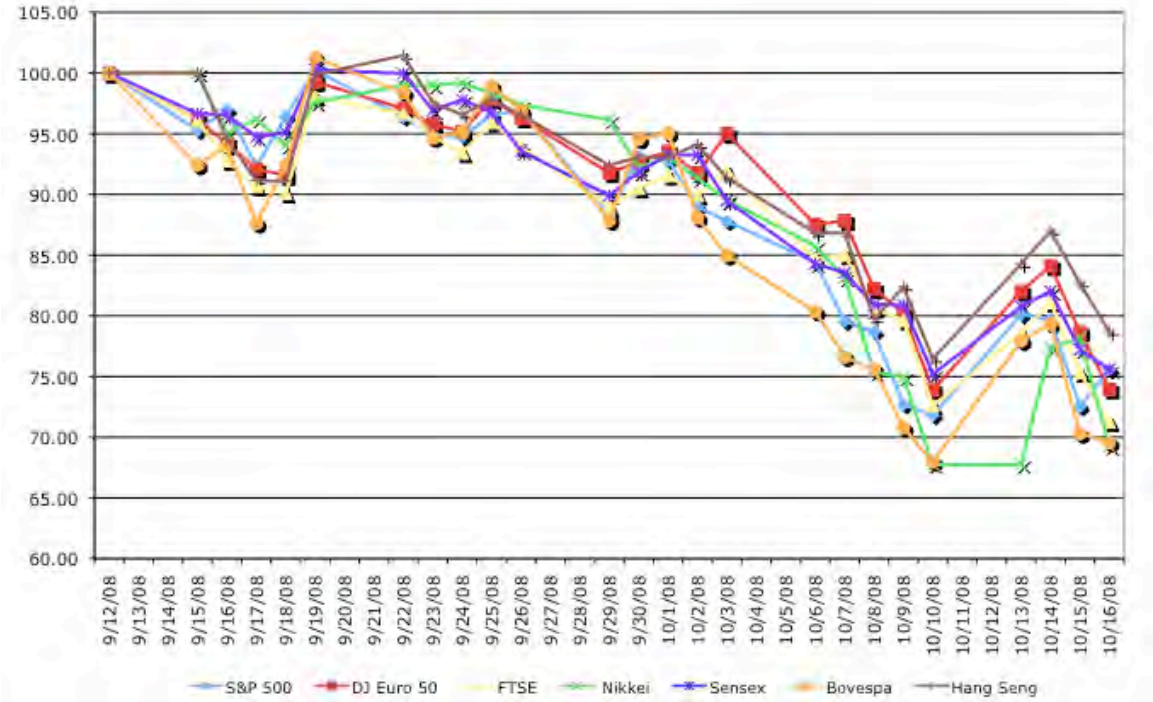
50 Ball, C. and W. Torous, 2000, *Stochastic correlation across international stock markets*, Journal of Empirical Finance. V7, 373-388.

Figure 6: The globalization of risk



Between September 12, 2008 and October 16, 2008, markets across the globe moved up and down together, with emerging markets showing slightly more volatility.

So where do we stand? We believe that while the barriers to trading across markets have dropped, investors still have a home bias in their portfolios and that markets remain partially segmented. While globally diversified investors are playing an increasing role in the pricing of equities around the world, the resulting increase in correlation across markets has resulted in a portion of country risk being non-diversifiable or market risk. It behooves us therefore to confront the question of how best to measure country risk and reflect that risk in valuation.

2. A Global Capital Asset Pricing Model

The other argument against adjusting for country risk comes from theorists and practitioners who believe that the traditional capital asset pricing model can be adapted fairly easily to a global market. In their view, all assets, no matter where they are traded, should face the same global equity risk premium, with differences in risk captured by differences in betas. In effect, they are arguing that if Malaysian stocks are riskier than US stocks, they should have higher betas and expected returns.

While the argument is reasonable, it flounders in practice, partly because betas do not seem capable of carry the weight of measuring country risk.

1. If betas are estimated against local indices, as is usually the case, the average beta within each market (Brazil, Malaysia, US or Germany) has to be one. Thus, it would be mathematically impossible for betas to capture country risk.
2. If betas are estimated against a global equity index, such as the Morgan Stanley Capital Index (MSCI), there is a possibility that betas could capture country risk but there is little evidence that they do in practice. Since the global equity indices are market weighted, it is the companies that are in developed markets that have higher betas, whereas the companies in small, very risky emerging markets report low betas. Table 8 reports the average beta estimated for the ten largest market cap companies in Brazil, India, the United States and Japan against the MSCI.

Table 8: Betas against MSCI – Large Market Cap Companies

Country	*Average Beta (against local index)*	*Average Beta (against MSCI)*
India	0.97	0.83
Brazil	0.98	0.81
United States	0.96	1.05
Japan	0.94	1.03

[a] The betas were estimated using two years of weekly returns from January 2006 to December 2007 against the most widely used local index (Sensex in India, Bovespa in Brazil, S&P 500 in the US and the Nikkei in Japan) and the MSCI using two years of weekly returns.

The emerging market companies consistently have lower betas, when estimated against global equity indices, than developed market companies. Using these betas with a global equity risk premium will lead to lower costs of equity for emerging market companies than developed market companies. While there are creative fixes that practitioners have used to get around this problem, they seem to be based on little more than the desire to end up with higher expected returns for emerging market companies.[51]

3. Country risk is better reflected in the cash flows

The essence of this argument is that country risk and its consequences are better reflected in the cash flows than in the discount rate. Proponents of this point of view argue that bringing in the likelihood of negative events (political chaos, nationalization and economic meltdowns) into the expected cash flows effectively risk adjusts the cashflows, thus eliminating the need for adjusting the discount rate.

[51] There are some practitioners who multiply the local market betas for individual companies by a beta for that market against the US. Thus, if the beta for an Indian chemical company is 0.9 and the beta for the Indian market against the US is 1.5, the global beta for the Indian company will be 1.35 (0.9*1.5). The beta for the Indian market is obtained by regressing returns, in US dollars, for the Indian market against returns on a US index (say, the S&P 500).

This argument is alluring but it is wrong. The expected cashflows, allowing for the possibility of poor outcomes, is not risk adjusted. In fact, this is exactly how we should be calculating expected cash flows in any discounted cash flow analysis. Risk adjustment requires us to adjust the expected cash flow further for its risk, i.e. compute certainty equivalent cash flows in capital budgeting terms. To illustrate why, consider a simple example where a company is considering making the same type of investment in two countries. For simplicity, let us assume that the investment is expected to deliver $ 90, with certainty, in country 1 (a mature market); it is expected to generate $ 100 with 90% probability in country 2 (an emerging market) but there is a 10% chance that disaster will strike (and the cash flow will be $0). The expected cash flow is $90 on both investments, but only a risk neutral investor would be indifferent between the two. A risk averse investor would prefer the investment in the mature market over the emerging market investment, and would demand a premium for investing in the emerging market.

In effect, a full risk adjustment to the cash flows will require us to go through the same process that we have to use to adjust discount rates for risk. We will have to estimate a country risk premium, and use that risk premium to compute certainty equivalent cash flows.[52]

Estimating a Country Risk Premium

If country risk is not diversifiable, either because the marginal investor is not globally diversified or because the risk is correlated across markets, we are then left with the task of measuring country risk and considering the consequences for equity risk premiums. In this section, we will consider three approaches that can be used to estimate country risk premiums, all of which build off the historical risk premiums estimated in the last section. To approach this estimation question, let us start with the basic proposition that the risk premium in any equity market can be written as:

> Equity Risk Premium = Base Premium for Mature Equity Market + Country Risk Premium

The country premium could reflect the extra risk in a specific market. This boils down our estimation to estimating two numbers – an equity risk premium for a mature equity market and the additional risk premium, if any, for country risk. To estimate a mature market equity risk premium, we can look at one of two numbers. The first is the historical risk premium that we estimated for the United States, which yielded 3.88% as the

[52] In the simple example above, this is how it would work. Assume that we compute a country risk premium of 3% for the emerging market to reflect the risk of disaster. The certainty equivalent cash flow on the investment in that country would be $90/1.03 = $87.38.

geometric average premium for stocks over treasury bonds from 1928 to 2008. If we do this, we are arguing that the US equity market is a mature market, and that there is sufficient historical data in the United States to make a reasonable estimate of the risk premium. The other is the average historical risk premium across 17 equity markets, approximately 3.4%, that was estimated by Dimson et al (see earlier reference), as a counter to the survivor bias that they saw in using the US risk premium. Consistency would then require us to use this as the equity risk premium, in every other equity market that we deem mature; the equity risk premium in September 2009 would be 3.88% (3.4%) in Germany, France and the UK, for instance. For markets that are not mature, however, we need to measure country risk and convert the measure into a country risk premium, which will augment the mature market premium.

Measuring Country Risk

There are at least three measures of country risk that we can use. The first is the sovereign rating attached to a country by ratings agencies. The second is to subscribe to services that come up with broader measures of country risk that explicitly factor in the economic, political and legal risks in individual countries. The third is go with a market-based measure such as the volatility in the country's currency or markets.

i. Sovereign Ratings

One of the simplest and most accessible measures of country risk is the rating assigned to a country's debt by a ratings agency (S&P, Moody's and Fitch, among others, all provide country ratings). These ratings measure default risk (rather than equity risk) but they are affected by many of the factors that drive equity risk – the stability of a country's currency, its budget and trade balances and political uncertainty, among other variables[53].

To get a measure of country ratings, consider five countries – Germany, Brazil, China, India and Russia. In September 2009, the Moody's ratings for the countries are summarized in table 9:

Table 9: Sovereign Ratings in September 2009 – Moody's

Country	*Local Currency Rating*	*Foreign Currency Rating*
Germany	Aaa	Aaa
Brazil	Baa3	Baa3
China	A1	A1

[53] The process by which country ratings are obtained in explained on the S&P web site at http://www.ratings.standardpoor.com/criteria/index.htm.

Russia	Baa1	Baa1
India	Baa3	Ba2

What do these ratings tell us? First, the local currency ratings tend to be higher (or at worst equal to) the foreign currency ratings for most countries, because a country should be in a better position to pay off debt in the local currency than in a foreign currency. India, however, seems to be an exception to that rule, with a higher rating for its foreign currency debt than for its local currency borrowing. Second, at least based on Moody's assessments in September 2009, Brazil and India are equivalent in terms of default risk, if we use the foreign currency ratings, India is the riskiest, if we draw on local currency ratings, and Germany is the safest, with China and Russia falling into the intermediate slots. Third, ratings do change over time. In fact, Brazil's rating has risen from B1 in 2001 to its current rating of Baa3, reflecting both strong economic growth and a more diversified economy. Appendix 2 contains the current ratings – local currency and foreign currency – for the countries that are tracked by Moody's in September 2009.[54]

While ratings provide a convenient measure of country risk, there are costs associated with using them as the only measure. First, ratings agencies often lag markets when it comes to responding to changes in the underlying default risk. The ratings for India, according to Moody's, were unchanged from 2004 to 2007, though the Indian economy grew at double-digit rates over that period. Second, the ratings agency focus on default risk may obscure other risks that could still affect equity markets. For instance, rising commodity (and especially oil) prices pushed up the ratings for commodity supplying countries (like Russia), even though there was little improvement in the rest of the economy. Finally, not all countries have ratings; much of sub-Saharan Africa, for instance, is unrated.

ii. Country Risk Scores

Rather than focus on just default risk, as rating agencies do, some services have developed numerical country risk scores that take a more comprehensive view of risk. These risk scores are often estimated from the bottom-up by looking at economic fundamentals in each country. This, of course, requires significantly more information and, as a consequence, most of these scores are available only to commercial subscribers.

[54] In a disquieting reaction to the turmoil of the market crisis in the last quarter of 2008, Moody's promoted the notion that Aaa countries were not all created equal and slotted these countries into three groups – resistant Aaa (the stongest), resilient Aaa (weaker but will probably survive intact) and vulnerable Aaa (likely to face additional default risk.

The Political Risk Services (PRS) group, for instance, considers political, financial and economic risk indicators to come up with a composite measure of risk (ICRG) for each country that ranks from 0 to 100, with 0 being lowest risk and 100 being the highest risk.[55] Appendix 3 includes composite country risk measures from the PRS Group for countries that they analyzed in early 2008.[56] Harvey (2005) examined the efficacy of these scores and found that they were correlated with costs of capital, but only for emerging market companies.

The Economist, the business newsmagazine, also operates a country risk assessment unit that measures risk from 0 to 100, with 0 being the least risk and 100 being the most risk. In September 2008, Table 10 the following countries were ranked as least and most risky by their measure:

[55] The PRS group considers three types of risk – political risk, which accounts for 50% of the index, financial risk, which accounts for 25%, and economic risk, which accounts for the balance. While this table is dated, updated numbers are available for a hefty price. Some university libraries have access to the updated data. While we have not updated the numbers, out of concerns about publishing proprietary data, you can get the latest PRS numbers by paying $99 on their website (http://www.prsgroup.com).

[56] Harvey, C.R., *Country Risk Components, the Cost of Capital, and Returns in Emerging Markets*, Working paper.

Table 10: Country Risk Scores – The Economist

Economist.com rankings

Country risk

Selected countries and territories, September 2008 (except where noted)

Least risky			Most risky		
Rank		Score*	Rank		Score
1	Switzerland †	12	120	Zimbabwe	86
2	Finland **	14	119	Iraq	80
	Norway **	14	118	Sudan	76
	Sweden ††	14	117	Myanmar	75
5	Canada **	17	116	Nicaragua	69
	Denmark †	17	115	Jamaica	68
	Netherlands §	17	114	Kenya	66
8	Germany ††	18	113	Cuba	64
9	Austria **	19	112	Cambodia	62
	France ††	19	111	Côte d'Ivoire	61
11	Belgium ††	20		Ecuador	61
12	Singapore	21		Pakistan	61
13	Japan **	23		Venezuela	61
14	Ireland #	24		Vietnam	61
	Britain	24	106	Syria	60
	United States †	24			

*Out of 100, with higher numbers indicating more risk. Scores are based on indicators from three categories: currency risk, sovereign debt risk and banking risk.

† May 2008; ** July 2008; †† June 2008; § August 2008; # February 2008

In fact, comparing the PRS and Economist measures of country risk provides some insight into the problems with using their risk measures. The first is that the measures may be internally consistent but are not easily comparable across different services. The second is that, by their very nature, a significant component of the measure has to be in a black box to prevent others from replicating the measure at no cost. Third, the measures are not linear and the services do not claim that they are; a country with a risk score of 60 in the Economist measure is not twice as risky as a country with a risk score of 30.

iii. Market-based Measures

To those analysts who feel that ratings agencies are either slow to respond to changes in country risk or take too narrow a view of risk, there is always the alternative of using market based measures.

- Bond default spread: We can compute a default spread for a country if it has bonds that are denominated in currencies such as the US dollar, Euro or Yen,

where there is a riskfree rate to compare it to. In September 2009, for instance, a 10-year US dollar denominated bond issued by the Brazilian government had a yield to maturity of 5.35%, giving it a default spread of 1.9% over the 10-year treasury bond rate (3.45%), as of the same date.

- Credit Default Swap Spreads: In the last few years, credit default swaps (CDS) markets have developed, allowing us to obtain updated market measures of default risk in different entities. In particular, there are CDS markets for countries (governments) that yield measures of default spreads that may be more updated and precise, at least in some cases, than bond default spreads.[57] Table 11 summarizes the CDS spreads (in basis points) for countries at the end of September 2009:

Table 11: Credit Default Swap Spreads (in basis points)– September 30, 2009

Country	*CDS Soread*	*Country*	*CDS Soread*	*Country*	*CDS Spread*
Abu Dhabi	102.74	Hungary	198.63	Portugal	58.15
Argentina	887.92	Iceland	361.33	Qatar	93.02
Australia	32.03	Indonesia	198.3	Russia	170.58
Austria	63.67	Ireland	130.07	Saudi Arabia	75.21
Bahrain	138.95	Israel	113.71	Slovakia	66.06
Belgium	38.68	Italy	75.67	South Africa	138.19
Brazil	139.96	Japan	63.39	South Korea	96.96
Bulgaria	180.13	Kazakhstan	242.34	Spain	75.06
Chile	74.8	Lebanon	285.02	Sweden	49.1
China	77.02	Lithuania	283.55	Switzerland	35.9
Colombia	159.04	Malaysia	87.92	Thailand	96.74
Croatia	196.65	Mexico	156.98	Turkey	184.78
Czech Republic	69.35	Netherlands	29.49	USA	23.83
Denmark	33.49	New Zealand	38.85	Ukraine	1099.51
Egypt	241.36	Norway	19.1	United Kingdom	48.09
Finland	21.01	Panama	147.97	Venezuela	885.88
France	27.12	Peru	138.12	Vietnam	169.22
Germany	23.76	Philippines	175.67		
Greece	129.31	Poland	113.62		

In September 2009, for instance, the CDS market yielded a spread of 1.3996% for the Brazilian Government, a lower value than that obtained from the 10-year dollar denominated Brazilian bond.

- Market volatility: In portfolio theory, the standard deviation in returns is generally used as the proxy for risk. Extending that measure to emerging markets, there are some analysts who argue that the best measure of country risk is the volatility in local stock prices. Stock prices in emerging markets will be more volatile that stock prices in developed markets, and the volatility measure should be a good

[57] The spreads are usually stated in US dollar or Euro terms.

indicator of country risk. While the argument makes intuitive sense, the practical problem with using market volatility as a measure of risk is that it is as much a function of the underlying risk as it is a function of liquidity. Markets that are risky and illiquid often have low volatility, since you need trading to move stock prices. Consequently, using volatility measures will understate the risk of emerging markets that are illiquid and overstate the risk of liquid markets.

Market-based numbers have the benefit of constant updating and reflect the points of view of investors at any point in time. However, they also are also afflicted with all of the problems that people associate with markets – volatility, mood shifts and at times, irrationality. They tend to move far more than the other two measures – sovereign ratings and country risk scores – sometimes for good reasons and sometimes for no reason at all.

b. Estimating Country Risk Premium

How do we link a country risk measure to a country risk premium? In this section, we will look at three approaches. The first uses default spreads, based upon country bonds or ratings, whereas the latter two use equity market volatility as an input in estimating country risk premiums.

1. Default Spreads

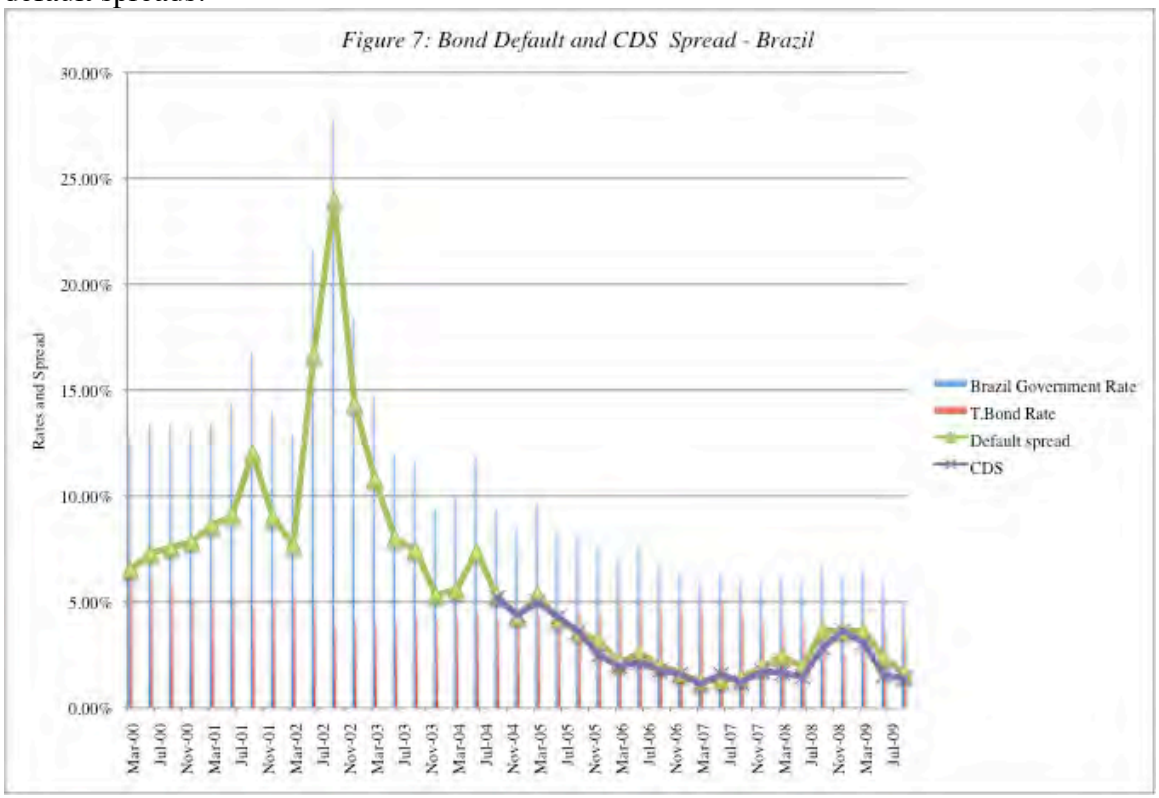
The simplest and most widely used proxy for the country risk premium is the default spread that investors charge for buying bonds issued by the country. This default spread can be estimated in one of three ways.

a. Default spread on country bond: As we noted in the last section, the default spread comes from either looking at the yields on bonds issued by the country in a currency where there is a default free bond yield to which it can be compared or spreads in the CDS market.[58] With the 10-year US dollar denominated Brazilian bond that we cited as an example in the last section, the default spread would have amounted to 1.9% on September 30, 2009: the difference between the interest rate on the Brazilian bond and a treasury bond of the same maturity. The CDS market spread on the same day for the default spread was 1.40%.

b. Average (Normalized) spread on bond: While we can make the argument that the default spread in the dollar denominated is a reasonable measure of the default risk in Brazil, it is also a volatile measure. In figure 7, we have graphed the yields on the dollar denominated ten-year Brazilian Bond and the U.S. ten-year treasury bond and highlighted the default spread from 2000 to 2009. In the same figure, we also show the CDS spreads

[58] You cannot compare interest rates across bonds in different currencies. The interest rate on a peso bond cannot be compared to the interest rate on a dollar denominated bond.

from 2004 to 2009;[59] these spreads have also changed over time but move with the bond default spreads.



Note that the bond default spread widened dramatically during 2002, mostly as a result of uncertainty in neighboring Argentina and concerns about the Brazilian presidential elections.[60] After the elections, the spreads decreased just as quickly and continued on a downward trend through the middle of last year. Since 2004, they have stabilized, with a downward trend; they spiked during the market crisis in the last quarter of 2008 but have settled back into pre-crisis levels. Given this volatility, a reasonable argument can be made that we should consider the average spread over a period of time rather than the default spread at the moment. If we accept this argument, the normalized default spread, using the average spreads over the last 5 years of data would be 2.89% (bond default spread) or 2.61% (CDS spread). Using this approach makes sense only if the economic fundamentals of the country have not changed significantly (for the better or worse) during the period but will yield misleading values, if there have been structural shifts in the economy. In 2008, for instance, it would have made sense to use averages over time

[59] Data for the sovereign CDS market is available only from the last part of 2004.

[60] The polls throughout 2002 suggested that Lula who was perceived by the market to be a leftist would beat the establishment candidate. Concerns about how he would govern roiled markets and any poll that showed him gaining would be followed by an increase in the default spread.

for a country like Nigeria, where oil price movements created volatility in spreads over time, but not for countries like China and India, which saw their economies expand and mature dramatically over the period or Venezuela, where government capriciousness made operating private businesses a hazardous activity (with a concurrent tripling in default spreads).

c. Imputed or Synthetic Spread: The two approaches outlined above for estimating the default spread can be used only if the country being analyzed has bonds denominated in US dollars, Euros or another currency that has a default free rate that is easily accessible. Most emerging market countries, though, do not have government bonds denominated in another currency and some do not have a sovereign rating. For the first group (that have sovereign rating but no foreign currency government bonds), there are two solutions. If we assume that countries with the similar default risk should have the same sovereign rating, we can use the typical default spread for other countries that have the same rating as the country we are analyzing and dollar denominated or Euro denominated bonds outstanding. Thus, Bulgaria, with a Baa3 rating, would be assigned the same default spread as Brazil, which also has Baa3 rating, and dollar denominated bonds and CDS prices from which we can extract a default spread. For the second group, we are on even more tenuous grounds. Assuming that there is a country risk score from the Economist or PRS for the country, we could look for other countries that are rated and have similar scores and assign the default spreads that these countries face. For instance, we could assume that Cuba and Kenya, which have the same country risk score from the Economist, have similar country risk; this would lead us to attach Cuba's rating of Caa1 to Kenya (which is not rated) and to use the same default spread (based on this rating) for both countries.

In table 12, we have estimated the typical default spreads for bonds in different sovereign ratings classes in September 2009. One problem that we had in estimating the numbers for this table is that relatively few emerging markets have dollar or Euro denominated bonds outstanding. Consequently, there were some ratings classes where there was only one country with data and several ratings classes where there were none. To mitigate this problem, we used spreads from the CDS market, referenced in the earlier section. We were able to get default spreads for almost 50 countries, categorized by rating class, and we averaged the spreads across multiple countries in the same ratings class.[61] An alternative approach to estimating default spread is to assume that sovereign

[61] For instance, Brazil, Bulgaria and Cratia all share a Baa3 rating, and the CDS spreads as of September 2008 were 1.4%, 2% and 2.6% respectively. The average spread across the three countries is 2%.

ratings are comparable to corporate ratings, i.e., a Ba1 rated country bond and a Ba1 rated corporate bond have equal default risk. In this case, we can use the default spreads on corporate bonds for different ratings classes. Table 12 also summarizes the typical default spreads for corporate bonds in different ratings classes in September 2009.

Table 12: Default Spreads by Sovereign Ratings Class – September 2009

Moody's Rating	*Sovereign Bonds/ CDS*	*Corporate Bonds*
Aaa	0.25%	0.70%
Aa1	0.35%	0.80%
Aa2	0.70%	0.90%
Aa3	0.80%	0.95%
A1	0.95%	1.10%
A2	1.10%	1.20%
A3	1.25%	1.35%
Baa1	1.75%	2.15%
Baa2	1.90%	2.25%
Baa3	2.00%	3.10%
Ba1	3.00%	4.25%
Ba2	3.55%	4.50%
Ba3	4.00%	4.75%
B1	5.50%	5.00%
B2	6.50%	5.50%
B3	8.00%	6.25%
Caa1	8.50%	8.25%
Caa2	9.50%	9.50%
Caa3	11.00%	11.50%

Note that the corporate bond spreads, at least in September 2009, were slightly larger than the sovereign spreads. Using this approach to estimate default spreads for Brazil, with its rating of Baa3 would result in a spread of 2% (3.10%), if we use sovereign spreads (corporate spreads). These spreads are down from post-crisis levels at the end of 2008 but are still higher than the spreads two years ago.

Analysts who use default spreads as measures of country risk typically add them on to both the cost of equity and debt of every company traded in that country. For instance, the cost of equity for a Brazilian company, estimated in U.S. dollars, will be 2% higher than the cost of equity of an otherwise similar U.S. company, using the September 2009 measure of the default spread on the dollar denominated bonds. In some cases,

analysts add the default spread to the U.S. risk premium and multiply it by the beta. This increases the cost of equity for high beta companies and lowers them for low beta firms.[62]

2. Relative Equity Market Standard Deviations

There are some analysts who believe that the equity risk premiums of markets should reflect the differences in equity risk, as measured by the volatilities of these markets. A conventional measure of equity risk is the standard deviation in stock prices; higher standard deviations are generally associated with more risk. If you scale the standard deviation of one market against another, you obtain a measure of relative risk. For instance, the relative standard deviation for country X (against the US) would be computed as follows:

$$\text{Relative Standard Deviation}_{\text{Country X}} = \frac{\text{Standard Deviation}_{\text{Country X}}}{\text{Standard Deviation}_{\text{US}}}$$

If we assume a linear relationship between equity risk premiums and equity market standard deviations, and we assume that the risk premium for the US can be computed (using historical data, for instance) the equity risk premium for country X follows:

$$\text{Equity risk premium}_{\text{Country X}} = \text{Risk Premum}_{\text{US}} * \text{Relative Standard Deviation}_{\text{Country X}}$$

Assume, for the moment, that you are using an equity risk premium for the United States of 5.00%. The annualized standard deviation in the S&P 500 between October 2007 and September 2009, using weekly returns, was 31.28%, whereas the standard deviation in the Bovespa (the Brazilian equity index) over the same period was 40.28%.[63] Using these values, the estimate of a total risk premium for Brazil would be as follows.

$$\text{Equity Risk Premium}_{\text{Brazil}} = 5.00\% * \frac{40.28\%}{31.28\%} = 6.44\%$$

The country risk premium for Brazil can be isolated as follows:

$$\text{Country Risk Premium}_{\text{Brazil}} = 6.44\% - 5.00\% = 1.44\%$$

Table 13 lists country volatility numbers for some emerging markets and the resulting total and country risk premiums for these markets, based on the assumption that the equity risk premium for the United States is 4%.

Table 13: Equity Market Volatilities and Risk Premiums

Country	Standard deviation in	Relative Volatility (to	Total Equity Risk	Country risk premium

[62] In a companion paper, I argue for a separate measure of company exposure to country risk called lambda that is scaled around one (just like beta) that is multiplied by the country risk premium to estimate the cost of equity. See Damodaran, A., 2007, Measuring Company Risk Exposure to Country Risk, SSRN Working Paper.

[63] If the dependence on historical volatility is troubling, the options market can be used to get implied volatilities for both the US market (23.19%) and for the Bovespa (27.83%).

	index	US)	Premium	
Argentina	46.56%	1.49	7.44%	2.44%
Brazil	40.28%	1.29	6.44%	1.44%
Chile	24.50%	0.78	3.92%	-1.08%
China	42.10%	1.35	6.73%	1.73%
Columbia	27.89%	0.89	4.46%	-0.54%
Croatia	41.65%	1.33	6.66%	1.66%
Czech Republic	41.70%	1.33	6.67%	1.67%
Egypt	42.26%	1.35	6.76%	1.76%
Hungary	39.08%	1.25	6.25%	1.25%
India	38.10%	1.22	6.09%	1.09%
Indonesia	37.98%	1.21	6.07%	1.07%
Israel	25.92%	0.83	4.14%	-0.86%
Kenya	28.14%	0.90	4.50%	-0.50%
Korea	34.05%	1.09	5.44%	0.44%
Malaysia	28.27%	0.90	4.52%	-0.48%
Mexico	36.07%	1.15	5.77%	0.77%
Namibia	38.23%	1.22	6.11%	1.11%
Nigeria	36.32%	1.16	5.81%	0.81%
Pakistan	36.16%	1.16	5.78%	0.78%
Peru	47.03%	1.50	7.52%	2.52%
Philippines	31.73%	1.01	5.07%	0.07%
Poland	30.34%	0.97	4.85%	-0.15%
Romania	46.74%	1.49	7.47%	2.47%
Russia	66.70%	2.13	10.66%	5.66%
Slovenia	29.48%	0.94	4.71%	-0.29%
Solvakia	23.43%	0.75	3.75%	-1.25%
Thailand	36.15%	1.16	5.78%	0.78%
Turkey	41.23%	1.32	6.59%	1.59%
Ukraine	47.80%	1.53	7.64%	2.64%
Venezuela	20.05%	0.64	3.20%	-1.80%
Vietnam	45.39%	1.45	7.26%	2.26%
US	**31.28%**		**5.00%**	

While this approach has intuitive appeal, there are problems with using standard deviations computed in markets with widely different market structures and liquidity. Since equity market volatility is affected by liquidity, with more liquid markets often showing higher volatility, this approach will understate premiums for illiquid markets and overstate the premiums for liquid markets.. For instance, the standard deviations in many emerging markets is lower than the standard deviation in the S&P 500, leading to equity risk premiums for those countries that are lower than the US. Thus, we assign a total equity risk premium, with this approach, of only 3.2% for Venezuela, lower than the 5%

we use in mature markets. On a relative basis, China's risk premiums, using this approach, are well above the equity risk premium for Nigeria or Namibia, both of which are riskier markets and economies than China. The second problem is related to currencies since the standard deviations are usually measured in local currency terms; the standard deviation in the U.S. market is a dollar standard deviation, whereas the standard deviation in the Brazilian market is a nominal Brazilian Reai standard deviation. This is a relatively simple problem to fix, though, since the standard deviations can be measured in the same currency – you could estimate the standard deviation in dollar returns for the Brazilian market.

3. Default Spreads + Relative Standard Deviations

In the first approach to computing equity risk premiums, we assumed that the default spreads (actual or implied) for the country were good measures of the additional risk we face when investing in equity in that country. In the second approach, we argued that the information in equity market volatility can be used to compute the country risk premium. In the third approach, we will meld the first two, and try to use the information in both the country default spread and the equity market volatility.

The country default spreads provide an important first step in measuring country equity risk, but still only measure the premium for default risk. Intuitively, we would expect the country equity risk premium to be larger than the country default risk spread. To address the issue of how much higher, we look at the volatility of the equity market in a country relative to the volatility of the bond market used to estimate the spread. This yields the following estimate for the country equity risk premium.

$$\text{Country Risk Premium} = \text{Country Default Spread} * \left(\frac{\sigma_{\text{Equity}}}{\sigma_{\text{Country Bond}}} \right)$$

To illustrate, consider again the case of Brazil. As noted earlier, the default spread on the Brazilian dollar denominated bond in September 2009 was 1.9% and the annualized standard deviation in the Brazilian equity index over the previous year was 40.28%. Using two years of weekly returns, the annualized standard deviation in the Brazilian dollar denominated ten-year bond was 35.58%.[64] The resulting country equity risk premium for Brazil is as follows:

$$\text{Brazil's Additional Equity Risk Premium} = 1.90\% \left(\frac{40.28\%}{35.58\%} \right) = 2.15\%$$

[64] Both standard deviations are computed on returns; returns on the equity index and yields on the 10-year bond.

Unlike the equity standard deviation approach, this premium is in addition to a mature market equity risk premium. Note that this country risk premium will increase if the country rating drops or if the relative volatility of the equity market increases.

Why should equity risk premiums have any relationship to country bond spreads? A simple explanation is that an investor who can make 1.90% risk premium on a dollar-denominated Brazilian government bond would not settle for a risk premium of 1.5% (in dollar terms) on Brazilian equity. Playing devil's advocate, however, a critic could argue that the interest rate on a country bond, from which default spreads are extracted, is not really an expected return since it is based upon the promised cash flows (coupon and principal) on the bond rather than the expected cash flows. In fact, if we wanted to estimate a risk premium for bonds, we would need to estimate the expected return based upon expected cash flows, allowing for the default risk. This would result in a lower default spread and equity risk premium. Both this approach and the last one use the standard deviation in equity of a market to make a judgment about country risk premium, but they measure it relative to different bases. This approach uses the country bond as a base, whereas the previous one uses the standard deviation in the U.S. market. This approach assumes that investors are more likely to choose between Brazilian bonds and Brazilian equity, whereas the previous approach assumes that the choice is across equity markets.

There are two potential measurement problems with using this approach. The first is computing the relative volatility requires us to estimate volatility in the government bond, which, in turn, presupposes that long-term government bonds not only exist but are also traded.[65] In countries where this data item is not available, we have three choices. One is to fall back on one of the other two approaches. The second is to use a proxy, say the volatility in bonds issued by a large corporation in that country; if the company has low default risk, the volatility on the corporate bond should be close to the volatility in the government bond. The third is to compute a cross sectional average of the ratio of stock market to bond market volatility across countries and use that average. In 2008, for instance, there were 28 emerging markets, where both the equity market volatility and the government bond volatility numbers were available. The median ratio, across these markets, of equity market volatility to bond price volatility was approximately 1.50.[66] The other issue is that there may be a potential for double counting risk, since the

[65] One indication that the government bond is not heavily traded is an abnormally low standard deviation on the bond yield.

[66] The ratio seems to be lowest in the markets with the highest default spreads and higher in markets with lower default spreads.

standard deviation in both the equity index and the government bond incorporate the volatility in the underlying riskless security – the US 10-year treasury bond. We could overcome this problem by using the excess returns (over and above the US 10-year treasury bond rate) on both the country bond and the equity index.

Choosing between the approaches

The three approaches to estimating country risk premiums will generally give you different estimates, with the bond default spread and relative equity standard deviation approaches generally yielding lower country risk premiums than the melded approach that uses both the country bond default spread and the equity and bond standard deviations. Table 14 summarizes the estimates of country equity and total risk premium using the three approaches for Brazil in September 2008:

Table 14: Country and Total Equity Risk Premium: Brazil in September 2003

Approach	*Mature Market Equity Premium*	*Brazil Country Risk Premium*	*Total Equity Risk Premium*
Country Bond Default Spread	5.00%	1.90%	6.90%
Relative Equity Market Standard Deviations	5.00%	1.44%	6.44%
Melded Approach (Bond default spread + Relative Standard Deviation)	5.00%	2.15%	7.15%

We believe that the larger country risk premiums that emerge from the last approach are the most realistic for the immediate future, but that country risk premiums will decline over time. Just as companies mature and become less risky over time, countries can mature and become less risky as well.

One way to adjust country risk premiums over time is to begin with the premium that emerges from the melded approach and to adjust this premium down towards either the country bond default spread or the country premium estimated from equity standard deviations. Thus, the equity risk premium will converge to the country bond default spread as we look at longer term expected returns. As an illustration, the country risk premium for Brazil would be 2.15% for the next year but decline over time to either the 1.90% (country default spread) or 1.44% (relative standard deviation) or perhaps even lower, depending upon your assessment of how Brazil's economy will evolve over time.

Implied Equity Premiums

The problem with any historical premium approach, even with substantial modifications, is that it is backward looking. Given that our objective is to estimate an updated, forward-looking premium, it seems foolhardy to put your faith in mean reversion and past data. In this section, we will consider three approaches for estimating equity risk premiums that are more forward looking.

1. DCF Model Based Premiums

When investors price assets, they are implicitly telling you what they require as an expected return on that asset. Thus, if an asset has expected cash flows of $15 a year in perpetuity, and an investor pays $75 for that asset, he is announcing to the world that his required rate of return on that asset is 20% (15/75). In this section, we expand on this intuition and argue that the current market prices for equity, in conjunction with expected cash flows, should yield an estimate on the equity risk premium.

A Stable Growth DDM Premium

It is easiest to illustrated implied equity premiums with a dividend discount model (DDM). In the DDM, the value of equity is the present value of expected dividends from the investment. In the special case where dividends are assumed to grow at a constant rate forever, we get the classic stable growth (Gordon) model:

$$\text{Value of equity} = \frac{\text{Expected Dividends Next Period}}{(\text{Required Return on Equity} - \text{Expected Growth Rate})}$$

This is essentially the present value of dividends growing at a constant rate. Three of the four inputs in this model can be obtained or estimated - the current level of the market (value), the expected dividends next period and the expected growth rate in earnings and dividends in the long term. The only "unknown" is then the required return on equity; when we solve for it, we get an implied expected return on stocks. Subtracting out the riskfree rate will yield an implied equity risk premium.

To illustrate, assume that the current level of the S&P 500 Index is 900, the expected dividend yield on the index is 2% and the expected growth rate in earnings and dividends in the long term is 7%. Solving for the required return on equity yields the following:

$$900 = (.02*900) /(r - .07)$$

Solving for r,

$$r = (18+63)/900 = 9\%$$

If the current riskfree rate is 6%, this will yield a premium of 3%.

In fact, if we accept the stable growth dividend discount model as the base model for valuing equities and assume that the expected growth rate in dividends should equate to the riskfree rate in the long term, the dividend yield on equities becomes a measure of the equity risk premium:

$$\text{Value of equity} = \frac{\text{Expected Dividends Next Period}}{(\text{Required Return on Equity} - \text{Expected Growth Rate})}$$

$$\text{Dividends/ Value of Equity} = \text{Required Return on Equity} - \text{Expected Growth rate}$$

$$\text{Dividend Yield} = \text{Required Return on Equity} - \text{Riskfree rate}$$

$$= \text{Equity Risk Premium}$$

Rozeff (1984) made this argument[67] and empirical support has been claimed for dividend yields as predictors of future returns in many studies since.[68] Note that this simple equation will break down if (a) companies do not pay out what they can afford to in dividends, i.e., they hold back cash or (b) if earnings are expected to grow at extraordinary rates for the short term.

There is another variant of this model that can be used, where we focus on earnings instead of dividends. To make this transition, though, we have to state the expected growth rate as a function of the payout ratio and return on equity (ROE) :[69]

$$\text{Growth rate} = (1 - \text{Dividends/ Earnings})\ (\text{Return on equity})$$

$$= (1 - \text{Payout ratio})\ (\text{ROE})$$

Substituting back into the stable growth model,

$$\text{Value of equity} = \frac{\text{Expected Earnings Next Period (Payout ratio)}}{(\text{Required Return on Equity} - (1 - \text{Payout ratio})\ (\text{ROE}))}$$

If we assume that the return on equity (ROE) is equal to the required return on equity (cost of equity), i.e., that the firm does not earn excess returns, this equation simplifies as follows:

$$\text{Value of equity} = \frac{\text{Expected Earnings Next Period}}{\text{Required Return on Equity}}$$

In this case, the required return on equity can be written as:

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[67] Rozeff, M. S. 1984. *Dividend yields are equity risk premiums*, Journal of Portfolio Management, v11, 68-75.

[68] Fama, E. F., and K. R. French. 1988. *Dividend yields and expected stock returns*. Journal of Financial Economics, v22, 3-25. As we will see later in this paper, this finding has been contested in more recent papers.

[69] This equation for sustainable growth is discussed more fully in Damodaran, A., 2002, Investment Valuation, John Wiley and Sons.

$$\text{Required return on equity} = \frac{\text{Expected Earnings Next Period}}{\text{Value of Equity}}$$

In effect, the inverse of the PE ratio (also referenced as the earnings yield) becomes the required return on equity, if firms are in stable growth earning no excess returns. Subtracting out the riskfree rate should yield an implied premium:

Implied premium (EP approach) = Earnings Yield on index – Riskfree rate

In September 2009, both these approaches would have delivered very low equity risk premiums for the US market.

Dividend Yield = 2.2% (in September 2009)

Earnings Yield = 6.67%:[70] Implied premium = 6.67% - 3.45% = 3.22%

Both approaches, though, draw on the dividend discount model and make strong assumptions about firms being in stable growth and/or long term excess returns.

A Generalized Model: Implied Equity Risk Premium

To expand the model to fit more general specifications, we would make the following changes: Instead of looking at the actual dividends paid as the only cash flow to equity, we would consider potential dividends instead of actual dividends. In my earlier work (2002, 2006), the free cash flow to equity (FCFE), i.e, the cash flow left over after taxes, reinvestment needs and debt repayments, was offered as a measure of potential dividends.[71] Over the last decade, for instance, firms have paid out only about half their FCFE as dividends. If this poses too much of an estimation challenge, there is a simpler alternative. Firms that hold back cash build up large cash balances that they use over time to fund stock buybacks. Adding stock buybacks to aggregate dividends paid should give us a better measure of total cash flows to equity. The model can also be expanded to allow for a high growth phase, where earnings and dividends can grow at rates that are very different (usually higher, but not always) than stable growth values. With these changes, the value of equity can be written as follows:

$$\text{Value of Equity} = \sum_{t=1}^{t=N} \frac{E(FCFE_t)}{(1+k_e)^t} + \frac{E(FCFE_{N+1})}{(k_e - g_N)(1+k_e)^N}$$

In this equation, there are N years of high growth, $E(FCFE_t)$ is the expected free cash flow to equity (potential dividend) in year t, k_e is the rate of return expected by equity investors and g_N is the stable growth rate (after year N). We can solve for the rate of

[70] The earnings yield in September 2009 is the inverse of the PE ratio of 15 on the S&P 500 index at the time.

[71] Damodaran, A., 2002, *Investment Valuation*, John Wiley and Sons; Damodaran, A., 2006, *Damodaran on Valuation*, John Wiley and Sons.

return equity investors need, given the expected potential dividends and prices today. Subtracting out the riskfree rate should generate a more realistic equity risk premium.

In a variant of this approach, the implied equity risk premium can be computed from excess return or residual earnings models. In these models, the value of equity today can be written as the sum of capital invested in assets in place and the present value of future excess returns:[72]

$$\text{Value of Equity} = \text{Book Equity today} + \sum_{t=1}^{t=\infty} \frac{\text{Net Income}_t - k_e(\text{Book Equity}_{t-1})}{(1+k_e)^t}$$

If we can make estimates of the book equity and net income in future periods, we can then solve for the cost of equity and use that number to back into an implied equity risk premium. Claus and Thomas (2001) use this approach, in conjunction with analyst forecasts of earnings growth, to estimate implied equity risk premiums of about 3% for the market in 2000.[73]

Implied Equity Risk Premium: S&P 500

Given its long history and wide following, the S&P 500 is a logical index to use to try out the implied equity risk premium measure. In this section, we will begin by estimating a current implied equity risk premium (in both January and in September of 2008) and follow up by looking at the volatility in that estimate over time.

Implied Equity Risk Premiums – January 2008 versus January 2009

On December 31, 2007, the S&P 500 Index closed at 1468.36, and the dividend yield on the index was roughly 1.89%. In addition, the consensus estimate of growth in earnings for companies in the index was approximately 5% for the next 5 years.[74] Since this is not a growth rate that can be sustained forever, we employ a two-stage valuation model, where we allow growth to continue at 5% for 5 years, and then lower the growth rate to 4.02% (the riskfree rate) after that.[75] Table 15 summarizes the expected dividends for the next 5 years of high growth, and for the first year of stable growth thereafter:

Table 15: Estimated Dividends on the S&P 500 Index – January 1, 2008

Year	*Dividends on Index*

[72] For more on excess return models, see Damodaran, A, 2006, *Valuation Approaches and Metrics: A Survey of the Theory and Evidence,* Working Paper, www.damodaran.com.

[73] Claus, J. and J. Thomas, 2001,'*Equity premia as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stock markets*, Journal of Finance 56(5), 1629–1666.

[74] We used the average of the analyst estimates for individual firms (bottom-up). Alternatively, we could have used the top-down estimate for the S&P 500 earnings.

[75] The treasury bond rate is the sum of expected inflation and the expected real rate. If we assume that real growth is equal to the real interest rate, the long term stable growth rate should be equal to the treasury bond rate.

1	29.12
2	30.57
3	32.10
4	33.71
5	34.39
6	36.81

[a]Dividends in the first year = 1.89% of 1468.36 (1.05)

If we assume that these are reasonable estimates of the expected dividends and that the index is correctly priced, the value can be written as follows:

$$1468.36 = \frac{29.12}{(1+r)} + \frac{30.57}{(1+r)^2} + \frac{32.10}{(1+r)^3} + \frac{33.71}{(1+r)^4} + \frac{34.39}{(1+r)^5} + \frac{36.81(1.0402)}{(r-.0402)(1+r)^5}$$

Note that the last term in the equation is the terminal value of the index, based upon the stable growth rate of 4.02%, discounted back to the present. Solving for required return in this equation yields us a value of 6.04%. Subtracting out the ten-year treasury bond rate (the riskfree rate) yields an implied equity premium of 2.02%.

The focus on dividends may be understating the premium, since the companies in the index have bought back substantial amounts of their own stock over the last few years. Table 16 summarizes dividends and stock buybacks on the index, going back to 2001.

Table 16: Dividends and Stock Buybacks on S&P 500 Index: 2001-2007

Year	*Dividend Yield*	*Stock Buyback Yield*	*Total Yield*
2001	1.37%	1.25%	2.62%
2002	1.81%	1.58%	3.39%
2003	1.61%	1.23%	2.84%
2004	1.57%	1.78%	3.35%
2005	1.79%	3.11%	4.90%
2006	1.77%	3.38%	5.15%
2007	1.89%	4.00%	5.89%
Average total yield between 2001-2007 =			4.02%

In 2007, for instance, firms collectively returned twice as much cash in the form of buybacks than they paid out in dividends. Since buybacks are volatile over time, and 2007 may represent a high-water mark for the phenomenon, we recomputed the expected cash flows, in table 17, for the next 6 years using the average total yield (dividends + buybacks) of 4.02%, instead of the actual dividends, and the growth rates estimated earlier (5% for the next 5 years, 4.02% thereafter):

Table 17: Cashflows on S&P 500 Index

Year	*Dividends+ Buybacks on Index*
1	61.98

2	65.08
3	68.33
4	71.75
5	75.34
6	78.36

Using these cash flows to compute the expected return on stocks, we derive the following:

$$1468.36 = \frac{61.98}{(1+r)} + \frac{65.08}{(1+r)^2} + \frac{68.33}{(1+r)^3} + \frac{71.75}{(1+r)^4} + \frac{75.34}{(1+r)^5} + \frac{75.34(1.0402)}{(r-.0402)(1+r)^5}$$

Solving for the required return and the implied premium with the higher cash flows:

Required Return on Equity = 8.39%

Implied Equity Risk Premium = Required Return on Equity - Riskfree Rate

= 8.39% - 4.02% = 4.37%

This value (4.37%) would have been our estimate of the equity risk premium on January 1, 2008.

During 2008, the S&P 500 lost just over a third of its value and ended the year at 903.25 and the treasury bond rate plummeted to close at 2.21% on December 31, 2008. Firms also pulled back on stock buybacks and financial service firms in particular cut dividends during the year. The inputs to the equity risk premium computation reflect these changes:

Level of the index = 903.25 (Down from 1468.36)

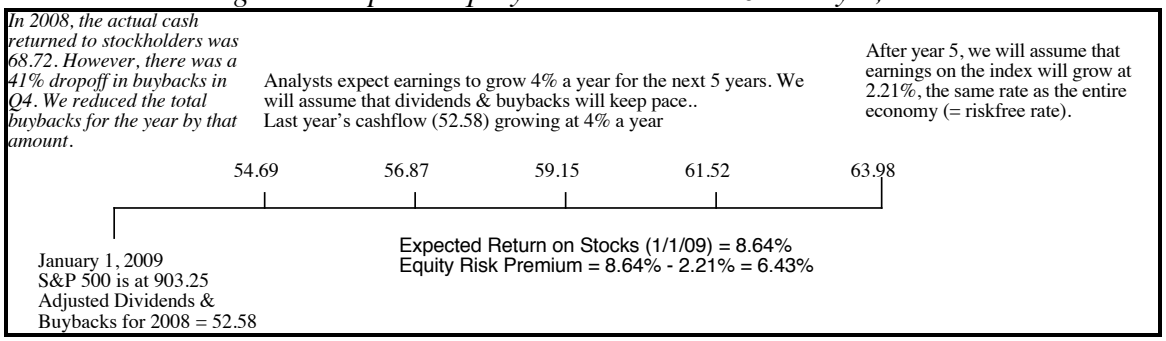
Treasury bond rate = 2.21% (Down from 4.02%)

Updated dividends and buybacks on the index = 52.58 (Down about 15%)

Expected growth rate = 4% for next 5 years (analyst estimates) and 2.21% thereafter (set equal to riskfree rate).

The computation is summarized in figure 8:

Figure 8: Implied Equity Risk Premium – January 1, 2009



The resulting equation is below:

$$903.25 = \frac{54.69}{(1+r)} + \frac{56.87}{(1+r)^2} + \frac{59.15}{(1+r)^3} + \frac{61.52}{(1+r)^4} + \frac{63.98}{(1+r)^5} + \frac{63.98(1.0221)}{(r-.0221)(1+r)^5}$$

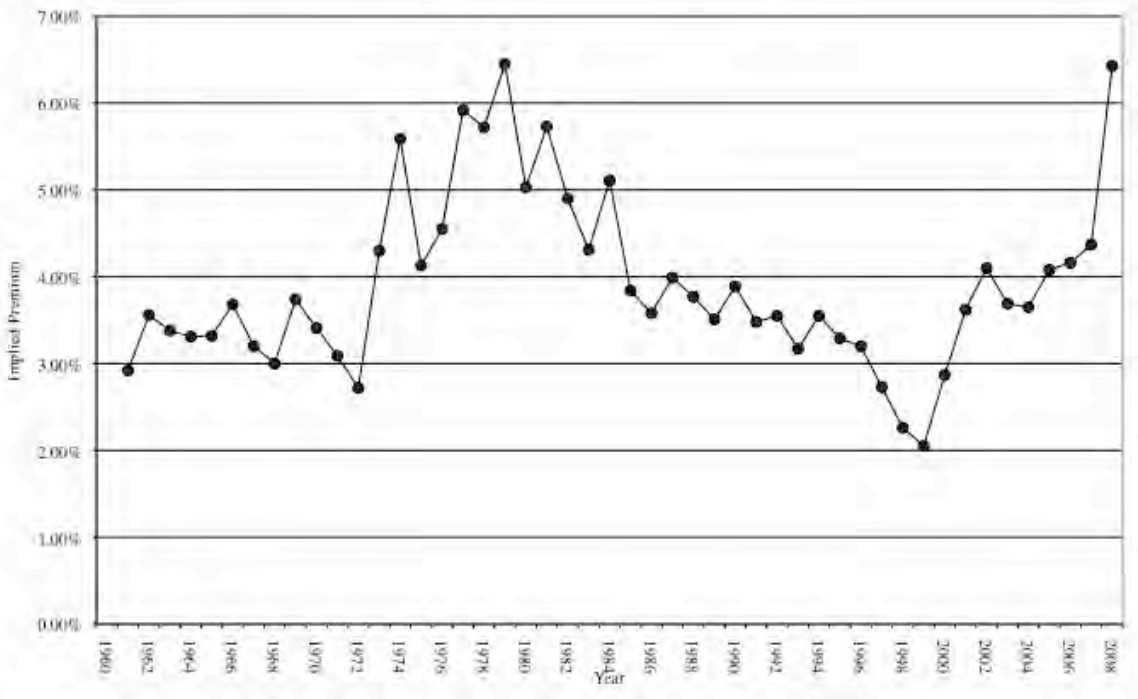
Solving for the required return and the implied premium with the higher cash flows:
Required Return on Equity = 8.64%
Implied Equity Risk Premium = Required Return on Equity - Riskfree Rate
= 8.64% - 2.21% = 6.43%

The implied premium rose more than 2%, from 4.37% to 6.43%, over the course of the year, indicating that investors perceived more risk in equities at the end of the year, than they did at the start and were demanding a higher premium to compensate.

Time Series Behavior for S&P 500 Implied Premium

As the inputs to the implied equity risk premium, it is quite clear that the value for the premium will change not just from day to day but from one minute to the next. In particular, movements in the index will affect the equity risk premium, with higher (lower) index values, other things remaining equal, translating into lower (higher) implied equity risk premiums. In Figure 9, we chart the implied premiums in the S&P 500 from 1960 to 2008:

Figure 9: Implied Premium for US Equity Market



In terms of mechanics, we used potential dividends (including buybacks) as cash flows, and a two-stage discounted cash flow model.[76] Looking at these numbers, we would draw the following conclusions:

[76] We used analyst estimates of growth in earnings for the 5-year growth rate after 1980. Between 1960 and 1980, we used the historical growth rate (from the previous 5 years) as the projected growth, since

- The implied equity premium has generally been lower than the historical risk premium for the US equity market for most of the last two decades. Even in 1978, when the implied equity premium peaked, the estimate of 6.50% is well below what many practitioners use as the risk premium in their risk and return models. In 2009, we saw this long-term trend reversed and the implied equity risk premium of 6.43% was much higher than the historical premium (3.88%).
- The implied equity premium did increase during the seventies, as inflation increased. This does have interesting implications for risk premium estimation. Instead of assuming that the risk premium is a constant, and unaffected by the level of inflation and interest rates, which is what we do with historical risk premiums, it may be more realistic to increase the risk premium if expected inflation and interest rates go up.
- There is a strong tendency towards mean reversion in implied equity premiums. Thus, the premium, which peaked at 6.5% in 1978, moved down towards the average in the 1980s. By the same token, the premium of 2% that we observed at the end of the dot-com boom in the 1990s quickly reverted back to the average, during the market correction from 2000-2003.[77] Given this tendency, it is possible that we can end up with a far better estimate of the implied equity premium by looking at not just the current premium, but also at historical trend lines. We can use the average implied equity premium over longer periods, say ten to fifteen years. Note that we do not need as many years of data to make this estimate as we do with historical premiums, because the standard errors tend to be smaller.
- Finally, the crisis of 2008 was unprecedented in terms of its impact on equity risk premiums. Implied equity risk premiums rose more during the last year (2008) than in any one of the prior 50 years. Much of that change occurred in the last 15 weeks of the year and we will come back to take a closer look at that period later in the paper.

Determinants of Implied Premiums

Looking at the variation of the implied equity risk premium over time does give rise to a follow-up question: How much of the variation in the premium over time can be explained by changes in the macro economic environment? To answer this question, we considered the effect of changes in interest rates on equity risk premiums. As can be seen

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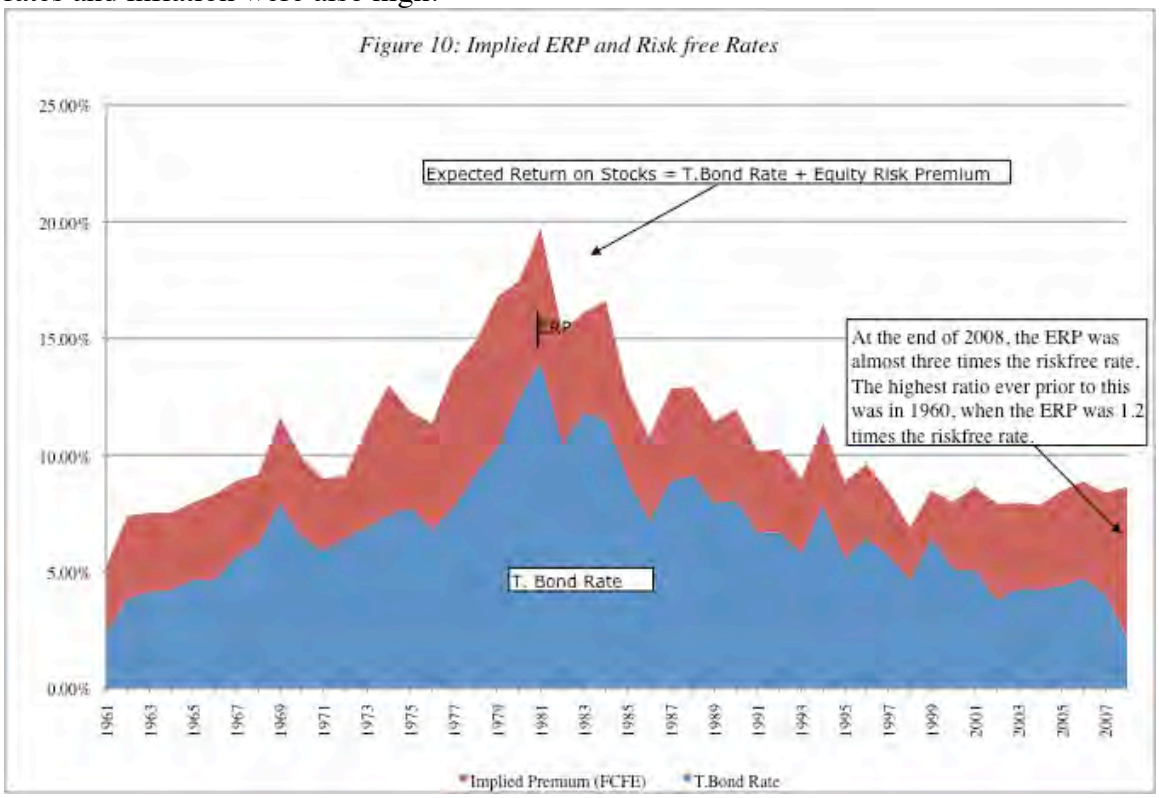
analyst estimates were difficult to obtain. Prior to the late 1980s, the dividends and potential dividends were very similar, because stock buybacks were uncommon. In the last 20 years, the numbers have diverged.

[77] Arnott, Robert D., and Ronald Ryan, 2001, *The Death of the Risk Premium: Consequences of the 1990s*, Journal of Portfolio Management, Spring 2001. They make the same point about reduction in implied equity risk premiums that we do. According to their calculations, though, the implied equity risk premium in the late 1990s was negative.

in figure 10, the implied equity risk premiums were highest in the 1970s, when interest rates and inflation were also high.



To see if this was an aberration, we ran a regression of the implied equity risk premium against both the level of long-term rates (the treasury bond rate) and the slope of the yield curve (captured as the difference between the 10-year treasury bond rate and the 6-month T.Bill rate), with the t statistics reported in brackets below each coefficient:

$$\text{Implied ERP} = 2.82\% + \underset{(3.42)}{0.177}\ (\text{T.Bond Rate}) - \underset{(0.96)}{0.081}\ (\text{T.Bond} - \text{T.Bill}) \qquad R^2 = 17.5\%$$

There is a strong positive relationship between the T.Bond rate and implied equity risk premiums: every 1% increase in the treasury bond rate increases the equity risk premium by 0.177%. The relationship between implied premiums and the slope of the yield curve is negative but much weaker: a more upward sloping yield curve has generally been associated with lower equity risk premiums.

This regression reinforces the view that equity risk premiums should not be constants but should be linked to the level of interest rates, at the minimum, and perhaps even to the slope of the yield curve. On September 30, 2009, for instance, when the 10-year treasury bond rate was 3.45% and the 6-month treasury bill rate was at 0.2%, the implied equity risk premium would have been computed as follows:

$$\text{Implied ERP} = 2.82\% + 0.177\ (3.45\%) - .081\ (3.45\% - 0.2\%) \qquad = 3.17\%$$

This would have been well below the observed implied equity risk premium of about 6.43% and the average implied equity risk premium of 4% between 1960 and 2008.

While we have considered only interest rates in this analysis, it can be expanded to include other fundamental variables including measures of overall economic growth (such as expected growth in the GDP), exchange rates and even measures of risk aversion. Doing so may give us a way of estimating an "intrinsic' equity risk premium, based upon macro economic conditions, that is less susceptible to market moods and perceptions.

Implied Equity Risk Premiums during a Market Crisis and Beyond

When we use historical risk premiums, we are, in effect, assuming that equity risk premiums do not change much over short periods and revert back over time to historical averages. This assumption was viewed as reasonable for mature equity markets like the United States, but was put under a severe test during the market crisis that unfolded with the fall of Lehman Brothers on September 15, and the subsequent collapse of equity markets, first in the US, and then globally.

Since implied equity risk premiums reflect the current level of the index, the 75 trading days between September 15, 2008, and December 31, 2008, offer us an unprecedented opportunity to observe how much the price charged for risk can change over short periods. In figure 11, we depict the S&P 500 on one axis and the implied equity risk premium on the other. To estimate the latter, we used the level of the index and the treasury bond rate at the end of each day and used the total dollar dividends and buybacks over the trailing 12 months to compute the cash flows for the most recent year.[78] We also updated the expected growth in earnings for the next 5 years, but that number changed only slowly over the period. For example, the total dollar dividends and buybacks on the index for the trailing 12 months of 52.58 resulted in a dividend yield of 4.20% on September 12 (when the index closed at 1252) but jumped to 4.97% on October 6, when the index closed at 1057.[79]

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[78] This number, unlike the index and treasury bond rate, is not updated on a daily basis. We did try to modify the number as companies in the index announced dividend suspensions or buyback modifications.

[79] It is possible, and maybe even likely, that the banking crisis and resulting economic slowdown was leading some companies to reassess policies on buybacks. Alcoa, for instance, announced that it was terminating stock buybacks. However, other companies stepped up buybacks in response to lower stock prices. If the total cash return was dropping, as the market was, the implied equity risk premiums should be lower than the numbers that we have computed.

Figure 11: Implied Equity Risk Premium - 9/12- 12/31/08

In a period of a month, the implied equity risk premium rose from 4.20% on September 12 to 6.39% at the close of trading of October 10 as the S&P moved from 1250 down to 903. Even more disconcertingly, there were wide swings in the equity risk premium within a day; in the last trading hour just on October 10, the implied equity risk premium ranged from a high of 6.6% to a low of 6.1%. Over the rest of the year, the equity risk premium gyrated, hitting a high of 8% in late November, before settling into the year-end level of 6.43%.

The volatility captured in figure 12 was not restricted to just the US equity markets. Global equity markets gyrated with and sometimes more than the US, default spreads widened considerably in corporate bond markets, commercial paper and LIBOR rates soared while the 3-month treasury bill rate dropped close to zero and the implied volatility in option markets rose to levels never seen before. Gold surged but other commodities, such as oil and grains, dropped. Not only did we discover how intertwined equity markets are around the globe but also how markets for all risky assets are tied together. We will explicitly consider these linkages as we go through the rest of the paper.

There are two ways in which we can view this volatility. One the one side, proponents of using historical averages (either of actual or implied premiums) will use

the day-to-day volatility in market risk premiums to argue for the stability of historical averages. They are implicitly assuming that when the crisis passes, markets will return to the status quo. On the other hand, there will be many who point to the unprecedented jump in implied premiums over a few weeks and note the danger of sticking with a "fixed" premium. They will argue that there are sometimes structural shifts in markets, i.e. big events that change market risk premiums for long periods, and that we should be therefore be modifying the risk premiums that we use in valuation as the market changes around us. In January 2009, in the context of equity risk premiums, the first group would have argued we should ignore history (both in terms of historical returns and implied equity risk premiums) and move to equity risk premiums of 6%+ for mature markets (and higher for emerging markets whereas the second would have made a case for sticking with a historical average, which would have been much lower than 6.43%. The first nine months of 2009 have provided more support for the latter group than the former, though the evidence is not conclusive. In figure 12, we report on the monthly equity risk premiums for the S&P 500 from January through September of 2009:

Figure 12: ERP and S&P 500: 2009

Note that the equity risk premium continued to climb in the first three months of the year, reaching a high of 7.68% on March 1, but has dropped significantly in the last few months. At the end of September 2009, the implied equity risk premium for the US stood at 4.86%.

Rather than take the expedient position of sitting out this debate, the very act of valuing companies requires taking a stand. Though I believe that mean reversion is a powerful force, I think that the banking and financial crisis of 2008 was unlike other market fevers and downturns in terms of exposing weaknesses in developed capital markets. When valuing emerging markets prior to September 2008, I used 4% as my mature market equity risk premium and based the estimate on the average implied equity risk premium over time (1960-2007). Since October of 2008, I have moved to a 5-6% mature market equity risk premium and will continue to use this higher premium until I am convinced otherwise.

Extensions of Implied Equity Risk Premium

The practice of backing out risk premiums from current prices and expected cashflows is a flexible one. It can be expanded into emerging markets to provide estimates of risk premiums that can replace the country risk premiums we developed in the last section. Within an equity market, it can be used to compute implied equity risk premiums for individual sectors or even classes of companies.

a. Other Equity Markets

The advantage of the implied premium approach is that it is market-driven and current, and does not require any historical data. Thus, it can be used to estimate implied equity premiums in any market, no matter how short its history, It is, however, bounded by whether the model used for the valuation is the right one and the availability and reliability of the inputs to that model. Earlier in this paper, we estimated country risk premiums for Brazil, using default spreads and equity market volatile. To provide a contrast, we estimated the implied equity risk premium for the Brazilian equity market in September 2009, from the following inputs.

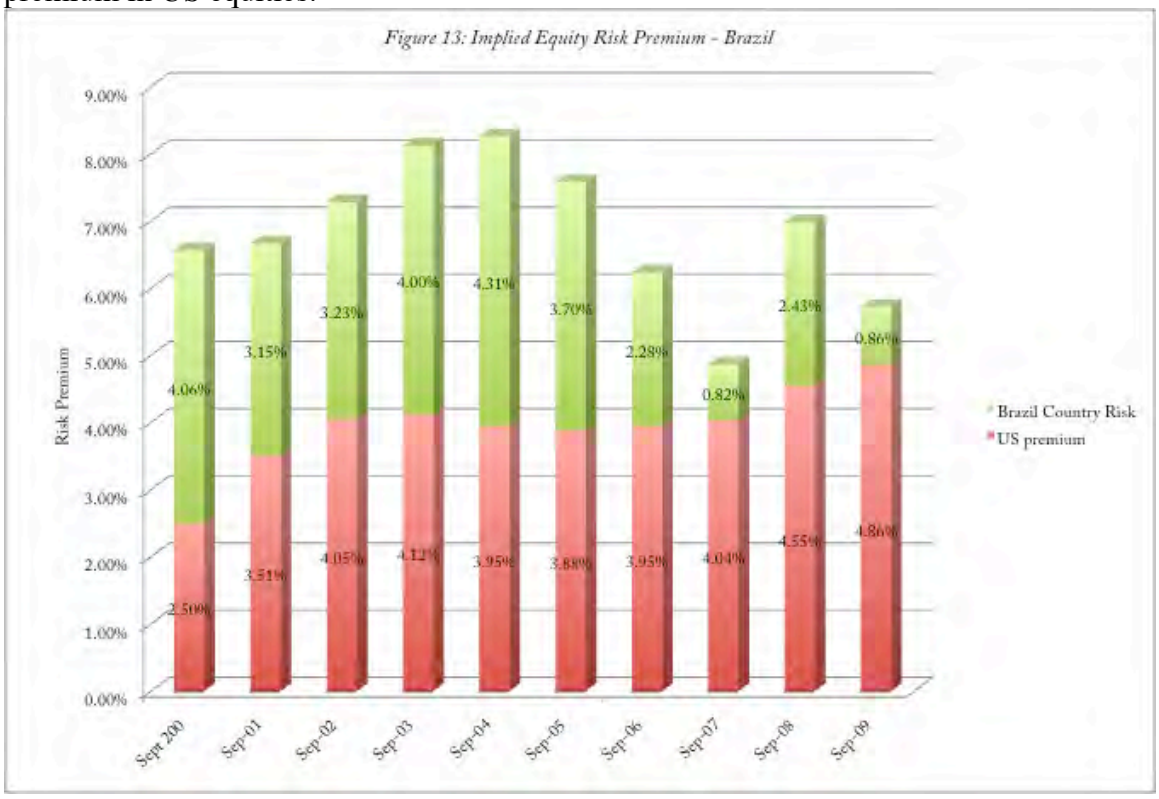
- The index (Bovespa) was trading at 61,172 on September 30, 2009, and the dividend yield on the index over the previous 12 months was approximately 2.2%. While stock buybacks represented negligible cash flows, we did compute the FCFE for companies in the index, and the aggregate FCFE yield across the companies was 4.95%.
- Earnings in companies in the index are expected to grow 6% (in US dollar terms) over the next 5 years, and 3.45% (set equal to the treasury bond rate) thereafter.
- The riskfree rate is the US 10-year treasury bond rate of 3.45%.

The time line of cash flows is shown below:

$$61{,}272 = \frac{3210}{(1+r)} + \frac{3{,}402}{(1+r)^2} + \frac{3{,}606}{(1+r)^3} + \frac{3{,}821}{(1+r)^4} + \frac{4{,}052}{(1+r)^5} + \frac{4{,}052(1.0345)}{(r-.0345)(1+r)^5}$$

These inputs yield a required return on equity of 9.17%, which when compared to the treasury bond rate of 3.45% on that day results in an implied equity premium of 5.72%. For simplicity, we have used nominal dollar expected growth rates[80] and treasury bond rates, but this analysis could have been done entirely in the local currency.

One of the advantages of using implied equity risk premiums is that that they are more sensitive to changing market conditions. The implied equity risk premium for Brazil in September 2007, when the Bovespa was trading at 73,512 was 4.63%, lower than the premium in September 2009. In figure 13, we trace the changes in the implied equity risk premium in Brazil from 2000 to 2009 and compare them to the implied premium in US equities:



Implied equity risk premiums in Brazil declined steadily from 2003 to 2007, with the September 2007 numbers representing a historic low. They surged in September 2008, as the crisis unfolded, but have fallen back since.

Computing and comparing implied equity risk premiums across multiple equity markets allows us to pinpoint markets that stand out, either as over priced (because their implied premiums are too low, relative to other markets) or under priced (because their

[80] The input that is most difficult to estimate for emerging markets is a long-term expected growth rate. For Brazilian stocks, I used the average consensus estimate of growth in earnings for the largest Brazilian companies which have ADRs listed on them. This estimate may be biased, as a consequence.

premiums at too high, relative to other markets). In September 2007, for instance, the implied equity risk premiums in India and China were roughly equal to or even lower than the implied premium for the United States, computed at the same time. Even an optimist on future growth these countries would be hard pressed to argue that equity markets in these markets and the United States were of equivalent risk, which would lead us to conclude that these stocks were overvalued relative to US companies.

Sector

Using current prices and expected future cash flows to back out implied risk premiums is not restricted to market indices. We can employ the approach to estimate the implied equity risk premium for a specific sector at a point in time. In September 2008, for instance, there was a widely held perception that investors were attaching much higher equity risk premiums to commercial bank stocks, in the aftermath of the failures of Fannie Mae, Freddie Mac, Bear Stearns and Lehman. To test this proposition, we took a look at the S&P Commercial Bank index, which was trading at 318.26 on September 12, 2008, with an expected dividend yield of 5.83% for the next 12 months. Assuming that these dividends will grow at 4% a year for the next 5 years and 3.60% (the treasury bond rate) thereafter, well below the nominal growth rate in the overall economy, we arrived at the following equation:

$$318.26 = \frac{19.30}{(1+r)} + \frac{20.07}{(1+r)^2} + \frac{20.87}{(1+r)^3} + \frac{21.71}{(1+r)^4} + \frac{22.57}{(1+r)^5} + \frac{22.57(1.036)}{(r-.036)(1+r)^5}$$

Solving for the expected return yields a value of 9.74%, which when netted out against the riskfree rate at the time (3.60%) yields an implied premium for the sector:

Implied equity risk premium for Commercial Banking = 9.74% - 3.60% = 6.14%

How would we use this number? One approach would be to compare it to the average implied premium in this sector over time, with the underlying assumption that the value will revert back to the historical average for the sector. The implied equity risk premium for commercial banking stocks was close to 4% between 2005 and 2007, which would lead to the conclusion that banking stocks were undervalued in September 2008. The other is to assume that the implied equity premium for a sector is reflective of perceptions of future risk in that sector; in September 2008, there can be no denying that financial service companies faced unique risks and the market was reflecting these risks in prices. As a postscript, the implied equity risk premium for financial service firms in September 2009 had reverted back to about 5%, just above the market implied premium at the time (4.86%).

A note of caution has to be added to about sector-implied premiums. Since these risk premiums consolidate both sector risk and market risk, it would be inappropriate to

multiply these premiums by conventional betas, which are influenced by sector risk. Thus, multiplying the implied equity risk premium for the technology sector (which will yield a high value) by a market beta for a technology company (which will also be high for the same reason) will result in double counting risk.[81]

Firm Characteristics

Earlier in this paper, we talked about the small firm premium and how it has been estimated using historical data, resulting in backward looking estimates with substantial standard error. We could use implied premiums to arrive at more forward looking estimates, using the following steps:

1. Compute the implied equity risk premium for the overall market, using a broad index such as the S&P 500. Earlier in this paper, we estimated this as of September 2009 to be 4.86%.

2. Compute the implied equity risk premium for an index containing primarily or only small cap firms, such as the S&P 600 Small Cap Index. In September 2009, the index was trading at 268.73 with an aggregated dividend yield (including stock buybacks) of about 3.5%, with an expected growth rate in earnings of 12% for the next 5 years. Using these values, in conjunction with a riskfree rate of 3.45%, yields the following equation:

$$268.73 = \frac{10.53}{(1+r)} + \frac{11.80}{(1+r)^2} + \frac{13.21}{(1+r)^3} + \frac{14.80}{(1+r)^4} + \frac{16.58}{(1+r)^5} + \frac{16.58(1.0345)}{(r-.0345)(1+r)^5}$$

Solving for the expected return, we get:

Expected return on small cap stocks = 8.66%

Implied equity risk premium for small cap stocks = 8.66% -3.45% = 5.21%

3. The forward-looking estimate of the small cap premium should be the difference between the implied premium for small cap stocks (in step 2) and the implied premium for the market (in step 1). With the numbers in September 2009, the small cap premium is 0.35%, well below the historical average premium of 4.57% that we estimated in the earlier section.

This approach to estimating premiums can be extended to other variables. For instance, one of the issues that has challenged analysts in valuation is how to deal with illiquidity, with the question being how to discount the values of illiquid assets. While the conventional approach is to attach an illiquidity discount, an alternative is to adjust the discount rate upwards for illiquid assets. If we compute the implied equity risk premiums for stocks categorized by illiquidity, we may be able to come up with an appropriate

[81] You could estimate betas for technology companies against a technology index (rather than the market index) and use these betas with the implied equity risk premium for technology companies.

adjustment. For instance, assume that the implied equity risk premium for stocks that rank in the lowest decile in terms of illiquidity, defined as turnover ratio, is 6.15%;[82] comparing this value to the implied premium for the S&P 500 of 4.86% results in an illiquidity premium of 1.29%. Adding this premium to the cost of equity for relatively illiquid investments will then discount the value of these investments for illiquidity.

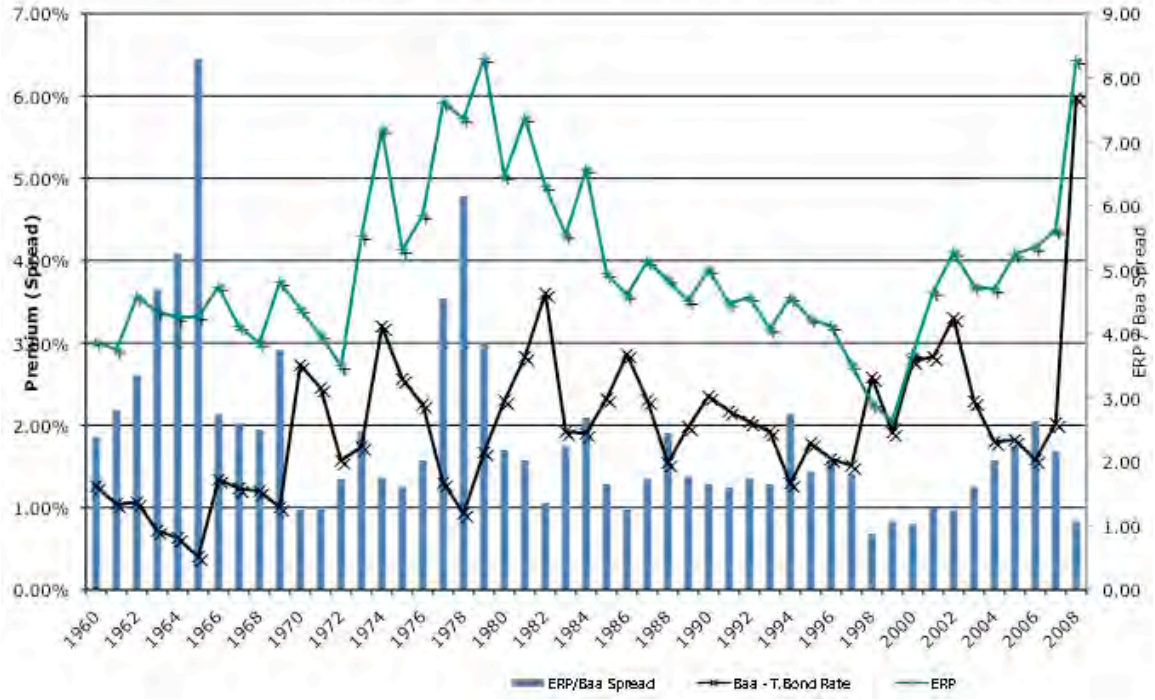
2. Default Spread Based Equity Risk Premiums

While we think of corporate bonds, stocks and real estate as different asset classes, it can be argued that they are all risky assets and that they should therefore be priced consistently. Put another way, there should be a relationship across the risk premiums in these asset classes that reflect their fundamental risk differences. In the corporate bond market, the default spread, i.e, the spread between the interest rate on corporate bonds and the treasury bond rate, is used as the risk premium. In the equity market, as we have seen through this paper, historical and implied equity premiums have tussled for supremacy as the measure of the equity risk premium. In the real estate market, no mention is made of an explicit risk premium, but real estate valuations draw heavily on the "capitalization rate", which is the discount rate applied to a real estate property's earnings to arrive at an estimate of value. The use of higher (lower) capitalization rates is the equivalent of demanding a higher (lower) risk premium.

Of these three premiums, the default spread is the less complex and the most widely accessible data item. If equity risk premiums could be stated in terms of the default spread on corporate bonds, the estimation of equity risk premiums would become immeasurably simpler. For instance, assume that the default spread on Baa rated corporate bonds, relative to the ten-year treasury bond, is 2.2% and that equity risk premiums are routinely twice as high as Baa bonds, the equity risk premium would be 4.4%. Is such a rule of thumb even feasible? To answer this question, we looked at implied equity risk premiums and Baa rated corporate bond default spreads from 1960 to 2008 in Figure 14.

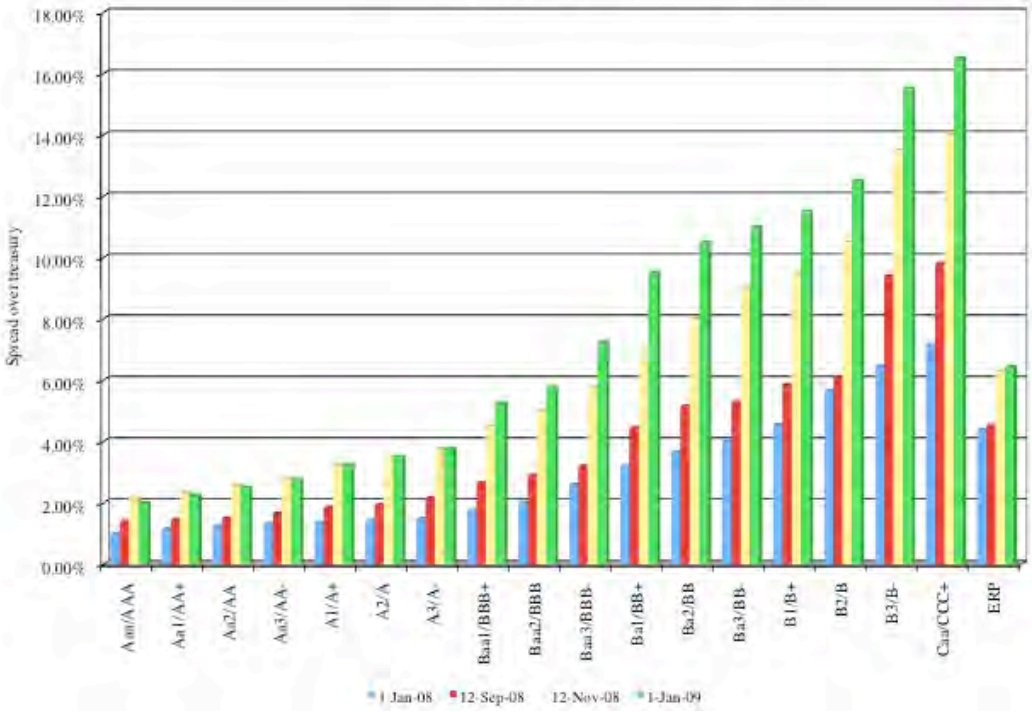
[82] The turnover ratio is obtained by dividing dollar trading volume in a stock by its market capitalization at that time.

Figure 14: Equity Risk Premiums and Bond Default Spreads



Note that both default spreads and equity risk premiums jumped in 2008, with the former increasing more on a proportionate basis. The average ratio of the equity risk premium to the Baa default spread from 1960 to 2008 is 2.38, but the median is approximately 2.02. The ratio of 1.08 (ERP/ Baa Default Spread) at the end of 2008 is the close to the lowest values in the entire series, suggesting that either equity risk premiums are too low or default spreads are too high. The connection between equity risk premiums and default spreads was obvious during 2008, where changes in one often were accompanied by changes in the other. Figure 15 graphs out changes in default spreads and ERP over the tumultuous year:

Figure 15: Default Spreads on Ratings Classes



In closing, default spreads, like equity risk premiums, decreased in the first nine months of 2009. On September 30, 2009, the default spread on a Baa rated bond had dropped back to 2.5%. Applying the median ratio of 2.02, estimated from 1960-08 numbers, to the Baa default spread in September 2009 results in the following estimate of the ERP:

Default Spread on Baa bonds (over treasury) on 9/30-/09 = 2.5%

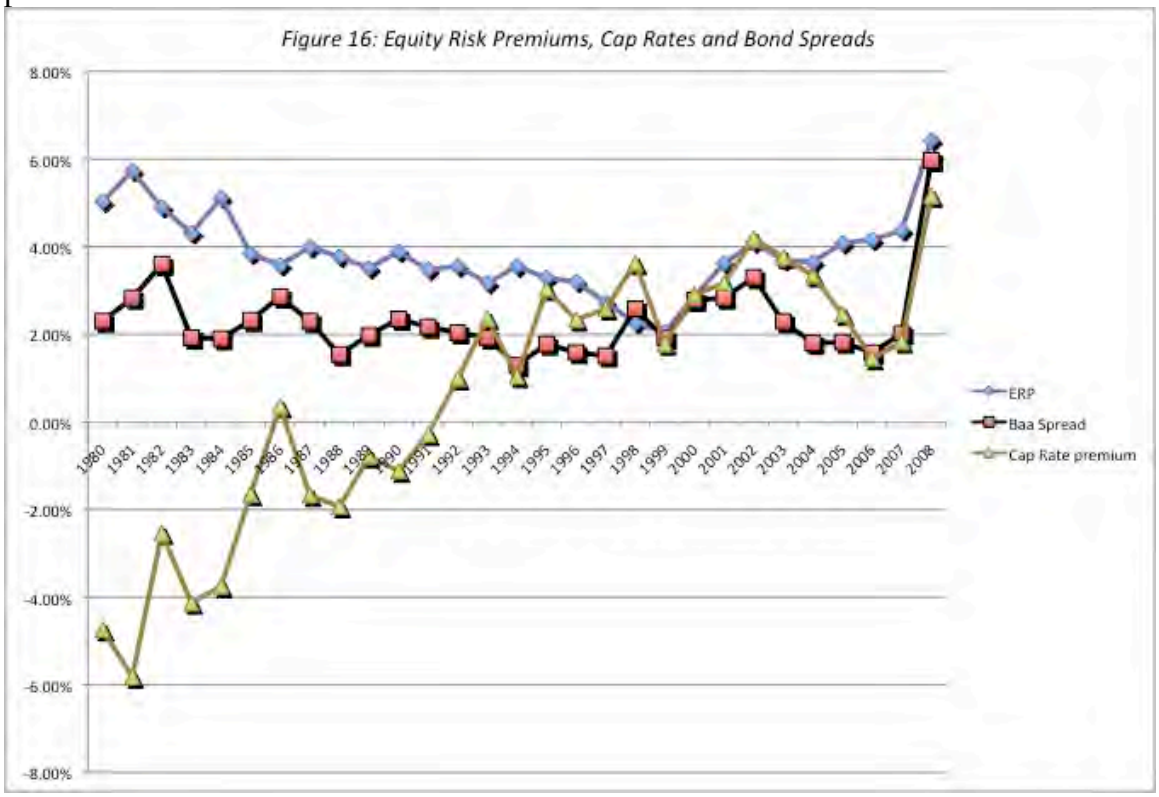
Equity Risk Premium = Default Spread * Median ratio or ERP/Spread

=2.50%* 2.02 = 5.10%

This is slightly higher than the implied equity risk premium of 4.86% in September 2009 but much higher than the historical premium of 3.88%. However, there is significant variation in the ratio (of ERP to default spreads) over time, with the ratio dropping below one at the peak of the dot.com boom (when equity risk premiums dropped to 2%) and rising to as high as 2.63 at the end of 2006; the standard error in the estimate is 0.20. Whenever the ratio has deviated significantly from the average, though, there is reversion back to that median over time.

The capitalization rate in real estate, as noted earlier, is a widely used number in the valuation of real estate properties. For instance, a capitalization rate of 10%, in conjunction with an office building that generates income of $ 10 million, would result in a property value of $ 100 million ($10/.10). The difference between the capitalization

ratio and the treasury bond rate can be considered a real estate market risk premium, In Figure 16, we used the capitalization rate in real estate ventures and compared the risk premiums imputed for real estate with both bond default spreads and implied equity risk premiums between 1980 and 2008.



The story in this graph is the convergence of the real estate and financial asset risk premiums. In the early 1980s, the real estate market seems to be operating in a different risk/return universe than financial assets, with the cap rates being less than the treasury bond rate. For instance, the cap rate in 1980 was 8.1%, well below the treasury bond rate of 12.8%, resulting in a negative risk premium for real estate. The risk premiums across the three markets - real estate, equity and bonds - starting moving closer to each other in the late 1980s and the trend accelerated in the 1990s. We would attribute at least some of this increased co-movement to the securitization of real estate in this period. In 2008, the three markets moved almost in lock step, as risk premiums in the markets rose and prices fell.

While the noise in the ratios (of ERP to default spreads and cap rates) is too high for us to develop a reliable rule of thumb, there is enough of a relationship here that we would suggest using this approach as a secondary one to test to see whether the equity risk premiums that we are using in practice make sense, given how risky assets are being

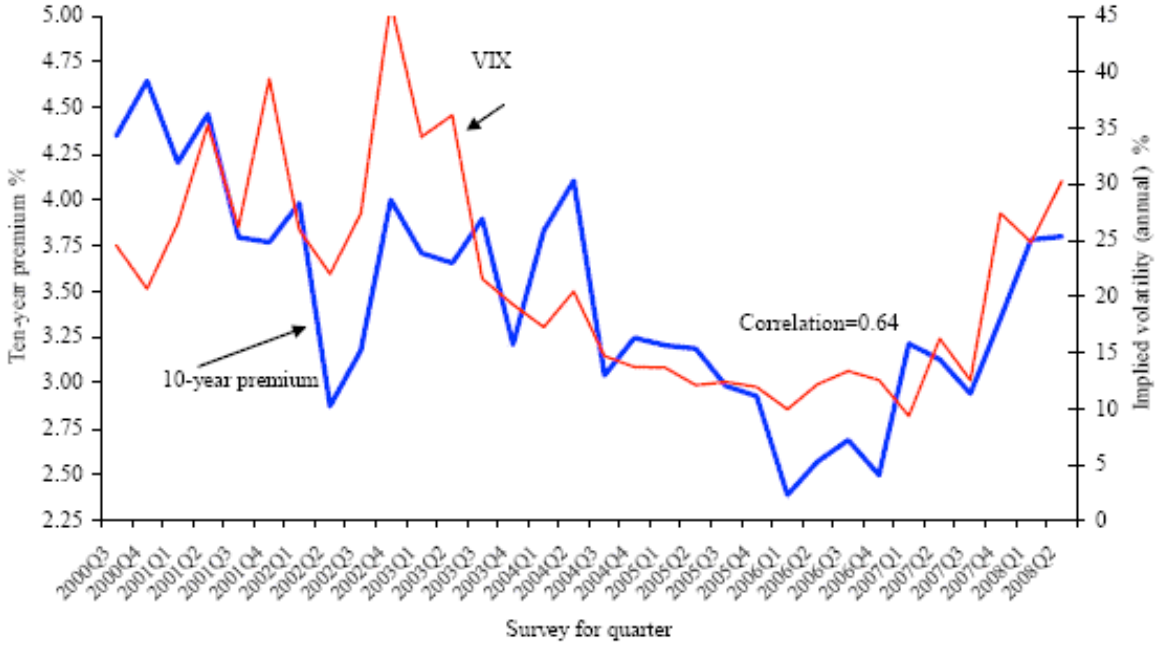
priced in other markets. Thus, using an equity risk premium of 2%, when the Baa default spread is approximately at the same level strikes us as imprudent, given history.

Option Pricing Model based Equity Risk Premium

There is one final approach to estimating equity risk premiums that draws on information in the option market. In particular, option prices can be used to back out implied volatility in the equity market. To the extent that the equity risk premium is our way of pricing in the risk of future stock price volatility, there should be a relationship between the two.

The simplest measure of volatility from the options market is the volatility index (VIX), which is a measure of 30—day volatility constructed using the implied volatilities in traded S&P 500 index options. The CFO survey premium from Graham and Harvey that we referenced earlier in the paper found a high degree of correlation between the premiums demanded by CFOs and the VIX value (see figure 17 below):

Figure 17: Volatility Index (VIX) and Survey Risk Premiums



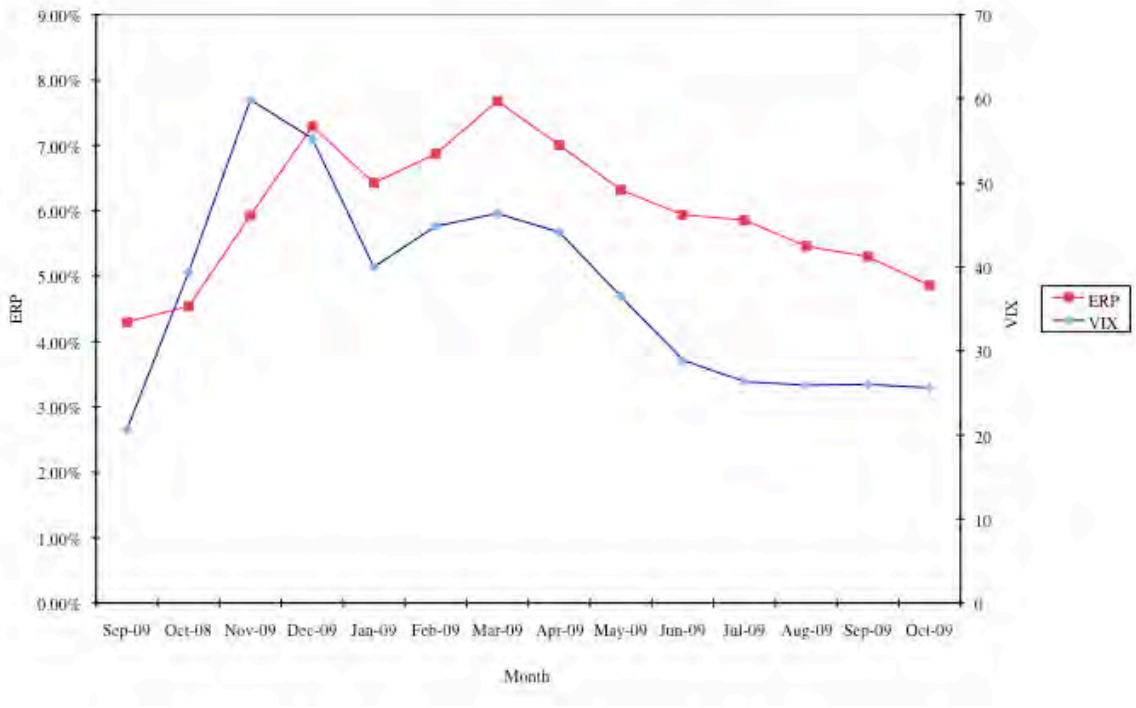
Santa-Clara and Yan (2006) use options on the S&P 500 to estimate the ex-ante risk assessed by investors from 1996 and 2002 and back out an implied equity risk premium on that basis.[83] To estimate the ex-ante risk, they allow for both continuous and discontinuous (or jump) risk in stocks, and use the option prices to estimate the probabilities of both types of risk. They then assume that investors share a specific utility

[83] Santa-Clara, P. and S. Yan, 2006, *Crashes, Volatility, and the Equity Premium: Lessons from S&P500 Options*, Review of Economics and Statistics.

function (power utility) and back out a risk premium that would compensate for this risk. Based on their estimates, investors should have demanded an equity risk premium of 11.8% for their perceived risk and that the perceived risk was about 70% higher than the realized risk over this period.

The link between equity market volatility and the equity risk premium also became clearer during the market meltdown in the last quarter of 2008. Earlier in the paper, we noted the dramatic shifts in the equity risk premiums, especially in the last year, as the financial crisis has unfolded. In figure 18, we look at the implied equity risk premium each month from September 2008 to October 2009 and the volatility index (VIX) for the S&P 500:

Figure 18: ERP versus VIX



Note that the surge in equity risk premiums between September 2008 and December 2008 coincided with a jump in the volatility index and that both numbers have declined in the months since.

Choosing an Equity Risk Premium

We have looked at three different approaches to estimating risk premiums, the survey approach, where the answer seems to depend on who you ask and what you ask them, the historical premium approach, with wildly different results depending on how you slice and dice historical data and the implied premium approach, where the final

number is a function of the model you use and the assumptions you make about the future. Ultimately, thought, we have to choose a number to use in analysis and that number has consequences. In this section, we consider why the approaches give you different numbers and a pathway to use to devise which number is best for you.

Why do the approaches yield different values?

The different ways of estimating equity risk premium provide cover for equity research analysts by providing justification for almost any number they choose to use in practice. No matter what the premium used by an analyst, whether it be 3% or 12%, there is back-up evidence offered that the premium is appropriate. While this may suffice as a legal defense, it does not pass muster on common sense grounds since not all risk premiums are equally justifiable. To provide a measure of how the numbers vary, the values that we have attached to the US equity risk premium, using different approaches, in September 2009, are summarized in table 18.

Table 18: Equity Risk Premium (ERP) for the United States – September 2009

Approach Used	*ERP*	*Additional information*
Survey: CFOs	4.30%	Campbell and Harvey survey of CFOs (2009)
Survey: Global Fund Managers	3.80%	Merrill Lynch (September 2009) survey of global managers
Historical - US	3.88%	Geometric average - Stocks over T.Bonds: 1928-2008
Historical – Multiple Equity Markets	3.40%	Average premium across 17 markets: Dimson, Marsh and Staunton (2009)
Current Implied premium	4.86%	From S&P 500 – 9/30/09
Average Implied premium	3.91%	Average of implied equity risk premium: 1960-2008
Implied premium adjusted for T.Bond rate and term structure	3.17%	Using regression of implied premium on T.Bond rate
Default spread based premium	5.10%	Default Spread * (ERP/ Default Spread average)

The equity risk premiums, using the different approaches, yield a fairly tight range, with the lowest value being 3.17% and the highest being 5.10%. Note that the range would have been larger if we used other measures of historical risk premiums: different time periods, arithmetic instead of geometric averages. The narrow range on the estimates that we obtain is unusual, since the differences have been far wider at other points in time. In December 1999, for instance, the estimates would have ranged from 2% (the implied equity risk premium from the index) to over 6% (from surveys and historical data).

There are several reasons why the approaches yield different answers much of time and why they converge sometimes.

1. When stock prices enter an extended phase of upward (downward) movement, the historical risk premium will climb (drop) to reflect past returns. Implied premiums will tend to move in the opposite direction, since higher (lower) stock prices generally translate into lower (higher) premiums. In 1999, for instance, after the technology induced stock price boom of the 1990s, the implied premium was 2% but the historical risk premium was almost 6%.
2. Survey premiums reflect historical data more than expectations. When stocks are going up, investors tend to become more optimistic about future returns and survey premiums reflect this optimism. In fact, the evidence that human beings overweight recent history (when making judgments) and overreact to information can lead to survey premiums overshooting historical premiums in both good and bad times. In good times, survey premiums are even higher than historical premiums, which, in turn, are higher than implied premiums; in bad times, the reverse occurs.
3. When the fundamentals of a market change, either because the economy becomes more volatile or investors get more risk averse, historical risk premiums will not change but implied premiums will. Shocks to the market are likely to cause the two numbers to deviate. After the terrorist attack in September 2001, for instance, implied equity risk premiums jumped almost 0.50% but historical premiums were unchanged (at least until the next update).

In summary, we should not be surprised to see large differences in equity risk premiums as we move from one approach to another, and even within an approach, as we change estimation parameters.

Which approach is the "best" approach?

If the approaches yield different numbers for the equity risk premium, and we have to choose one of these numbers, how do we decide which one is the "best" estimate? The answer to this question will depend upon several factors:

a. Predictive Power: In corporate finance and valuation, what we ultimately care about is the equity risk premium for the future. Consequently, the approach that has the best predictive power, i.e. yields forecasts of the risk premium that are closer to realized premiums, should be given more weight. So, which of the approaches does best on this count?

Campbell and Shiller (1988) suggested that the dividend yield, a simplistic measure of the implied equity risk premium, had significant predictive power for future returns.[84] However, Goyal and Welch (2007) examined many of the measures suggested as predictors of the equity risk premium in the literature, including the dividend yield and the earnings to price ratio, and find them all wanting.[85] Using data from 1926 to 2005, they conclude that while the measures do reasonably well in sample, they perform poorly out of sample, suggesting that the relationships in the literature are either spurious or unstable. Campbell and Thompson (2008) disagree, noting that putting simple restrictions on the predictive regressions improve out of sample performance for many predictive variables.[86]

To answer this question, we looked at the implied equity risk premiums from 1960 to 2008 and considered four predictors of this premium – the historical risk premium through the end of the prior year, the implied equity risk premium at the end of the prior year, the average implied equity risk premium over the previous five years and the premium implied by the Baa default spread. Since the survey data does not go back very far, we could not test the efficacy of the survey premium. Our results are summarized in table 19:

Table 19: Predictive Power of different estimates- 1960 - 2008

Predictor	*Correlation with implied premium next year*	*Correlation with actual risk premium – next 10 years*
Current implied premium	0.732	0.452
Average implied premium: Last 5 years	0.619	0.276
Historical Premium	-0.326	-0.526
Default Spread based premium	0.056	0.134

Over this period, the implied equity risk premium at the end of the prior period was the best predictor of the implied equity risk premium in the next period, whereas historical risk premiums did worst. The results, though, may be specific to one-year ahead forecasts and are skewed towards the implied premium forecasts. If we extend

[84] Campbell, J. Y. and R. J. Shiller. 1988, *The Dividend-Price Ratio And Expectations Of Future Dividends And Discount Factors*, Review of Financial Studies, v1(3), 195-228.

[85] Goyal, A. and I. Welch, 2007, *A Comprehensive Look at the Empirical Performance of Equity Premium Prediction,* Review of Financial Studies, v21, 1455-1508.

[86] Campbell, J.Y., and S.B. Thompson, 2008, *Predictive Excess Stock Returns Out of Sample: Can Anything Beat the Historical Average?* Review of Financial Studies, v21, 150-9-1531.

our analysis to make forecasts of the actual return premium earned by stocks over bonds for the next 10 years, the current implied equity risk premium still yields the best forecast for the future, though default spread based premiums improve as predictors. Historical risk premiums perform even worse as forecasts of actual risk premiums over the next 10 years. If predictive power were the only test, historical premiums clearly fail the test.

b. Beliefs about markets: Implicit in the use of each approach are assumptions about market efficiency or lack thereof. If you believe that markets are efficient in the aggregate, or at least that you cannot forecast the direction of overall market movements, the current implied equity premium is the most logical choice, since it is estimated from the current level of the index. If you believe that markets, in the aggregate, can be significantly overvalued or undervalued, the historical risk premium or the average implied equity risk premium over long periods becomes a better choice. If you have absolutely no faith in markets, survey premiums will be the choice.

c. Purpose of the analysis: Notwithstanding your beliefs about market efficiency, the task for which you are using equity risk premiums may determine the right risk premium to use. In acquisition valuations and equity research, for instance, you are asked to assess the value of an individual company and not take a view on the level of the overall market. This will require you to use the current implied equity risk premium, since using any other number will bring your market views into the valuation. To see why, assume that the current implied premium is 4% and you decide to use a historical premium of 6% in your company valuation. Odds are that you will find the company to be over valued, but a big reason for your conclusion is that you started off with the assumption that the market itself is over valued by about 25-30%.[87] To make your valuation market neutral, you will have to stick with the current implied premium. In corporate finance, where the equity risk premium is used to come up with a cost of capital, which in turn determines the long-term investments of the company, it may be more prudent to build in a long-term average (historical or implied) premium.

In conclusion, there is no one approach to estimating equity risk premiums that will work for all analyses. If predictive power is critical or if market neutrality is a pre-requisite, the current implied equity risk premium is the best choice. For those more skeptical about

[87] If the current implied premium is 4%, using a 6% premium on the market will reduce the value of the index by about 25-30%.

markets, the choices are broader, with the average implied equity risk premium over a long time period having the strongest predictive power. Historical risk premiums are very poor predictors of both short-term movements in implied premiums or long term returns on stocks.

Myths about equity risk premiums

There are widely held misconceptions about equity risk premiums that we would like to dispel in this section.

1. Services "know" the risk premium: When Ibbotson and Sinquefield put together the first database of historical returns on stocks, bonds and bills in the 1970s, the data that they used was unique and not easily replicable, even for professional money managers. The niche they created, based on proprietary data, has led some to believe that Ibbotson Associates, and data services like them, have the capacity to read the historical data better than the rest of us, and therefore come up with better estimates. Now that the access to data has been democratized, and we face a much more even playing field, there is no reason to believe that any service has an advantage over any other, when it comes to historical premiums. Analysts should no longer be allowed to hide behind the defense that the equity risk premiums they use come from a reputable service and are thus beyond questioning.
2. There is no right risk premium: The flip side of the "services know it best" argument is that the data is so noisy that no one knows what the right risk premium is, and that any risk premium within a wide range is therefore defensible. As we have noted in this paper, it is indeed possible to arrive at outlandishly high or low premiums, but only if you use estimation approaches that do not hold up to scrutiny. The arithmetic average premium from 1988 to 2008 for stocks over treasury bills of 7.30% is an equity risk premium estimate, but it is not a good one.
3. The equity risk premium does not change much over time: Equity risk premiums reflect both economic fundamentals and investor risk aversion and they do change over time, sometimes over very short intervals, as evidenced by what happened in the last quarter of 2008. Shocks to the system – a collapse of a large company or sovereign entity or a terrorist attack – can cause premiums to shoot up overnight. A failure to recognize this reality will lead to analyses that lag reality.
4. Using the same premium is more important than using the right premium: Within many investment banks, corporations and consulting firms, the view seems to be that getting all analysts to use the same risk premium is more important than testing to see whether that premium makes sense. Thus, if all equity research analysts use 5% as the

equity risk premium, the argument is that they are all being consistent. There are two problems with this argument. The first is that using a premium that is too high or low will lead to systematic errors in valuation. For instance, using a 5% risk premium across the board, when the implied premium is 4%, will lead you to find that most stocks are overvalued. . The second is that the impact of using too high a premium can vary across stocks, with growth stocks being affected more negatively than mature companies. A portfolio manager who followed the recommendations of these analysts would then be over invested in mature companies and under invested in growth companies.

5. If you adjust the cash flows for risk, there is no need for a risk premium: While statement is technically correct, adjusting cash flows for risk has to go beyond reflecting the likelihood of negative scenarios in the expected cash flow. The risk adjustment to expected cash flows to make them certainty equivalent cash flows requires us to answer exactly the same questions that we deal with when adjusting discount rates for risk.

Summary

The risk premium is a fundamental and critical component in portfolio management, corporate finance and valuation. Given its importance, it is surprising that more attention has not been paid in practical terms to estimation issues. In this paper, we began by looking at the determinants of equity risk premiums including macro economic volatility, investor risk aversion and behavioral components. We then looked at the three basic approaches used to estimate equity risk premiums – the survey approach, where investors or managers are asked to provide estimates of the equity risk premium for the future, the historical return approach, where the premium is based upon how well equities have done in the past and the implied approach, where we use future cash flows or observed bond default spreads to estimate the current equity risk premium.

The premiums we estimate can vary widely across approaches, and we considered two questions towards the end of the paper. The first is why the numbers vary across approaches and the second is how to choose the "right" number to use in analysis. For the latter question, we argued that the choice of a premium will depend upon the forecast period, whether your believe markets are efficient and whether you are required to be market neutral in your analysis.

Appendix 1: Historical Returns on Stocks, Bonds and Bills – United States

Year	*Stocks*	*T.Bills*	*T.Bonds*
1928	43.81%	3.08%	0.84%
1929	-8.30%	3.16%	4.20%
1930	-25.12%	4.55%	4.54%
1931	-43.84%	2.31%	-2.56%
1932	-8.64%	1.07%	8.79%
1933	49.98%	0.96%	1.86%
1934	-1.19%	0.32%	7.96%
1935	46.74%	0.18%	4.47%
1936	31.94%	0.17%	5.02%
1937	-35.34%	0.30%	1.38%
1938	29.28%	0.08%	4.21%
1939	-1.10%	0.04%	4.41%
1940	-10.67%	0.03%	5.40%
1941	-12.77%	0.08%	-2.02%
1942	19.17%	0.34%	2.29%
1943	25.06%	0.38%	2.49%
1944	19.03%	0.38%	2.58%
1945	35.82%	0.38%	3.80%
1946	-8.43%	0.38%	3.13%
1947	5.20%	0.57%	0.92%
1948	5.70%	1.02%	1.95%
1949	18.30%	1.10%	4.66%
1950	30.81%	1.17%	0.43%
1951	23.68%	1.48%	-0.30%
1952	18.15%	1.67%	2.27%
1953	-1.21%	1.89%	4.14%
1954	52.56%	0.96%	3.29%
1955	32.60%	1.66%	-1.34%
1956	7.44%	2.56%	-2.26%
1957	-10.46%	3.23%	6.80%
1958	43.72%	1.78%	-2.10%
1959	12.06%	3.26%	-2.65%
1960	0.34%	3.05%	11.64%
1961	26.64%	2.27%	2.06%
1962	-8.81%	2.78%	5.69%
1963	22.61%	3.11%	1.68%
1964	16.42%	3.51%	3.73%
1965	12.40%	3.90%	0.72%
1966	-9.97%	4.84%	2.91%
1967	23.80%	4.33%	-1.58%
1968	10.81%	5.26%	3.27%
1969	-8.24%	6.56%	-5.01%

1970	3.56%	6.69%	16.75%
1971	14.22%	4.54%	9.79%
1972	18.76%	3.95%	2.82%
1973	-14.31%	6.73%	3.66%
1974	-25.90%	7.78%	1.99%
1975	37.00%	5.99%	3.61%
1976	23.83%	4.97%	15.98%
1977	-6.98%	5.13%	1.29%
1978	6.51%	6.93%	-0.78%
1979	18.52%	9.94%	0.67%
1980	31.74%	11.22%	-2.99%
1981	-4.70%	14.30%	8.20%
1982	20.42%	11.01%	32.81%
1983	22.34%	8.45%	3.20%
1984	6.15%	9.61%	13.73%
1985	31.24%	7.49%	25.71%
1986	18.49%	6.04%	24.28%
1987	5.81%	5.72%	-4.96%
1988	16.54%	6.45%	8.22%
1989	31.48%	8.11%	17.69%
1990	-3.06%	7.55%	6.24%
1991	30.23%	5.61%	15.00%
1992	7.49%	3.41%	9.36%
1993	9.97%	2.98%	14.21%
1994	1.33%	3.99%	-8.04%
1995	37.20%	5.52%	23.48%
1996	23.82%	5.02%	1.43%
1997	31.86%	5.05%	9.94%
1998	28.34%	4.73%	14.92%
1999	20.89%	4.51%	-8.25%
2000	-9.03%	5.76%	16.66%
2001	-11.85%	3.67%	5.57%
2002	-21.98%	1.66%	15.12%
2003	28.41%	1.03%	0.38%
2004	10.70%	1.23%	4.49%
2005	4.85%	3.01%	2.87%
2006	15.63%	4.68%	1.96%
2007	5.48%	4.64%	10.21%
2008	-36.58%	1.59%	20.10%

Appendix 2: Sovereign Ratings by Country- September 2009

Country	Foreign Currency	Local Currency	Country	Foreign Currency	Local Currency	Country	Foreign Currency	Local Currency
Albania	B1	B1	Finland [1]	Aaa	Aaa	Nicaragua	Caa1	B3
Argentina	B3	B3	France [1]	Aaa	Aaa	Norway	Aaa	Aaa
Armenia	Ba2	Ba2	Germany [1]	Aaa	Aaa	Oman	A2	A2
Australia	Aaa	Aaa	Greece [1]	A1	A1	Pakistan	B3	B3
Austria [1]	Aaa	Aaa	Guatemala	Ba2	Ba1	Panama	Ba1	-
Azerbaijan	Ba1	Ba1	Honduras	B2	B2	Papua New Guinea	B1	B1
Bahamas	A3	A1	Hong Kong	Aa2	Aa2	Paraguay	B3	B3
Bahrain	A2	A2	Hungary	Baa1	Baa1	Peru	Ba1	Baa3
Barbados	Baa2	A3	Iceland	Baa1	Baa1	Philippines	Ba3	Ba3
Belarus	B1	B1	India	Baa3	Ba2	Poland	A2	A2
Belgium [1]	Aa1	Aa1	Indonesia	Ba2	Ba2	Portugal [1]	Aa2	Aa2
Belize	B3	B3	Ireland [1]	Aa1	Aa1	Qatar	Aa2	Aa2
Bermuda	Aa2	Aa2	Isle of Man	Aaa	Aaa	Romania	Baa3	Baa3
Bolivia	B2	B2	Israel	A1	A1	Russia	Baa1	Baa1
Bosnia and Herzegovina	B2	B2	Italy [1]	Aa2	Aa2	Saudi Arabia	A1	A1
Botswana	A2	A2	Jamaica	B2	B2	Singapore	Aaa	Aaa
Brazil	Baa3	Baa3	Japan	Aa2	Aa2	Slovakia	A1	A1
Bulgaria	Baa3	Baa3	Jordan	Ba2	Baa3	Slovenia [1]	Aa2	Aa2
Cambodia	B2	B2	Kazakhstan	Baa2	Baa2	South Africa	A3	A3
Canada	Aaa	Aaa	Korea	A2	A2	Spain [1]	Aaa	Aaa
Cayman Islands	Aa3	-	Kuwait	Aa2	Aa2	St. Vincent & the Grenadines	B1	B1
Chile	A1	A1	Latvia	Baa3	Baa3	Suriname	B1	Ba3
China	A1	A1	Lebanon	B2	B2	Sweden	Aaa	Aaa
Colombia	Ba1	Baa3	Lithuania	Baa1	Baa1	Switzerland	Aaa	Aaa
Costa Rica	Ba1	Ba1	Luxembourg [1]	Aaa	Aaa	Taiwan	Aa3	Aa3
Croatia	Baa3	Baa3	Macao	Aa3	Aa3	Thailand	Baa1	Baa1
Cuba	Caa1	-	Malaysia	A3	A3	Trinidad and Tobago	Baa1	Baa1
Cyprus [1]	Aa3	Aa3	Malta [1]	A1	A1	Tunisia	Baa2	Baa2
Czech Republic	A1	A1	Mauritius	Baa2	Baa2	Turkey	Ba3	Ba3
Denmark	Aaa	Aaa	Mexico	Baa1	Baa1	Turkmenistan	B2	B2
Dominican Republic	B2	B2	Moldova	WR	WR	Ukraine	B2	B2
Ecuador	Caa3	-	Mongolia	B1	B1	United Arab Emirates	Aa2	Aa2
Egypt	Ba1	Ba1	Montenegro	Ba3	-	United Kingdom	Aaa	Aaa
El Salvador	Baa3	WR	Morocco	Ba1	Ba1	United States of America	Aaa	Aaa
Estonia	A1	A1	Netherlands [1]	Aaa	Aaa	Uruguay	Ba3	Ba3
Fiji Islands	B1	B1	New Zealand	Aaa	Aaa	Venezuela	B2	B1
						Vietnam	Ba3	Ba3

Appendix 3: Country Risk Scores from the PRS Group – February 2008

Country	*Composite Score*	*Country*	*Composite Score*	*Country*	*Composite Score*
Norway	92.3	Slovenia	75.8	Iran	67.8
Luxembourg	89.3	Iceland	75.5	Bulgaria	67.5
Switzerland	89.3	Panama	75.0	Honduras	67.5
Brunei	88.5	Jordan	74.8	Congo, Republic	67.3
Finland	87.8	Kazakhstan	74.8	Colombia	66.3
Singapore	87.8	Argentina	74.0	Nicaragua	66.3
Sweden	87.3	Peru	74.0	Tanzania	66.0
Denmark	86.5	Azerbaijan	73.5	Venezuela	65.5
Kuwait	86.3	Gabon	73.5	Serbia	65.3
Germany	86.0	Hungary	73.5	Burkina Faso	64.8
Hong Kong	85.8	Cameroon	73.3	Nigeria	64.8
Canada	85.0	South Africa	73.0	Senegal	64.8
Netherlands	85.0	Brazil	72.8	Zambia	64.5
Botswana	84.5	Estonia	72.8	Korea, D.P.R.	64.3
Ireland	84.5	Lithuania	72.8	Ecuador	64.3
United Arab Emir	84.5	United States	72.8	Mali	64.3
Japan	84.0	Croatia	72.5	Paraguay	64.3
Belgium	83.8	Israel	72.5	Turkey	64.3
Oman	83.8	Greece	72.3	Syria	64.0
Austria	83.0	Vietnam	72.3	Yemen, Republic	63.0
Taiwan	83.0	Albania	72.0	Bangladesh	62.5
Bahrain	82.8	Jamaica	71.8	Kenya	62.3
Australia	82.0	Morocco	71.8	Madagascar	62.3
Korea, Republic	82.0	Tunisia	71.8	Sri Lanka	62.0
Chile	81.8	Mozambique	71.0	Uganda	62.0
Libya	81.5	Papua New Guine	71.0	Togo	61.8
Malaysia	81.3	Dominican Repub	70.8	Moldova	61.0
Namibia	81.3	Ukraine	70.8	Haiti	60.5
Saudi Arabia	81.3	Indonesia	70.5	Cote d'Ivoire	60.0
Trinidad & Tobag	81.0	Latvia	70.5	Ethiopia	60.0
Cyprus	80.5	Angola	70.0	Sierra Leone	59.8
United Kingdom	80.5	India	70.0	Malawi	59.5
Bahamas	79.8	Ghana	69.8	Guyana	59.3
China, Peoples' R	79.8	Uruguay	69.8	Lebanon	58.3
New Zealand	79.8	Mongolia	69.5	Niger	57.5
France	79.0	Philippines	69.3	Myanmar	57.0
Qatar	79.0	Suriname	69.3	Pakistan	57.0
Malta	78.3	Egypt	69.0	Guinea-Bissau	55.5
Czech Republic	78.0	Thailand	69.0	Sudan	55.3
Russian Federatio	78.0	El Salvador	68.8	Guinea	53.0
Mexico	77.8	Guatemala	68.8	Congo, Dem. Rep	51.5
Portugal	77.8	Armenia	68.0	Iraq	51.3
Algeria	77.5	Cuba	68.0	Liberia	50.8
Italy	76.8	Romania	68.0	Zimbabwe	40.8
Poland	76.8	Belarus	67.8	Somalia	39.5
Spain	76.5	Bolivia	67.8		
Costa Rica	75.8	Gambia	67.8		