Q: Reference: Page 45, Lines 30-33

Please provide a copy of the Mercer Investment Consulting paper titled "Understanding the Equity Risk Premium" (May 2002).

A: A copy of the requested paper is attached.

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Discussion Paper, Volume 1 – Canada

Understanding the Equity Risk Premium

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Martin Den Heyer, MA, FSA, FCIA

Julie Dubois, MSc

Jean Michel, MSc, ASA, CFA

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Introduction

As we enter the twenty-first century, a number of articles are being published about the equity risk premium we might expect in the years to come. Many market commentators and academics agree that we should anticipate a premium lower than the historical average of the last fifty years. But consensus has not yet emerged as to the extent of this shift. Nor is it likely to, as the excess return of equities looking forward is difficult to predict with precision. The size of the premium is generally assumed to be primarily a measure of the compensation investors demand for taking on the extra risk and uncertainty inherent in equity investments compared to government bonds.

Looking at historical data, one can infer the size of the realised premium on equity investments over bonds. This ex-post premium however, should not be mistaken for the expected equity premium for future years, which can't be observed directly. To assess the implications of recent observations of the realised equity premium on the expected equity premium for future years, one needs to consider the nature of each of these two measures of the premium. Although data on the U.S. stock market and economy are used in the following analysis, we believe the underlying reasoning applies to equity markets in general.

Realised and expected premium

The expected (ex-ante) equity premium is defined as the excess annual return of equities over bonds that can be expected in future years. The realised (ex-post) premium is the observed differential between the total annualised return on equities over bonds over some periods in the past.[1] The difference between these two measures (the realised and the expected premium) is analogous to the difference between the holding period return on a bond and its yield at the start of the period. The bond yield gives the expected future return on a bond. In the absence of default and reinvestment risk, the difference between return and yield is strictly the result of variation in discount rates linked to variations in the price of the bond (i.e. capital gains and losses). When interest rates fall, the higher payout on previous bond issues looks more attractive relative to the lower rates offered on the new issues, resulting in higher realised returns on these bonds. The same is true for equities, although the linkage is much less certain. For example, all other things being kept constant, we expect that some investors will find equity markets more attractive than loan markets when interest rates decline, exerting an upward pressure on stock prices.

For bonds, the best estimate of the expected return is the current market yield. But for equities, the expected return is uncertain because it cannot be observed directly like a bond yield. As a result, investors form their equity premium expectations based on risk,

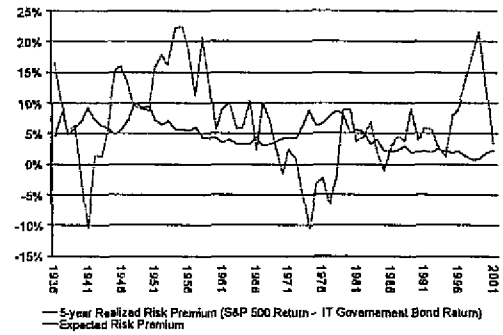
[1] *In this paper, we use the realised real return on nominal U.S. Treasury Bonds with 10 years maturity as the proxy for the risk-free real rate of return.*

or rather loss, aversion. The level of loss aversion is shaped by the prevailing degree of uncertainty in estimating variables such as future economic growth, future company earnings and dividend yields. The various estimates represent a probability distribution of equity premiums that are conditional on the possible states of the economy and other variables over future years. The median of the distribution would presumably correspond to the expected equity risk premium.

As can be seen from Chart 1, the realised equity premium is fairly volatile, even over long periods of time. Not surprisingly, the expected equity premium, based on estimates of future dividend yields, earnings growth and inflation, is more stable over time. Nevertheless, the expected equity risk premium may occasionally drift upward or downward as a result of changes in the perception of risk associated with equity investments.

In a climate of steady business expansion, and under the hypothesis of rational expectations, one would anticipate the expected premium to be relatively small. Concurrently, at times of uncertainty, the perception of risk may rise dramatically. As the possibility of loss becomes a more compelling factor, fear-induced trading will drive investors to more liquid instruments,

Chart 1. Realised vs. expected equity premium* on the S&P 500 Index



* *The expected equity premium was estimated using historical dividend yield and earnings growth, as well as an estimation of anticipated inflation based on historical nominal interest rates.*

increasing the equity premium. The pattern exhibited by our estimate of the expected premium in the last 20 years illustrates the shrinking of the equity premium in optimistic economic environments.

These changes in the level of the expected equity premium create gains and losses as the market price adjusts to the new required return. Market prices are highly sensitive to changes in required return because earnings cash flows span over many decades into the future. Therefore, small variations in the level of the expected equity premium would translate into large variations in market prices and, by the same token, in the level of the realised premium.

Determinants of equity returns

Although the size and timing of future cash flows are highly uncertain and the required rate of return is unknown, a stock's value is simply the present value of its future cash flows. Nevertheless, during some periods, market valuations may, with the benefit of hindsight, appear to result more from fear-induced selling or *irrational exuberance.* The realised return on equity is effectively generated from either price appreciation or dividend yield. Over a specified holding period the following return formula applies:

$$\text{Return} = \frac{\text{Price}_{\text{End of period}} - \text{Price}_{\text{Beginning of period}} + \text{Dividend}}{\text{Price}_{\text{Beginning of period}}}$$

Price appreciation can be broken down into two components: realised earnings growth and variation in the earnings multiplier (PE). Realised earnings growth can be decomposed into realised real growth and realised inflation, while changes in the earnings multiplier represent valuation changes given the level of interest rates, anticipated future earnings growth and changes in the quality of earnings. The return formula could therefore be restated as follows:

$$\text{Return} = \Delta\text{PE} + \text{E[g]} + \text{E[inf.]} + \text{Dividend yield}$$

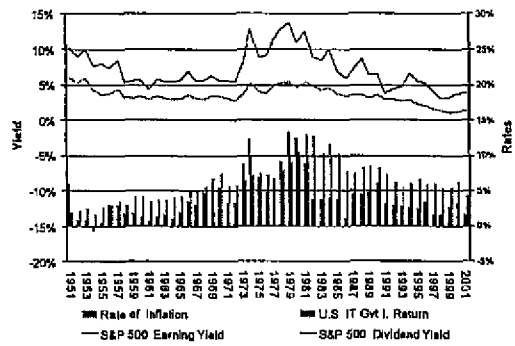
PE refers to the earnings multiplier or Price Earning ratio and 1/PE to the earnings yield. E[g] is the Expected real earnings growth and E[inf.] is the Expected inflation.

In the following paragraphs, we discuss the nature of each component and how they interact.

The earnings multiplier is an indication of investors' optimism regarding growth prospects. The PE ratio is nothing more than the inverse of the real discount rate for inflation adjusted equity cash flows, given current real interest rates and anticipated real earnings growth. When future growth opportunities are strong, investors will tend to offer a higher price relative to the level of current earnings.

The dividend yield is a function of the earnings yield and dividend payout ratio. Dividends have tended to be relatively stable in comparison to earnings as it can be seen from Chart 2. Corporations tend to pay out dividends based on their estimates of sustainable long-term earnings prospects and are hesitant to cut or increase them rapidly.

Chart 2: S&P 500 Index Earnings and Dividend Yield



In parallel, fiscal and other incentives have led shareholders to favour price appreciation

over high dividend payout. So much so that more and more companies are not paying any dividends. As a matter of fact, the S&P 500 payout ratio has dropped to 50-year lows in 1999 and 2000 (35% and 33% respectively as compared with an historical average of 50%). Net share repurchases, defined as shares repurchased by the company less new shares issued, tend to reduce payout ratios and should also be viewed as a current dividend. Therefore, although share repurchases have added significant volatility to cash payout, they should not have any bearing on the realised premium over the long term. When dividends are held constant in dollar terms, the dividend yield would tend to decline, as equity prices appreciate in line with inflation and real earnings growth. Chart 2 also illustrates that dividend yields, and especially earnings yields, have tended to follow secular trends in nominal interest rates and inflation. Earnings are considerably more volatile than dividends because they are affected by short-term factors such as transitory variations in consumer spending. A short-term drop in earnings will likely lead to a drop in funds reinvested in the firm, generating less internal growth and equity value rather than a drop in dividends paid to shareholders. Transitory write-offs, accounting conventions and non-cash items also regularly affect stated earnings.

In the long run, earnings and dividends cannot grow faster than national income. Economic growth adjusted for inflation (real GDP growth) can be decomposed into the various factors of production, including growth of the labour force (or population growth) and output per worker (productivity). In the short run, output fluctuations are essentially a result of shifts in aggregate demand. This is because firms cannot always expand and contract their labour force and capital base or modify selling prices quickly enough to adjust instantaneously to a changing economic environment. Because of this lack of near-term flexibility in the means of production, earnings growth of publicly-traded companies and national income growth may not be in line for some years, particularly if they start from unusually low or high levels. Hence, abnormally high growth in earnings has invariably been offset by subsequent lower and even negative growth, and vice versa. As can be seen in Chart 3, real growth in GDP, earnings, and dividends all tend to be mean reverting.

Chart 3: Real growth in GDP, S&P 500 Index Earnings and Dividends

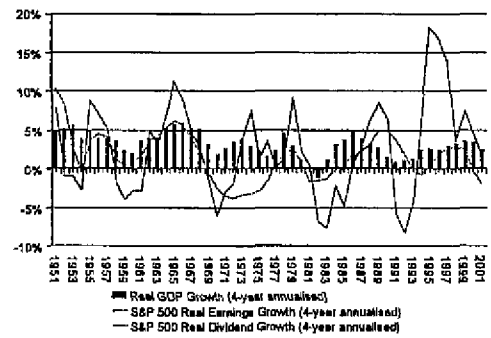
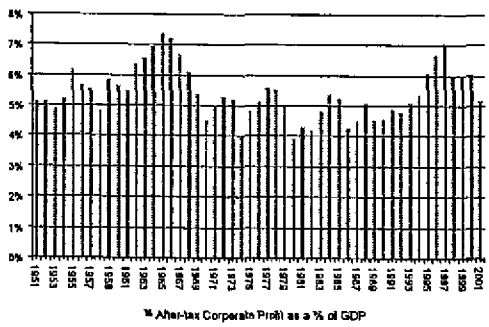


Chart 4 shows that the share of after-tax corporate profits in GDP has averaged around 5.4% over the last 50 years. Wide

fluctuations are apparent over the period: after reaching sample heights in the 1960s, it dropped to or below 4% after each oil shock (1973 and 1979). A downward slope started as early as the second half of the 1960s, likely in the wake of demographic trends and the expansion of social welfare programs. Since then, it has risen and fallen, reaching a peak in 1997 and dropping the following year, perhaps in the aftermath of the Asian crisis. The main point of this chart is to illustrate the fact that the share of company profits in GDP cannot rise without limit. In the last decade, 1992-2001, the average annual increase in total wages has been less than 1.5% in real terms while corporate profits have grown by 3.3%.

Chart 4: After-tax Corporate Earnings as a share of GDP



Employees may eventually ask to equally benefit from the economic growth thereby limiting the growth in corporate profits. In a democracy, we can expect that over time social pressure will act as a regulator to ensure that the share of after-tax corporate profits in GDP remains at a reasonable level. Over the last 50 years, after-tax corporate profits and GDP have grown at about the same rate (3.3% for both) after adjusting for inflation. Thus, long-term after-tax corporate profits and long-term GDP growth are virtually tied together even though they are not in line over shorter periods.

Analysis of realised equity premium

In the following section, we present an analysis of historical financial and economic data to substantiate our assessment of the expected equity premium. Table 1 shows that real GDP and productivity growth, as measured by output per hour worked, have been fairly stable since 1952, averaging 3.3% and 2.1% respectively since then. Inflation, whether measured by the Consumer Price Index or the GDP Implicit deflator (as shown below), has been more volatile. Periods of high inflation that accompanied the oil shocks of the seventies are clearly evident. Going forward however, most market observers are confident that we are in an era of U.S. Federal Reserve policy that actively promotes more stable core inflation.

The historical 50-year average return on the S&P 500 has been 12.0% (Table 1) while the return on the risk-free proxy has been 6.5%. This means the realised premium on equity investments has been 5.5% per year on average over the last 50 years.

Table 1 : Calculation of the realised risk premium

Period	S&P 500 Return (1)	Nominal Bond Return (2)	Realized Risk Premium (1) - (2)
1952-1961	16.4%	2.5%	13.9%
1962-1971	7.1%	4.6%	2.5%
1972-1981	6.5%	5.8%	0.7%
1982-1991	17.6%	13.1%	4.5%
1992-2001	12.9%	6.7%	6.2%
1952-2001	12.0%	6.5%	5.5%

Table 2 : Components of the S&P 500 Index Total Return

Period	Dividend Yield	P/E	Inflation	Real Earnings Growth
1952-1961	4.0%	8.7%	1.8%	0.9%
1962-1971	3.2%	-2.2%	3.2%	2.7%
1972-1981	4.5%	-7.8%	7.5%	2.7%
1982-1991	3.8%	12.6%	3.5%	-3.0%
1992-2001	1.9%	5.9%	1.9%	2.5%
1952-2001	3.5%	3.2%	3.6%	1.1%

Table 3 : Economic Statistics

Period	Inflation	GDP Growth Nominal	GDP Growth Real	Productivity
1952-1961	1.8%	4.9%	3.1%	2.3%
1962-1971	3.2%	7.4%	4.1%	2.9%
1972-1981	7.5%	10.8%	3.0%	1.5%
1982-1991	3.5%	6.6%	3.0%	1.5%
1992-2001	1.9%	5.3%	3.3%	2.1%
1952-2001	3.6%	7.0%	3.3%	2.1%

Table 2 shows a breakdown of the components of the S&P 500 rate of return. It should be noted that average annualised real earnings growth in the 1990s followed a decade of negative earnings growth, which lead to the 6.2% equity premium registered in the last decade. Over a 50-year period, both after-tax total corporate profits and GDP grew at an average real rate of 3.3% per annum as indicated in Table 3. In contrast, the average real growth in S&P 500 earnings has been only 1.1% over the same 50-year period! There are two plausible explanations for this apparent discrepancy.

One explanation revolves around the quality discounts and premiums that investors assign to reported earnings in different inflation environments and stages of the economic cycle. Over time, accounting conventions have changed, so that we are not always comparing apples to apples when comparing reported earnings over long time horizons. P/E ratios also reflect the quality discounts and premiums that investors assign to current earnings. In this context quality refers to the level of current reported earnings relative to the expected average level of earnings that can be sustained over the long run. For example, at the end of 2001 the P/E ratio stood at 46. One reason that investors were willing to pay such a high earnings multiple is that they considered that earnings were likely to revert to much higher levels as the recession subsides. So, investors are willing to pay a premium with the belief that current earnings are understated compared to the future average level of sustainable earnings. Another way of looking at this is to express the P/E ratio in terms of sustainable earnings levels rather than current reported earnings. This might reduce the ratio from 46 to 25.

The P/E ratio at the beginning of 1952 was approximately 10. Inflation spiked to fairly high levels in the early 1950's, which probably caused significant distortions in reported earnings as inventory and capital costs at pre-inflated prices were offset

against revenue reflecting post-inflation prices. Under those circumstances, investors most likely discounted the P/E ratio knowing that reported earnings were not sustainable in the long run. Had earnings been calculated using replacement costs for inventory and the capital cost allowance, the P/E ratio might have been 15 instead of 10.

Now, how these adjustments for earnings quality might influence our interpretation of the historical data? During the period 1952-2001, the S&P 500 Index real price appreciation averaged 4.3% per annum, outgrowing real GDP and after-tax total corporate profits by about 1%. Table 3 splits real price appreciation into two components; 1.1% for real earnings growth and 3.2% for the growth in the P/E ratio from 10 to 46. Using earnings adjusted for estimated quality discounts and premiums, the growth in the adjusted P/E ratio from 15 to 25 accounts for a 1% annual real growth, leaving 3.3% real growth in adjusted earnings, which is similar to real GDP and after-tax total profits.

Another reason why the S&P 500 Index earnings growth have been less than real GDP, revolves around the construction of the S&P index itself. The S&P 500 Index covers a fixed number of companies (i.e. 500 U.S. companies with the largest stock market value since 1957). Over the last five decades, the portion of the U.S. economy and the portion of total corporate profit accounted for by the Index has shrunk with an ever-increasing number of smaller companies contributing to economic growth. That is, the number of companies contributing to economic growth has increased over the years. As earnings and growth opportunities have been more broadly spread, earnings of the 500 companies in the S&P500 have grown at a lower rate than the GDP. Not to mention that over the history of the Index, some constituent companies have either gone bankrupt or have been liquidated for one reason or another and therefore, have negatively impacted the growth of the S&P 500's earnings. At present, the Index represents roughly 75% of the market capitalisation of all stocks traded on major U.S. stock exchanges. Thus, we expect the Index's earnings growth to continue to lag GDP growth in the future given that creation of new companies outside the Index and bankruptcy of companies already in the Index would normally carry on.

In practice, the historical price appreciation for the S&P500 Index cannot be split by sources (e.g. changes in valuation versus earnings growth) with a high degree of accuracy because estimation of quality adjustments to reported earnings and the impact of the S&P 500 Index construction is bound to be somewhat subjective. In essence, the historical data is subject to various interpretations for the purpose of estimating the expected equity risk premium. Nevertheless, we are able to construct estimates of the expected equity risk premium based on some reasonable assumptions for the various factors, as outlined in the next section.

Expected equity premium

In this section, we intend to assess the equity premium investors have put on the equity market (using the S&P 500 Index as proxy) given the level of the market as of January 1, 2002. Our intent is to come up with an estimation of the risk premium the median investor required from the market at that date. It should therefore not be mistaken for a prediction of future realised equity returns which, as seen previously, could be very different.

With the assumption that investors are right on an aggregate basis (i.e. the markets are efficient), the expected equity premium of the median investor should lie on the probability distribution of future equity returns, at a point where there exists a 50/50 probability for the realised premium to outperform or under perform the expectation. Our assessment will consist of neither overly optimistic nor overly pessimistic forecasts of the variables that will determine future equity returns; this, in our opinion, best represents the expectation of the median investor.

Since we want to assess the expected equity premium in relation to the current level of the market, we assume that the PE remains constant in the future and does not contribute to the expected return of the S&P 500. However, since the U.S. economy has entered a recession in 2001, we need to adjust the current PE to correct for the slump in reported earnings recorded as a result of the recession. This anticipates that earnings would normally catch-up at the end of a recession to return to a more normal level. Under the hypothesis that the level of current earnings as a percentage of GDP is abnormally low given the recession, we adjust the current PE of 46 (or 2.2% earnings yield) to what we believe to be a more sustainable level over the long-term. Therefore, we use a forecast PE of 25 (4.0% earnings yield). It should be noted that since the change in PE from 46 to 25 results from an increase in earnings, as opposed to a decrease in the level of the market, it does not reduce future equity returns.

Regarding the second component of the expected return, we assume that the median investor expects a future growth rate in real S&P500 earnings of 2.8%, following the period of adjustment in earnings described above. The starting point for this expectation is the assumption that real GDP will continue to grow at the historical rate of 3.3%. This can be achieved if labour productivity and other means of efficiency enhancements increase at a rate of 2.1% while labour force grows at its historical rate of 1.2%. Although it is accepted that trend in productivity may continue, a steady growth in labour force may be more disputable. Over the last fifty years, the growth has been fuelled by the access of women to the job market and by baby boomers. On the other hand, it may be argued that immigration and globalisation make it possible to tap into population growth outside the U.S. and that it is global labour force growth that matters. Finally, we believe that S&P 500 earnings will continue to lag the real GDP growth by

about 0.5%, for the reasons described previously.

The last component of return is the dividend yield. Dividends are only the portion of earnings that companies return to investors in cash or by repurchasing the companies' own stocks. Historically, the average payout ratio has been between 50% to 60% of earnings. To a large extent, the dividend payout appears to be at a corporation's discretion. There are no doubt many factors, including the attractiveness of reinvestment opportunities and taxes, that are taken into account.

Economic theory (e.g. Modigliani/Miller) suggests that dividend policy does not affect the total return on equities, as any change in the dividend yield is likely to be offset by an equivalent change in price. In this context, the current dividend yield is bound to be a poor predictor of the average future yield, as it can be changed with the stroke of a pen. Nevertheless, there should be some specific level of dividend yield that is consistent with our other equilibrium assumptions for future GDP growth and equity valuation. One approach is to set the equilibrium dividend yield at a level that will preserve equity prices, earnings and dividends as a constant factor share of GDP (recall that real GDP growth can be decomposed into productivity growth and labour force growth). All other things being equal, this would be achieved by retaining enough earnings to fund an expansion of the capital stock commensurate with labour force growth. Thus, under equilibrium conditions, given an earnings yield of 4.0% and expected labour force growth of 1.2%, the expected average future dividend yield is 2.8% (i.e. a payout ratio of 70%, slightly higher than what historical data reveals).

The components add up to a real annual expected return on the S&P 500 of 5.6% (e.g. 2.8% real earnings growth plus 2.8% equilibrium dividend yield). In 1997, the U.S. Treasury began issuing Inflation Protected Securities (TIPS) that provided coupon and principal payments directly linked to the Consumer Price Index. Using the current real yield of 3.5% on 10 year term TIPS as the expected future real return for bonds (this is commonly accepted), we estimate that, as at January 1, 2002, the median investor required an expected risk premium of 2.1% to invest in equities. This is much lower than what investors realised in the past. Evidently, slightly different assumptions in terms of expected dividend yield and/or growth in earnings would lead to a different expected premium. For example, if earnings growth keeps pace with the expected 3.3% real GDP growth, the expected equity risk premium would increase to 2.6%. On the other hand, using a dividend yield of 2.4% would mean a payout ratio closer to the historical level of about 60%, and would result in an expected equity premium of 1.7%. So given the fundamental uncertainties involved, estimates of the expected equity risk premium based on the considerations reviewed above, adjusted for the preferences and beliefs of different investors, might reasonably lie in the range of 1.7% to 2.6%.

Our assessment of 2.1% of the expected risk premium constitutes only what we believe to be the central point in the distribution of possible future realised equity premium. It should never be forgotten that the future realised equity premium could be quite different, especially over short periods.

Conclusion

It is hard to rationalise a shrinking equity premium as a permanent shift in preferences, but institutional changes have occurred in the U.S. that could justify some degree of permanence. The risk priced by investors may consist of both systematic risk inherent to equity markets as well as market imperfections. These would include the inability of investors to fully insure against shocks outside the stock markets, incomplete knowledge about existing investment opportunities and high direct and indirect transaction costs. Over the last thirty years, technological improvements have resulted in greater access to information and faster communication. In addition, increased participation in stock markets, changes in the tax structure, the ability and determination (or faith therein) of the U.S. Federal Reserve to avoid high inflation and depression, as well as lower transaction costs have all possibly reduced the degree of risk and presumably the equity premium required by investors. Finally, the greater availability of investment opportunities and vehicles has resulted in larger and better-diversified equity portfolios, which may also contribute to a declining equity premium.

All these factors may have reduced the risk premium but it is doubtful that changes in liquidity preferences would justify a null or negative premium (as advocated by some authors) given the existence of a risk-free asset.

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