What causes the equity premium?

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70 word summary

My essential thesis is that the long-term rate of return enjoyed by stock market investors is largely determined by the underlying return on shareholders' equity. Investors may be more reluctant to invest in stocks than bonds, but the main underlying cause of the superior historical record of equities over bonds is the gap between the return on shareholders' equity and interest rates rather than the behaviour of portfolio investors.

Statistical regularities and laws of nature

A pragmatist may argue that as long as there is an equity premium, its cause is unimportant. I would like to start by saying a little about the distinction between regularities and laws of nature because this explains why correct identification of the cause of the equity premium is important.

In this context, a law of nature is a rule that describes how something tends to respond to certain stimuli, such as the way bond prices react to changes in interest rates. A regularity is a recurring pattern we have observed without establishing its cause. Such a pattern may be statistically significant, but it should remain a regularity rather than a law of nature until we have identified its cause. (For a more extensive discussion, see Chalmers, 1999.)

We may for example observe that stock returns have consistently outperformed bonds over long periods in the past. This is a regularity that can be confirmed as statistically significant. We then hypothesise that this phenomenon is caused by the risk averse behaviour of stock-market investors. If we can establish that this cause is correct, then we have established the equity premium as a law of nature. As Chalmers (1999) wrote *".. causes and laws are intimately linked. Events are caused through the action of particulars that possess the power to act as causes."* Provided stock market investors remain risk averse and this causes an equity premium then, as a law of nature, we can be confident that the premium will continue.

There is, however, great scientific danger in assuming something to be a law of nature when it is only a regularity or when an incorrect cause is identified. As an example, I would cite the appearance of earthworms in the Northern Territory after a thunderstorm. An explanation once advanced for the emergence of worms was that hailstones were worm eggs; it would not require too much imagination to devise an experiment to discredit this explanation. In the physical sciences we can experiment

to confirm causes. Unfortunately experimentation is difficult in finance and economics.

As an example of something that is obviously just a regularity, I would cite the sequence of numbers 1860, 1880, 1900, 1920, 1940 and 1960, indicating the year of election to office of US presidents who died in office in the last 100 years. In a book entitled *The principles of model building* (written in 1970) Rivett posed the question, will 1980 be the next number in the series? [It very nearly was!] However, Rivett also wrote that if the statistical evidence became overwhelming we may be tempted to assume such a regularity will continue, even if we do not understand why.

It is apparent from these examples that regularities should have a much lower scientific status than laws of nature. In 1985, Mehra and Prescott issued an intellectual challenge to the accepted cause of the equity premium. In a subsequent paper in 2003, they observed that the equity premium puzzle that they invented in 1985 remains unsolved. Mehra and Prescott seem to realise that failure to identify the cause of the equity premium calls into question the reliability of a whole class of economic models that have become common practice.

It also seems well known that many experienced fund managers do not accept this causal hypothesis. So I am not alone in suggesting that as a reward for enduring stock-market volatility, the equity premium may be no more than a regularity even though standard texts, such as Brealey and Myers (2003), treat it as a law of nature.

However, as Mehra and Prescott claim in 2003, the statistical evidence in favour of the equity premium is now overwhelming and perhaps we should follow Rivett's advice and expect the equity premium to continue as a regularity, even if we do not understand its cause.

Unfortunately, this relaxed view has been challenged by events, in particular the rapid rise of the US stock market in the last decade. One consequence has been the emergence of *ex-ante* estimates of the US equity premium ranging from minus 1% to plus 9% per annum. (See, for example Ritter, 2002 and Derrig and Orr, 2004). Many of the lower *ex-ante* estimates use dividend discount models based on assumptions that are quite different from the accepted causal explanation of the historical record.

Not only do published *ex-ante* estimates of the equity premium now vary widely, so do the assumptions on which they are based. Therefore, or so it seems to me, we have two options:

(a) our first option is to solve the equity premium puzzle by identifying the cause of the equity premium so that it can be used in applications which require reliable *ex-ante* estimates.

(b) our second option is to find an alternative law of nature which will provide a different method of deriving answers to problems for which we now use the equity premium.

Given Mehra and Prescott's view that their puzzle remains unsolved in 20 years, perhaps this second option justifies some effort even though some people may find it difficult to accept the possibility that the equity premium is a mere regularity.

Should we model stock returns or the equity premium?

In the actuarial profession we have traditionally been more interested in returns on different asset classes than the equity premium. Our interest in the equity premium has been more as a building block for total return models rather than a topic of interest in its own right. Also, I note that historical estimates of the equity premium start with stock returns from which fixed interest returns are deducted.

There is however, a far more valid reason for starting with stock returns rather than the equity premium. While the equity premium puzzle remains unsolved, I believe we can identify return on shareholders' equity as the main cause of long-term stock returns. As I will explain: inflation, growth in GDP and investor behaviour are relatively unimportant.

If we knew the future return on shareholders' funds underlying the ASX index portfolio, then we would be able to estimate long-term index stock returns with a fair degree of accuracy. If required, an *ex-ante* estimate the equity premium can follow an *ex-ante* estimate of stock-returns. However, the estimation process starts with return on shareholders' equity, not the equity premium.

For these two reasons, the traditional actuarial interest in long-term returns and the possibility of a law of nature linking stock-returns to return on shareholders' equity, my analysis is mainly concerned with an explanation of long-term stock returns first and the equity premium second.

Return on shareholders' equity

In all the discussion of ex-ante estimates of future stock returns, the one factor that is given little weight (and often ignored) is the return on shareholders' funds that management will be able to achieve in the future. If this is zero, then there will be no profits, no sustainable dividends and no growth in shareholders' equity except through stock issues. In these circumstances, I fail to see how investors can be compensated for the lack of profits and dividends by any sustainable capital appreciation.

If, on the other hand, return on shareholders' equity were to be sustained at (say) 25% per annum, then initial public offerings with a 60% payout dividend policy would offer a long-term buy-and-hold return of at least 15% per annum irrespective of stock price movements.

I would argue, therefore that return-on-shareholders'-equity is a causal factor in determining the long-term rate of return enjoyed by portfolio investors. To what extent, then, has this factor determined long-term stock returns in the past?

I do not know if it was original at the time, but the earliest model I have seen that attempts to answer this question was published by John Hemsted (1962) in a fairly obscure actuarial journal. It is relatively simple to show mathematically that if return on shareholders' equity and payout ratio is constant (and there are no share issues or buybacks), then earnings, dividends and shareholders' equity will all grow at a constant rate of growth - return on shareholders equity multiplied by the proportion of profits retained (100% - the payout ratio). We then add this growth rate to the dividend yield to estimate the total long-term 'buy-and-hold' return.

In JASSA (Fitzherbert, 2005) , I reconciled this model with the total return on Australian equities over the last 125 years. To do something a little different today I propose to reconcile this formula with some US data. First, we can relate this express this standard "buy-and-hold" formula in terms of return on shareholders' equity (***RoSe***) , payout ratio (***POR***) and price-to-book ratio (***PBR***) as follows by noting that dividends in a year are equal to return on shareholders equity times shareholders equity (***ShEq***) times the payout ratio.

$$\begin{aligned} TR &\approx \frac{Divs}{Price} + RoSe \times (1 - POR) \\ &= \frac{RoSe \times ShEq \times POR}{Price} + RoSe \times (1 - POR) \\ &= \frac{RoSe \times POR}{PBR} + RoSe \times (1 - POR) \end{aligned}$$

Using average figures relating to the DJIA over the 70 years ending in 1989 which were published by Value-Line (1990) this gives a total return estimate of 9.3% per annum as follows:

$$\frac{0.116 \times 0.6}{1.5} + 0.116 \times 0.4 = 4.64\% + 4.64\% = 9.3\%$$

The average earnings and dividend yields were 7.8% and 4.7% respectively which gives a typical payout ratio of 4.7 ÷ 7.8 or 60%. The average return on book value was 11.6%, The average price/book ratio is an estimate published in Fitzherbert (1992).

The first factor is an estimate of the dividend component of total return over this period which compares to 4.7% published by Value-Line. The second factor is the estimated rate of growth of earnings, dividends and book value which we can compare with the actual figures as follows:

DJIA	1920	1989	Compound Growth rate (% pa)
Book value	48.2	1206	4.8
Earnings	9.1	224	4.8
Dividends	5.8	103	4.3

These figures are admittedly averages, but (together with an estimated price/book ratio of 1.5) they nevertheless account for both the dividend factor and growth in either dividends or earnings over this period.

In this particular case, the price/book ratio was roughly the same at the start and end of the measurement period. Any future projections using this method therefore need to consider both its current level and possible future changes in overall price/book ratios as well as future levels of return on equity and, of lesser importance, payout ratios.

Equity returns, GDP growth and inflation

Despite the contradictory historical evidence, many people are surprised by the omission of inflation in these calculations. This is perhaps a topic which would justify a week-long debate. However, let me point out that while dividends, earnings and company values may move broadly in line with GDP in aggregate, investors are in a completely different position to the tax office because they supply the equity capital. If we assume dividends will grow with GDP, we need to allow the issue of new and additional shares, less buybacks. In my JASSA (Fitzherbert, 2005) article I argued that the "accounting equation" approach I have adopted makes the necessary implicit adjustments in much the same way as stock indices are adjusted.

If, in the absence of new issues, shareholders equity were to have grown from retained profits as well as inflation then the rate of growth of book values would have an order of magnitude greater than what actually happened.

My explanation of this inflation puzzle is that historical cost accounting measure money profits and not real profits. With some exceptions (eg permanent real assets such as land) historical accounting treats real assets such as plant and inventories as monetary assets even though they may be real.

Here is a simplified example: a small firm issues $100,000 in shares to fit out a small office; the directors pay all of the profits to themselves and they depreciate the cost of the fit-out over the terms of the lease and do not buy any more assets. Their initial balance sheet would then be:

Balance sheet at commencement of lease

Liabilities		Assets	
Shareholders' equity	$100,000	Fixed assets	$100,000

As they depreciate their fit-out over the term of the lease, their fixed assets at the end of the lease will be zero, but their equity will still be $100,000 and this will now be in cash. So their balance sheet at the end of the lease will be:

Balance sheet at conclusion of lease

Liabilities		Assets	
Shareholders' equity	$100,000	Fixed assets	Nil
		Cash	$100,000

This highly simplified example illustrates the crucial point that, under the historical cost accounting convention, it is only the monetary value of real assets that is preserved in the balance sheet. If, say, this fit-out had a terminal value greater than zero and the assets were sold, this would give rise to a profit which would appear in the profit and loss account, not the balance sheet. Consequently any benefit from inflation will appear in reported earnings rather than stock holders' equity.

As Graham (1973) pointed out, any benefit from inflation would therefore appear as a significant increase in return on shareholders' equity which did not happen over the period he considered. In fact, recent experience suggests that RoSe may rise as inflation and interest rates fall; and conversely!

The future

The ultimate test of what I have said is whether it can be used, reliably in practice. Using data available to account holders with Commonwealth Securities Limited on 22 September, 2006, the ASX All Ordinaries Index portfolio was trading at 2.1 x book value and 15 times earnings. This implies ***RoSe*** of 14% per annum (well in excess of the long term average of 9% ***RoSe*** and 1.4 x book.) See also RBA May 2006 bulletin page 48.

If these levels of ***RoSe*** and ***PBR*** persist, the estimated buy-and hold return (assuming 60% payout) is given by:

$$TR \approx \frac{RoSe \times POR}{PBR} + RoSe \times (1 - POR)$$
$$= \frac{0.14 \times 0.6}{2.1} + 0.14 \times (1 - 0.4) = 9.6\% pa$$

If we deduct the current long-term bond rates from this estimate, then we arrive at an ex-ante estimate of the equity premium of around 4% per annum. (This is a geometric mean.) However, if we assume that ***RoSe*** and ***PBR*** slowly revert to their long-term means of 9% and 1.4 over (say) 10 years, then we have quite a different story. Using a spread sheet I arrive at a (median) estimate of 4.2% for the geometric mean return for the ASX Index over the next 10 years and a negative equity premium.

Conclusion:

Very long-term stock returns are mainly determined by the underlying return on shareholders' funds. The equity premium puzzle is therefore the ***RoSe*** puzzle. Once

we accept this argument, we need to understand what determines the level of return on shareholders' funds. If ***RoSe*** is a mean reverting process, then this will (at times) dramatically change our forward estimates of the equity returns compared to bonds. Also important is the way investors react to changes in ***RoSe***, about which there has been little investigation.

As with the equity premium, there is a risk that ***RoSe*** will also be treated as a regularity rather than a law of nature. However, if we are looking for a cause of the equity premium, then my suggestion is that we should be first seeking to explain return on shareholders' equity.

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