The equity premium puzzle

Investment theories state that stocks should give a higher return than bonds in the long term. But the historical difference is far greater than expected, says Rajnish Mehra

There is a wealth of evidence that for more than a century, stock returns have been considerably higher than those for Treasury bills. The average annual real return (that is to say, the inflation-adjusted return) on the US stock market over the past 110 years has been about 7.9 per cent. Over the same period, the return on a relatively riskless security was a paltry 1 per cent. The difference between these returns - 6.9 per cent - is called the equity premium. This statistical difference is even more pronounced since the war, with the premium being almost 8 per cent.

Further, this pattern of excess returns on equity holdings is not unique to US capital markets. Equity returns compared with the return to debt holdings in other countries also exhibit this historical regularity. The annual return on the UK stock market was 5.7 per cent since the war, a 4.6 per cent premium over the average bond return of 1.1 per cent. Similar differentials are documented for France, Germany, Italy and Spain.

Academic Jeremy Siegel has analyzed data on US stock and bond returns going back to 1802 and found a similar though somewhat smaller premium in place for the past 200 years. Table 1 summarizes the data.

The dramatic investment implications of these different rates of return can be seen in Table 2, which maps the capital appreciation of $1 invested in different assets from 1920-1997 and from 1925-2000. As this shows, $1 invested in a diversified stock index yields $568.946 against a value of $205, in real terms, for $1 invested in a portfolio of Treasury bills for the period 1920-1997. While for the 75 years between 1925 and 2000, the corresponding values are $2,264.74 and $1,721. (This table assumes that all payments to the underlying asset, such as dividends payments to stocks and interest payments to bonds, are reinvested and no taxes are paid.)

This long-term perspective underscores the remarkable wealth-building potential of the equity premium. It should come as no surprise that the equity premium is of central importance in portfolio allocation decisions and estimates of the cost of capital.

A puzzle in the hands of the stock market premium may be a generation game

Also, it is central to the debate in the US about investing social security funds in the stock market.

In putting together an investment portfolio, investors choose among different assets such as stocks, real estate and corporate bonds. Typically an investor chooses a portfolio by assessing the relative risk characteristics and expected returns of various options. The risk premium spells out the differential return an investor can expect from different assets.

Are stocks riskier?

Why has the return on stocks been higher than on relatively risk-free assets? One answer is that because stocks are "riskier", investors seek more reward. Indeed, the standard deviation of the returns to stocks (about 20 per cent a year historically) is larger than that of the returns to Treasury bills (about 4 per cent a year), so obviously stocks are considerably more risky. But are they?

To deepen our understanding of balancing risk and return in pricing assets, let us look at why different assets give different rates of return. The theory prices assets so that the "incremental loss of well-being" in sacrificing current consumption when buying an asset is equal to the "increment gain in well-being" from the increase in consumption anticipated when the asset pays off.

The essence here is the "incremental loss or gain of well-being due to consumption", which is different from "incremental consumption". In other words, the same amount of consumption may result in different degrees of well-being at different times. (A five-course dinner after a heavy lunch yields less satisfaction than a similar dinner when one is hungry.)

Hence assets that pay off when times are good and consumption levels are high - that is, when the incremental value of additional consumption is low - are less desirable than those that pay off as equivalent amounts when times are bad and additional consumption is more desirable and more highly valued.

This can be illustrated by considering the standard model of modern finance, the Capital Asset Pricing Model (CAPM). This postulates a linear relationship between an asset's "beta" (a measure of its risk) and expected return. Thus, high beta stocks yield a high expected rate of return. In the CAPM, good times and bad times are captured by the return on the market. The performance of the market as captured by a broad-based index acts as a surrogate indicator for the state of the economy.

A high beta stock tends to pay off more when the market return is high, and hence is less valuable and consequently sells for less. To use the jargon of modern asset pricing theory, an asset that pays off in states of high marginal utility will sell for a lower price than a similar asset that pays less in states of low marginal utility. Since rates of return are inversely proportional to asset prices, the latter class of assets will, on average, give a lower rate of return than the former.

Another way of looking at asset pricing is to realize that economic agents prefer to smooth out patterns of consumption over time. Assets that pay off relatively lower amounts at relatively lower consumption levels are low "smooth out" consumption. Naturally, the latter are more valuable and thus require a

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Stocks

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lower rate of return to induce investors to hold these assets. (Insurance policies are a classic example of assets that smooth consumption, not unlike Treasury bonds. Each investor should command approximately the same rate of return. In fact, a 1995 paper by this author and Edward Prescott showed that stocks on average should command at most a 1 percent return premium over Treasury bonds. However, for as long as there was reliable data (about 100 years), the mean premium on stocks over bonds was considerably and consistently higher, so we realised we had a puzzle on our hands.

It should be stressed that the equity premium puzzle is a quantitative puzzle. Standard theory is not inconsistent with our notion of risk that, on average, stocks should return more than bonds. The puzzle arises from the fact that returns predicted by the theory are very different from those that have been historically documented.

The puzzle cannot be dismissed lightly, since much of our economic intuition is based on the very class of models that fall short so dramatically when confronted with financial data. It shows that concepts central to financial and economic modelling fail to capture the single characteristic that appears to make stocks comparatively so risky. It also questions the viability of using this class of models for a quantitative assessment, say, to gauge the welfare implications of alternative stabilization policies since the costs and benefits associated with these policies are now suspect. For these reasons economic specialist and economists have made repeated attempts to solve the puzzle over the past 15 years or so. Most research falls into two camps. Some have proposed modifications of the utility functions that are typically used to model investors as being highly averse to risk. Others have proposed explanations based on market imperfections, transactions costs, potential disaster states, selection bias, and the inability to insure against risk and disaster scenarios.

Two recent approaches to resolving the equity premium puzzle. The first, exemplified by academicians John Campbell and John Cochrane, incorporates the possibility of economic recession as a variable in the calculations. In this approach, the risk aversion of investors rises dramatically when the chances of a recession become larger.

The second approach, proposed by George Constantinides, John Donaldson and this author, incorporates consumer heterogeneity and departures from the representative agent model. In an approach, equity thus is not

Table 1: US stocks and bond returns

<table>
<thead>
<tr>
<th>Year</th>
<th>Real</th>
<th>Nominal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928-1949</td>
<td>7.1</td>
<td>9.2</td>
</tr>
<tr>
<td>1946-1978</td>
<td>6.6</td>
<td>8.6</td>
</tr>
<tr>
<td>1979-2000</td>
<td>4.0</td>
<td>7.1</td>
</tr>
<tr>
<td>2001-2008</td>
<td>0.7</td>
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</tr>
<tr>
<td>2009-2018</td>
<td>1.1</td>
<td>0.5</td>
</tr>
<tr>
<td>2019-2020</td>
<td>0.4</td>
<td>0.4</td>
</tr>
</tbody>
</table>


Stocks are priced not by the young, for whom they are attractive, but by the middle-aged

Figure 1: Realized equity risk premium a year 1928-2000

The middle-aged are more averse to the risk of job loss, and other major personal disasters that can neither be hedged away nor insured against. This means equities and cyclically related investments exhibit the undesirable feature that they drop in value when the probability of job-loss increases. In economic downturns, consumers need an extra incentive to hold equities and other similar investment instruments. The equity premium is thus rationalized as the added incentive needed to make equities palatable to investors.

Further reading

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