Myopic Loss Aversion and the Equity Premium Puzzle

Introduction

In this article, we are going to summarize "Myopic Loss Aversion and the Equity Premium Puzzle", published by Shlomo Benartzi and Richard Thaler in 1995. The purpose of revisiting this paper is introducing our readers to the domain of behavioral economics. Behavioural economics is the field of economic studies which aims to explain the anomalies deriving from the standard model of rational expectations. The findings of behavioural economics are applicable to finance as well, as this paper demonstrates. We will start by describing the elements of Daniel Kahneman and Amos Tversky's "prospect theory", which Benartzi and Thaler use as part of the explanation for the equity premium puzzle.

Prospect Theory and Samuelson's Wager

Daniel Kahneman and Amos Tversky's "prospect theory" has two pillars:

- Reference dependence: utility depends on gains and losses relative to a reference point; when dealing with wealth levels, utility does not depend on the absolute level of wealth but on the difference between the level of wealth achieved and the reference level of wealth

- Loss aversion: the utility function has a kink, so it is steeper in the loss domain relative to the reference point; this implies that the pain of a loss is larger than an equivalent gain; in other words, we are more sensitive to loss than to gains of the same magnitude

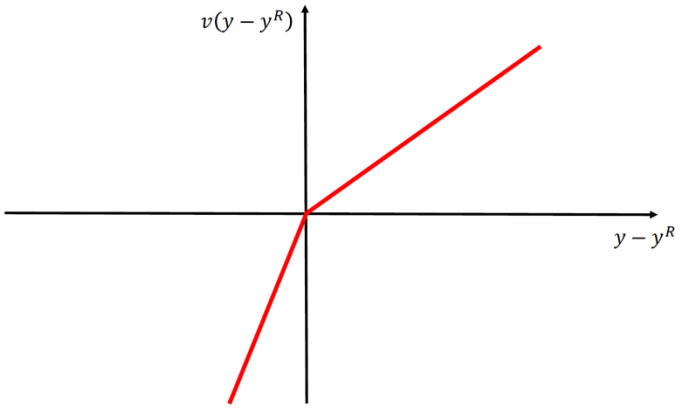
$$v(y - y^R) = \begin{cases} y - y^R & if \quad y \geq y^R \\ \lambda(y - y^R) & if \quad y < y^R \end{cases}$$

$\lambda \geq 1$ captures the extent of departure from rationality:

- $\lambda = 1$: only reference dependent utility
- $\lambda > 1$: reference dependent utility + loss aversion

Source: Bocconi Students Investment Club

This is the formula for our utility function when prospect theory is taken into account. In the gain domain, our utility depends just on the difference between y and y^R, the reference level of y.
In the loss domain, the lambda is coming from the kink. As lambda is higher than 1 and estimated at a level of 2.5, we are more sensitive to losses than to gains.



Source: Bocconi Students Investment Club

These two elements, reference dependence and loss aversion, help explaining anomalies of decision making under risk when using the rational standard model. We use the Samuelson's wager as an example:

$$A = \begin{cases} \$200 & prob. \quad 0.5 \\ -\$100 & prob. \quad 0.5 \end{cases}$$

Source: Bocconi Students Investment Club

Samuelson's wager is an experiment in which people are asked if they would take this lottery over nothing. Most people decide not to take the lottery, showing risk aversion. However, this is in contrast with the Expected Utility Theory. Since we are dealing with small stakes relative to a person's lifetime wealth, people should be neutral to risk and by computing the expected value of the lottery (200 * 0.5 – 100 * 0.5 = 100 – 50 = 50), they should accept the bet.
If we approach the same problem by using the elements of prospect theory, we understand why many people avoid the lottery. Indeed, under prospect theory, the expected value of the lottery is negative (200 * 0.5 – 2.5 * 100 * 0.5 = -25). In the following paragraphs, we show how the outcome of Samuelson's wager under prospect theory is consistent with the equity premium puzzle under myopic loss aversion.

The Equity Premium Puzzle

Historically the average return on equity has far exceeded the average return on short-term virtually default-free debt. Over the ninety-year period 1889-1978 the average real annual yield on the Standard and Poor 500 Index was seven percent, while the average yield on short-term debt was less than one percent. Imagine that in 1925 a U.S. saver had $1000 to bequeath to his greatgrandchildren. The saver is worried about the stock market being overvalued, so he invests the $1000 in bonds, rightly so, he might think, since 4 years later we have the start of the great depression. On December 31, 1995, the grandchildren collects $12720. If the great-grandmother had invested in stocks, the grandchildren would have $842000, 66 times more. The equity premium puzzle refers to the

excessively high historical outperformance of stocks over Treasury bills, which is difficult to explain. The equity risk premium, which is usually defined as equity returns minus the return of Treasury bills, is estimated to be between 5% and 8% in the United States. The premium is supposed to reflect the relative risk of stocks compared to "risk free" government securities. However, the puzzle arises because this unexpectedly large percentage implies an unreasonably high level of risk aversion among investors.

The equity premium puzzle was first formalized in a study by Rajnish Mehra and Edward C. Prescott in 1985. It remains a mystery to financial academics to this day. Some academics believe the equity risk premium is too large to reflect a proper level of compensation that would result from investor risk aversion. Therefore, the premium should be much lower than the historical average of between 5% and 8%. Some of the mystery surrounding the equity premium puzzle involves the variance of the premium over time. Estimates for the first half of the 20th century put the equity risk premium at near 5%. In the second half of that century, the equity premium went up to over 8%. There are many factors to consider when discussing EPP, for example demographics may play a significant role in stock market returns and explaining the equity premium puzzle. During the 20th century, populations in most countries were increasing, which supported business growth and higher stock market returns. Empirically, stock markets in Japan and many European countries performed poorly as their populations started to decline. Perhaps, rising populations created the equity premium puzzle.

The aggregation of stocks may also play a part in the equity risk premium puzzle. Individual stocks are far riskier than the stock market as a whole. In many cases, investors were compensated for the higher risk of holding particular stocks rather than overall market risk. The traditional idea was that an investor would directly buy shares in a few companies. Ideas about diversification, mutual funds, and index funds came later. By diversifying, investors can reduce risk without reducing returns, potentially explaining the excessive equity risk premium at the heart of the equity premium puzzle.

Myopic Loss Aversion

Benartzi and Thaler propose that myopic loss aversion may be the cause of the equity premium puzzle. Critically, the authors show that when investors have loss averse preferences, their attitude towards risk depends a great deal on the time horizon over which returns are evaluated.
An investor evaluating his portfolio frequently would find stocks very unattractive, given their high short run volatility. An investor evaluating his portfolio in the long run likes stocks, because over this horizon stocks produce gains.

To understand this, we consider Samuelson's wager once again:

$$A = \begin{cases} \$200 & prob. \quad 0.5 \\ -\$100 & prob. \quad 0.5 \end{cases}$$

Source: Bocconi Students Investment Club

Suppose gamble A is repeated two times, and consider two loss averse investors that must decide whether to take this doubled-gamble. The "short run" agent evaluates his position after each gamble is played. The "long run" agent evaluates his position after both gambles are played. We can think of A as an abstract stock market.
The "short run" agent turns down Samuelson's wager (does not invest in the stock market) because, before each repetition, his utility from gambling is still negative (200 * 0.5 – 2.5 * 100 * 0.5 = - 25). The "short run" agent never enters the double game.
The "long run" agent decides whether to enter the double gamble based on his utility after the two draws. Therefore, the distribution of payoff is:

$$A_{double} = \begin{cases} \$400 & prob. \quad 0.25 \\ \$100 & prob. \quad 0.5 \\ -\$200 & prob. \quad 0.25 \end{cases}$$

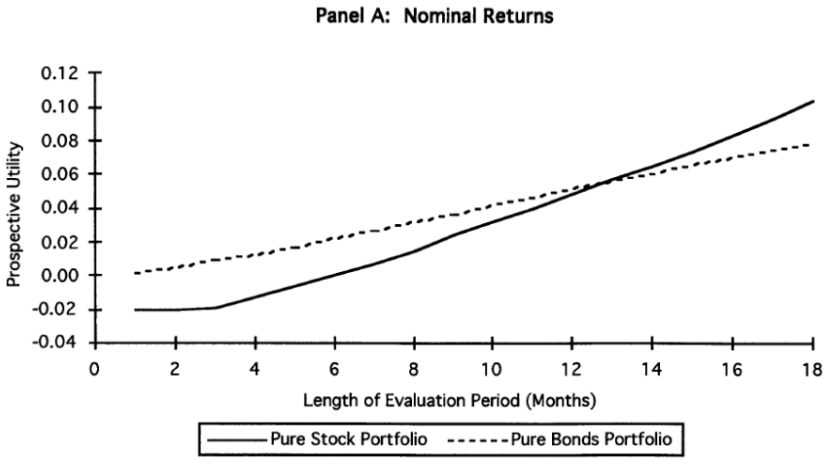
Source: Bocconi Students Investment Club

Repetition of the gamble increases the probability that in the final wealth state the expected value of the gamble is obtained. Under prospect theory, the expected value of the double game is positive (400 * 0.25 + 100 * 0.5 – 2.5 * 200 * 0.25 = 25). The "long run" agent is more willing to take the risk because repetition reduces the probability that a loss is incurred at the end.

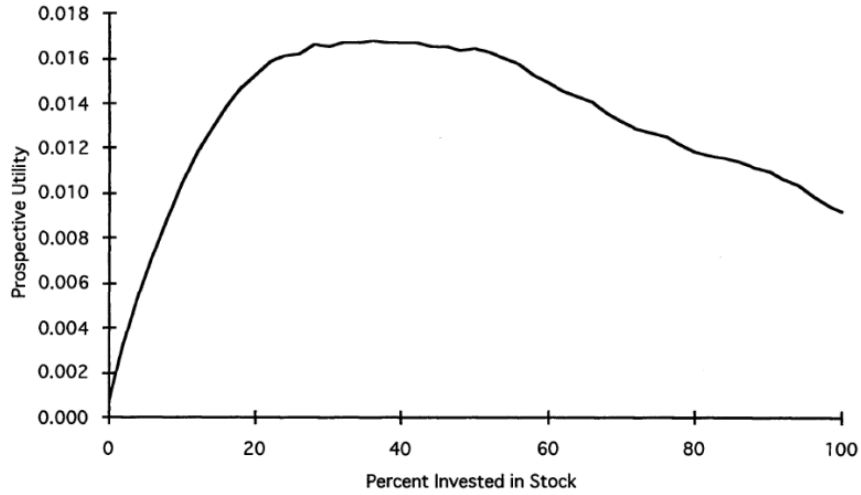
The bottom line is that, with loss aversion, evaluation horizon is important for taking repeated bets (and the stock market is one!). If the investor is myopic, by having a short evaluation horizon, then he will turn down the Samuelson's wager (will not invest in the stock market), leaving the equity premium on the table.

To connect these findings to equity premium Benartzi and Thaler do the following: they take a full specification of prospect theory that encodes loss aversion, diminishing sensitivity, and probability weighting. Using historical data, they compute the distribution of stock returns and bond returns at n-months horizon, for several $n \geq 1$. Finally, they consider each of these n -months distribution as the relevant «Samuelson's wager» for an agent with evaluation horizon of n months ($n = 1$ is a short-term investor, $n = 120$ is a long-term investor). It is important to highlight that the period of evaluation has no correlation with the investment horizon.

They proceed to asking themselves how often investors with a myopic loss aversion would have to evaluate their portfolio to explain the equity premium. More specifically, the evaluation frequency needed at which they are indifferent between holding all wealth in stocks or bonds given their average returns. Secondly, given the evaluation horizon found in the previous question, what would be the optimal mix of stocks and bonds chosen by the myopically loss averse investor. Using numerical data, they found that an evaluation horizon of 12 months makes the investor indifferent between stocks and bonds and that an evaluation horizon of 12 months makes it optimal for the investor to invest in stocks about 50% of his wealth.



Source: "Myopic Loss Aversion and the Equity Premium Puzzle", Benartzi and Thaler (1995)



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Conclusions

With an evaluation horizon of 12 months, loss aversion can explain the equity premium and the portfolio mix between stocks and bonds. It can thus reconcile both equity premium puzzle and risk-free rate puzzle. These results rely only on loss aversions without considering other ingredients of prospect. This theory still needs to be assessed empirically, there are many challenges in measuring the evaluation period but what we can say is that the 12 months seem a reasonable evaluation period.

TAGS: behavioral economics, behavioral finance, equity, equity premium, loss aversion, prospect theory