

Behavioral Finance



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Anomalies in stock market



Three most striking facts about stock market behavior:

- **The equity premium**

- Campbell and Cochrane (1999) report that the average log return on the S&P 500 index is 3.9% higher than the average log return on short-term commercial paper.

- **Volatility**

- Stock returns and price/dividend ratios are both highly variable - the annual standard deviation of excess log returns on the S&P 500 is 18%, while the annual standard deviation of the log price/dividend ratio is 0.27.

- **Predictability**

- Stock returns are forecastable - using monthly, real, equal-weighted NYSE returns from 1941–1986, Fama and French (1988) show that the dividend/price ratio is able to explain 27% of the variation of cumulative stock returns over the subsequent four years.

Facts=puzzles?



- These facts are hard to rationalize in a simple consumption-based model, where:
 - the average log return on the stock market would be just 0.1% higher than the risk-free rate, not the 3.9% observed historically
 - the standard deviation of log stock returns would be only 12%, not 18%
 - and the price–dividend ratio would be constant (implying, of course, that the dividend–price ratio has no forecast power for future returns).
- Note: in any model with stationary P/D ratio, a resolution of the volatility puzzle is simultaneously a resolution of the predictability puzzle.

Equity Premium Puzzle



- First defined by **Mehra and Prescott (1985)** on US data 1889–1978
 - average real annual yield on the S&P 500 Index was 7 %, while the average yield on short-term debt was less than 1 %
 - “the combination of a high equity premium, low risk-free rate and smooth consumption is difficult to explain with plausible levels of investor risk aversion”
- Historically, market has earned high excess rate of return and seem to be inconsistent with maintained theories of asset-pricing behavior

Criticism: Survivorship bias

Equity Premium Puzzle



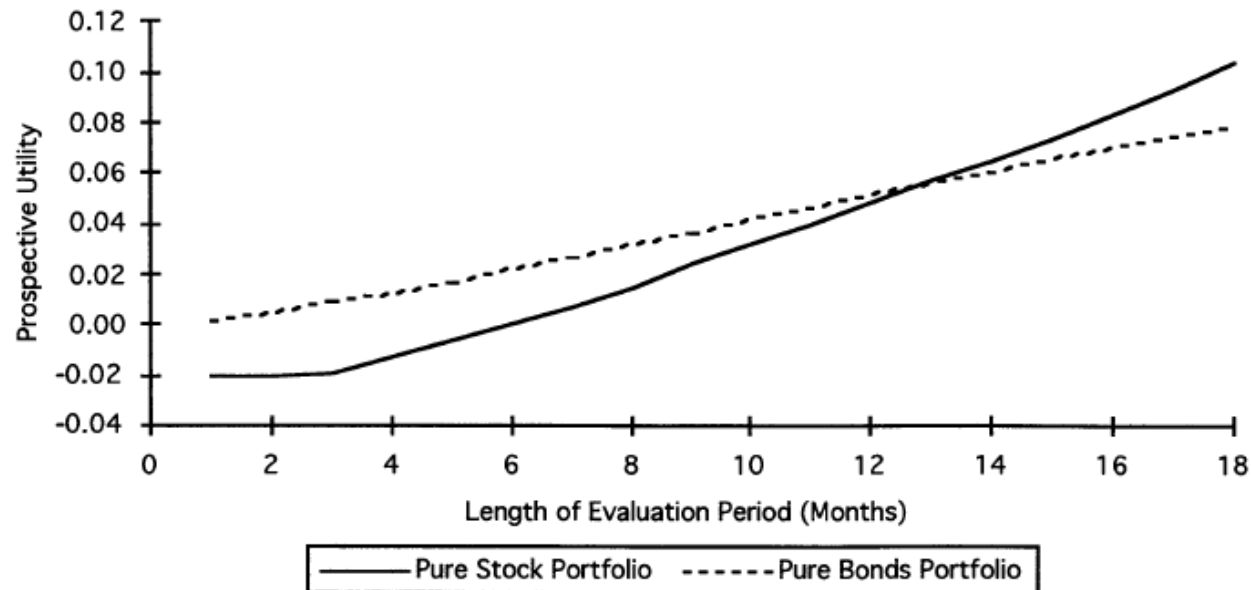
- **Benartzi and Thaler (1995):** *Myopic loss aversion and the equity premium puzzle* – first ones to approach equity premium puzzle applying prospect theory
- Questions asked:
 - Why is the equity premium so large?
 - Respectively, why is anyone willing to hold bonds?
- -> BT study how investor with prospect theory type preferences allocates his financial wealth between treasury bills and stock market
- Used concepts: Loss aversion and mental accounting

Equity market premium – Myopic loss aversion



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Panel A: Nominal Returns



Equity market premium – Myopic loss aversion

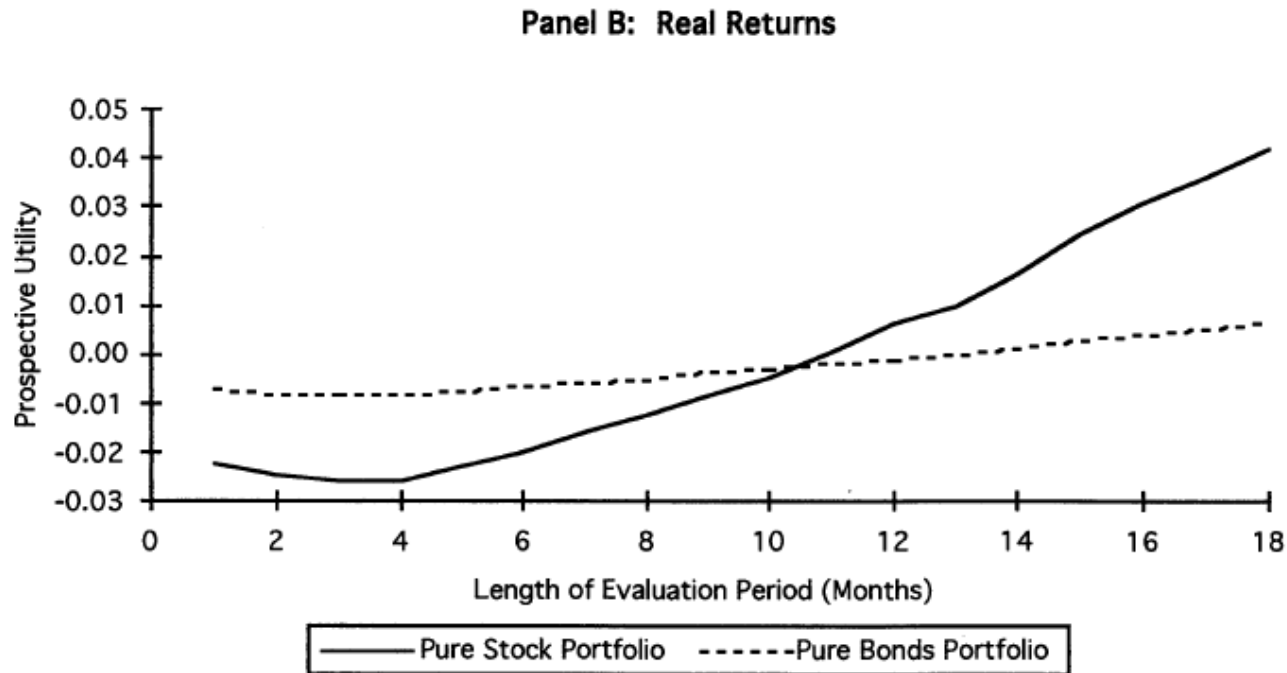
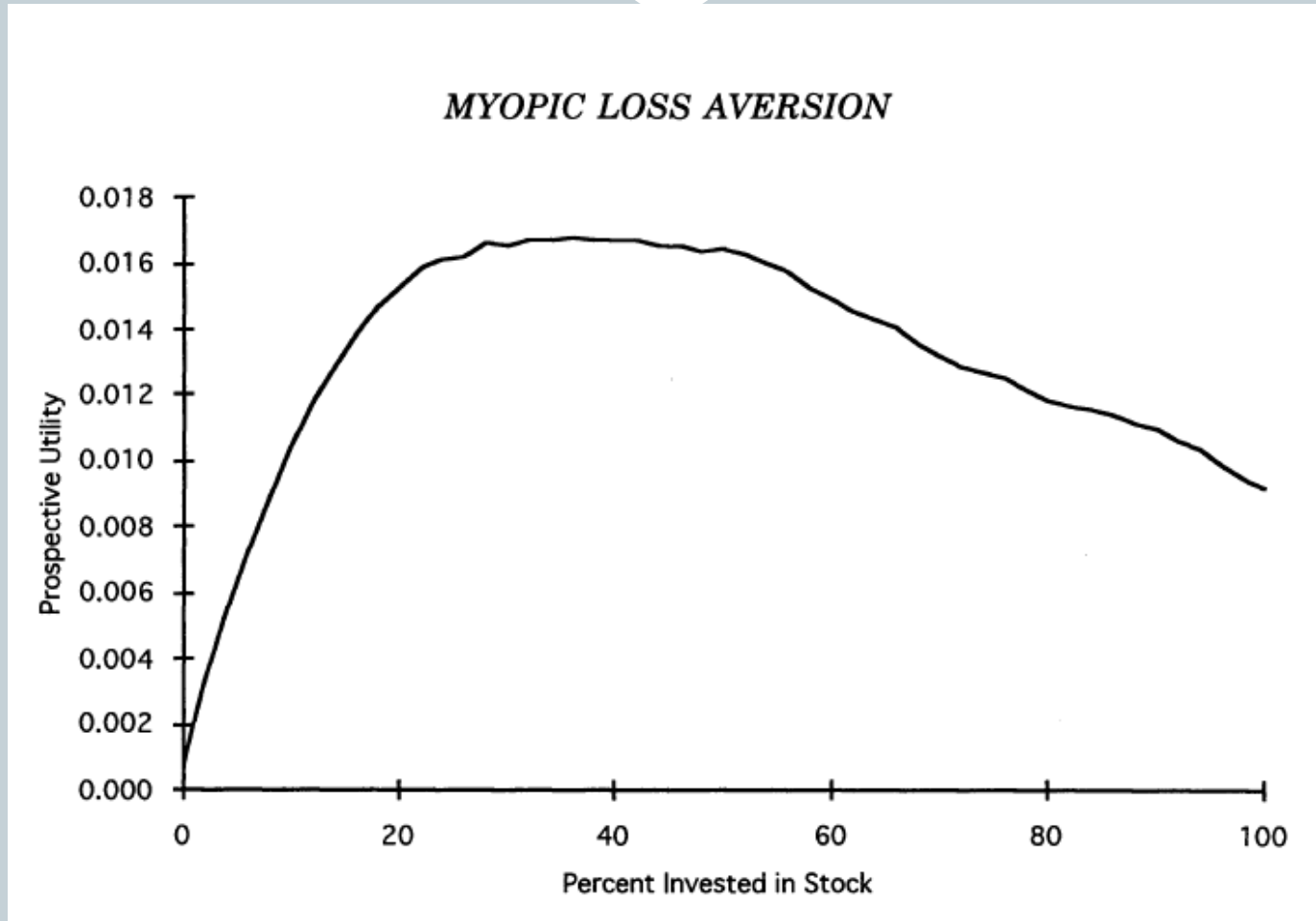


FIGURE I
Prospective Utility as Function of the Evaluation Period

Equity market premium – Myopic loss aversion



Equity market premium – Myopic loss aversion

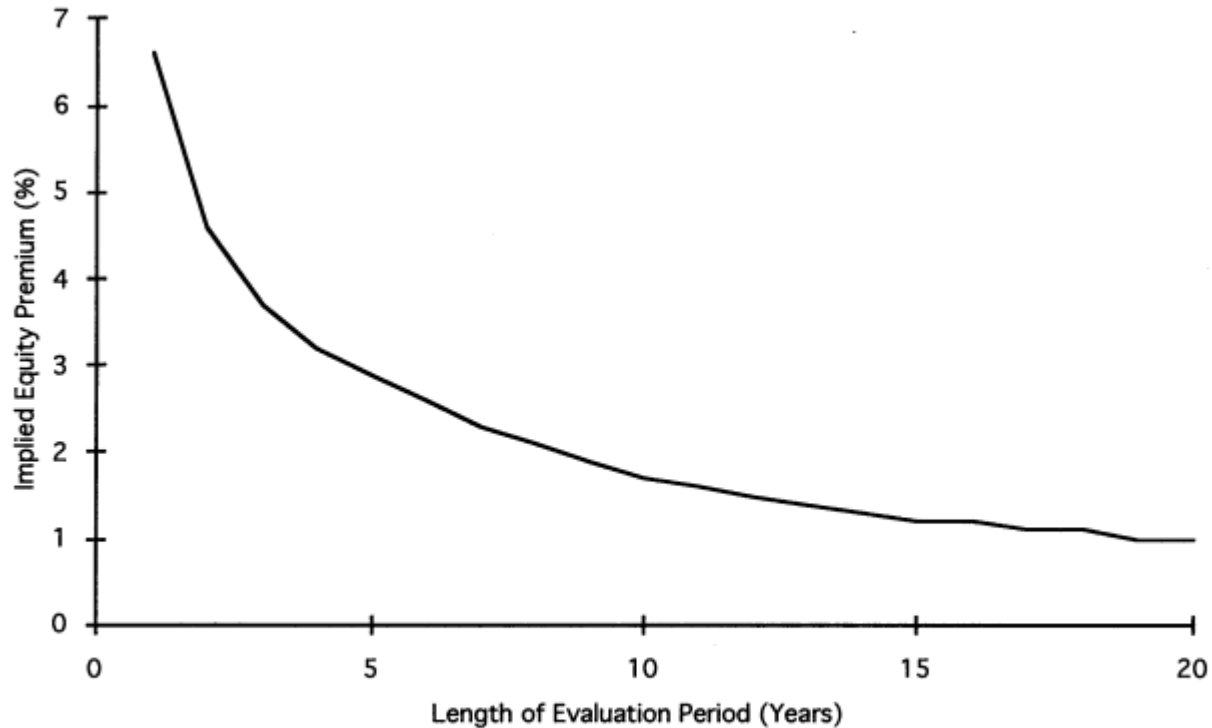


FIGURE III
Implied Equity Premium as Function of the Evaluation Period

Equity premium puzzle – explanation by BT



- Results:

The explanation has two components:

1. Investors are assumed to be '**loss averse**' - distinctly more sensitive to losses than to gains.
 2. Investors are assumed to **evaluate their portfolios frequently**, even if they have long-term investment goals
- This combination called '**myopic loss aversion**'.
 - Using simulations BT find that the size of the equity premium is consistent with the previously estimated parameters of prospect theory if investors evaluate their **portfolios annually**

Put other way: If investors get utility from annual changes in financial wealth and are loss averse over these changes, their fear of a major drop in financial wealth will lead them to demand a high premium as compensation

Equity premium puzzle – explanation by prospect theory updated



- When looking at **daily movement** of the [S&P 500 from 1950-2014](#), you see losses **46% throughout the time** and see 54% gains during this period
- Investors who monitor their portfolios less frequently experience significantly less loss or pain
- If investors were to check their portfolio on a **monthly basis**, as opposed to a daily basis from 1927-2014, they would experience **38% less loss**.
- If investors were to check on an extremely disciplined **annual basis**, this visible loss would **drop to 27%** of the time.

Equity premium puzzle – consumption puzzle?



- Solution by **Benartzi and Thaler (1995)** only **suggestive**, since it does not take into account...

Equity premium puzzle – consumption puzzle?



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...consumption aspect

“Given the low volatility of consumption growth, why are investors so reluctant to buy a high return asset, especially when that asset’s covariance with consumption growth is so low?”

Equity premium puzzle – explanation by BHS



- Barberis, Huang and Santos (2001): [Prospect Theory and asset prices](#) present model in which investors have the preferences:

$$E_0 \sum_{t=0}^{\infty} \left[\rho^t \frac{C_t^{1-\gamma}}{1-\gamma} + b_0 \bar{C}_t^{-\gamma} \hat{v}(X_{t+1}) \right]$$

- investor gets utility from consumption,
- + gets utility from changes in the value of his holdings of the risky asset between t and $t + 1$, X_{t+1}
- BHS define the unit of time to be a year – gains and losses are measured annually
- Utility from gains and losses measured by

$$\hat{v}(X) = \begin{cases} X & \text{for } X \geq 0, \\ 2.25X & \text{for } X < 0. \end{cases}$$

Equity premium puzzle – explanation by BHS



- **Results:**

- loss aversion can indeed provide a partial explanation of high Sharpe ratio
- However, how much of the Sharpe ratio it can explain depends heavily on the importance of the second source of utility – b_0 parameter - controls the importance of risk aversion term in the investors' preferences
 - > psychological pain of losing \$\$ in the stock market vs consumption-related pain of having to consume \$\$ less

Volatility puzzle



Nobel Prize winner Richard Thaler on low volatility:

<https://www.youtube.com/watch?v=31bERBjeuMk>

Volatility puzzle



- **Shiller (1981) and LeRoy and Porter (1981):** it is difficult to explain the historical volatility of stock returns with any model in which investors are rational and discount rates are constant

→ Importance of variation of P/D ratio

- 1. Changing expectations of future dividend growth
- 2. Rational variation in discount rates

Volatility puzzle - beliefs



- Reading in Barberis and Thaler (2003):
 - pages 1081-1084
 - What are the main presented belief-based stories?
 - What biases they reflect?

Volatility puzzle - preferences



- Reading in Barberis and Thaler (2003):
 - pages 1084-1085
- How do the dynamic aspects of loss aversion contribute to the explanation of volatility puzzle?

Coming next



- **Market anomalies and investor behavior**

References



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