

## CENTRE FOR FINANCIAL MANAGEMENT

### CFM QUARTERLY IN FINANCE

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#### BEHAVIOURAL PORTFOLIO THEORY

Introduced by Hersh Shefrin and Meir Statman, behavioural portfolio theory is a goal-based theory.

In this theory, investors divide their money into several mental account layers, arranged as a portfolio pyramid. Each layer corresponds to a specific goal such as buying a house, paying for children's education, having a secure retirement, or being affluent enough to go on a world tour whenever one chooses to.

The seeds for behavioural portfolio theory were sown when Milton Friedman and Henry Savage noted, way back in 1948, that human behaviour is guided by a desire to seek protection from adversity as well as a hope for riches. That is why people buy insurance policies as well as lottery tickets.

Few years later, Harry Markowitz wrote two papers that were based on two very different views of behaviour. In one, he developed the celebrated mean-variance theory, based on expected utility theory. In the mean-variance theory, people are always risk-averse and hence never buy lottery tickets.

In the second paper, he extended the insurance–lottery framework of Friedman and Savage. He noted that people aspire to move up the social hierarchy. So, a person with \$10,000 may accept lottery-like odds to win \$1 million, and a person with \$1 million may accept lottery-like odds to win \$100 million. Taking a cue from this paper of Markowitz, Daniel Kahneman and Amos Tversky developed the prospect theory. This theory explains why people accept lottery-type odds when they are below their aspiration levels.

Within the behavioural framework, a portfolio resembles a layered portfolio. In his book *The Way to Save*, G. Wall presented a portfolio which is shown in Exhibit 9.7. A somewhat simplified behavioural portfolio is shown in Exhibit 9.8.

In their paper 'Behavioural Portfolio theory', Hersh Shefrin and Meir Statman explore a

simple two-layer portfolio with a downside protection layer and an upside potential layer.

The two basic building blocks of behavioural portfolio theory are a two-factor theory of risky choice proposed by Lala Lopes and prospect theory developed by Daniel Kahneman and Amos Tversky.

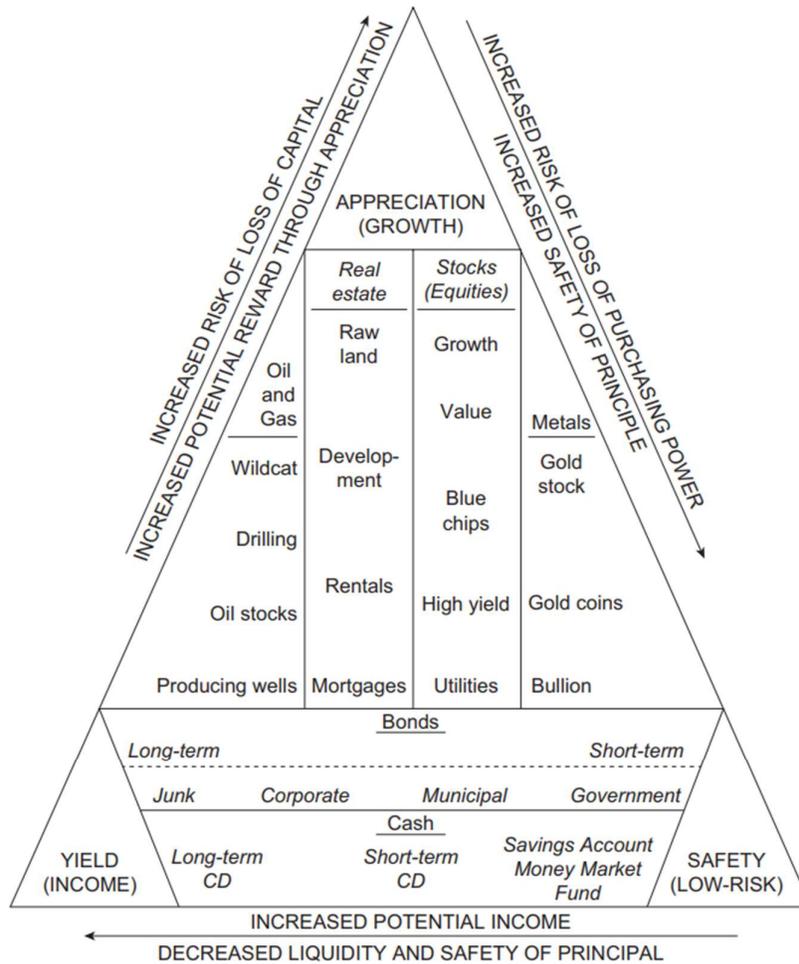
In Lola Lopes' two-factor theory of risky choice (1987), the first factor focuses on the goals of security and potential. The goal of risk-averse people is security whereas the goal of riskseeking people is potential. While security is the primary motivation for some people, the potential is the primary motivation for others – both the motivations exist in some strength in all people.

Aspiration level is the second factor in Lopes' theory. It varies among people. While most people aspire to be rich, they differ in the amount they define as being rich.

According to prospect theory, when people face complex problems they frame them into simpler subproblems (in prospect theory framing is called editing) and then evaluate them. Thus, the two stages of decision making in prospect theory are editing and evaluation.

The utility function in prospect theory differs from the standard expected utility function in three ways. First, the editing stage influences how the utility is calculated. More specifically, investors frame monies into a variety of distinct mental accounts and assign utility to each mental account in isolation. Second, in prospect theory utility is assigned to gains and losses

**Exhibit 1: Portfolio Pyramid**



Source: Wall, 1993

relative to a reference point and whereas in the expected utility theory utility is assigned to the final wealth. Third, prospect theory utility function is concave in the domain of gains (implying risk-aversion) and convex in the domain of wealth (implying risk-seeking).

While investors divide the portfolio into several layers, Shefrin and Statman describe a more basic two-layer stylised portfolio. In their model, in the editing stage investors divide their wealth into current consumption and securities which are put into two layers, a 'downside protection' layer and an 'upside potential layer'.

The overall utility for investor  $h$  is:

$$V = V_C + \gamma_D V_D + \gamma_U V_U$$

where  $V$  is the overall utility for investor  $h$ ,  $V_C$  is the utility associated with consumption,  $V_D$  is the utility associated with the downside protection layer,  $V_U$  is the utility associated with

the upside protection layer,  $\gamma_D$  and  $\gamma_U$  reflect both time discounting and relative importance attach to the two layers.

The parameters  $\gamma_D$  and  $\gamma_U$  reflect the relative importance assigned by the investor to downside protection and upside potential. A high  $\gamma_D/\gamma_U$  ratio means that the investor regards the goal of downside protection more important relative to the goals of upside potential compared to an investor with a low ratio. He naturally allocates more of his wealth to the downside protection layer.

Behavioural portfolios are structured as separated layers of a pyramid. Five factors determine their contents:

1. Investor goals: A greater weight assigned to the upside potential will result in an increase in the proportion of wealth allocated to the upside potential layer.
2. Reference points: There are reference points for each layer of the portfolio. A higher reference point for the upside potential layer will result in the selection of securities that are more 'speculative'.
3. Shape of the utility function: A higher concavity in the domain of gains means earlier satiation with given security. This, in turn, leads to an increase in the number of securities in a layer.
4. Degree of inside information: Investors who believe that they have inside information in some securities, real or imaginary, will take more extreme positions in them.
5. Degree of aversion to realisation of losses: Investors who have a greater aversion to the realization of losses will hold more cash. That way they can avoid the realization of losses to satisfy liquidity needs.

The salient features of the behavioural portfolio theory are as follows:

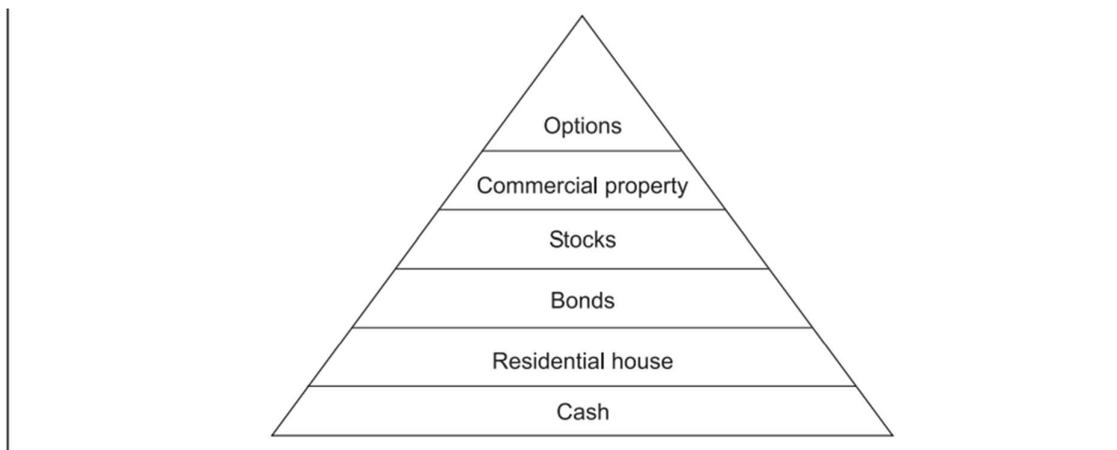
- ☒ Investors have several goals such as safety, income, and growth, often in that sequence.
- ☒ Each layer in the pyramid represents assets meant to meet a particular goal. The bottom layers of the pyramid (cash, fixed deposits, provident fund) are meant to guarantee financial survival and the upper layers (stocks, options, and so on) offer upside potential with attendant volatility.
- ☒ Investors have separate mental accounts for each investment goal and they are willing to assume different levels of risk for each goal. Risk is managed by matching different assets to different investment objectives.
- ☒ The asset allocation of an investor's portfolio is determined by the amount of money

assigned to each asset class by the mental accounts.

☒ The co-variation of returns between different asset categories and individual securities is largely ignored. Investors end up with a variety of mini-portfolios as they overlook interactions among mental accounts and among investment assets.

☒ Diversification stems from investor goal diversification, not from purposeful asset diversification as recommended by Markowitz's portfolio theory. This means that most investors do not have efficient portfolios. They may be taking too much risk for the returns expected from their portfolio. Put differently, they can earn higher expected returns for the level of risk they are taking.

### **Exhibit 2**



### **Exhibit 3: A Comparison of Mean-Variance Portfolio Theory and Behavioural Portfolio Theory**

Exhibit 3 provides a comparison of mean-variance portfolio theory and behavioural portfolio theory.

<b>Mean-Variance Portfolio Theory and Behavioural Portfolio Theory</b>	
<i>Mean-Variance Portfolio Theory (MVPT)</i>	<i>Behavioural Portfolio Theory (BPT)</i>
1. Efficient portfolios lie on the mean-variance frontier.	Efficient portfolios lie on the behavioural wants frontier.
2. Efficient portfolios satisfy wants for utilitarian benefits (high expected returns and low variance).	Efficient portfolios satisfy wants for utilitarian benefits as well as expressive and emotional benefits.
3. Investors consider a portfolio in its totality.	Investors consider a portfolio as a layered pyramid, in which each layer is a mental account which is associated with a want or goal.
4. Risk is measured by the variance of returns.	Risk is measured by the probability of shortfall from a goal, the amount of shortfall, or a mixture of both.
5. Investors have a single risk aversion which is concerned with their portfolio as a whole.	Investors have multiple risk aversion, one for each mental account.
6. Investors are always risk-averse, risk being measured as the variance of returns.	Investors are always risk-averse, risk being measured by the probability of shortfall from a goal, the amount of shortfall, or a mixture of both. Risk aversion in BPT may correspond to risk seeking in MVPT

### Mental Accounting Portfolio Theory

Sanjiv Das, Harry Markowitz, Jonathan Scheid, and Meir Statman, combined mean-variance portfolio theory and behavioural portfolio theory to develop mental accounting portfolio theory. According to their theory, investors first allocate their wealth across goals into mental account layers, say 50 per cent for retirement income, 20 per cent for children’s college education, 15 per cent for bequest, and 15 per cent for getting rich. Then, investors specify the desired probability of reaching the threshold of each goal, say 95 per cent for retirement income, 75 per cent for children’s college education, 50 per cent for bequest, and 40 per cent for getting rich. Finally, investors optimise each mental account as a sub-portfolio using the rules of mean-variance theory. For example, the retirement goal is likely to be achieved by a sub-portfolio that is tilted toward bonds, the college education goal is likely to be achieved by a sub-portfolio that has a balanced mix of stocks and bonds, the bequest goal is likely to be achieved by a sub-portfolio dominated by real estate, and the getting rich goal is likely to be achieved by a sub-portfolio consisting of growth stocks and options with some lottery tickets thrown in. The overall portfolio will be the sum of the mental account sub-portfolios, and, like the mental account sub-portfolios, it will also lie on the mean-variance efficient frontier.

### SNIPPETS

#### Neoclassical Economics and Behavioural Economics

The neoclassical framework is inspired by physics. Humans in neoclassical framework behave like idealized by particles in physics. As Sanjit Dhami says, “The neoclassical framework includes, but is not restricted exclusively to consistent preferences, subjective expected utility, Bayes’ rule to update probabilities, self- regarding preferences, emotionless deliberation, exponential discounting, unlimited abilities, unlimited attention, unlimited willpower, and frame and context dependence of preferences. Neoclassical economics is also typically underpinned by optimization based solution methods and an equilibrium approach.”

The empirical success of the neoclassical framework in explaining and predicting economic phenomena is modest. An impressive body of experimental, neuroeconomic, and field evidence casts serious shadow over the core assumptions and predictions of

neoclassical models. This has been complemented by significant theoretical developments drawing on insights from psychology, sociology, biology, anthropology, and other social sciences and this has been called behavioural economics. These models have been more successful than neoclassical models.

Behavioural economics is very worthwhile as it increases the explanatory power of neoclassical economics. In his inimitable style, Richard Thaler provides one more reason for studying behavioural economics. "Behavioural economics is more interesting and more fun than regular economics. It is the un-dismal science."

Behavioural economics is no less rigorous than neoclassical economics. As Sanjit Dhami says, "Most behavioural models adopt the same underlying optimization framework, are typically underpinned by axiomatic foundations, are parsimonious, rigorous, falsifiable, and internally consistent." However, the emphasis on rigour may be misplaced. As Gentic says, "The economic theorist's overvaluation of rigor is a symptom of their undervaluation of explanatory power. The truth is its own justification and needs no help from rigor."

### **Social Contagion**

Social contagion or behavioural contagion refers to the propensity for certain behaviour exhibited by one person to be copied by others. Ogundale describes behavioural contagion as a "spontaneous, unsolicited and uncritical imitation of another's behaviour."

Behavioural contagion occurs under the following conditions.

- The observer and the model share a similar situation or mood
- The model is regarded as a positive reference individual
- The model's behaviour encourages the observer to review his condition and to change it.
- The model's behaviour helps the observer to resolve a conflict by reducing restraints, if copied.
- To properly determine asset allocation, investment professionals try to assess the risk tolerance of their clients. Traditionally, investment advisors ask their clients how they feel about their portfolio under different scenarios. For example, if the stock market went down by 25 percent, how would you react? They would pose a number of questions of this kind to estimate the client's risk tolerance.
- The problem with this approach is no matter how many different scenarios are present, the client's risk tolerance cannot be estimated correctly. Why? According to Dean G. Pruitt, a distinguished social scientist, investors are acting out what he calls the "Walter Mitty effect." Walter Mitty is a fictional character in James Thurber's short story "The Secret Life of Walter Mitty." He is portrayed as a timid fellow total intimidated by his overbearing wife. He coped by daydreaming in which he imagined himself to be a courageous hero. One minute he dreaded facing his

wife's sharp tongue and the next minute he became a fearless bomber pilot undertaking a dangerous mission.

- Pruitt believes that investor reaction to the stock market is similar to Walter Mitty's reaction to life. When the market rises, investors become euphoric and happily accept more risk. On the other hand, when the market declines they rush for the exit door. So when you ask an investor to express his risk tolerance, the answer, as Robert Hagstrom says, "comes from either a fearless bomber pilot (in a bull market) or a henpecked husband (in a bear market)."
- To overcome the Walter Mitty effect, we have to go beyond the standard questions and examine the underlying psychological issues. Robert Hagstrom and Justin Green developed a risk analysis tool that focuses on an individual's personality rather than asks questions about risk tolerance directly. They identified important demographic factors and personal traits that have a bearing on risk tolerance. Two demographic facts, viz. age and gender, influence risk tolerance. Older people are less tolerant to risk compared to younger people; similarly, women are less tolerant to risk compared to men. The level of personal wealth does not seem to influence the level of risk tolerance.
- Two personality traits have a bearing on risk tolerance: *personal control orientation* and *achievement orientation*. The first refers to the sense of control an individual has over the environment and decisions of his life. People who think they have this control are called "internals." In contrast, those who think they have little control are called "externals." Internals are prone to take more risk than externals.
- Achievement orientation reflects the degree to which people are goal-oriented. Goal-oriented people tend to take more risks.
- The true relationship between personality traits and risk tolerance depends on how the investor views the risk environment. Does the investor believe that outcomes of investment decision depend upon skill or chance? In general, investors will choose conservative options if they believe in chance and risky options if they believe in skill.
- To sum up, assuming age and gender variables are equal, risk tolerant investors have, as Robert Hagstrom put it, the following traits: "they set goals, they believe they control their environment and can affect its outcome, and most important, they view the stock market as a contingency dilemma in which information, combined with rational choices, will produce winning results."

## HUMOUR

### Socialistic Revolution

During his visit to Siberia in 1956, Soviet Premier Krushchev met a 90- year old farmer. He asked him, “Grandpa are you happier now than you were before the Great Socialist Revolution?” The farmer said, “I don’t know about that, but before the revolution, I had two overcoats, two suits, two pairs of boots, and two fur hats. But now I have only one of each, and even these are in a tattered condition.” Consoling the farmer, Kruschev said, “I just returned from a trip to China, India, Africa, and Latin America and found that most of the people there do not have any of these things and go half-naked.” The old farmer scratched his head and said, “Then they must have had their great socialistic revolution, long before ours.”

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### **I Could Have Been**

.....a farmer ... but the idea never cropped up

.....a tailor ..... but I’d cut a sorry figure

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### **WISE SAWS**

1.The English language is like a woman’s wardrobe- full of things she can’t use, & yet the one thing she needs she can’t find.

2.A wise man reads both books and life itself. : Lin Yutang