READING 7 THE BEHAVIORAL FINANCE PERSPECTIVE

Introduction

Behavioral finance differs from traditional finance in that it focuses on how investors and markets behave in practice rather than in theory.

As Meir Statman so succinctly puts it, “Standard finance people are modeled as “rational,” whereas behavioral finance people are modeled as “normal.” Normal people behave in a manner and with outcomes that may appear irrational or suboptimal from a traditional finance perspective.

To provide a framework for understanding the implications of the decision-making process for financial market practitioners, throughout this reading we will use an approach developed by decision theorist, Howard Raiffa. Raiffa (1997) discusses three approaches to the analysis of decisions that provide a more accurate view of a “real” person’s thought process. He uses the terms **normative analysis**, **descriptive analysis**, and **prescriptive analysis**:

- **Normative analysis** is concerned with the rational solution to the problem at hand. It defines an ideal that actual decisions should strive to approximate.
- **Descriptive analysis** is concerned with the manner in which real people actually make decisions.
- **Prescriptive analysis** is concerned with practical advice and tools that might help people achieve results more closely approximating those of normative analysis.

*We can think of the traditional finance assumptions about behavior as normative, behavioral finance explanations of behaviors as descriptive, and efforts to use behavioral finance in practice as prescriptive.*

A- Behavioral versus traditional perspectives

Within **traditional finance**, **individuals** are assumed to be:

- risk-averse
- self-interested
- utility maximizers

Investors who behave in a manner consistent with these assumptions are referred to as **rational**.

Traditional finance further hypothesizes that, at the **market level**:

- Prices incorporate and reflect all available and relevant information.
- Markets that behave in a manner consistent with this hypothesis are described as efficient.

**Behavioral finance** attempts to understand and explain observed investor and market behaviors and bases its assumptions on observed financial behavior rather than on idealized financial behavior. Behavioral finance neither assumes that people act rationally and consider all available information in decision making nor that markets are efficient. To make behavioral finance easier to understand—and to differentiate the study of individual investor behavior from collective market behavior—behavioral
finance in this reading is classified as either behavioral finance micro (BFMI) or behavioral finance macro (BFMA):

- **Behavioral finance micro** examines behaviors or biases that distinguish individual investors from the rational actors envisioned in neo-classical economic theory. BFMI questions the perfect rationality and decision-making process of individual investors.

- **Behavioral finance macro** considers market anomalies that distinguish markets from the efficient markets of traditional finance. BFMA questions the efficiency of markets.

Under BFMI behavioral biases can be categorized as:

- **Cognitive errors**: Cognitive errors stem from basic statistical, information-processing, or memory errors; cognitive errors may be considered to result from reasoning based on faulty thinking

- **Emotional biases**: Emotional biases stem from impulse or intuition; emotional biases may be considered to result from reasoning influenced by feelings.

Under BFMA markets are subject to **behavioral effects**. These behavioral effects may cause markets to deviate from the efficient markets of traditional finance.

1. **Traditional Finance Perspectives on Individual Behavior**

Traditional finance concepts may be thought of as normative, indicating how people and markets should behave. Investors are assumed to be rational; investors make decisions consistent with utility theory and revise expectations (update beliefs) consistent with Bayes’ formula. They are further assumed to be self-interested and risk-averse, to have access to perfect information, and to process all available information in an unbiased way.

   a. **Utility Theory and Bayes’ Formula**

In utility theory, people maximize the present value of utility subject to a present value budget constraint.

Utility may be thought of as the level of relative satisfaction received from the consumption of goods and services. Decision makers maximize their expected utility—the weighted sum of the utility values of outcomes multiplied by their respective probabilities—subject to their budget constraints.

It is important to note that the determination of the value of an item is not based on its price, but rather on the utility it yields. The price of an item is dependent only on the characteristics of the item and is equal for everyone; the utility, however, is dependent on the particular circumstances and preferences of the person making the estimate of utility.
The basic axioms of utility theory are completeness, transitivity, independence, and continuity. If the individual’s decision making satisfies the four axioms, the individual is said to be rational.

- **Completeness** assumes that an individual has well-defined preferences and can decide between any two alternatives.
- **Transitivity** assumes that, as an individual decides according to the completeness axiom, an individual decides consistently.
- **Independence** also pertains to well-defined preferences and assumes that the preference order of two choices combined in the same proportion with a third choice maintains the same preference order as the original preference order of the two choices.
- **Continuity** assumes there are continuous (unbroken) indifference curves such that an individual is indifferent between all points, representing combinations of choices, on a single indifference curve.

The rational decision maker, given new information, is assumed to update beliefs about probabilities according to Bayes’ formula. Bayes’ formula is a mathematical rule explaining how existing probability beliefs should be changed given new information.

**Bayes’ formula** shows how one conditional probability is inversely related to the probability of another mutually exclusive outcome. The formula is:

\[
P(A|B) = \frac{P(B|A)}{P(B)} \times P(A)
\]

Where:

- \(P(A|B)\) = conditional probability of event A given B. It is the updated probability of A given the new information B.
- \(P(B|A)\) = conditional probability of B given A. It is the probability of the new information B given event A.
- \(P(B)\) = prior (unconditional) probability of information B.
- \(P(A)\) = prior probability of event A, without new information B. This is the base rate or base probability of event A.

People have cognitive limitations not accounted for in expected utility theory. Behavioral finance proponents argue that it seems highly unlikely that people actually take each of these steps as a matter of procedure every time they make a decision or that the decisions of people are consistent with those that would be made on the basis of Bayesian updating.
b. Rational Economic Man

Traditional finance assumes that after gathering information and analyzing it according to Bayes’ formula, individuals will make decisions consistent with the decisions of homo economicus or rational economic man (REM).

Principles of perfect rationality, perfect self-interest, and perfect information govern REM’s economic decisions.

c. Perfect Rationality, Self-Interest, and Information

Perfect rationality assumes that REM is capable of thinking through all possible outcomes and choosing the course of action that will result in the best possible outcome.

In reality, however, rationality is not the sole driver of human behavior. At times, it is observed that the human intellect is subservient to such human emotions as fear, love, hate, pleasure, and pain. Moreover, people often use their intellects to achieve or avoid these emotional outcomes.

Perfect self-interest is the idea that humans are perfectly selfish. For every economic decision, REM ensures that he is getting the highest possible utility and will never concede anything to his opponent in a transaction.

Perfect self-interest would preclude people from performing unselfish deeds, such as volunteering, helping the needy, or serving in the military. If behaving in an apparently altruistic manner generates utility for the giver, however, then such behavior is consistent with self-interest and may be viewed as rational.

Perfect information: It is impossible, for every person to enjoy perfect knowledge of every subject. In the world of investing, there is nearly an infinite amount to learn and know, and even the most successful investors don’t master all disciplines.

d. Risk Aversion

Expected utility theory generally assumes that individuals are risk-averse. This means that an individual may refuse a fair wager (a wager with an expected value of zero), and also implies that his utility functions are concave and show diminishing marginal utility of wealth.

Given an opportunity to participate or to forgo to participate in an event for which the outcome, and therefore his or her receipt of a reward, is uncertain, the certainty equivalent is the maximum sum of money a person would pay to participate or the minimum sum of money a person would accept to not participate in the opportunity. The difference between the certainty equivalent and the expected value is called the risk premium. Certainty equivalents are used in evaluating attitudes toward risk.

Risk attitudes toward wealth are reflected in the curvature of the individual’s utility function of wealth. Risk-neutral individuals have linear utility functions; risk-averse individuals have concave utility functions; and risk-seeking individuals have convex utility functions.
2- Behavioral Finance Perspectives on Individual Behavior

Behavioral finance challenges the assumptions of traditional finance based on observed behaviors. The assumptions of traditional finance with respect to the behaviors of individuals are not universally observed to hold true.

a. Challenges to Rational Economic Man

Those who challenge REM do so by attacking the basic assumptions of perfect information, perfect rationality, and perfect self-interest.

**Bounded rationality** is proposed as an alternative to the assumptions of perfect information and perfect rationality. It relaxes the assumptions of expected utility theory and perfect information to more realistically represent human economic decision making. Bounded rationality assumes that individuals’ choices are rational but are subject to limitations of knowledge and cognitive capacity.

A shortcoming of the theory of rational economic man is that it disregards the inner conflicts that real people face e.g. short-term versus long-term goals /spending versus saving.

Individuals are neither perfectly rational nor perfectly irrational; instead, they possess diverse combinations of rational and irrational characteristics and benefit from different degrees of knowledge. The extent to which any one individual appears to be behaving rationally can vary between decisions depending on a variety of factors, including the type of decision, the extent of the individual’s knowledge, and the particular circumstances. Even if individuals do not behave rationally, the idea of REM is useful because it is normative and helps define an optimal outcome.

b. Utility Maximization and Counterpoint

**Indifference curve analysis** may incorporate budget lines or constraints, which represent restrictions on consumption that stem from resource scarcity.

The indifference curve shows the marginal rate of substitution, or the rate at which a person is willing to give up one good for another, at any point. If the two items are perfect substitutes, then the individual is willing to trade one for the other in a fixed ratio; then, the indifference curve is a line with a constant slope reflecting the marginal rate of substitution. If the two items are perfect complements, then the curve would be L-shaped. An additional amount of either good adds no extra utility because the goods are only used in combination. The failure to consider exogenous factors in rational utility analysis is also problematic. Furthermore, risk needs to be accounted for. What is this individual’s risk of job loss if he or she does not work eight hours a day? Risk plays an important part in making utility-maximizing decisions. Risk aversion is an assumption underlying actions taken by REM.
c. Attitudes Toward Risk

Perhaps the most important concept we can learn here is that risk evaluation is reference-dependent, meaning risk evaluation depends in part on the wealth level and circumstances of the decision maker. Friedman and Savage indicate that it is not necessarily true that an individual’s utility function has the same curvature consistently: There may be levels of wealth, for instance, at which an investor is a risk-seeker and levels of wealth where the investor is risk-neutral. Also, circumstances may vary. The Friedman–Savage double inflection utility function, is concave, becomes convex and then it becomes concave again. Thus, at low income levels, agents exhibit risk-averse behavior; they are also risk-averse at high income levels. However, between inflection points, agents are risk-loving.

Prospect theory has been proposed as an alternative to expected utility theory. Prospect theory assigns value to gains and losses (changes in wealth) rather than to final wealth, and probabilities are replaced by decision weights. In prospect theory, the shape of a decision maker’s value function is assumed to differ between the domain of gains and the domain of losses. The value function is defined by deviations from a reference point and is normally concave for gains (implying risk aversion), convex for losses (risk-seeking), and steeper for losses than for gains (loss aversion). Decision weights are generally lower than the corresponding probabilities, except in the range of low probabilities.

3- Neuro-economics

Neuro-economics combines neuroscience, psychology, and economics in attempting to explain how humans make economic decisions.

The release of dopamine after an expected or unexpected reward and the desire for dopamine release may explain risk-taking behavior. The prospect of a euphoric effect may inhibit people from focusing on the more logical thought of how small the odds of a reward (positive outcome) actually are. In this context, it is not difficult to imagine that dopamine may explain such behavioral biases as overconfidence and may also play a role in market overreaction to short-term results.

Although neuro-economics research is interesting and may provide further insights into individual economic decision making, its effect on economic theory remains to be seen.

B- Decision Making

This section examines behavioral theories developed in response to the relaxing of particular assumptions about individual behavior with respect to decision making. Prospect theory relaxes the assumptions of expected utility theory and loss aversion. Bounded rationality relaxes the assumption that all available information is used to arrive at a wealth-maximizing decision.

Prospect theory and bounded rationality are descriptive, describing how people do behave and make decisions. Expected utility and decision theories are normative, describing how people should behave and make decisions.

1 x^2 is convex and –x^2 is concave.
1- Decision Theory

Decision theory is concerned with identifying values, probabilities, and other uncertainties relevant to a given decision and using that information to arrive at a theoretically optimal decision. Decision theory is normative, meaning that it is concerned with identifying the ideal decision. As such, it assumes that the decision maker is fully informed, is able to make quantitative calculations with accuracy, and is perfectly rational. The practical application of decision theory is prescriptive. It analyzes decisions and attempts to provide tools and methods to help people make better decisions.

2- Bounded Rationality

Simon (1957) proposed the notion of bounded rationality, recognizing that people are not fully rational when making decisions and do not necessarily optimize but rather satisfice when arriving at their decisions. People have informational, intellectual, and computational limitations. Simon introduced the terms bounded rationality and satisfice to describe the phenomenon where people gather some (but not all) available information, use heuristics to make the process of analyzing the information tractable, and stop when they have arrived at a satisfactory, not necessarily optimal, decision.

Decision makers may choose to satisfice rather than optimize because the cost and time of finding the optimal solution can be very high. In these circumstances, satisficing creates a stop rule to the decision process and allows the cost incurred and time taken to be limited.

Instead of looking at every alternative, people set constraints as to what will satisfy their needs. These constraints indicate what is aspired to. This is not a minimum acceptable outcome but a satisfactory acceptable outcome. Simon refers to these constraints as aspiration levels. Aspiration levels are set based on experiences and on comparisons with what other individuals have achieved. People tend to aspire for a future that is better than the past. When aspirations are reached, people tend to adjust the aspirations upward; when aspirations are not reached, people tend to adjust downward.

An example of heuristics is means-ends analysis, where the problem solver is at a current state and decides on the goal state. Rather than looking for alternatives to achieve the goal, the decision maker moves toward the goal in stages. Decisions are made progressively until the goal state is achieved.

Another example is the divide-and-conquer procedure, where a problem or issue is divided into components. In this case, rather than attempt to find alternatives to solve the issue or problem, the decision makers attempt to find satisfactory solutions for each sub-problem.
3- Prospect Theory

Kahneman and Tversky (1979) introduce prospect theory as an alternative to expected utility theory. Prospect theory describes how individuals make choices in situations in which they have to decide between alternatives that involve risk and how individuals evaluate potential losses and gains.

In prospect theory, based on descriptive analysis of how choices are made, there are two phases to making a choice: an early phase in which prospects are framed (or edited) and a subsequent phase in which prospects are evaluated and chosen.

More specifically, people decide which outcomes they see as economically identical and then establish a reference point to consider where these prospects rate. Outcomes below the reference point are viewed as losses, and those above the reference point are gains. In the second phase, the edited prospects are evaluated and the prospect of highest perceived value is chosen.

The following are examples of six operations in the framing/editing process:

1) **Codification**: People perceive outcomes as gains and losses rather than final states of wealth or welfare. A gain or loss is, of course, defined with respect to some reference point. The location of the reference point affects whether the outcomes are coded as gains or losses.
2) **Combination**: Prospects are simplified by combining the probabilities associated with identical gains or losses.
3) **Segregation**: The riskless component of any prospect is separated from its risky component.

The above operations are applied to each prospect separately. The following operations are applied to two or more prospects:

4) **Cancellation**: Cancellation involves discarding common outcome probability pairs between choices.
5) **Simplification**: Prospects are likely to be rounded off.
6) **Detection of Dominance**: Outcomes that are strictly dominated are scanned and rejected without further evaluation.

Preference anomalies may arise from the act of editing. An example of a preference anomaly is the isolation effect. This results from the tendency of people to disregard or discard outcome probability pairs that the alternatives share (cancellation) and to focus on those which distinguish them. Because different choice problems can be decomposed in different ways, this can lead to inconsistent preferences.

Clearly, how the prospects were framed had an effect on the choice. Kahneman and Tversky interpret this finding in the following manner: To simplify the choice between alternatives, people frequently disregard components that the alternatives share and instead focus on those that distinguish them. Because different choice problems can be decomposed in different ways, inconsistent preferences can result, as above. They call this phenomenon the isolation effect.
The Evaluation Phase

In the evaluation phase of prospect theory, people behave as if they compute a value (utility) function based on the potential outcomes and their respective probabilities and then choose the alternative that has a higher utility. For this evaluation process, Kahneman and Tversky assume the following formula:

\[ U = w(p_1)v(x_1) + w(p_2)v(x_2) + \ldots \]

Where,

- \( x_1, x_2 \ldots \): are the potential outcomes
- \( p_1, p_2 \ldots \): their respective probabilities
- \( v \): is a function that assigns a value to an outcome
- \( w \): is a probability-weighting function

The probability-weighting function expresses the fact that people tend to overreact to small probability events but underreact to mid-sized and large probabilities.

The value function, which passes through the reference point, is s-shaped; moreover, as its asymmetry implies, given the same variation in absolute value there is a bigger impact of losses than of gains (loss aversion). People are not risk-averse but rather are loss-averse.
In contrast to expected utility theory, the prospect theory value function measures gains and losses but not absolute wealth and is reference-dependent. Reference dependence is incompatible with the standard interpretation of expected utility theory. Reference dependence is a unique feature of prospect theory and is central to prospect theory’s perspective on how people make decisions under uncertainty.

Kahneman and Tversky’s prospect theory explains apparent deviations in decision making from the rational decisions of traditional finance. These deviations result from overweighting low probability outcomes, underweighting moderate and high probability outcomes, and having a value function for changes in wealth (gains and losses) that is in general concave for gains, convex for losses, and steeper for losses than for gains. As a result, people are risk-averse when there is a moderate to high probability of gains or a low probability of losses; they are risk-seeking when there is a low probability of gains or a high probability of losses. This is consistent with people simultaneously buying lottery tickets and insurance while investing money conservatively.

C- Perspectives on Market Behavior and Portfolio Construction

Traditional finance assumes that, at the market level, prices incorporate and reflect all available and relevant information. Markets that behave in a manner consistent with this assumption are referred to as efficient. Portfolios constructed in accordance with traditional finance assumptions are referred to as optimal.

1- Traditional Perspectives on Market Behavior

Much of modern investment theory and practice is predicated on the efficient market hypothesis:

Markets fully, accurately, and instantaneously incorporate all available information into market prices.

Thaler (2009) concludes his efficient market examination as such: the risks of investments are more correlated than previously thought, that high returns based on high leverage may be transitory and an illusion, and that revealed price distortions challenge the assumption of the price is right. Further, the acceptance of the price is right has led to significant misallocations of resources. However, Thaler leaves us with a quandary: if we abandon the efficient market hypothesis and its assumption that the price is right, how do we allocate resources? Thaler suggests that regulation may serve a useful function in the process of allocating resources.

a. Review of Efficient Market Hypothesis

An efficient market is a market wherein prices fully reflect available information because of the actions of a large number of rational investors. Underlying market efficiency is the assumption that market participants are rational economic beings, always acting in their own self-interest and making optimal decisions by trading off costs and benefits weighted by statistically correct probabilities and marginal utilities. The efficient market hypothesis requires that agents have rational expectations. This means that, in aggregate, the population is correct, even if no one person is. Also, whenever new
relevant information appears, the population updates its expectations. **Another key assumption is that relevant information is freely available to all participants.**

In sum, at any given time in an efficient market, the **price of a security will match that security’s intrinsic value.** If markets are efficient, then no market participant should be able to consistently earn excess returns.

Grossman and Stiglitz (1980) argue that prices must offer a **return to information acquisition**; otherwise information will not be gathered and processed. **If information is not gathered and processed, the market cannot be efficient.** This is known as the Grossman–Stiglitz paradox. They conclude that in equilibrium, if markets are to be efficient, a return should accrue to information acquisition.

Fama (1970) proposes three forms of market efficiency:

- **The weak form**: assumes that all past market price and volume data are fully reflected in securities’ prices. Thus, if a market is weak-form efficient, technical analysis will not generate excess returns.
- **The semi-strong form**: assumes that all publicly available information, past and present, is fully reflected in securities’ prices. Thus, if a market is semi-strong-form efficient, technical and fundamental analyses will not generate excess returns.
- **The strong form**: assumes that all information, public and private, is fully reflected in securities’ prices. Thus, if a market is strong-form efficient, even insider information will not generate excess returns.

b. **Studies in Support of the EMH**

Many studies have been conducted that support the EMH. Typically, a study tests either the weak form or semi-strong form of efficiency with respect to a particular market. It is more difficult to test the strong form of efficiency. Extensive support for the weak-form and semi-strong forms of market efficiency has been published.

i. **Support for the Weak Form of the EMH**

Initially, most statistical research of the stock market focused tested whether security prices are serially correlated (i.e., whether trends exist in stock prices) or whether they are random. A number of studies conclude that the path of securities’ prices cannot be predicted based on past prices (Roberts (1959), Fama (1965), Samuelson (1965), and Malkiel (1973)).

ii. **Support for the Semi-Strong Form of the EMH**

Several studies attempt to test the semi-strong form of market efficiency. These tests are typically event studies. An event study looks at a sample of similar events that occurred to different companies at different times and determines what effect(s) these events had on the stock price (on average) of each company. Other studies investigate returns to active management. The absence of positive returns to active management is taken as evidence of market efficiency.
a. Studies Challenging the EMH: Anomalies

Some studies find evidence that appears to contradict market efficiency. These studies mainly describe apparent market anomalies or deviations from the efficient market hypothesis. A market anomaly must persist for a lengthy period to be considered evidence of market inefficiency. Otherwise, the market anomaly may be attributable to the sample period and a strategy that provided abnormal returns in the past may not provide abnormal returns in the future.

i. Fundamental Anomalies

A fundamental anomaly is an irregularity that emerges when one considers a stock’s future performance based on a fundamental assessment of the stock’s value. Examples of fundamental anomalies are the performance of small-capitalization companies and value companies compared to large-capitalization companies and growth companies, respectively. A large body of evidence supports the premise that investors consistently overestimate the prospects of growth companies and underestimate the prospects of value companies. As a result, value stocks appear to generate anomalously high returns compared to growth stocks.

The apparent size and value stock anomalies may be a function of incomplete models being used in testing for inefficiency rather than actual anomalies.

ii. Technical Anomalies

A technical anomaly is an irregularity that emerges when one considers past prices and volume levels. Brock, Lakonishok, and LeBaron (1992) test:

- **Moving Averages**: Buy and sell signals are generated by the crossing of a short moving average with a long moving average.
- **Trading Range Break (Support and Resistance)**: A buy signal is generated when the price penetrates the resistance level, and a sell signal is generated when the price penetrates the support level.

The authors conclude that the “results are consistent with technical rules having predictive power.” However, they warn that transaction costs may reduce the benefits of trading based on technical anomalies and of course many other studies dispute the benefits of technical analysis.

iii. Calendar Anomalies

A calendar anomaly is an irregularity identified when patterns of trading behavior that occur at certain times of the year are considered.

The January effect is particularly interesting because it has not disappeared despite being well known for 25 years. Arbitrage theory tells us that anomalies should disappear as traders attempt to exploit them in advance.
iv. Anomalies Conclusion
Support exists for both efficient markets and anomalous markets. Studies that claim to identify anomalies are often critiqued for their use of an assumed pricing model. In reality, markets are neither perfectly efficient nor completely anomalous; market efficiency is not black or white, but rather gray. In markets exhibiting substantial inefficiency, sophisticated investors may be able to outperform less savvy participants. Many analysts believe that such U.S. large-capitalization stocks as GE and Microsoft are quite efficient, but U.S. small-capitalization and international stocks offer more opportunities for outperformance.

v. Limits to Arbitrage
Implicit in the limits to the arbitrage idea is that the EMH does not hold. Shleifer and Vishny (1997) develop a theory of limited arbitrage. They assume that implicit restrictions are placed on a fund’s ability to arbitrage by investors’ ability to withdraw their money. In other words, when a firm or portfolio manager is viewed as incompetent or simply wrong about a trade, because certain securities remain irrationally priced for extended periods of time, investors may withdraw their money before the irrational pricing corrects itself and the position may have to be closed prematurely.

2- Traditional Perspectives on Portfolio Construction
From a traditional finance perspective, a “rational” portfolio is one that is mean–variance efficient. The appropriate portfolio for an investor is constructed holistically by considering the investor’s tolerance for risk, investment objectives, investment constraints, and investor circumstances. Subject to investment objectives and constraints, a suitable portfolio is chosen from the opportunity set of mean–variance efficient portfolios. The output of the mean–variance model may be considered as a “rational” or optimal portfolio allocation.

However, this approach to portfolio construction implicitly assumes that investors (or their advisers) have perfect information and that investors behave rationally in forming their portfolios. If these assumptions do not apply, then portfolios may be constructed using other approaches resulting in portfolios that have too much or too little risk when compared to the optimal portfolio. Further, although a portfolio based on mean–variance optimization may be theoretically sound, it may fail to meet the needs of the investor because of behavioral considerations.

3- Alternative Models of Market Behavior and Portfolio Construction
There is no single unifying theory of behavioral finance to explain the observed market behaviors. In the absence of such a theory, supporters of traditional finance perspectives contend that the traditional finance perspectives remain superior to behavioral finance perspectives.

Four of the behavioral models advanced to explain market behavior and portfolio construction are discussed; none of these models has yet achieved the kind of general acceptance among finance practitioners and academics that the EMH and mean–variance portfolio construction models have.
a. A Behavioral Approach to Consumption and Savings

Shefrin and Thaler (1988) developed a behavioral life-cycle theory that incorporates self-control, mental accounting, and framing biases.

- In the traditional life-cycle model, self-control allows people to pursue long-term goals rather than focus on short-term satisfaction. In behavioral finance, the self-control bias recognizes that people may focus on short-term satisfaction to the detriment of long-term goals.
- Mental accounting is the phenomenon whereby people treat one sum of money differently from another sum of money even though money is fungible (interchangeable).
- Framing bias results in different responses based on how questions are asked (framed).

Rather than viewing money (their wealth) as fungible, people tend to frame their expenditure decisions taking into account the source of the wealth. Individuals are hypothesized to first spend current income, then to spend based on current assets, and finally to spend based on future income.

These propensities to consume have a variety of implications. For example:

- People may save a higher proportion of bonus income because they may classify bonus income as a current asset rather than current income and thus have a lower marginal propensity to consume it.
- If a government cuts taxes but does not reduce withholding rates, the ensuing tax refunds may be treated as current assets rather than current income. This may result in greater savings than if the tax reduction had been treated as current income.
- When spending from current assets, liquidity and maturity are taken into account. Basically, such short-term liquid assets as cash and checking accounts are liquidated first to finance current expenditures. Long-term, less-liquid assets, such as homes and retirement savings, are less likely to be used to finance current expenditures.
- However, individuals who view home equity as part of current assets are more likely to take out loans based on their home’s value to finance current consumption than individuals who view their home as part of their retirement assets or future income.
- Similarly, individuals who classify pension assets as current assets rather than as a source of future retirement income are more prone to take loans against or spend their pension assets.

a. A Behavioral Approach to Asset Pricing

Shefrin and Statman (1994) begin to develop an alternative to the classic capital asset pricing model. Shefrin (2005, 2008) develops the idea further and proposes a behavioral approach to asset pricing using models, which Shefrin terms behavioral stochastic discount factor-based (SDF-based) asset pricing models. Shefrin, based on the results of empirical tests, concludes that investors do not make their decisions in an unbiased way. The stochastic discount factor to reflect this bias is a function of investor sentiment relative to fundamental value. The model focuses on market sentiment as a major
determinant of asset pricing, which in turn is derived from systematic errors in judgment committed by investors.

Shefrin (2005) proposes that the dispersion of analysts’ forecasts serves as a proxy for the sentiment risk premium in the model. Shefrin develops a stochastic process for sentiment and a fundamental SDF-based asset-pricing equation. The price of an asset is the expected value of its discounted payoffs. The discount rate captures the effects of the time value of money, fundamental risk, and sentiment risk.

If an investor’s subjective beliefs about the discount rate match those of traditional finance, the investor is said to have zero risk sentiment. If an investor’s subjective beliefs about the discount rate do not match those of traditional finance, the investor’s beliefs are said to include risk sentiment. Thus, the discount rate on a security is the sum of the risk-free rate and fundamental premiums (corresponding to efficient prices) and a sentiment premium (reflecting sentiment-based risk).

Although Shefrin cites evidence that investors commit errors that result in inefficient prices in the aggregate, it is important to determine if these errors are either systematic or essentially random in nature. If they are systematic, then the errors may be predicted and exploited to earn excess returns. A logical assumption, in that case, is that rational and informed investors—however few in number—would act on these inefficiencies and thereby limit the scope of the pricing errors. If investors’ errors are random in nature, however, then observing and modeling them presents a formidable challenge, as indicated in the original work by Shefrin and Statman (1994).

b. Behavioral Portfolio Theory

In behavioral portfolio theory, investors construct their portfolios in layers and expectations of returns and attitudes toward risk vary between the layers. The resulting portfolio may appear well-diversified, but diversification is incidental to and not necessarily an objective of the portfolio construction.

Shefrin and Statman contend that portfolio construction is primarily a function of five factors:

- First, the allocation to different layers depends on investor goals and the importance assigned to each goal.
- Second, the allocation of funds within a layer to specific assets will depend on the goal set for the layer.
- Third, the number of assets chosen for a layer depends on the shape of the investor’s utility function. Risk-averse individuals have concave utility functions, meaning that utility increases at a decreasing rate with increases in wealth. The greater the concavity of the utility curve, the earlier the satiation for a specific security. Thus, the greater the concavity of the utility curve, the greater the number of securities included in a layer.
- Fourth, concentrated positions in some securities may occur if investors believe they have an informational advantage with respect to the securities.
- Fifth, investors reluctant to realize losses may hold higher amounts of cash so that they do not have to meet liquidity needs by selling assets that may be in a loss position.
Further, the portfolios of investors reluctant to realize losses may continue to hold some securities not because of the securities’ potential, but rather because of the investor’s aversion to realize losses.

In the first layer, the investor seeks safety by buying bonds or riskless assets in order to insure his aspirational level of wealth with a small maximum chance of failure. In the second layer, the investor is willing to take risk with the residual wealth. In consequence, a BPT-optimal portfolio can differ from the rational diversified portfolio that is mean–variance efficient. In the BPT model, risk aversion is taken into account by the constraint that limits the risk of failing to achieve the aspirational level of wealth.

c. Adaptive Market Hypothesis

Lo (2004) proposes the adaptive markets hypothesis (AMH). The AMH applies principles of evolution—such as competition, adaptation, and natural selection—to financial markets in an attempt to reconcile efficient market theories with behavioral alternatives.

The greater the competition for scarce resources or in markets for profits and the less adaptable the participants, the greater the likelihood of not surviving.

The AMH is a revised version of the EMH that considers bounded rationality, satisficing, and evolutionary principles. Under the AMH, individuals act in their own self-interest, make mistakes, and learn and adapt; competition motivates adaptation and innovation; and natural selection and evolution determine market dynamics.

Five implications of the AMH are:

1) **The relationship between risk and reward varies over time** (risk premiums change over time) because of changes in risk preferences and such other factors as changes in the competitive environment;

2) **Active management can add value by exploiting arbitrage opportunities**;

3) **Any particular investment strategy will not consistently do well but will have periods of superior and inferior performance**;

4) The **ability to adapt and innovate is critical for survival**; and

5) **Survival is the essential objective.** In other words, recognizing that things change, the survivors will be those who successfully learn and adapt to changes.