

THE BEHAVIORAL FINANCE PERSPECTIVE¹

Study Session 3

EXAM FOCUS

This opening topic review introduces the concept of behavioral finance, contrasts it with traditional finance theory, and then explores its affects on investment decision making. Behavioral finance is a relatively modern concept, and the CFA Institute introduced it into the curriculum at an early stage in the evolution of the concept. It is highly likely behavioral finance will be tested with a dedicated item set or as part of a constructed response question. In constructed response it is often linked into an investment policy statement question.

Some candidates find this study session confusing. Much of the terminology is redundant in that more than one term can mean the same thing. Many of the concepts are overlapping, and most of the questions depend heavily on comprehending the terminology. Your focus should be on understanding the basic meaning of each term as given in the material.

TRADITIONAL FINANCE VS. BEHAVIORAL FINANCE

LOS 7.a: Contrast traditional and behavioral finance perspectives on investor decision making.

CFA® Program Curriculum, Volume 2, page 6

Traditional finance (TF) focuses on how individuals should behave. It assumes people are rational, risk-averse, and selfish utility maximizers who act in their own self interests without regard to social values—unless such social values directly increase their own personal utility. Such individuals will act as *rational economic men*, which will lead to efficient markets where prices reflect all available, relevant information. Traditional finance is concerned with normative analysis and determining the rational solution to a problem. It uses prescriptive analysis to look for practical tools and methods to find those rational solutions.

Behavioral finance (BF) is normative analysis, which focuses on how individuals behave and make decisions. It draws on concepts of traditional finance, psychology, and neuroeconomics. Neuroeconomics has been used to look at decision making under uncertainty, drawing on studies of brain chemistry to understand how decision making utilizes both rational and emotional areas of the brain. Behavioral finance recognizes that the way information is presented can affect decision making, leading to both

1. Terminology used throughout this topic review is industry convention as presented in Reading 7 of the 2013 CFA Level III exam curriculum.

emotional and cognitive biases. Individuals are *normal* and may or may not act in a risk-averse utility maximization manner. Their resulting decisions may be suboptimal from a rational (traditional finance) perspective. This can result in markets that temporarily or persistently deviate from efficiency.

Behavioral finance can be divided into two general categories: micro and macro. *Micro behavioral finance* is concerned with describing the decision-making processes of individuals. It attempts to explain why individuals deviate from traditional finance theory. *Macro behavioral finance* focuses on explaining how and why markets deviate from what we would term *efficient* in traditional finance.

Traditional Finance

Traditional finance is based on neoclassical economics and assumes individuals are risk-averse, have perfect information, and focus on maximizing their personal utility function. Investors who behave this way are then defined as rational, or a *rational economic man (REM)*. Such behavior leads to efficient markets where prices reflect available, pertinent information. A rational investor will exhibit utility theory, which asserts individuals have a limited budget and will select the mix of goods and services that maximize their utility. A rational decision maker will follow four self-evident rules or axioms:

- Completeness assumes individuals know their preferences and use them to choose between any two mutually exclusive alternatives. Given a choice between D or E, they could prefer D, E, or be indifferent.
- Transitivity assumes individuals consistently apply their completeness rankings. If D is preferred to E and E is preferred to F, then D must be preferred to F.
- Independence assumes rankings are also additive and proportional. If D and F are mutually exclusive choices where D is preferred and J is an additional choice that adds positive utility, then $D + x(J)$ will be preferred to $F + x(J)$. In this case, x is some portion of J.
- Continuity assumes utility indifference curves are continuous, meaning that unlimited combinations of weightings are possible. If F is preferred to D, which is preferred to E, then there will be a combination of F and E for which the individual will be indifferent to D.

For the Exam: Many of the assertions that are said to be self-evident under TF are not so self-evident under BF. Behavioral finance essentially asserts that this is not the way individuals always act. Most of the terminology you see here should be familiar from Levels I and II with some additions. The next section covers Bayes' formula, which was called Bayes' Theorem and posterior probabilities at Level I.

The decision process of a REM who follows these axioms can be explained using event diagrams, Bayes' formula, and updating probabilities for new information. Bayes' formula:

$$P(A | B) = \frac{P(B | A)P(A)}{P(B)}$$

where:

$P(A|B)$ = probability of event A occurring given that event B has occurred;
conditional probability of event A

$P(B|A)$ = probability of event B occurring given that event A has occurred;
conditional probability of event B

$P(B)$ = unconditional probability of event B occurring

$P(A)$ = unconditional probability of event A occurring

Example: Applying Bayes' formula

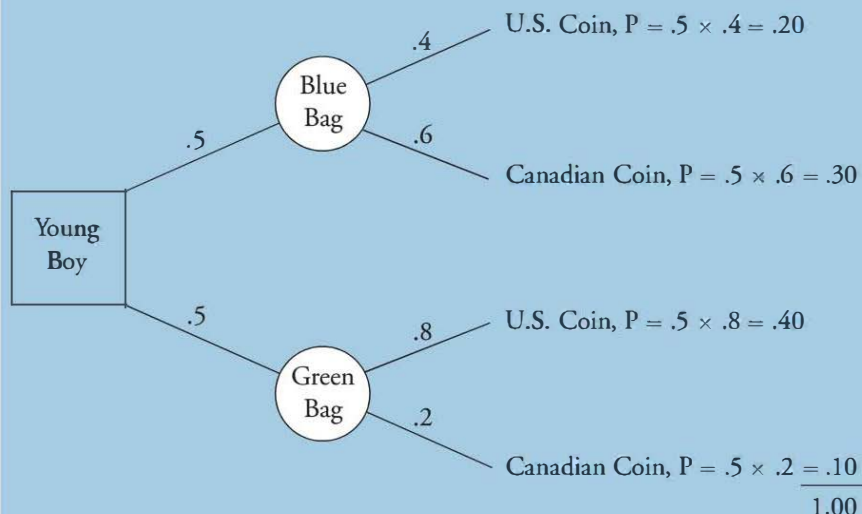
Assume a blue bag and a green bag each contain 10 coins:

- The blue bag contains 4 U.S. coins and 6 Canadian coins.
- The green bag contains 8 U.S. coins and 2 Canadian coins.

Without looking at the bags, a young boy reaches into one of them and withdraws a U.S. coin. Determine the probability that the boy reached into the blue bag.

Answer:

The first step is to draw the event diagram.



- Each bag contains 10 coins for a total of 20 coins. The probability of any single coin coming from either the blue or green bag is $10/20 = .5$.
- The probability of withdrawing a U.S. coin from the blue bag is 4 out of 10 = 40%.
- The probability if withdrawing a U.S. coin from the green bag is 8 out of 10 = 80%.

If it was not known a U.S. coin had been drawn, then the probability the blue bag was selected would be 50% as there were only two choices. However, knowing a U.S. coin was drawn allows the probabilities to be updated for this information. Knowing a U.S. coin was pulled from a bag, what is the probability the boy reached into the blue bag? The answer is the probability of selecting a U.S. coin from the blue bag ($.5 \times .4 = .20$) over the total probability that a U.S. coin would be selected from either bag ($.40 + .20 = .60$) for a probability of $.20/.60 = 33.3\%$. Using the equation, it is:

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)} = \frac{40\%}{60\%}(50\%) = 33.3\%$$

where:

$P(A|B)$ = probability that the blue bag was selected given that the boy withdrew a U.S. coin (to be determined)

$P(B|A)$ = probability of withdrawing a U.S. coin given that the blue bag was selected = 40%

$P(B)$ = probability of withdrawing a U.S. coin = 60%

$P(A)$ = probability of selecting the blue bag = 50%

For the Exam: A Level III candidate developed a study plan six months before the exam after carefully considering their personal strengths and weaknesses, their available study time, and the exam weight of each topic. It is now three weeks prior to the exam and, as often happens, the candidate is behind on the study plan. The candidate becomes even more determined to complete the original study plan.

It could be said the candidate is failing to adjust probability weights for new information. The new information is that the remaining time to study is only three weeks, and the original study plan is no longer optimal. The candidate has not updated the study schedule to weigh study time for the probability material is important on the exam and for the limited three weeks of study time available. Subsequent BF concepts will also suggest the candidate is committing numerous cognitive and emotional errors to the candidate's detriment.

RISK AVERSION

Traditional finance generally assumes individuals are risk-averse and prefer greater certainty to less certainty. In contrast, behavioral finance assumes that individuals may be risk-averse, risk-neutral, risk-seeking, or any combination of the three; the way something is presented can affect decision making. The concepts can be illustrated by considering what a person would pay to participate in an investment with an equal probability of the investment paying back immediately GBP 100 or GBP 200. In other words, it would pay back on average GBP150.

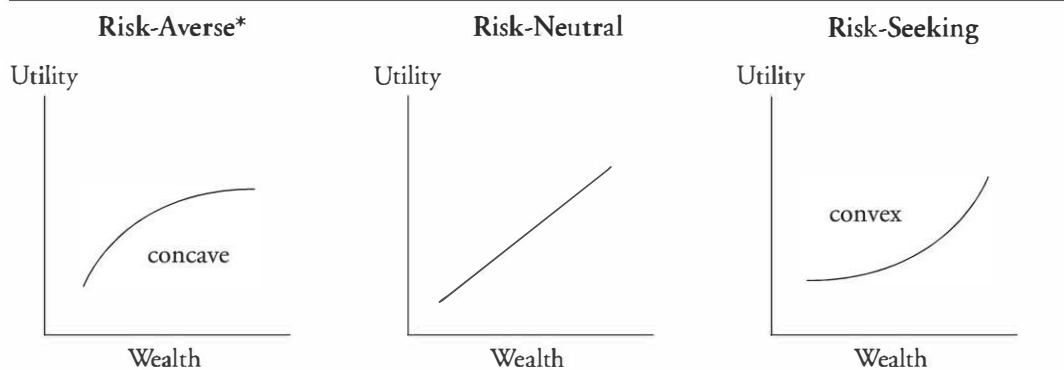
Risk-averse. The risk-averse person suffers a greater loss of utility for a given loss of wealth than they gain in utility for the same rise in wealth. Therefore, they would pay less than GBP 150 for an uncertain, but expected, payoff of GBP 150.

Risk-neutral. The risk-neutral person gains or loses the same utility for a given gain or loss of wealth and would be willing to pay GBP 150 for the expected payoff of GBP 150.

Risk seeker. The risk-seeking person gains more in utility for a rise in wealth than they lose in utility for an equivalent fall in wealth. Therefore, they would pay more than GBP 150.

In each case, the person's utility (satisfaction) is a function of wealth and can be described graphically.

Figure 1: Utility Function of Wealth



* Generally assumed for Traditional Finance Theory

Challenges to Traditional Finance and the Rational Economic Man

Behavioral finance does not assume individuals are always risk-averse, that they adhere to Bayes' formula, that they act in their own self-interest, or that they have perfect information. Individuals sometimes act as rational economic men (REM), but at other times, their behavior is better explained by psychology. Challenges to REM include:

- Decision making can be flawed by lack of information or flaws in the decision-making process.
- Personal inner conflicts that prioritize short-term (spending) goals over long-term (saving) goals can lead to poor prioritization.
- Lack of perfect knowledge is perhaps the most serious challenge to REM. How many individuals can properly assess the impacts of a change in central bank policy on their future wealth?
- Wealth utility functions may not always be concave as assumed by utility theory, and individuals can sometimes exhibit risk seeking behavior.

UTILITY THEORY AND PROSPECT THEORY

LOS 7.b: Contrast expected utility and prospect theories of investment decision making.

CFA® Program Curriculum, Volume 2, pages 16

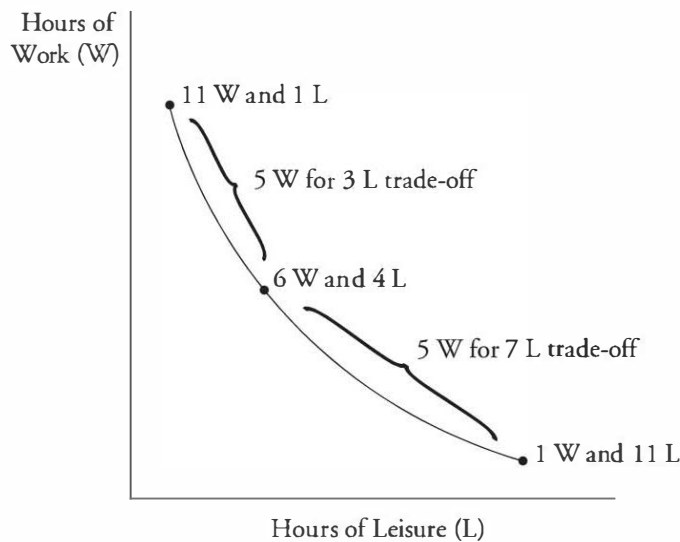
For the Exam: This material is very theoretical, and it is not always clear in the reading exactly what could be relevant to any particular LOS. You would be wise to work through the end-of-chapter questions for the CFA readings to get a better sense of what level of detail is expected.

Utility Theory and Indifference Curves

Traditional finance is based in **utility theory** with an assumption of diminishing marginal return. This leads to two consequences. First, the risk-averse utility function is concave. As more and more wealth is added, utility (satisfaction) increases at a diminishing rate. Second, it leads to convex indifference curves due to a diminishing marginal rate of substitution.

For example, consider an individual looking at the trade-off between paid hours of work (W) and unpaid hours of leisure (L). Suppose an individual has 12 hours available in a day after allowing for sleep, eating, and other needs. How would the individual split work hours and leisure hours to maintain an indifferent level of satisfaction?

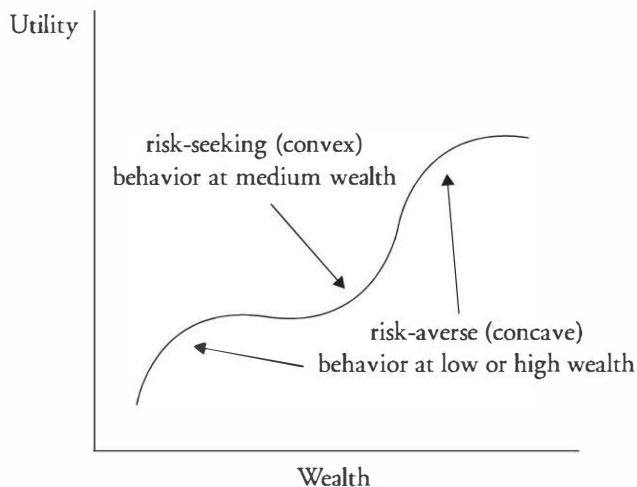
- Suppose the individual currently works 11 hours with 1 hour of leisure. Having little leisure time, the individual might trade 5W for 3L, a 5/3 trade-off, that results in a total of 6W and 4L at the same level of satisfaction.
- From the new indifference point, adding more leisure adds less marginal utility. The individual might only give up 5 more W for 7L, a 5/7 trade-off, resulting in 1W and 11L.
- At any point on the indifference curve, they are equally satisfied.

Figure 2: Trade-Off between Work and Leisure

While indifference curves and utility theory appear rational, they ignore that many individuals are unable to quantify such mathematical trade-offs. Indifference curves also don't explicitly consider risk and the assumption of risk aversion. For example, during recessions when jobs are scarce, the trade-off of W for L would likely change.

Complex Risk Functions

Behavioral finance observes that individuals sometimes exhibit risk-seeking as well as risk-averse behavior. Many people simultaneously purchase low-payoff, low-risk insurance policies (risk-averse behavior) and low-probability, high-payoff lottery tickets (risk-seeking behavior). Combinations of risk seeking and risk aversion may result in a complex double inflexion utility function.

Figure 3: Friedman-Savage, Double-Inflexion Utility Function

Decision Theory

Decision theory is focused on making the ideal decision when the decision maker is fully informed, mathematically able, and rational. The theory has evolved over time.

- Initial analysis focused on selecting the highest probability-weighted payoff.
- Later evolution separated expected value, which is just the market price of an item paid by anyone versus expected utility. Expected utility is subjective and depends on the unique preferences of individuals and their unique rate of diminishing marginal utility and substitution.
- Risk is defined as a random variable due to the one outcome that will occur from any probability-weighted analysis. For example, a stock has an $E(R)$ of 10% but returns 12%. Risk can be incorporated into analysis by maximizing expected utility.
- In contrast, uncertainty is unknowable outcomes and probabilities. It is, by definition, immeasurable and not amenable to traditional utility maximization analysis.
- Subjective analysis extends decision theory to situations where probability cannot be objectively measured but is subjective.

LOS 7.c: Discuss the effects of cognitive and knowledge capacity limitations on investment decision making.

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In traditional finance, all investors are assumed to possess the same information and interpret it accurately and instantly, without bias, in evaluating investments and in making utility-maximizing decisions. Behavioral finance acknowledges that investors do not always make decisions consistent with this form of utility maximization.

Bounded Rationality

Bounded rationality assumes knowledge capacity limits and removes the assumptions of perfect information, fully rational decision making, and consistent utility maximization. Individuals instead practice satisfice. Outcomes that offer sufficient satisfaction, but not optimal utility, are sufficient.



Professor's Note: Cognitive limitations stem from a lack of the resources, mental or mechanical, to thoroughly interpret information. Knowledge limitations refer to the inability to have all relevant information.

Example: Satisfice and bounded rationality

Jane Smith has excess funds she can deposit to earn interest. She wants the funds to be backed by the government, so she visits the bank closest to her workplace. The rate seems acceptable, and she makes the deposit after verifying that the deposits are government insured. Is her behavior consistent with a rational economic man?

Answer:

No. Smith is showing bounded rationality and satisfice. The rate was adequate and met the condition of government guarantee, so she accepted it. She did not research all other options or have perfect information (bounded rationality). There is no reason to expect that this particular rate is the optimal solution.

Prospect Theory

For the Exam: The LOS and end-of-chapter questions are conceptually focused and not mathematically focused. The discussion of the evaluation phase of prospect theory specifically says “a quantitative illustration ... is complex and not necessary to review here.” No math is provided.

Bounded rationality relaxes the assumptions of perfect information and maximizing expected utility. Prospect theory further relaxes the assumption of risk aversion and instead proposes loss aversion. Prospect theory is suited to analyzing investment decisions and risk. It focuses on the framing of decisions as either gains or losses and weighting uncertain outcomes. While utility theory assumes risk aversion, prospect theory assumes loss aversion.

Under prospect theory, choices are made in two phases. In the first phase, the editing phase, proposals are framed or edited using simple heuristics (decision rules) to make a preliminary analysis prior to the second evaluation phase. In the editing phase, economically identical outcomes are grouped and a reference point is established to rank the proposals. The goal of the editing phase is to simplify the number of choices that must be made before making the final evaluation and decision. Doing so addresses the cognitive limitations individuals face in evaluating large amounts of information. The risk is that the selection of the reference point frames the proposal as a gain or loss and affects the subsequent evaluation or decision step.

In the second phase, the evaluation phase, investors focus on loss aversion rather than risk aversion. The difference is subtle, but the implication is that investors are more concerned with the *change in wealth* than they are in the resulting level of wealth, per se. In addition, investors are assumed to place a greater value in change on a loss than on a gain of the same amount. Given a potential loss and gain of equal sizes, the increase in utility associated with the potential gain is smaller than the decrease in utility (i.e., disutility) associated with the potential loss. Investors tend to fear losses and can become risk seeking (assume riskier positions) in an attempt to avoid them.

Experiments have shown that most individuals will not take a gamble that offers 50/50 odds of equal but opposite payoffs. For example, the average individual will not take a gamble with 50% probability of winning \$100 and 50% probability of losing \$100, even though the expected outcome is \$0. The possible gain would have to be increased to at least \$200 (at least double the possible loss) to entice the average individual to take the gamble.

Example: Framing the decision as a gain or loss

<i>Portfolio Assets</i>	<i>Current Price</i>	<i>Cost Basis</i>	<i>Yesterday's Close</i>	<i>Year-end Close</i>
A	10	7	11	9
B	12	13	13	13
C	14	9	15	13

Which asset has the largest percentage loss?

Answer:

It depends on the selected (framed) reference point to determine perceived loss. A perception can affect subsequent decisions. For example, if yesterday's close is the reference point, every asset has a perceived loss with Asset A having the largest percentage loss. However, if cost basis is the selected reference, then B has the largest percentage loss while A and C have gains.

Editing Phase

The early editing phase can involve a large number of operations. The precise sequence and number of steps is determined by the data. The first three steps may apply to individual proposals.

1. **Codification** codes the proposal as a gain or loss of value and assigns a probability to each possible outcome. To do this, the reference point must be selected.
2. **Combination** simplifies the outcomes by combining those with identical values. For example, an investor might probability weight expected returns of a stock (codification) and then combine identical outcomes.

Figure 4: Example of Combination

<i>Outcomes:</i>		<i>Combined Outcomes:</i>	
<i>Probability (p)</i>	<i>E(R)</i>	<i>Probability (p)</i>	<i>E(R)</i>
.10	–5%	.10	–5%
.20	0%	.20	0%
.20	10%		
.30	10%	.50	10%
.20	20%	.20	20%
1.00		1.00	

3. **Segregation** can be used to separate an expected return into both a risk-free and risky component of return. For example, assume a gamble offers a 75% chance of a \$100 payoff and a 25% chance of paying \$150. This can be segregated as a 100% risk-free payoff of \$100 and a 25% chance of another \$50.

The next three steps may apply when comparing two or more proposals.

4. **Cancellation** removes any outcomes common to two proposals. Overlapping outcomes would not affect any decision.

Figure 5: Example of Cancellation

<i>Before Cancellation:</i>			<i>After Cancellation:</i>	
Proposal A:				
E(R)	5%	10%	15%	15%
p	.333	.333	.333	.333
Proposal B:				
E(R)	5%	10%	5%	10%
p	.50	.50	.167	.167

5. **Simplification** applies to very small differences in probabilities or to highly unlikely outcomes. For example, a 49% chance of \$500 with a 50% chance of \$700 and a 1% chance of \$750 might be simplified as an equal chance of \$500 or \$700.
6. **Detection of dominance** would discard from consideration any proposal that is clearly dominated. The previous 50/50 chance of \$500 or \$700 dominates an equal chance of \$400 or \$600 in every regard: higher average, higher minimum, and higher maximum.

Editing choices can sometimes lead to the preference anomaly known as the **isolation effect**, where investors focus on one factor or outcome while consciously eliminating or subconsciously ignoring others. It is referred to as an anomaly because the sequence of the editing can lead to different decisions.

Example: The isolation effect

Assume an individual is asked to choose between two lotteries:

- Lottery 1 offers payoffs of a 33% chance of \$3,000 or nothing.
- Lottery 2 offers payoffs of a 20% chance of \$5,500 or nothing.

The expected (probability weighted) payoffs are \$1,000 and \$1,100 respectively.

Not surprisingly empirical studies show that most individuals select the higher and rational payoff of Lottery 2.

However, framing the lottery (e.g., changing the order of presentation) can affect the selection. Suppose the expected payoffs of Lottery 1 and Lottery 2 in this case were maintained, but they were recast to occur in the second stage of a two-stage lottery. In the new game, the first stage has a 67% chance in ending in a zero payoff and a 33% chance of moving on to the second stage. The second stage will consist of either Lottery 3 or Lottery 4, but an individual must select to participate in either Lottery 3 or Lottery 4 before the first stage is played. In other words, it is not known if the individual has moved to the second stage before selecting Lottery 3 or Lottery 4. They do know that:

- Lottery 3 offers payoffs of a 100% chance of \$3,000 or nothing.
- Lottery 4 offers payoffs of a 60% chance of \$5,500 or nothing.

What is surprising is that a majority of individuals now choose Lottery 3 even though it has an expected payoff of \$1,000 versus \$1,100 for Lottery 4. This is the opposite of the choice made when confronted with choosing between Lottery 1 and Lottery 2.

Expected payoffs:

Lottery 1: $.33 \times \$3,000 \approx \$1,000$

Lottery 2: $.20 \times \$5,500 = \$1,100$

Lottery 3: $.33 \times 1.00 \times \$3,000 \approx \$1,000$

Lottery 4: $.33 \times .60 \times \$5,500 \approx \$1,100$

Empirical studies have shown the framing and order of the lottery can produce inconsistent and irrational choices.



Professor's Note: Please do not send in emails saying the calculations above are not precise. The \approx sign was used intentionally, and the calculations are demonstrating the simplification step.

The Evaluation Phase

In the **evaluation phase**, investors place values on alternatives in terms of weighted and probability-weighted outcome to determine expected utility. A quantitative illustration is complex and specifically stated to be unnecessary to the purpose of the reading (thus, it is not presented here). The equation is shown as:

$$\text{utility} = w(p_1)v(X_1) + w(p_2)v(X_2) + \dots$$

where:

p_1 and p_2 = probability weights of possible outcomes X_1 and X_2

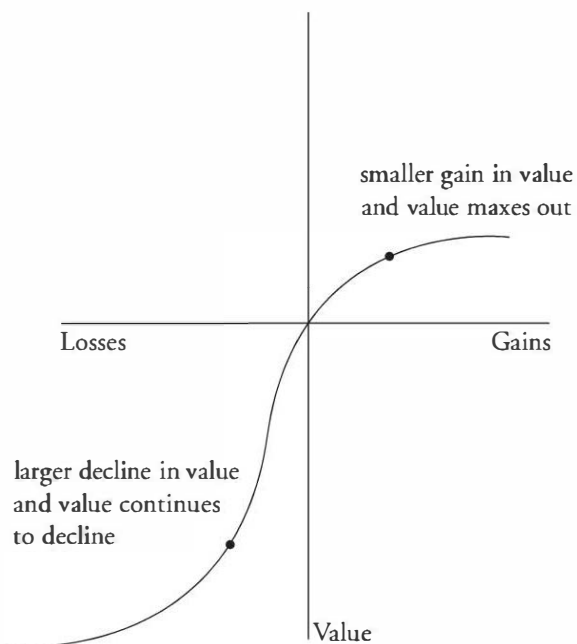
v = a function that assigns value to an outcome

w = a probability weighting function

The important implications are:

- w reflects a tendency of individuals to overreact to small probabilities and underreact to large probabilities.
- The value function is based on changes and is not level.
- The resulting value function is S-shaped and asymmetric. Individuals experience a greater decline in value for a given loss than a rise in value for a corresponding gain.

Figure 6: Value Function



- As a result, most investors are risk averse when presented with gains. Empirical studies show that when given an equal chance of making \$100 or losing \$70, most individuals will not take the bet. They are risk averse and want a higher expected payoff than \$15.
- However, most individuals are risk seekers when confronted with likely losses. Offered the choice of a sure loss of \$75 or a 50/50 chance of winning \$30 or losing \$200, they exhibit risk-seeking behavior by taking the bet that has an expected payoff of -\$85. The bet is worse than the sure loss of \$75.
- This could explain why many investors over-concentrate in high-risk and low-risk investments but not medium-risk investments.

Figure 7: Summary of Traditional Finance versus Bounded Rationality and Prospect Theory

<i>Traditional Finance Assumes:</i>	<i>Bounded Rationality* and Prospect Theory** Assume:</i>
Unlimited perfect knowledge	Capacity limitations on knowledge*
Utility maximization	Satisfice*
Fully rational decision making	Cognitive limits on decision making*
Risk aversion	Reference dependence to determine gain or loss leading to possible cognitive errors**

CAPITAL MARKETS AND PORTFOLIO CONSTRUCTION

LOS 7.d: Compare traditional and behavioral finance perspectives on portfolio construction and the behavior of capital markets.

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The Traditional Finance Perspective

Much of modern portfolio theory is premised on the *efficient market hypothesis* (EMH). The EMH presumes market prices reflect all relevant available information. The aggregate decision making of market participants is correct even if individual investors are wrong. The resulting efficient prices reflect intrinsic value and do not allow investors to earn excess, risk-adjusted returns after allowing for transaction costs. The EMH proposes three versions of efficiency:

- A market is **weak-form efficient** if current prices incorporate all past price and volume data. If markets are weakly efficient, managers cannot consistently generate excess returns using technical analysis (charting).
- If a market is **semi-strong form efficient**, prices reflect all public information, including past price and volume data. The moment valuable information is released, it is fully and accurately reflected in asset prices. If markets are semi-strong form efficient, managers cannot consistently generate excess returns using technical or fundamental analysis.
- **Strong-form efficiency** requires prices to reflect all privileged nonpublic (i.e., inside) information as well as all public information, including past price and volume data. If a market is strong-form efficient, no analysis based on inside and/or public information can consistently generate excess returns. Strong-form efficiency is not generally accepted as nonpublic information is associated with excess returns.

For the Exam: Presume the EMH is generally correct, but also be aware of the evidence that supports and contradicts it.

Support for the EMH

The weak form of the EMH has been the most studied and supported. If past security prices show strong serial correlation, then past prices could be used to predict subsequent changes. Nevertheless, historical studies show virtually zero serial correlation, which is consistent with weak-form efficiency. Stock price changes appear random.

However, the random nature of stock prices does not by itself support the further notion that the *price is right* and that price correctly reflects intrinsic value. Accepting the price as right when it does not, in fact, reflect intrinsic value could lead to a serious misallocation of portfolio resources.

Tests of the semi-strong form have focused on two areas:

- Event studies, such as the announcement of a stock split, look for evidence that such events are predictive of future stock price movement. In itself, a stock split creates no economic value and should not affect the split adjusted price. However, splits are strongly associated with abnormal dividend increases that might reflect rising economic value. Event studies show that stock prices rise abnormally for up to two years before the split and complete an upward adjustment coincident with the split announcement. This is consistent with the semi-strong EMH. Of course, if you knew ahead of time that the split and dividend increases were coming, it would allow you to earn excess returns. The ability to benefit from advance inside information is consistent with semi-strong form but is a rejection of strong-form efficiency.
- Other studies focus on the aggregate ability of professional managers to generate positive excess return or alpha. Studies of mutual fund managers show the majority have negative alphas both before and after management fees. This is consistent with semi-strong EMH. This is sometimes referred to as *no free lunch*, which asserts that it is difficult or impossible to consistently outperform on a risk-adjusted basis.

Challenges to EMH

Some studies do find evidence that appears to be or is inconsistent with the EMH. If such market anomalies persist, those anomalies argue for inefficiency of markets. Several different forms of anomalies have been identified.

Fundamental anomalies would relate future stock returns to stock fundamentals, such as P/E or dividend yield. Fundamental anomalies would be violations of both semi-strong and strong-form efficiency.

Numerous studies have shown evidence that value stocks with lower P/E, P/B, and P/S, higher E/P and B/P, and dividend yield outperform growth stocks (which tend to have the opposite fundamental characteristics).

Studies show abnormal positive returns for small-cap stocks.

Other studies suggest the abnormal return of value stocks is not evidence of excess return but of higher risk. Fama and French (1995, 2008) propose extending the capital asset pricing model (CAPM) to include market cap and B/P as priced risks. Analysis using

these revised risk premiums suggests the apparent excess returns are just a failure to properly adjust (upward) for risk.

For the Exam: This discussion is a perfect example of the kind of material you will commonly see at Level III. You could be asked to discuss evidence that contradicts the EMH and then to critique that same evidence. You are expected to understand both sides of the issue when the material is well discussed in the curriculum.

Technical anomalies relate to studies of past stock price and volume. Technical anomalies would be violations of all three forms of efficiency. (Hint: Remember the semi-strong and strong forms encompass the weak form as well.)

- Studies have shown that when a short-term (1-, 2-, or 5-day) moving average of price moves above (below) a longer-term (50-, 150-, or 200-day) moving average, it signals a buy (sell). Other studies show that when a stock price rises above a resistance level, it signals a buy; if the stock price moves below a support level, it signals a sell. As such, the signals do provide value.
- Calendar anomalies appear to show that stocks (small-cap stocks in particular) have abnormally high returns in January, in the last day of each month, and in the first four days of each month.
- Such technical anomalies appear to be violations of all forms of EMH. Transaction costs remove most of the benefits, and any remaining benefit(s) should disappear as an investor buys and sells securities to exploit the opportunities. In other words, the investor will arbitrage the opportunities. The ability of investors to withdraw funds from a manager may limit arbitrage activity. An arbitrageur takes positions in anticipation those prices will correct, often using high leverage. For example, the arbitrageur could take a position to exploit the January effect, buying a stock in anticipation of the rise. If prices do not move up as quickly as expected, the arbitrageur's investors may become dissatisfied and withdraw funds. The arbitrageur must then sell, pushing down the stock price, which is the opposite of what was expected. Such liquidity issues may put limits on the ability of arbitrage to establish market efficiency. A highly leveraged arbitrageur must be correct and market prices must quickly correct quickly and in the way expected.

The Behavioral Finance Perspective

Traditional finance (TF) assumes markets are efficient and prices reflect fundamental value. New information is quickly and properly reflected in market prices. Portfolio managers can focus on identifying efficient portfolios on the efficient frontier that meet the client's objectives of risk and return while also observing the investor's constraints. (These ideas of portfolio management will be extensively covered in later study sessions.) However, if prices are not correctly reflecting intrinsic value, or at least providing the best indication possible, this approach to portfolio management is flawed.

Behavioral finance (BF) challenges these traditional finance notions. It has not yet been able to propose a unified, alternative theory. Four alternative behavioral models have been proposed: (1) consumption and savings, (2) behavioral asset pricing, (3) behavioral portfolio theory, and (4) the adaptive markets hypothesis.

For the Exam: The previous section on TF, along with a conceptual understanding of the four alternative models that follows, is the most direct answer to LOS 7.d.

1. **Consumption and savings:** Traditional finance assumes investors are able to save and invest in the earlier stages of life to fund later retirement. This requires investors to show self control by delaying short-term spending gratification to meet long-term goals. The consumption and savings approach proposes an alternative *behavioral life-cycle model* that questions the ability to exercise self control and suggests individuals instead show mental accounting and framing biases. Investors mentally account and frame wealth as current income, assets currently owned, and present value of future income.

Traditional finance assumes that all forms of wealth are interchangeable. Behavioral finance presumes the mental accounting for wealth by source makes individuals less likely to spend from current assets and expected future wages. Therefore, individuals will overcome at least some of their lack of self-control to save some of what they will need to meet long-term goals. This also makes them subject to framing bias. For example, if individuals perceive a bonus as current income, they are more likely to spend it. If they perceive it as future income, they are more likely to save it.

2. **Behavioral asset pricing:** Traditional asset pricing models (e.g., CAPM) assume market prices are determined through an unbiased analysis of risk and return. The intrinsic value of an asset is its expected cash flows discounted at a required return, based on the risk-free rate and a fundamental risk premium. The behavioral asset pricing model adds a **sentiment premium**² to the discount rate; the required return on an asset is the risk-free rate, plus a fundamental risk premium, plus a sentiment premium. The sentiment premium can be estimated by considering the dispersion of analysts' forecasts. A high dispersion suggests a higher sentiment premium.

Under the traditional CAPM, the sentiment premium would be unwarranted. If this added, erroneous error is systematic and predictable, it might be possible to exploit it. If it is random, it will be more difficult to exploit.

For the Exam: The reading does not elaborate on this point, but consider the earlier discussion of arbitrage. If a price can be identified as wrong and is expected to quickly correct, it can be exploited to earn excess profit. If it just stays wrong, the arbitrage does not work.

2. The sentiment premium is referred to as a **stochastic discount factor** (SDF) in the proposed asset pricing model and is based on investor sentiment relative to fundamental value. Shefrin, Hersch, and Meir Statman, 1994. "Behavioral Capital Asset Pricing Theory." *Journal of Financial and Quantitative Analysis*, vol. 35, no. 2.

3. **Behavioral portfolio theory (BPT):** Based on empirical evidence and observation, rather than hold a well-diversified portfolio as prescribed by traditional finance, individuals construct a portfolio by layers. Each layer reflects a different expected return and risk. BPT further asserts that individuals tend to concentrate their holdings in nearly risk-free or much riskier assets. Allocation of funds to an investment of each layer depends on:
 - The importance of each goal to the investor. If a high return for the goal is important, funds will be allocated to the high-return (high-risk) layer. If low risk is crucial to the goal, funds will be allocated to the low-risk (low-return) layer.
 - Asset selection will be done by layer and based on the goal for that layer. If high return is the goal, then higher-risk, more-speculative assets will be selected.
 - The number of assets in a layer will reflect the investor's risk aversion. Risk-averse investors with a concave utility function will hold larger numbers of assets in each layer.
 - If an investor believes they hold an information advantage (have information others do not have), more concentrated positions will be held.
 - If an investor is loss-averse, the investor will hold larger cash positions to avoid the possible need to sell assets at a loss to meet liquidity needs.

The resulting overall portfolio may appear to be diversified but is likely to be sub-optimal because the layers were constructed without regard to their correlation with each other. Such layering can explain:

- The irrational holding of both insurance and lottery tickets, as discussed earlier.
 - Holding excess cash and low-risk bonds in the low-risk layer and excessively risky assets in the high-risk layer. (This also includes not holding more moderate-risk assets.)
4. **Adaptive markets hypothesis (AMH):** The AMH assumes successful market participants apply heuristics until they no longer work and then adjust them accordingly. In other words, success in the market is an evolutionary process. Those who do not or cannot adapt do not survive.

Because AMH is based on behavioral finance theory, it assumes investors satisfice rather than maximize utility. Based on an amount of information they feel is sufficient, they make decisions to reach subgoals, steps that advance them toward their desired goal. In this fashion, they do not necessarily make optimal decisions as prescribed by utility theory or act as REM. Through trial and error, these heuristic rules that work come to be adopted by more and more participants until they are reflected in market pricing and then no longer work. The market evolves.

AMH leads to five conclusions:

- The relationship of risk and return should not be stable. The market risk premium changes over time as the competitive environment changes.
- Active management can find opportunities to exploit arbitrage and add value.
- No strategy should work all the time.
- Adaption and innovation are essential to continued success.
- Survivors change and adapt.

AMH is essentially EMH with bounded rationality, satisficing, and evolution. In AMH, the degree to which the market is efficient will depend on the degree

of competition in the market, the availability of profit, and the flexibility of participants to exploit opportunity.

Hopefully, in time, the insights of behavioral finance will allow for the construction of portfolios that are efficient from a traditional finance perspective and understandable to investors. If an investor can understand the portfolio, the investor is more likely to stay with it for the long run.

KEY CONCEPTS

LOS 7.a

Traditional finance is *prescriptive*; it explains how investors *should* make investment decisions based on mathematical models and theories. Behavioral finance is *descriptive*; it tries to explain *observed* investor decision making.

To maximize utility, a rational investor will make decisions conforming to the four axioms of utility: completeness, transitivity, independence, and continuity.

With the receipt of new, relevant information, rational investors revise expectations utilizing a Bayesian framework.

LOS 7.b

Traditional finance is based in utility theory and an assumption of diminishing marginal return. This leads to two consequences. First, the risk-averse utility function is concave. As more and more wealth is added, utility (satisfaction) increases at a diminishing rate. Second, it leads to convex indifference curves due to a diminishing marginal rate of substitution.

Decision theory is focused on making the ideal decision when the decision maker is fully informed, mathematically able, and rational. The theory has evolved over time.

- Initial analysis focused on selecting the highest probability-weighted payoff.
- Later evolution separated expected value, which is just the market price of an item paid by anyone, from expected utility. Expected utility is subjective and depends on the unique preferences of individuals and their unique rate of diminishing marginal utility and substitution.
- Risk is defined as a random variable due to the one outcome that will occur from any probability-weighted analysis. For example, a stock has an $E(R)$ of 10% but returns 12%. Risk can be incorporated into analysis by maximizing expected utility.
- In contrast, uncertainty is unknowable outcomes and probabilities. It is, by definition, immeasurable and not amenable to traditional utility maximization analysis.
- Subjective analysis extends decision theory to situations where probability cannot be objectively measured but is subjective.

LOS 7.c

Bounded rationality means that individuals act as rationally as possible, given their lack of knowledge and lack of cognitive ability.

Rather than optimize, individuals satisfice. Investors gather what they consider to be an adequate amount of information and apply heuristics to arrive at an acceptable decision. The result is that the investor takes steps and accepts short-term goals toward the ultimately desired goal. The investor does not necessarily make the theoretically optimal decision from a traditional finance perspective.

LOS 7.d

Traditional finance (TF) assumes markets are efficient and prices reflect fundamental value. New information is quickly and properly reflected in market prices. Portfolio managers can focus on identifying efficient portfolios on the efficient frontier that met the client's objectives of risk and return while observing the investor's constraints. (These ideas of portfolio management will be extensively covered in later study sessions.) However, if prices are not correctly reflecting intrinsic value, or at least providing the best indication possible, this approach to portfolio management is flawed.

Behavioral finance (BF) challenges these TF notions. However, it has not yet been able to propose a unified, alternative theory. Four alternative behavioral models have been proposed: (1) consumption and savings, (2) behavioral asset pricing, (3) behavioral portfolio theory, and (4) the adaptive markets hypothesis.

1. **Consumption and savings approach:** Traditional finance assumes investors are able to save and invest in the earlier stages of life to fund later retirement. The consumption and savings approach proposes an alternative *behavioral life-cycle model* that questions the ability to exercise self control and suggests individuals instead show mental accounting and framing biases.
2. **Behavioral asset pricing:** Traditional asset pricing models (e.g., CAPM) assume market prices are determined through an unbiased analysis of risk and return. The intrinsic value of an asset is its expected cash flows discounted at a required return, based on the risk-free rate and a fundamental risk premium. The behavioral asset pricing model adds a **sentiment premium** to the discount rate; the required return on an asset is the risk-free rate, plus a fundamental risk premium, plus a sentiment premium. Under the traditional CAPM, the sentiment premium would be unwarranted.
3. **Behavioral portfolio theory (BPT):** Based on empirical evidence and observation, rather than hold a well-diversified portfolio as prescribed by traditional finance, individuals construct a portfolio by layers. Each layer reflects a different expected return and risk. BPT further asserts that individuals tend to concentrate their holdings in nearly risk-free and much riskier assets. Allocation of funds to and investment of each layer depends on the importance of each goal to the investor. If a high return for the goal is important funds will be allocated to the high return (high risk) layer in the form of more speculative assets. If low risk is crucial to the goal then funds will be allocated to the low risk (low return layer) in the form of larger cash positions and low risk bonds. Risk-averse investors with a concave utility function will hold larger numbers of assets in each layer. If an investor believes they hold an information advantage (have information others do not have) more concentrated positions will be held.
4. **Adaptive markets hypothesis (AMH):** The AMH assumes successful market participants apply heuristics until they no longer work and then adjust them accordingly. In other words, success in the market is an evolutionary process. Those who do not or cannot adapt do not survive. AMH assumes investors satisfice rather than maximize utility.

CONCEPT CHECKERS

1. An investor has ranked three investments and labeled them as A, B, and C. He prefers investment A to investment B and investment B to investment C. Not being able to rank investment A relative to investment C would *most likely* violate which of the four axioms of utility?
 - A. Continuity.
 - B. Dominance.
 - C. Transitivity.
2. Applying the independence axiom of utility, an investor who prefers investment A to investment B and has the option to add all or a portion of investment C to his selection would **NOT** prefer:
 - A. $(A + C)$ to $(B + C)$.
 - B. $(A + 0.25C)$ to $(B + 0.25C)$.
 - C. $(B + 0.75C)$ to $(A + 0.75C)$.

3. Data for two investments are presented below:

<i>Investment</i>	<i>Expected Return</i>	<i>Standard Deviation</i>
A	8%	20%
B	10%	20%

A rational investor who selects investment B over investment A would *most likely* have a utility function characterized as:

- A. concave.
 - B. convex.
 - C. linear.
4. An investor who actively seeks risk in investing *most likely* experiences:
 - A. constant marginal utility.
 - B. decreasing marginal utility.
 - C. increasing marginal utility.
5. According to prospect theory, investors are more concerned with changes in wealth than in returns, per se. Prospect theory suggests that investors:
 - A. are risk averse.
 - B. can be loss averse.
 - C. place more value on gains than on losses of equal magnitude.

6. Based on the following data, **determine** and **explain** using expected utility whether or not the investor is likely to make the investment.

<i>Outcome</i>	<i>Utility</i>	<i>Probability of Occurrence</i>	<i>Subjective Probability Factor</i>
–8%	–120	15%	1.25
0%	–10	40%	1.15
6%	50	30%	0.85
10%	100	15%	0.65
Total	20	100%	

7. At lunch, two portfolio managers discuss their recent trades. One complains that it is extremely difficult if not impossible to gather and analyze all relevant available information before trading. He admits that he often just “goes with” the information he has. **Determine** the behavioral bias most likely indicated by his actions and **explain** your choice.
8. Satisficing is *best* described as:
- A. making short-term, suboptimal decisions.
 - B. making utility-maximizing decisions.
 - C. a form of bounded rationality that causes investors to act rationally.

9. Two analysts are overheard discussing market efficiency. They make the following statements:

“I don’t care who you are. The stock market is semi-strong efficient, so you can’t consistently generate excess returns. There are no free lunches!”

“The January effect is proof enough that markets are not strong-form efficient.”

Determine whether you agree or disagree with each statement, and if you disagree, justify your decision. Answer in the template provided.

<i>Statement</i>	<i>Agree/Disagree</i>	<i>Justification</i>
“I don’t care who you are. The stock market is semi-strong efficient, so you can’t consistently generate excess returns. There are no free lunches!”	Agree	
	Disagree	
“The January effect is proof enough that markets are not strong-form efficient.”	Agree	
	Disagree	

10. Two analysts are overheard discussing technical trading rules. One says, “I have noticed over the last year or so that the market rises to about 11,000 and then falls back. It seems to do that every two to three months. At the bottom, it goes to about 10,000 and then rebounds. It’s sort of like watching a roller coaster.” From a technical standpoint, the numbers 10,000 and 11,000 in the analyst’s statement would *most likely* be referred to respectively as:
- a fundamental anomaly and a technical anomaly.
 - a support and a resistance level.
 - both would be considered fundamental anomalies.

11. Two analysts are overheard discussing technical trading rules. One says, “I have noticed over the last year or so that the market rises to about 11,000 and then falls back. It seems to do that every two to three months. At the bottom, it goes to about 10,000 and then rebounds. It’s sort of like watching a roller coaster.”

The market consistently staying in a band between 10,000 and 11,000 is *most likely* to be used as evidence against which form of market efficiency?

- Weak-form efficient.
- Semi-strong form efficient.
- Strong-form efficient.

12. An analyst states that investors should not conclude that market prices do not fully reflect all public information simply because they can temporarily wander from their intrinsic values. Use a liquidity argument to **explain** why the analyst is correct.

13. Beth Smargen, CFA candidate, makes the following statement:

“The behavioral asset pricing model incorporates a sentiment premium when valuing assets. For example, the more strongly analysts feel about a security, the greater the sentiment premium and the higher the price.”

In the template, **indicate** by circling whether you agree or disagree with Smargen’s statement. If you disagree, justify your decision.

<i>Statement</i>	<i>Agree/Disagree</i>	<i>Justification</i>
“The behavioral asset pricing model incorporates a sentiment premium when valuing assets. For example, the more strongly analysts feel about a security, the greater the sentiment premium and the higher the price.”	Agree	
	Disagree	

ANSWERS – CONCEPT CHECKERS

1. C According to transitivity, investment rankings must be applied consistently. If an investor prefers investment A to investment B and prefers investment B to investment C, he must prefer investment A to investment C. Continuity is the axiom of utility that must apply for indifference curves to be smooth and unbroken (continuous). Dominance has two, similar meanings. In portfolio theory, dominance is a characteristic of portfolios on the efficient frontier (EF). Portfolios on the EF are said to dominate any portfolio below the efficient frontier. In a similar fashion, during the editing phase of prospect theory, an investor will eliminate any investment opportunity he perceives as being dominated by others.
2. C Adding choice C to both A and B will not affect the preference ranking of A and B. If the investor prefers A to B and we add C to both choices, the investor will prefer (A + C) over (B + C). This also applies to adding a portion of C.
3. A A rational investor will maximize return for a given level of risk and minimize risk for a given level of return. Rational investors experience decreasing marginal utility, meaning that their utility functions are concave. Each additional unit of wealth increases their utility but at a decreasing rate. Risk-neutral investors more or less ignore risk and have linear utility functions (constant marginal utility), and risk seekers have convex utility functions. We are told the investor is rational, so we can rule out the linear and convex utility functions.
4. C An investor who actively seeks risk in investments would be classified as risk seeking and would experience increasing marginal utility; each additional unit of wealth produces more utility than the previous unit, so the investor derives utility out of riskier investments with high expected returns. This investor would have a convex utility function. Constant marginal utility refers to risk-neutral investors with linear utility functions, and decreasing marginal utility applies to risk-averse investors with concave utility functions.
5. B One of the foundations of prospect theory loss aversion. Investors focus on risk relative to gains and losses (changes in wealth) rather than risk relative to returns. The result is that the disutility associated with a loss is greater than the increase in utility from a gain of the same magnitude.

6. Determine the investor's subjective probability for each outcome and then find the subjective weighted average utility:

1	2	3	4	
Outcome	Utility	Probability of Occurrence	Subjective Probability Factor, w	Subjective Probability (3×4)
-8%	-120	15%	1.25	18.75%
0%	-10	40%	1.15	46.00%
6%	50	30%	0.85	25.50%
10%	100	15%	0.65	9.75%
Total	20	100%		

$$\begin{aligned}
 \text{Exp(Utility)} &= wP_{-8\%}U_{-8\%} + wP_{0\%}U_{0\%} + wP_{6\%}U_{6\%} + wP_{10\%}U_{10\%} \\
 &= 0.1875(-120) + 0.46(-10) + 0.255(50) + 0.0975(100) \\
 &= -22.50 - 4.6 = -27.10 = -27.10 = -27.10
 \end{aligned}$$

The investor is **not likely** to make the investment because its subjective probability-weighted average utility is negative.

7. The manager's actions are indicative of *bounded rationality*. According to bounded rationality, investors attempt to make the most rational decision possible based on an amount of information they deem satisfactory. Rather than gather and analyze all relevant available information, the investor gathers and analyzes enough information to make a positive decision, not necessarily the optimal decision. Note that *satisficing* would have been an acceptable answer with the same discussion.
8. A Satisficing refers to making the most rational decision possible given the available information and the investor's limited cognitive ability. Rather than making the optimal, utility-maximizing decision, investors act as rationally as possible in making decisions (bounded rationality). Each decision is seen as suboptimal but positive in that it moves the investor toward the desired goal.

9.

<i>Statement</i>	<i>Agree/Disagree</i>	<i>Justification</i>
"I don't care who you are. The stock market is semi-strong efficient, so you can't consistently generate excess returns. There are no free lunches!"	Disagree	"No free lunch" would imply that the efficient market hypothesis is valid, that markets are strong-form efficient.
"The January effect is proof enough that markets are not strong-form efficient."	Agree	The January effect is a calendar anomaly that seems to suggest that public information is not accurately reflected in prices. Thus, it disputes semi-strong form efficiency. Strong-form efficiency states all information is reflected in prices. Thus a violation of either weak-form or semi-strong form is also a violation of strong form.

10. B Support levels act like floors to security or index price levels. As the security or index price approaches the floor, buy pressure tends to push it up. Resistance levels act like ceilings. As the security or index price approaches the resistance level, sell pressure tends to push it down.

11. A The numbers 11,000 and 10,000 represent a technical trading band formed by a resistance level (11,000) and a support level (10,000). Support and resistance levels are technical trading indicators and are usually considered evidence against weak-form efficiency.

12. An underlying assumption of the efficient markets hypothesis is that arbitrage forces will move instantaneously to correct mispricing. Liquidity concerns, however, can delay or even prohibit the forces of arbitrage. For example, a hedge fund manager may be constrained from quickly taking a position because of liquidity constraints. If the fund is open quarterly for subscription or withdrawal, liquidity needs are uncertain. Realizing he may have to meet liquidity needs by unwinding a position before the profit is realized or even at a loss, the manager can be hesitant to assume the position in the first place. If enough managers face similar constraints, market prices could stray from their intrinsic values and remain that way for extended periods.

13.

<i>Statement</i>	<i>Agree/Disagree</i>	<i>Justification</i>
"The behavioral asset pricing model incorporates a sentiment premium when valuing assets. For example, the more strongly analysts feel about a security, the greater the sentiment premium and the higher the price."	Disagree	The sentiment premium in the BAPM can be derived from the agreement or disagreement among analysts, not the strengths of their sentiments per se. The more widely dispersed analysts' opinions, the greater the sentiment premium, the higher the discount rate applied to assets' cash flows, and the lower their prices.

THE BEHAVIORAL BIASES OF INDIVIDUALS¹

Study Session 3

EXAM FOCUS

This assignment builds on the previous reading. It goes into more details on various biases. Expect exam questions that present situations where you must identify which bias or biases are displayed. Because many of the biases are closely related, read each exam situation closely and identify from the facts presented which bias is the best fit to the facts. Also know the implications of a bias on investment decision making or policy and be able to identify whether it is better to accommodate or mitigate a bias.

COGNITIVE ERRORS AND EMOTIONAL BIASES

The assumptions of traditional finance that individuals act as rational economic men who objectively consider all relevant information to make rational decisions and that this process results in efficient markets is not completely accurate. Behavioral finance looks at normal behavior of individual market participants (Behavioral Finance Micro) and the effect of such behavior on markets (Behavioral Finance Macro). A better understanding of the biases of clients (and of the professionals who work with those clients) should allow for the construction of portfolios that better approximate the efficiency of traditional finance and with which clients are better able to adhere to with during adverse conditions.

LOS 8.a: Distinguish between cognitive errors and emotional biases.

CFA® Program Curriculum, Volume 2, page 49

Cognitive errors are due primarily to faulty reasoning and could arise from a lack of understanding proper statistical analysis techniques, information processing mistakes, faulty reasoning, or memory errors. Such errors can often be corrected or mitigated with better training or information. In contrast emotional biases are not related to conscious thought and stem from feelings or impulses or intuition. As such they are more difficult to overcome and may have to be accommodated. Despite the distinction in grouping biases as either cognitive or emotional, a bias may have elements of both cognition and emotion. When trying to overcome or mitigate biases that are both emotional and cognitive, success is more likely by focusing on the cognitive issues.



Professor's Note: You should always look at the combination of facts and information presented in any question to see if the bias in a particular situation is arising more from cognitive or emotional thinking before determining if it is likely it can be mitigated or if it must be accommodated.

1. Terminology used throughout this topic review is industry convention as presented in Reading 8 of the 2013 CFA Level III exam curriculum.

LOS 8.b: Discuss commonly recognized behavioral biases and their implications for financial decision making.

CFA® Program Curriculum, Volume 2, page 50

LOS 8.c: Analyze an individual's behavior for behavioral biases.

CFA® Program Curriculum, Volume 2, pages 50

LOS 8.d: Evaluate the impact of biases on investment policy and asset allocation and discuss approaches to mitigate their effect.

CFA® Program Curriculum, Volume 2, pages 79

Cognitive Errors

While cognitive errors arise primarily from statistical or information or reasoning deficiencies or faulty memory, they can also have an emotional element. Market participants may unconsciously tilt away from behavior that causes personal distress or pain while tilting towards behavior that causes pleasure. In general cognitive errors are easier to mitigate or correct with better information, asking the right questions, or seeking qualified advice.

Cognitive errors can be divided into 5 “belief perseverance” biases that reflect a desire to stick with a previous decision and 4 “processing errors where the information analysis process is flawed.

Cognitive Errors: Belief Perseverance

1. Conservatism bias occurs when market participants hold on to a prior view or opinion and fail to adequately consider new information. In Bayesian terminology they overweight the initial probabilities and do not adjust probabilities for the new information.

Example: Conservatism

John Mue has carefully analyzed the historical data and concluded that recessionary environments occur on average 20% of the time. Mue has incorporated this probability into his strategic asset allocation recommendations. When new information is presented by a coworker showing that the actions of the central bank significantly affect the recession probabilities and that the new head of the central bank has announced tightening monetary conditions, Mue goes on vacation without making any adjustments to his work.

Answer:

Mue is showing conservatism by sticking with his original work and not considering the impact of the new information. In this case there may be an emotional aspect as well as Mue chooses the pleasure of a vacation over doing hard work.

Consequences and implications of conservatism may include market participants who are:

- Unwilling or slow to update a view and therefore hold an investment too long.
- Hold an investment too long to avoid the mental effort or stress of updating a view.

Conservatism detection starts with participants becoming aware of their own biases. The more difficult the thought process or information, the more likely conservatism bias will occur. Conversely easy changes may be made too often because they involve little mental effort. Thus conservatism can lead to either too little or too much change and turnover.

2. **Confirmation** bias occurs when market participants look for new information or distort new information to support an existing view. It is a kind of selection bias. Client's who get involved with the portfolio process by researching some of their portfolio holdings may become overly attached to some holdings and only bring up information favorable to the holding. This would be confirmation bias.

Consequences and implications of confirmation may include market participants who:

- Consider positive but ignore negative information and therefore hold investments too long.
- Set up the decision process or data screens incorrectly to find what they want to see.
- Under diversify as they become overly convinced their ideas are correct.
- Over concentrate in the stock of their employer believing they have an information advantage in to that security.

Confirmation detection starts with seeking out contrary views and information. For example if an analyst focuses on bottom's up fundamental financial statement analysis then the analyst could consult with a top down economic forecaster to gain an alternative view.

3. **Representativeness bias** can take several forms. In each case an overly simple decision rule takes the place of more thorough analysis.
 - Representativeness might rely on an overly simplistic past classification to categorize new information. For example a stock classified as a growth stock continues to be evaluated as a growth stock even when new information suggest otherwise. The new information is not properly considered.
 - In *base-rate neglect* new information is given too much importance, taken to represent too much, and underlying probabilities are not sufficiently considered. For example a portfolio manager has classified a stock as value stock based on a few past criteria, a somewhat superficial classification. As subsequent performance of the stock is evaluated it is compared to other value stocks without adequate consideration of whether it really is a value stock.
 - In *sample-size neglect* new information is also overweighed and taken as too representative without considering that the new data or result is only a sample of what could have occurred. For example a properly categorized growth stock reports a one time and abnormally low increase in EPS. As a result it is immediately and improperly reclassified as a value stock without any further analysis.

Example: Representativeness

XYZ company has long been recognized as a growth stock delivering superior earnings growth and stock price appreciation. While earnings have continued to grow, last year's revenue has not and neither has the stock price. If an analyst suffers from base-rate neglect and sample-size neglect would he be more likely to buy or sell the stock? What if the analyst treats the growth classification as representative?

Answer:

If the analyst exhibits sample-size and base-rate neglect the analyst will ignore XYZ's long record as a growth stock, focus on the short-term disappointing result and may recommend sale without considering the long term possibility it will revert to growth behavior.

However if the analyst over relies on the initial growth classification the analyst may assume it will return to growth and recommend purchase without properly considering all of the recent results.

Consequences and implications of representativeness may include market participants who:

- Attach too much importance to new pieces of information and have excessive turnover.
- Make decisions based on simple rules of thumb and classification without thorough and more difficult analysis, attaching either too much or too little importance to new information.

Representativeness detection starts with a better understanding of the laws of probability and statistical analysis. Helpful questions that might detect the bias include assessing the probability a given investment is properly categorized in a

certain group of ideas and not in a different group. By thinking in probabilities, it is more likely risk will be considered and sufficient diversification will occur.

In evaluating the performance of a portfolio this would include analyzing: How the performance compares to similar portfolios (rather than to the general market alone)? Have there been changes in the managers of the portfolio? What is the general reputation of the manager? Has the portfolio or manager changed style or investment approach due to changing conditions?

4. **Illusion of control** bias arises from a belief by market participants that they can control or affect outcomes when they cannot. It is often associated with emotional biases: *illusion of knowledge* (belief you know things you do not know), *self-attribution* (belief you personally caused something to happen), and *overconfidence biases* (an unwarranted belief you are correct).

Consequences and implications of illusion of control may include market participants who:

- Trade more than is appropriate as they mistakenly believe they can control the outcome of a trade or are overconfident in their analysis.
- Fail to adequately diversify.

Illusion of control detection starts with realizing investment results are probabilistic. Participants should seek out opposing viewpoints to consider alternative outcomes. Keeping good records to document the thinking behind ideas and reviewing results to see if there are patterns behind which ideas work, which don't, and the actual past probability of being right is essential.

5. **Hindsight bias** is a selective memory of past events or evaluation of what was knowable at that time. Participants tend to remember their correct views and forget the errors. They also overestimate what could have been known.

Consequences and implications of hindsight may include market participants who:

- Overestimate the rate at which they correctly predicted events which could reinforce an emotional overconfidence bias.
- Become overly critical of the performance of others. For example they might criticize the stock selections of an analyst whose recommendations underperformed the market when the recommendations outperformed the market groups for which the analyst was responsible.

Hindsight detection starts with asking questions like "Do I really remember what I predicted and recommended?" Participants should also maintain and review complete records to determine past errors as well as successes. They should remember there will be periods when strategies are in or out of favor and review success relative to appropriate benchmarks.

Cognitive Errors: Information-Processing Biases

These are related more to the processing of information and less to the decision making process.

1. **Anchoring and adjustment bias** arise when market participants use psychological heuristic experience based trial and error rules to unduly affect probabilities. Generally when individuals are forced to estimate an unknown, they often select an arbitrary initial value and then try to adjust it up or down as they process information. This makes it closely related to conservatism and a reluctance to change as new information is received. New information is not dependent on initial estimates or starting points and the new data should be objectively considered without regard to any initial anchor point.

Consequences and implications of anchoring and adjustment may include market participants who stay anchored to an initial estimate and do not adjust for new information.

Anchoring and adjustment detection starts with asking questions such as “Am I staying with this stock because I originally recommended it at a higher price. In other words am I becoming dependent on that previous price? Or would I recommend it based on an all new analysis if this was the first time I evaluated it?”

2. **Mental accounting bias** arises when money is treated differently depending on how it is categorized. For example a client might mentally treat wages differently from a bonus when determining saving and investment goals.

Consequences and implications of mental accounting may include market participants:

- Structuring portfolios in layers to meet different priority goals. This may help clients overcome other biases. But it ignores correlation between layers of the portfolio and results can be suboptimal from a traditional perspective.
- Failing to lower portfolio risk by adding assets with very low correlation.
- Segregating return into arbitrary categories of income, realized gains and losses, or unrealized gains and losses. The result tends to be an overemphasis on income generating assets, resulting in a lower total return.

Mental accounting could be detected by examining what the portfolio could have achieved if the entire client assets were examined as one portfolio considering the effects of correlation among all parts of the portfolio. An excessive focus on source of return (i.e., income versus price appreciation) could be detected by analyzing the maximum total return consistent with the investor's risk objective and constraints. If this is considerably better than the existing expected return of the portfolio, too much attention is being placed on source of return. For example, if the portfolio has an expected return of 6.7% and the return is primarily income but another portfolio with the same risk but less income has an expected return of 7.5%, it would appear better to accept the portfolio generating less income.

Professor's Note: It is important not to jump to simplistic labeling of something as all good or all bad. For example layering a portfolio can be a "good" way help a client untrained in the concepts of portfolio theory to make better decisions yet it can be "bad" in not achieving a fully optimal portfolio.



You should notice how much the terminology overlaps and it is certainly possible to describe a situation in which more than one bias is present. However for the exam you should know the basic definition of each bias and select the bias for which the facts most closely match the definition.

3. **Framing bias** occurs when the answer given is affected by the way in which the question is asked or "framed." In other words the way the question is framed affects how the information is processed leading to the answer given. For instance if a stock is priced at GBP20 and that is compared to a cost basis of GBP 15 the holder is more likely to sell (and experience the pleasure of realizing a gain). But if the priced is compared to a close of GBP25 the holder is less likely to sell (and experience the pain of a loss). If only one or two reference points are considered (as above) it could be called *narrow framing*.

Example: Decision framing bias

Investors were shown 3 efficient portfolios and the 95% confidence interval of expected returns for each portfolio. For example the first portfolio was shown as having a range of 0.1% to 6.7%, while the other portfolios had wider ranges. Next the same portfolios were shown but the expected return was listed and then the standard deviation. If investors show loss aversion and framing bias, under which conditions would the investors be likely to pick the lowest return portfolio?

Answer:

If shown the range of returns they would be more likely to pick the lowest returning portfolio because it frames the data to show the first portfolio with a positive lower return while the other portfolios, with wider ranges, are more likely to show a lower number that is negative. The first number seen in the display of data is framing the final decision. In contrast the other display of data starts with expected positive return numbers and does not directly show any negative numbers, only a standard deviation. Thus investors often select a portfolio with a higher return number.

A number of other biases might also be present. Because the example distinguishes how the information is displayed, and the order the information is presented, decision framing is the best answer.

Consequences and implications of framing bias may include market participants who:

- Fail to properly assess risk and end up overly risk-averse or risk-seeking.
- Choose suboptimal risk for their portfolio or assets based on the way a presentation is made.
- Become overly concerned with short term price movement and trade too often.

Framing could be detected by asking a question such as “Is my decision based on realizing a gain or a loss?” Instead a more appropriate analysis might compare current price to intrinsic value analysis.

4. Availability bias starts with putting undue emphasis on the information that is readily available. It is a mental short cut to focus excessively on what is easy to get. It can include some or all of the following:
 - Retrievability, which is simply to focus on what is first thought of.
 - Categorization, which puts excessive emphasis on how an idea is first categorized. For instance a manager assumes a stock is a growth stock and therefore screens it for issues such as P/E and growth rate (failing to consider other issues like leverage ratios).
 - Narrow range of experience could occur when the frame of reference is too narrow. For example a CFA Level III candidate prepares for the exam by working all of the old exam questions. The candidate then says it is unfair when other types of questions are asked on the exam. The frame of reference is too narrow, especially when the readings change and old questions and answers may no longer be relevant.
 - Resonance occurs when individuals assume what interests them is representative of what other people will find important.

Consequences and implications of availability may include market participants who:

- Choose a manager based on advertizing or recalling they have heard the name.
- Limit investment choices to what they are familiar with resulting in:
 - ♦ Under diversification.
 - ♦ Inappropriate asset allocation.

Availability could be overcome by maintaining a carefully researched and constructed Investment Policy Statement (IPS); through appropriate research and analysis of all decisions; and a long term focus. Questions such as “where did I hear of this idea could help detect availability bias.” Problems created by availability include overreacting and trading too much based on recent and easily available news or relying on available information or opinions that are of low quality and relevance.

Emotional Biases

While there is no formally accepted definition, these six biases generally arise from emotion and feelings rather than any conscious thought.



Professor's Note: Some of the terms about to be discussed here have already come up in the discussion of cognitive biases. If the context of a discussion emphasizes a view is based on unconscious emotion that the holder is unwilling or unable to change it will be more appropriate to see it as an emotional bias. On the other hand if the facts suggest the bias can be overcome with a relatively simple change in thought process or information it is better to see it as a cognitive bias.

1. Loss-aversion bias has already been well discussed previously. It arises from feeling more pain in a loss than pleasure in an equal gain.

Consequences and implications of loss-aversion may include:

- Feeling less pleasure in a gain in value for a profit than pain in a decline in value for an equal loss.
- To avoid the pain of loss an investment holder will tend to hold on to losers too long but may sell winners too quickly.
- Trade too much by selling for small gains which raises transaction costs and lowers returns.
- Incurring too much risk by continuing to hold assets that have deteriorated in quality and lost value.
- If an initial decline in value occurs, then taking excessive risk in the hope of recovering. Investment managers can be particularly susceptible to this behavior.
- Allowing the framing of the reference point to determine if a position is seen as a gain or loss.
- Treating money that is made on a trade differently than other funds and taking excess risk with such money.
- Myopic loss aversion refers to a situation where market participants overemphasize the short term potential losses that can occur on stocks and underemphasize the long term return. This results in a risk premium on stocks that is too high given their long term characteristics and an under-weighting in stocks.

Loss aversion could be overcome by maintaining a disciplined well thought out process based on future prospects of an investment, not perceived gain or loss.

2. **Overconfidence** bias leads market participants to overestimate their own intuitive ability or reasoning. It can show up as *illusion of knowledge* where they think they do a better job of predicting than they actually do. Combined with *self-attribution bias*, individuals will take personal credit when things go right (*self-enhancing*) but blame others or circumstances for failure (*self-protecting*). While it is both cognitive and emotional, it is more emotional in nature because it is difficult for most individuals to correct and is rooted in the desire to feel good.

Overconfidence arising from an illusion of knowledge is based a general feeling that the individual will be right. *Prediction overconfidence* leads individuals to underestimate uncertainty and standard deviation of their predictions while *certainty overconfidence* occurs when they overstate the probability they will be right.

Consequences and implications of overconfidence may include:

- Underestimate risk and overestimate return.
- Under diversification.
- Excessive turnover and transaction costs resulting in lower return.

Overconfidence might be overcome by establishing long-term financial goals with a budget to assure adequate savings and investments are made to meet all goals. In other words, maintain an Investment Policy Statement and Strategic Asset Allocation.

3. **Self-control** bias is a failure to address long-term goals due to insufficient self-discipline.

Self-Control Failure

Many CFA candidates fail the Level III exam the first time because they do not exercise sufficient self-control to study enough.

However it is combining a failure of self-control with other biases that causes the more serious problems:

- Overconfidence due to assuming that passing Levels I and II will indicate success at Level III.
- Representativeness as they assume the way they studied and the exam skills required at Levels I and II will be sufficient at Level III.

Consequences and implications of self-control may include:

- Insufficient savings accumulation to fund retirement needs.
- Taking excessive risk in the portfolio to try and compensate for insufficient savings accumulation.
- An overemphasis on income producing assets to meet shorter term distribution needs.



Professor's Note: You should be noticing a number of references to the idea analyzing a portfolio on a total return basis and not income versus change in value. This theme will continue in later sessions. Total return is the general approach to take on the exam unless given specific direction otherwise.

Self-control bias might be overcome by establishing an appropriate investment plan and a budget to achieve sufficient savings. Both should be reviewed on a regular basis.

4. **Status quo** bias is based on an emotion desire to do nothing. If investment choices include the option to maintain existing choices, or if a choice will happen unless the participant opts out; status quo choices become more likely.

Consequences and implications of status quo may include:

- Holding portfolios with inappropriate risk.
- Not considering other, better investment options.

Status quo is very hard to overcome so education regarding reasonable risk/return combinations and the danger of overconcentration in an (employer's) stock is essential.



Professor's Note: Status quo and the next two biases are very closely related. But status quo is maintaining a choice out of inertia, while endowment bias arises when some intangible value unrelated to investment merit is assigned to a holding, and regret-aversion is just what it says, if you make a change and it goes badly you will feel bad about it so do nothing and then you are not to blame. All three can lead to the same result (keep what you have) but the reason for doing so is slightly different.

5. **Endowment bias** could be shown when one spouse holds on to the securities their deceased spouse purchased for some reason like sentiment that is unrelated to the current merits of the securities. In studies individuals have been asked to state their minimum sale price for an asset (say \$25) and their maximum purchase price (say \$23). The fact that they will sell it at a price higher than they would pay has been explained as endowment. Once they own it, they act as if it is worth more than they would pay.

Consequences and implications of endowment may include:

- Failing to sell an inappropriate asset resulting in inappropriate asset allocation.
- Holding things you are familiar with because they provide some intangible sense of comfort.

Endowment is common with inherited assets and might be detected or mitigated by asking a question such as “Would you make this same investment with new money today?” If inherited assets are significant holdings in the portfolio it may be essential to address the bias. Starting a disciplined diversification program could be a way to ease the discomfort of sales.

6. **Regret-aversion bias** occurs when market participants do nothing out of excess fear that actions could be wrong. They attach undue weight to actions of commission (doing something) and don't consider actions of omission (doing nothing). Their sense of regret and pain is stronger for acts of commission.

Consequences and implications of regret-aversion may include:

- Excess conservatism in the portfolio because it is easy to see that riskier assets do at times underperform. Therefore, do not buy riskier assets and you won't experience regret when they decline.
- This leads to long-term underperformance and a failure to meet goals.
- *Herding behavior* is a form of regret-aversion where participants go with the consensus or popular opinion. Essentially the participants tell themselves they are not to blame if others are wrong too.

Regret-aversion might be mitigated through effective communication on the benefits of diversification, the outcomes consistent with the efficient frontier tradeoff of risk/return, and the consequences of not meeting critical long-term investment goals.

Further Implications of Biases on Investment Policy and Asset Allocation

Investment practitioners who understand behavioral biases have a better chance of constructing and managing portfolios that benefit normal clients. By first acknowledging and then accommodating or modifying biases, more optimal results are likely. This starts with asking the right questions:

- What are the biases of the client?
- Are they primarily emotional or cognitive?
- How do they effect portfolio asset allocation?
- Should the biases be moderated or adapted to?
- Is a behaviorally modified asset allocation warranted?
- What are the appropriate quantifiable modifications?

Goals-Based Investing (GBI)



Professor's Note: GBI will be similar to the layers in behavioral portfolio theory (BPT). BPT explained the layers as reflecting whether higher return or lower risk was important to the goal. GBI starts with the importance of achieving the goal.

GBI starts with establishing the relative importance to the client of each of the client's goals.

- Essential needs and obligations should be identified and quantified first. These would include essential living expenses and should be met with low risk investments as the base layer of the portfolio assets.
- Next might come desired outcomes such as annual giving to charity which can be met with a layer of moderate risk investments.
- Finally low priority aspirations such as increasing the value of the portfolio to leave it to a foundation at death could be met with higher risk investments.

GBI is consistent with the concept of loss-aversion in prospect theory. The client can see that more important goals are exposed to less risky assets and less potential loss. It is better suited to wealth preservation than to wealth accumulation. By utilizing the mental accounting of layers to meet goals, the client can better understand the construction of the portfolio.

Behaviorally Modified Asset Allocation (BMAA)

BMAA is another approach to asset allocation that incorporates the client's behavioral biases. A worst case scenario for many clients is to abandon an investment strategy during adverse periods. The outcome can be very detrimental because the change is likely to occur at a low point, right before a recovery for the strategy begins. Determining in advance a strategy the client can adhere to during adverse periods would be a better outcome. BMAA considers whether it is better to moderate or adapt to the client's biases in order to construct a portfolio the client can stick with.

BMAA starts with identifying an optimal strategic asset allocation consistent with traditional finance. It then considers the relative wealth of the client and the emotional versus cognitive nature of the client's biases to adjust that allocation.

- A high level of wealth versus lifestyle and what the client considers essential needs would be a low standard of living risk (SLR). With a low SLR the client can afford to deviate from an optimal portfolio. The rich can afford to be eccentric.
- Biases that are primarily cognitive in nature are easier to modify. Working with the client can accomplish this and allow for less deviation from a traditionally efficient portfolio mix.
- In contrast emotionally based biases are generally harder to modify and may have to be accommodated, resulting in a less efficient portfolio.
- Finally the amount of deviation to accept from a traditional optimal allocation should be established. Typically this would be done by setting a range in which an asset class can deviate from optimal before it must be adjusted back. For example suppose an optimal allocation would call for 60% equity for the client.

The table below demonstrates how the process could be implemented in order to create an asset allocation that the client will be able to adhere to over the long run.

Figure 1: When to Accommodate Versus When to Modify

<i>Relative Wealth (RW) and SLR:</i>	<i>Biases are Primarily:</i>	<i>Accommodate to or Modify the Biases of the Client:</i>	<i>Allowable Deviations Up or Down from Optimal Weight:</i>
High RW and low SLR	Emotional	Accommodate	10 to 15%
High RW and low SLR	Cognitive	Some of both	5 to 10%
Low RW and high SLR	Emotional	Some of both	5 to 10%
Low RW and high SLR	Cognitive	Modify	0 to 3%

- The specific deviation numbers chosen are arbitrary and are intended to show that low SLR and emotional biases can be accommodated with large deviations from the optimal weights. The client can afford to allow their emotions to be accommodated.
- In contrast high SLR and cognitive errors require the biases be addressed with the client and moderated to achieve a near optimal asset allocation. Those with low wealth cannot afford to deviate and cognitive errors are easier to overcome.
- The other two cases fall in between.

Case Study, Ms. Z:

Ms. Z is a new client of BF Advisors. BF begins each client relationship with an extensive set of interviews. These interviews determined Ms. Z has very low needs in relation to her wealth. With even modest diversification there is no reasonable likelihood she could outlive her assets. In addition she is expected to inherit large sums from her mother's estate. The estate settlement is expected in the next year.

BF also uses a set of standardized questions to identify the biases of each client. Ms. Z shows strong tendencies to conservatism, sample-size neglect, framing, endowment, and availability biases. After completing the questions she meets with her BF portfolio manager and asks for further information regarding the biases. She has always enjoyed studying new areas and learning new approaches to life.

Recommend whether her biases should be accommodated or modified, and whether her portfolio will deviate from a traditional optimal allocation.

Answer:

Ms. Z has very low SLR which would allow her biases to be accommodated however her biases are primarily cognitive (except for endowment bias). In addition she likes to learn suggesting that it may be easy to moderate her biases. Therefore a mix of accommodation and modification is appropriate, though in her case we will lean towards modification and smaller deviations from a traditional optimal asset allocation.

KEY CONCEPTS

LOS 8.a

Cognitive errors result from the inability to analyze information or from basing decisions on partial information. Individuals try to process information into rational decisions, but they lack the capacity or sufficient information to do so. Cognitive errors can be divided into belief perseverance errors and processing errors. **Emotional biases** are caused by the way individuals frame the information and the decision rather than the mechanical or physical process used to analyze and interpret it. Emotional bias is more of a spontaneous reaction.

LOS 8.b,c

Cognitive Errors: Belief Perseverance

- Conservatism bias.
- Confirmation bias.
- Representativeness bias.
- Control bias.
- Hindsight bias.

Cognitive Errors: Information Processing

- Anchoring and adjustment.
- Mental accounting bias.
- Framing bias.
- Availability bias.

Emotional Biases

- Loss aversion bias.
- Overconfidence bias.
- Self-control bias.
- Status quo bias.
- Endowment bias.
- Regret-aversion bias.

LOS 8.d

Conservatism Bias

Impact: Slow to react to new information or avoid the difficulties associated with analyzing new information. Can also be explained in terms of Bayesian statistics; place too much weight on the base rates.

Mitigation: Look carefully at the new information itself to determine its value.

Confirmation Bias

Impact: Focus on positive information about an investment and ignore or dismiss anything negative. Can lead to too much confidence in the investment and to overweighting it in the portfolio.

Mitigation: Actively seek out information that seems to contradict your opinions and analyze it carefully.

Representativeness Bias

Impact: Place information into categories utilizing an if-then heuristic. Place too much emphasis on perceived category of new information. Likely to change strategies based on a small sample of information.

Mitigation: Consciously take steps to avoid base rate neglect and sample size neglect. Consider the true probability that information fits a category. Use *Periodic Table of Investment Returns*.

Illusion of Control Bias

Impact: The illusion of control over one's investment outcomes can lead to excessive trading with the accompanying costs. Can also lead to concentrated portfolios.

Mitigation: Seek opinions of others. Keep records of trades to see if successful at controlling investment outcomes.

Hindsight Bias

Impact: Overestimate accuracy of their forecasts and take too much risk.

Mitigation: Keep detailed record of all forecasts, including the data analyzed and the reasoning behind the forecast.

Anchoring and Adjustment

Impact: Tend to remain focused on and stay close to their original forecasts or interpretations.

Mitigation: Give new information thorough consideration to determine its impact on the original forecast or opinion.

Mental Accounting Bias

Impact: Portfolios tend to resemble layered pyramids of assets. Subconsciously ignore the correlations of assets. May consider income and capital gains separately rather than as parts of the same total return.

Mitigation: Look at all investments as if they are part of the same portfolio to analyze their correlations and determine true portfolio allocation.

Framing Bias

Impact: Narrow a frame of reference; individuals focus on one piece or category of information and lose sight of the overall situation or how the information fits into the overall scheme of things.

Mitigation: Investors should focus on expected returns and risk, rather than on gains or losses. That includes assets or portfolios with existing gains or losses.

Availability Bias: Four causes are retrievability, categorization, narrow range of experience, and resonance.

Impact: Select investments based on how easily their memories are retrieved and categorized. Narrow range of experience can lead to concentrated portfolios.

Mitigation: Develop an IPS and construct a suitable portfolio through diligent research.

Loss Aversion Bias

Myopic loss aversion combines the effects of time horizon and framing.

Impact: Focus on current gains and losses. Continue to hold losers in hopes of breaking even. Sell winners to capture the gains.

Mitigation: Perform a thorough fundamental analysis. Overcome mental anguish of recognizing losses.

Overconfidence Bias

Impact: Hold under-diversified portfolios; underestimate the downside while overestimating the upside potential. Trade excessively.

Mitigation: Keep detailed records of trades, including the motivation for each trade. Analyze successes and losses relative to the strategy used.

Self-Control Bias

Impact: Lack discipline to balance short-term gratification with long-term goals. Tend to try to make up the shortfall by assuming too much risk.

Mitigation: Maintain complete, clearly defined investment goals and strategies. Budgets help deter the propensity to over-consume.

Status Quo Bias

Impact: Risk characteristics of the portfolio change. Investor loses out on potentially profitable assets.

Mitigation: Education about risk and return and proper asset. Difficult to mitigate.

Endowment Bias

Impact: Value of owned assets higher than same assets if not owned. Stick with assets because of familiarity and comfort or were inherited.

Mitigation: Determine whether the asset allocation is appropriate.

Regret Aversion Bias

Impact: Stay in low-risk investments. Portfolio with limited upside potential. Stay in familiar investments or “follow the herd.”

Mitigation: Education is primary mitigation tool.

Goals-based investing recognizes that individuals are subject to loss aversion and mental accounting. Builds a portfolio in layers, each consisting of assets used to meet individual goals. Pyramiding: bottom layer comprised of assets designated to meet the investor’s most important goals. Each successive layer consists of increasingly risky assets used to meet less and less important goals. Provides investor with ability to see risk more clearly. Although portfolio probably won’t be efficient, it will tend to be fairly well diversified.

Behaviorally Modified Asset Allocation

- Emotional biases are more often accommodated through deviations from the rational asset portfolio allocation.
- Higher wealth relative to lifestyle needs allows for greater deviations from the rational portfolio.
- The emotional biases of the lower-wealth individual are treated about the same as the cognitive biases of the wealthier individual.
- The amount of deviation is also affected by the number of different asset classes in the portfolio.
- The lower the suggested deviation from the rational portfolio asset allocation, the greater the need to mitigate the investor’s behavioral biases.
 - Due to significant standard of living risk, for example, the cognitive biases of the low-wealth investor must be mitigated.

CONCEPT CHECKERS

1. Which of the following would *most likely* be classified as an emotional bias? The investor:
 - A. has difficulty interpreting complex new information.
 - B. only partially adjusts forecasts when he receives new information.
 - C. has a tendency to value the same assets higher if he owns them than if he does not own them.
2. Which of the following would *most likely* indicate that an investor is subject to an emotional bias?
 - A. Regularly basing decisions on only a subset of available information.
 - B. Reacting spontaneously to a negative earnings announcement by quickly selling a stock.
 - C. Remaining invested in a profitable technology stock even though new information indicates its PE ratio is too high.
3. A cognitive error is *best* indicated by which of the following?
 - A. Taking more and more risk because the investor mentally attributes his recent investing success to his strategies.
 - B. Ending up with a suboptimal asset allocation because the investor does not use a holistic approach to construct the portfolio.
 - C. Experiencing a significant loss on an investment because the investor hoped to recover from a negative position that subsequently worsened.
4. Don Henry has just received new information regarding his investment in Orange, Inc. The new information appears to conflict with his earlier forecast of what the stock price should be at this point. Nonetheless, he is unwilling to incorporate the new information into his forecast and to revise it accordingly. What behavioral trait is Henry displaying?
 - A. Conservatism bias.
 - B. Confirmation bias.
 - C. Anchoring and adjustment.
5. Abby Lane is a savvy investor who has investments scattered across many different accounts, from bank savings and before- and after-tax retirement accounts to taxable nonretirement accounts. She also has several different investing goals ranging from important short-term goals to longer-term “wish list” goals. Even though she has many investments along with different goals, she is smart enough to take into consideration the correlation between her assets. She allocates the assets according to her risk-return profile across different asset classes, viewing the investments as comprising a single portfolio with a single measure of risk. What behavioral trait would represent the *opposite* way Lane approaches investing?
 - A. Framing bias.
 - B. Mental accounting.
 - C. Overconfidence bias.

6. Twenty years ago, Jane Ivy set up her initial asset allocation in her defined contribution plan by placing an equal amount in each asset class and never changed it. Over time, she increased her contribution by 1% per year until she reached the maximum amount allowed by law. Due to her steadfastness and good fortune, coupled with matching funds from her employer, she now finds herself in her early 40s with a million-dollar retirement account. Which of the following biases does Ivy suffer from, and how should she remedy that bias?
- A. Representativeness; make sure the sample size is correct and new information is interpreted correctly.
 - B. Status quo bias; educate the investor on tradeoffs between risk and return and subsequent proper asset allocation.
 - C. Availability bias; develop an investment policy statement through diligent research rather than information that is readily available.

ANSWERS – CONCEPT CHECKERS

1. C This describes the *endowment bias*, where individuals place a higher value on assets they own than if they did not own those same assets. The other two answer choices describe cognitive errors that are due to the inability to analyze all the information.
2. B Emotional biases tend to elicit more of a spontaneous reaction than a cognitive error would. Making a decision based only on partial information is indicative of a cognitive error. Ignoring a high PE ratio could be indicative of the conservatism bias, which is reacting slowly to new information or avoiding analyzing new information. It could also indicate the confirmation bias, where the investor focuses on positive information and ignores negative information. Both conservatism and confirmation biases are cognitive errors of belief perseverance.
3. B This describes the cognitive error of *mental accounting* in which the investor ends up with a layered pyramid as her portfolio. The different layers of investments do not take into consideration the correlation between the assets and are viewed in isolation from each other; thus, the asset allocation tends to be suboptimal from a risk-return perspective. Taking more risk as a result of attributing investing success to a particular strategy represents overconfidence which is an emotional bias.
4. A This describes the conservatism bias where individuals mentally place more emphasis on the information they used to form their original forecast than on new information. Anchoring and adjustment is closely related to the conservatism bias but is characterized as individuals being stuck on a particular forecasting number and is not associated with how investors relate new information to old information as the conservatism bias does. The confirmation bias is when individuals notice only information that agrees with their perceptions or beliefs. They look for confirming evidence while discounting or even ignoring evidence that contradicts their beliefs.
5. B Lane is investing based on traditional finance theory, which assumes investors make rational decisions and view their assets in a single portfolio context with an asset allocation that takes into consideration the correlation between the assets. The *opposite* approach would be *mental accounting*, where the investor views his assets in different “accounts,” each with a separate purpose to achieve a separate goal. The resulting portfolio resembles a pyramid comprised of layers with each layer making up a different set of assets used to accomplish a separate goal. The correlation between those assets is not taken into consideration; thus, the assets are usually not optimally allocated among different asset classes. The *framing bias* is when individuals view information differently depending upon how it is received. *Overconfidence* is when people think they know more than they do, have more and better information than others, and are better at interpreting it, leading to under-diversified portfolios and excessive trading.
6. B Ivy is suffering from the *status quo bias*, where investors leave their asset allocation alone and don’t change it according to changing market conditions or changes in their own circumstances. The other two answer choices correctly describe ways of mitigating those behavioral traits.

BEHAVIORAL FINANCE AND INVESTMENT PROCESSES¹

Study Session 3

EXAM FOCUS

This topic review focuses on the influence of behavioral traits on all aspects of the investment process—creating the investment policy statement, the client/adviser relationship, portfolio construction, analyst forecasts, and market anomalies. Be able to discuss the benefit to both clients and advisers of incorporating behavioral finance into the client's investment policy statement and the limitations of classifying investors into behavioral types. Be able to explain how behavioral finance influences the client/adviser relationship and to discuss the benefits to both of incorporating the behavioral aspects of investing into the relationship. Understand how investors tend to construct portfolios from a behavioral perspective. Be able to explain how behavioral biases affect analysts in their forecasting and the remedial actions that should be taken to reduce the influence of those biases. Also, know how behavioral biases affect the decision-making processes of investment committees. Lastly, be able to discuss the influence of behavioral biases on entire markets.

CLASSIFYING INVESTORS INTO BEHAVIORAL TYPES

LOS 9.a: Explain the uses and limitations of classifying investors into various types.

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Financial market participants, both investors and financial advisers, have found that when the psychology of investing is recognized in creating the client's investment policy statement and subsequent implementation, the outcome is likely to be favorable. Applying a strictly traditional finance perspective can lead to pitfalls and unpleasant surprises for both the client and adviser. For example, investors who are overly risk averse or risk seeking react more emotionally to investing than would be expected of the typical, average investor. The adviser will have better success by addressing these clients' emotional biases rather than ignoring them and taking a more traditional finance perspective.

The traditional finance perspective seeks to educate clients based on more quantitative measures of investing, such as standard deviation and Sharpe ratios, and these are of little interest to the client who reacts more emotionally to investing. The goal of viewing the client/adviser relationship from a psychological perspective as compared to a purely traditional finance perspective is for the adviser to better understand his client and to

1. Terminology used throughout this topic review is industry convention as presented in Reading 9 of the 2013 CFA Level III exam curriculum.

make better investment decisions. By incorporating behavioral biases into clients' IPSs, clients' portfolios will tend to be closer to the efficient frontier, and clients will be more trusting and satisfied and tend to stay on track with their long-term strategic plans. Ultimately, since everyone is happy, the result is a better overall working relationship between client and adviser.

Behavioral Models

We will discuss three behavioral models: (1) the Barnewall two-way model, (2) the Bailard, Biehl, and Kaiser five-way model, and (3) the Pompain model.

The **Barnewall two-way behavioral model**² was developed in 1987 and classifies investors into only two types: passive and active. *Passive investors* are those who have not had to risk their own capital to gain wealth. For example they might have gained wealth through long, steady employment and disciplined saving or through inheritance. As a result of accumulating wealth passively, they tend to be more risk averse and have a greater need for security than their "active" counterparts. *Active investors* risk their own capital to gain wealth and usually take an active role in investing their own money. Active investors are much less risk averse than passive investors and are willing to give up security for control over their own wealth creation.



Professor's Note: The causal relationship between steadily accumulating wealth over time and a high aversion to risk could go in either direction. Either one can lead to the other.

The **Bailard, Biehl, and Kaiser (BB&K) five-way model**³, developed in 1986, classifies investors along two dimensions according to how they approach life in general. The first dimension, *confidence*, identifies the level of confidence usually displayed when the individual makes decisions. Confidence level can range from confident to anxious. The second dimension, *method of action*, measures the individual's approach to decision making. Depending on whether the individual is methodical in making decisions or tends to be more spontaneous, method of action can range from careful to impetuous.

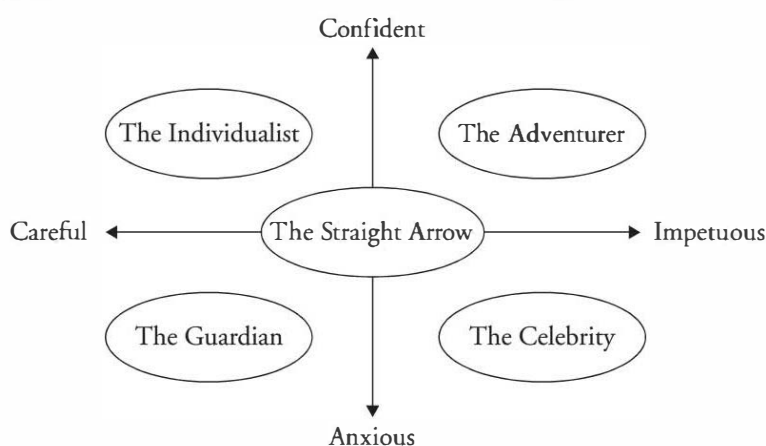
BB&K categorize investors into five behavioral types, which lie at different points in a grid formed by confidence/method of action. For example, the "straight arrow" investor would lie in the center of the grid, with the other four behavioral types scattered around the center.

Using the two dimensions like axes on a graph, the five behavioral types of the BB&K model are summarized in the following according to confidence and method of action, as indicated in Figure 1.

2. Barnewall, Marilyn. 1987. "Psychological Characteristics of the Individual Investor." *Asset Allocation for the Individual Investor*. Charlottesville, VA: The Institute of Chartered Financial Analysts.
3. Bailard, Brad M., David L. Biehl, and Ronald W. Kaiser. 1986. *Personal Money Management*, 5th ed. Chicago: Science Research Associates.

1. The **adventurer** has the following traits:
 - Confident and impetuous (northeast quadrant).
 - Might hold highly concentrated portfolios.
 - Willing to take chances.
 - Likes to make own decisions.
 - Unwilling to take advice.
 - Advisors find them difficult to work with.
2. The **celebrity** has the following traits:
 - Anxious and impetuous (southeast quadrant).
 - Might have opinions but recognizes limitations.
 - Seeks and takes advice about investing.
3. The **individualist** has the following traits:
 - Confident and careful (northwest quadrant).
 - Likes to make own decisions after careful analysis.
 - Good to work with because they listen and process information rationally.
4. The **guardian** has the following traits:
 - Anxious and careful (southwest quadrant).
 - Concerned with the future and protecting assets.
 - May seek the advice of someone they perceive as more knowledgeable than themselves.
5. The **straight arrow** has the following traits:
 - Average investor (intersection of the two dimensions).
 - Neither overly confident nor anxious.
 - Neither overly careful nor impetuous.
 - Willing to take increased risk for increased expected return.

Figure 1: Classification of Investors According to the BB&K Behavioral Model⁴



4. Based on Exhibit 1, 2013 Level III curriculum, vol. 2, p 105.

The **Pompian behavioral model**⁵, developed in 2008, identifies four behavioral investor types (BITs). Pompian suggests that the adviser go through a 4-step process to determine the investor's BIT.

1. Interview the client to determine if she is active or passive as an indication of her risk tolerance.
2. Plot the investor on a risk tolerance scale.
3. Test for behavioral biases.
4. Classify the investor into one of the BITs.

Figure 2 shows the results of the Pompian method of classifying investors. You will notice that both the *Passive Preserver* and the *Active Accumulator* tend to make emotional decisions. The *Friendly Follower* and *Independent Individualist* tend to use a more thoughtful approach to decision making. The most common cognitive and emotional biases associated with each investor type are listed following Figure 2.

Figure 2: Four Investor Types, Investment Styles, and Behavioral Biases⁶

<i>Investor Type</i>	<i>Risk Tolerance</i>	<i>Investment Style</i>	<i>Decision Making</i>
Passive Preserver	Low ↓	Conservative ↓	Emotional
Friendly Follower			Cognitive
Independent Individualist			Cognitive
Active Accumulator	High	Aggressive	Emotional

Most common *emotional* biases exhibited:

- **Passive Preserver:** Endowment, loss aversion, status quo, regret aversion.
- **Friendly Follower:** Regret aversion.
- **Independent Individualist:** Overconfidence, self-attribution.
- **Active Accumulator:** Overconfidence, self-control.

Most common *cognitive* biases exhibited:

- **Passive Preserver:** Mental accounting, anchoring and adjustment.
- **Friendly Follower:** Availability, hindsight, framing.
- **Independent Individualist:** Conservatism, availability, confirmation, representativeness.
- **Active Accumulator:** Illusion of control.

5. Pompian, Michael. 2008. "Using Behavioral Investor Types to Build Better Relationships with Your Clients." *Journal of Financial Planning*, October 2008: 64-76.

6. Based on Exhibit 4, 2013 Level III curriculum, vol. 2, p 108.

Behavioral Investor Types (BITs)

As previously mentioned, the last step in Pompian's process of determining which behavioral bias the investor is exhibiting is to categorize the investor into a behavioral investor type (BIT). There are four BITs, ranging from conservative to aggressive investing. The first BIT is the **Passive Preserver**, characterized as having low risk tolerance, an emotional bias, not willing to risk his own capital, usually not financially sophisticated, and possibly difficult to advise because he is driven by emotion.

The **Friendly Follower** would also be considered a passive investor who has low to moderate risk tolerance and suffers mainly from cognitive errors, which are errors resulting from faulty reasoning and not emotional biases. A Friendly Follower tends to overestimate her risk tolerance and wants to be in the most popular investments with little regard to market conditions or how the investment fits into her overall long-term investment plan. Since a Friendly Follower tends to approach investing from a more cognitive (thinking) perspective, the best course of action in advising her is to use more quantitative methods in educating her on the benefits of portfolio diversification.

The **Independent Individualist** is an active investor who is willing to risk his own capital and give up security to gain wealth. He has moderate to high risk tolerance and suffers from cognitive biases. He is strong-willed, likes to invest, does his own research, and tends to be a contrarian. The Independent Individualist tends to be difficult to advise but will listen to sound advice. Therefore, the best approach to advising him is regular education on investing concepts relevant to the investor.

The **Active Accumulator** is an active investor with a high tolerance for risk who approaches investing from an emotional perspective. The Active Accumulator is an aggressive investor who often comes from an entrepreneurial background and likes to get deeply involved in her investing. She is strong-willed, confident, and likes to control her investing, making her the most difficult of all the BITs to advise. Thus, the best course of action for the adviser is to take control of the investment process and not let the investor control the situation.

Limitations on Classifying Investors into Behavioral Types

Many times, individuals act irrationally at unpredictable moments, making it difficult to apply the different behavioral investor traits consistently for any one investor over a period of time. This leads to several limitations of classifying investors into the various behavioral investor types:

- Many individuals may simultaneously display both emotional biases and cognitive errors. This can make it difficult and inappropriate to try and classify them as to whether their biases are emotional or cognitive; they are both.

- An individual might display traits of more than one behavioral investor type, making it difficult to place the individual into a single category.
- As investors age, they will most likely go through behavioral changes, usually resulting in decreased risk tolerance along with becoming more emotional about their investing.
- Even though two individuals may fall into the same behavioral investor type, the individuals should not necessarily be treated the same due to their unique circumstances and psychological traits.
- Individuals tend to act irrationally at unpredictable times because they are subject to their own specific psychological traits and personal circumstances. In other words, people don't all act irrationally (or rationally) at the same time.

THE CLIENT/ADVISER RELATIONSHIP

LOS 9.b: Discuss how behavioral factors affect adviser–client interactions.

CFA® Program Curriculum, Volume 2, page 113

The goal of the client/adviser relationship is constructing a portfolio that the client is comfortable with and will be happy staying in over the long term. This is more easily accomplished once the adviser recognizes the need to incorporate behavior biases into the investment decision-making process.

The success of the typical client/adviser relationship can be measured in four areas, and each one is enhanced by incorporating behavioral finance traits:

1. *The adviser understands the long-term financial goals of the client.* Behavioral finance helps the adviser understand the reasons for the client's goals. The client/adviser relationship is enhanced because the client feels the adviser truly understands him and his needs.
2. *The adviser maintains a consistent approach with the client.* Behavioral finance adds structure and professionalism to the relationship, which helps the adviser understand the client before giving investment advice.
3. *The adviser acts as the client expects.* This is the area that can be most enhanced by incorporating behavioral finance into the client/adviser relationship. Once the adviser thoroughly understands the client and her motivations, the adviser knows what actions to perform, what information to provide, and the frequency of contact required to keep the client happy.
4. *Both client and adviser benefit from the relationship.* The primary benefit of incorporating behavioral finance into the client/adviser relationship is a closer bond between the two. This results in happier clients and an enhanced practice and career for the adviser.

Risk Tolerance Questionnaires

As one of the first steps in the client/adviser relationship, the adviser has the client fill out a risk tolerance questionnaire. Unfortunately, the same individuals can give different answers to the same set of questions depending on their frame of mind or current circumstances. In addition, most questionnaires are not structured to measure behavioral biases. This means there are a number of limitations to the traditional questionnaire.

First, since an individual's responses are affected by the wording of questions (framing), the same questions can produce different results if the structure of the questions is changed only slightly. Then, since client answers reflect all their behavioral biases, and those in turn are affected by the client's circumstances, administering a questionnaire only during the initial meeting is insufficient. Since the client's IPS should be analyzed annually for appropriateness, the questionnaire should also be administered annually.

Advisers also may interpret what the client says too literally, when client statements should only act as indicators. The successful adviser is able to determine the client's intent, for example, when he states a minimum allowable return in a given year. Rather than interpret the minimum allowable return literally, the adviser should use the statement as an indicator of the client's attitude toward risk and return. As a consequence, risk tolerance questionnaires are probably better suited to institutional investors, where less interpretation is required. Institutional investors are generally more pragmatic and tend to approach investing from a thinking/cognitive approach with a better understanding of risk and return.

BEHAVIORAL FACTORS AND PORTFOLIO CONSTRUCTION

LOS 9.c: Discuss how behavioral factors influence portfolio construction.

CFA® Program Curriculum, Volume 2, page 115

Research on defined contribution and 401k retirement plans in the U.S. indicates ways behavioral finance influences portfolio construction and how the insight gained might be applied in portfolio construction to achieve results more consistent with traditional finance theory. The studies show evidence of the following.

Status quo bias as investors do not make changes to their portfolio even when transaction costs are zero. Portfolio theory would clearly suggest that as time passes and the investors are aging, their optimal portfolio mix will shift. These changes are not being made. In addition, the investors generally accept whatever default investor option is offered by the employer and the contribution default rate. Neither is optimal as the asset mix is usually heavily weighted to money market funds and the contribution rate is lower than allowable.

To counteract this bias some companies have autopilot options such as target date funds. A target date fund has a stated retirement date and the manager of the fund automatically shifts the asset mix in ways suitable for investors planning to retire on that date. Once the investor picks the target date fund, the manager makes the adjustments for passage of time and the client does not need to take any action.

Naïve diversification as investors equally divide their funds among whatever group of funds is offered. According to a study, when offered a stock and bond fund, investors allocated 50/50. Then, if offered a stock and balanced fund, investors still allocated 50/50. Others suggest investors follow **conditional naïve diversification**. They select a smaller number of funds (e.g., three to five), and then allocate equally. In either case some argue this is motivated by seeking to avoid regret. Owning equal amounts of all, investors did not miss the best performer.

Excessive **concentration in employer stock** is also evident. This will be discussed in a later study session but it is very risky as retirement fund performance is now linked to compensation at an underlying source, the company. This could be based on *familiarity and overconfidence*. Employees may think, “I know the company and see it every day; surely it is a good investment.” If past performance has been good and you are familiar with it that would be *naïve extrapolation of past results*. *Framing and status quo effect of matching contributions* is exhibited as if the employer’s contribution is made in employer stock. In such cases the employees then increase the amount they chose to place in the employer stock. *Loyalty effect* is simply a desire to hold employer stock as a sign of loyalty to the company. When *financial incentives* are offer by the employer to invest in employer stock, the decision may be rational, but the holdings are in excess of what can be justified.

Excessive trading of holdings is evident in the brokerage account holdings of individuals even though individuals show status quo in retirement funds. This could be due to *overconfidence* as the individuals think they have superior stock selection skills or *self selection* as trading-oriented investors put their money in brokerage accounts and others put money in retirement portfolios at their company. Investors also show a *disposition effect* in selling stocks that appreciate (e.g., winners) but holding on to stocks that depreciate (e.g., losers).

Home bias is seen in under diversification and failing to invest outside the investor’s home country.

LOS 9.d: Explain how behavioral finance can be applied to the process of portfolio construction.

CFA® Program Curriculum, Volume 2, page 115

Behavioral Portfolios vs. Mean Variance Portfolios

Investors exhibit behavioral biases when they construct portfolios in *layers*, comprising a pyramid with each layer having a specific purpose in achieving a different goal. This is also referred to as **mental accounting** because the assets in each layer of the pyramid are viewed separately from each other with no regard to how they are correlated.

In the pyramid structure, the most pressing goals are placed on the bottom layer and are met using low-risk, conservative investments. Each successive layer going toward the top of the pyramid is comprised of riskier assets to accomplish less immediate or less important goals. The top of the pyramid is comprised of risky, more speculative assets

to meet “wish list” types of goals. Behavioral finance can be applied and benefit the portfolio management process by:

- Leading to the use of portfolios such as target funds, which work around the bias of investors to be static.
- Leading managers and clients to discuss the relative importance of goals and perceived risk. Tiered investment portfolios that the client can understand and maintain could be superior to traditional portfolios that consider correlation but that the client is unwilling to stay with.

ANALYST FORECASTS AND BEHAVIORAL FINANCE

LOS 9.e: Discuss how behavioral factors affect analyst forecasts and recommend remedial actions for analyst biases.

CFA® Program Curriculum, Volume 2, page 120

Research has shown that experts in varying fields make forecasting errors as a result of behavioral biases, and financial analysts are subject to those same biases. Surprisingly, it is analysts' superior skills in analyzing companies that makes them vulnerable to forecasting errors. An understanding of their weaknesses can help analysts limit the degree of their forecasting inaccuracies.

There are three primary behavioral biases that can affect analysts' forecasts:

(1) overconfidence, (2) the way management presents information, and (3) biased research.

Overconfidence



Professor's Note: Remember that overconfidence leads to underestimating risk and setting confidence intervals that are too narrow.

Analysts can be susceptible to overconfidence as a result of undue faith in their own forecasting abilities caused by an inflated opinion of their own knowledge, ability, and access to information. Analysts also tend to remember their previous forecasts as being more accurate than they really were (a form of hindsight bias). There are several behavioral biases that contribute to overconfidence.

Analysts are subject to the *illusion of knowledge bias* when they think they are smarter than they are. This, in turn, makes them think their forecasts are more accurate than the evidence indicates. The illusion of knowledge is fueled when analysts collect a large amount of data. This leads them to think their forecasts are better because they have more and better information than others. Gathering additional information could add to an analyst's overconfidence without necessarily making the forecast more accurate. The *illusion of control bias* can lead analysts to feel they have all available data and have reduced or eliminated all risk in the forecasting model; hence, the link to overconfidence.

Exhibiting *representativeness*, an analyst judges the probability of a forecast being correct on how well the available data represent (i.e., fit) the outcome. The analyst incorrectly combines two probabilities: (1) the probability that the information fits a certain information category, and (2) the probability that the category of information fits the conclusion.

An analyst exhibits the *availability bias* when he gives undue weight to more recent, readily recalled data. Being able to quickly recall information makes the analyst more likely to “fit” it with new information and conclusions. The *representativeness* and *availability biases* are commonly exhibited in reactions to rare events.

To subconsciously protect their overconfidence, analysts utilize **ego defense mechanisms**. One ego defense mechanism is the *self-attribution bias*. Analysts take credit for their successes and blame others or external factors for failures. Self-attribution bias is an ego defense mechanism, because analysts use it to avoid the cognitive dissonance associated with having to admit making a mistake.

The relationship between self-attribution bias, illusion of knowledge, and overconfidence are fairly obvious. By aligning past successes with personal talent, the analyst adds to the feeling of complete knowledge, which in turn fuels overconfidence.

Hindsight bias is another ego defense mechanism. In effect, the analyst selectively recalls details of the forecast or reshapes it in such a way that it fits the outcome. In this way, the forecast, even though it technically was off target, serves to fuel the analyst’s overconfidence. Hindsight bias then leads to future failures. By making their prior forecasts fit outcomes, analysts fail to properly recalibrate their models.

There are several actions analysts can take to minimize (mitigate) overconfidence in their forecasts. For example, they can self-calibrate better. *Self-calibration* is the process of remembering their previous forecasts more accurately in relation to how close the forecast was to the actual outcome. Getting prompt and immediate feedback through self evaluations, colleagues, and superiors, combined with a structure that rewards accuracy, should lead to better self-calibration. Analysts’ forecasts should be unambiguous and detailed, which will help reduce hindsight bias.

To help counteract the effects of overconfidence, analysts should seek at least one counterargument, supported by evidence, for why their forecast may not be accurate. Analysts should also consider *sample size*. Basing forecasts on small samples can lead to unfounded confidence in unreliable models. Lastly, Bayes’ formula is a useful tool for reducing behavioral biases when incorporating new information. Bayes’ formula is discussed in the topic review, *The Behavioral Finance Perspective*.

Influence by Company Management

The way a company’s management presents (frames) information can influence how analysts interpret it and include it in their forecasts. The problem stems from company managers being susceptible to behavioral biases themselves. There are three cognitive biases frequently seen when management reports company results: (1) framing, (2) anchoring and adjustment, and (3) availability.

Framing refers to a person's inclination to interpret the same information differently depending on how it is presented. We know, for example, that simply changing the order in which information is presented can change the recipient's interpretation of the information. In the case of company information, analysts should be aware that a typical management report presents accomplishments first.

Anchoring and adjustment refers to being "anchored" to a previous data point. Being influenced by (anchored to) the previous forecast, analysts are not able to fully incorporate or make an appropriate adjustment in their forecast to fully incorporate the effect of new information. The way the information is framed (presenting the company's accomplishments first), combined with anchoring (being overly influenced by the first information received), can lead to overemphasis of positive outcomes in forecasts.

Availability refers to the ease with which information is attained or recalled. The enthusiasm with which managers report operating results and accomplishments makes the information very easily recalled and, thus, more prominent in an analyst's mind. The more easily the information is recalled, the more emphasis (weight) it is given in the forecasting process.

Analysts should also look for **self-attribution bias** in management reports that is a direct result of the structures of management compensation packages. For example, management typically receives salary increases and bonuses based on operating results. Management is thus inclined to overstate results (overemphasize the positive), as well as the extent to which their personal actions influenced the operating results. Thus, self-attribution naturally leads to excessive optimism (overconfidence).

Analysts must also be wary of recalculated earnings, which do not necessarily incorporate accepted accounting methods. Again, since management compensation is based largely on operating results, there is a motivation to present the best possible data. The analyst should be particularly sensitive to earnings that are restated in a more favorable light than originally presented.

To help avoid the undue influence in management reports, analysts should focus on quantitative data that is verifiable and comparable rather than on subjective information provided by management. The analyst should also be certain the information is framed properly and recognize appropriate base rates (starting points for the data) so the data is properly calibrated.

Analyst Biases in Research

Biases specific to analysts performing research are usually related to the analysts' collecting too much information, which leads to the illusions of knowledge and control and to representativeness, all of which contribute to overconfidence. Two other common biases found in analysts' research are the *confirmation bias* and the *gambler's fallacy*.

The **confirmation bias** (related to *confirming evidence*) relates to the tendency to view new information as confirmation of an original forecast. It helps the analyst resolve cognitive dissonance by focusing on confirming information, ignoring contradictory information, or interpreting information in such a way that it conforms to the analyst's

way of thinking. The confirmation bias can also be seen in analysts' forecasts where they associate a sound company with a safe investment, even though the stock price and the current economic environment would indicate otherwise.

The **gambler's fallacy**, in investing terms, is thinking that there will be a reversal to the long-term mean more frequently than actually happens. A *representative bias* is one in which the analyst inaccurately extrapolates past data into the future. An example of a representative bias would be classifying a firm as a growth firm based solely on previous high growth without considering other variables affecting the firm's future.



Professor's Note: The gambler's fallacy can be effectively demonstrated with a coin toss example. Consider an individual who is watching a coin being tossed. He knows intellectually that the probability of heads or tails turning up in any single toss is 50%. Before the coin is tossed the first time, he maintains this 50%/50% prior probability. Now, assume the coin is tossed five times, and heads turns up all five times. Knowing that the long-term mean is 50% heads and 50% tails, the individual starts to feel the probability of tails turning up on the next toss has increased above 50%. In fact, if the run of heads increases, the individual's subjective probability that tails will come up on the next toss will also increase, even though the probability of either heads or tails stays at 50% with every toss.

There are many actions an analyst can take to prevent biases in research, some of which are the same as when they are interpreting management reports. For example, analysts should be aware of the possibility of *anchoring and adjustment* when they recalculate forecasts given new information. They should use metrics and ratios that allow for comparability to previous forecasts. They should take a systematic approach with prepared questions and gather data before forming any opinions or making any conclusions.

Analysts should use a structured process by incorporating new information sequentially and assigning probabilities using Bayes' formula to help avoid conclusions with unlikely scenarios. They should seek contradictory evidence, formulating a contradictory opinion instead of seeking more information that proves their initial hypothesis. They should get prompt feedback that allows them to re-evaluate their opinions and gain knowledge for future insight, all the while documenting the entire process.

INVESTMENT COMMITTEES

LOS 9.f: Discuss how behavioral factors affect investment committee decision making and recommend techniques for mitigating their effects.

CFA® Program Curriculum, Volume 2, page 131

Many investment decisions are made in a group setting (e.g., stock recommendations by research committees, analysts working in a team setting, pension plan decisions being approved by a board of trustees, or an investment club deciding which stocks to buy). The thinking is that the collective expertise of the individual members will contribute to

better investment decision making. In a group setting, the individual biases mentioned before can be either diminished or amplified with additional biases being created.

Social proof bias is when a person follows the beliefs of a group. Research has shown that the investment decision making process in a group setting is notoriously poor. Committees do not learn from past experience because feedback from decisions is generally inaccurate and slow, so systematic biases are not identified.

The typical makeup of a committee coupled with group dynamics leads to the problems normally seen with committees. Committees are typically comprised of people with similar backgrounds and, thus, they approach problems in the same manner. In a group setting, individuals may feel uncomfortable expressing their opinion if it differs with others or a powerful member of the group. The remedy is for committees to have the following features:

- Comprised of individuals with diverse backgrounds.
- Members who are not afraid to express their opinions even if it differs from others.
- A committee chair who encourages members to speak out even if the member's views are contrary to the group's views.
- A mutual respect for all members of the group.

BEHAVIORAL FINANCE AND MARKET BEHAVIOR

LOS 9.g: Describe how behavioral biases of investors can lead to market anomalies and observed market characteristics.

CFA® Program Curriculum, Volume 2, page 133

In an efficient market, one should not be able to consistently generate excess returns using any form of information. Once information is known to investors, it should be instantaneously and fully incorporated into prices. But this does not mean that all apparent pricing exceptions to the efficient market hypothesis are anomalies.

- An excess return before fees and expenses that disappears after properly reflecting all costs required to exploit it is not an anomaly.
- Some apparent anomalies are simply a reflection of an inadequate pricing model. If another model with an additional risk factor removes the excess return, it may not be an anomaly.
- Apparent anomalies can just be small sample size. Just because flipping a coin three times generates three heads, does not make the odds on the next flip anything more than 50/50.
- An anomaly may exist for only the short-run and disappear once it becomes known and exploited.
- Some apparent anomalies are a rational reflection of relevant economic factors. Year-end trading anomalies may just reflect rational behavior to reduce taxes.

But other deviations from the EMH and rationality do persist and behavioral finance can offer insight into these.

Momentum Effect

All forms of the EMH assert technical-price-based trading rules should not add value. Yet studies continue to show evidence of correlation in price movement. A pattern of returns that is correlated with the recent past would be classified as a **momentum effect**. This effect can last up to two years, after which it generally reverses itself and becomes negatively correlated, with returns reverting to the mean. This effect is caused by investors following the lead of others, which at first is not considered to be irrational. The collective sum of those investors trading in the same direction results in irrational behavior, however. There are several forms of momentum that can take place, which are discussed in the following.

Herding is when investors trade in the same direction or in the same securities, and possibly even trade contrary to the information they have available to them. Herding sometimes makes investors feel more comfortable because they are trading with the consensus of a group. Two behavioral biases associated with herding are the *availability bias* (a.k.a. the *recency bias* or *recency effect*) and *fear of regret*. In the availability bias, recent information is given more importance because it is most vividly remembered. It is also referred to as the availability bias because it is based on data that are readily available, including small data samples or data that do not provide a complete picture. In the context of herding, the recent data or trend is extrapolated by investors into a forecast.

Regret is the feeling that an opportunity has passed by and is a *hindsight bias*. The investor looks back thinking they should have bought or sold a particular investment (note that in the availability bias, the investor most easily recalls the recent positive performance). Regret can lead investors to buy investments they wish they had purchased, which in turn fuels a **trend-chasing effect**. Chasing trends can lead to excessive trading, which in turn creates short-term trends.

Financial Bubbles and Crashes

Financial bubbles and subsequent crashes are periods of unusual positive or negative returns caused by panic buying and selling, neither of which is based on economic fundamentals. The buying (selling) is driven by investors believing the price of the asset will continue to go up (down). A bubble or crash is defined as an extended period of prices that are two standard deviations from the mean. A crash can also be characterized as a fall in asset prices of 30% or more over a period of several months, whereas bubbles usually take much longer to form.

Typically, in a bubble, the initial behavior is thought to be rational as investors trade according to economic changes or expectations. Later, the investors start to doubt the fundamental value of the underlying asset, at which point the behavior becomes irrational. Recent bubbles were seen in the technology bubble of 1999–2000 and increased residential housing prices in the United Kingdom, Australia, and the United States.

In bubbles, investors sometimes exhibit rational behavior—they know they are in a bubble but don't know where the peak of the bubble is. Or, there are no suitable

alternative investments to get into, making it difficult to get out of the current investment. For investment managers, there could be performance or career incentives encouraging them to stay invested in the inflated asset class.

There are several different types of behavior that are evident during bubbles. Investors usually exhibit *overconfidence*, leading to excessive trading and underestimating the risk involved. Portfolios become concentrated, and investors reject contradictory information. Overconfidence is linked to the *confirmation bias*, in which investors look for evidence that confirms their beliefs and ignore evidence that contradicts their beliefs. *Self-attribution bias* is also present when investors take personal credit for the success of their trades (they make no attempt to link ex post performance to strategy).

Hindsight bias is present when the investor looks back at what happened and says, “I knew it all along.” *Regret aversion* is present when an investor does not want to regret missing out on all the gains everyone else seems to be enjoying. The *disposition effect* is prevalent when investors are more willing to sell winners and hold onto losers, leading to the excessive trading of winning stocks.

As the bubble unwinds in the early stages, investors are anchored to their beliefs, causing them to under-react because they are unwilling to accept losses. As the unwinding continues, the disposition effect dominates as investors hold onto losing stocks in an effort to postpone regret.

Value vs. Growth

Two anomalies discussed by Fama and French⁷ are associated with value and growth stocks. Value stocks have low price-to-earnings ratios, high book-to-market values, and low price-to-dividend ratios, with growth stocks having the opposite characteristics. In their 1998 study, Fama and French found that value stocks historically outperformed growth stocks in 12 of 13 markets over a 20-year period from 1975 to 1995. They also found that small-capitalization stocks outperformed large-caps in 11 of 16 markets. Additionally, they contend that in their three factor model, comprised of size, value, and market beta, the value stock mispricing anomaly disappears and is instead due to risk exposures of companies with a particular size and book-to-market value being more vulnerable during economic downturns.

Other studies have offered behavioral explanations, identifying the value and growth anomalies as a mispricing rather than an adjustment for risk. For example, in the **halo effect**, the investor transfers favorable company attributes into thinking that the stock is a good buy. A company with a good record of growth and share price performance is seen as a good investment with continued high expected returns. This is a form of representativeness in which investors extrapolate past performance into future expected returns, leading growth stocks to become overvalued.

The **home bias** anomaly is one where investors favor investing in their domestic country as compared to foreign countries. This also pertains to companies that are located closer to the investor. This bias can be related to a perceived information advantage or the

7. Fama, Eugene F. and Kenneth R. French, 1998. “Value versus Growth: The International Evidence.” *Journal of Finance*, vol 53, no. 6: 1975-1999.

comfort one feels from being closer to the home office or executives of the company. Analysts may see this as having easier access to those individuals, or a desire of the investor to invest in their community.

KEY CONCEPTS

LOS 9.a:

Incorporating behavioral biases into the client's IPS should result in the following:

- Portfolios that are closer to the efficient frontier.
- More satisfied clients.
- Clients who are better able to stay on track with their long-term strategic plans.
- Better working relationships between the client and adviser.

Limitations of classifying investors into behavioral types include the following:

- Individuals can display emotional and cognitive errors at the same time.
- The same individual may display traits of more than one behavioral investor type.
- As investors age, they become more risk averse and emotional toward investing.
- Individuals who fall into the same behavioral type shouldn't necessarily be treated the same.
- Unpredictably, individuals tend to act irrationally at different times.

LOS 9.b:

There are four areas of the client/adviser relationship that can be enhanced by incorporating behavioral finance into the relationship:

1. Behavioral finance helps the adviser understand the reasons for the client's goals.
2. Behavioral finance adds structure and professionalism to the relationship.
3. The adviser is better equipped to meet the client's expectations.
4. A closer bond between them results in happier clients and an enhanced practice for the adviser.

LOS 9.c:

Behavioral biases exhibited by defined contribution (DC) plan participants:

- *Status quo bias*: Investors make no changes to their initial asset allocation.
- *Naïve diversification (1/n naïve diversification)*: Employees allocate an equal proportion of their retirement funds to each mutual fund in the plan.

Reasons employees invest in their own company's stock.

- *Familiarity*: They underestimate its risk; they become overconfident in their estimate of the company's performance.
- *Naïve extrapolation*: The company's recent good performance is extrapolated into expected future performance.
- *Framing*: If the employer's contribution is in company stock, employees tend to keep it rather than sell it and reallocate.
- *Loyalty*: Employees hold company stock in an effort to help the company (e.g., to prevent a takeover by another firm).
- *Financial incentive*: Tax incentives or the ability to purchase the stock at a discount lead to holding too much company stock.

Due to *overconfidence*, retail investors trade their brokerage accounts excessively. The result can be lower returns due to trading costs. *Disposition effect*: Investors tend to sell winners too soon and hold losers too long.

Home bias is closely related to *familiarity*. It leads to staying completely in or placing a high proportion of assets in the stocks of firms in their own country.

Mental accounting: Investors tend to construct portfolios in layers (pyramids). Each layer is used to meet a different goal. Investors see each layer as having a separate level of risk and ignore correlations of assets in the different layers.

LOS 9.d

Behavioral finance insights could lead to portfolio construction using:

- Target funds to overcome status quo bias.
- Layered portfolios that accommodate perceptions of risk and importance of goals to build portfolios the client will stay with.

LOS 9.e:

Analysts typically exhibit three biases: (1) overconfidence; (2) interpreting management reports; and (3) biases in their own research.

Behavioral biases that contribute to overconfidence:

- The illusion of knowledge bias.
- The self-attribution bias.
- Representativeness.
- The availability bias.
- The illusion of control bias.
- Hindsight bias.

Actions analysts can take to minimize overconfidence:

- Get feedback through self evaluations, colleagues, and superiors, combined with a structure that rewards accuracy, leading to better self-calibration.
- Develop forecasts that are unambiguous and detailed, which help to reduce hindsight bias.
- Provide one counterargument supported by evidence for why their forecast may not be accurate.
- Consider sample size and model complexity.
- Use Bayes' formula.

Reporting by company management is subject to behavioral biases:

- Framing.
- Anchoring and adjustment.
- Availability.

Analysts should be aware of the following when a management report is presented:

- Results and accomplishments are usually presented first, giving more importance to that information.
- Self-attribution bias in the reports.
- Excessive optimism.
- Recalculated earnings.

Actions the analyst can take to prevent undue influence in management reports:

- Focus on verifiable quantitative data.
- Be certain the information is framed properly.
- Recognize appropriate base rates so the data is properly calibrated.

Analyst biases in research:

- Usually related to collecting too much information.
- Leads to illusions of knowledge and control as well as representativeness.
- Inaccurately extrapolate past data into the future.
- Can suffer from *confirmation bias* and *gambler's fallacy*.

To prevent biases in research:

- Ensure previous forecasts are properly calibrated.
- Use metrics and ratios that allow comparability to previous forecasts.
- Take a systematic approach with prepared questions and gathering data first before making conclusions.
- Use a structured process; incorporate new information sequentially assigning probabilities using Bayes' formula.
- Seek contradictory evidence and opinions.

LOS 9.f:

Committee forecasts are usually no better than an individual's. In committees individual behavioral biases can be diminished or amplified. *Social proof bias* is when a person follows the beliefs of a group.

Committees are typically comprised of people with similar backgrounds; they tend to approach problems in the same manner. Individuals may feel uncomfortable expressing their opinions. To overcome these problems, construct committees with individuals who have diverse backgrounds, are not afraid to express their opinions, and have respect for the other members of the group.

LOS 9.g:

Market anomalies:

- *Momentum effect*. Patterns in returns that are caused by investors following the lead of others; they tend to trade in the same direction, which is referred to as *herding*.
- *Financial bubbles and crashes*. Periods of unusual positive or negative returns caused by panic buying or selling. They can be defined as a period of prices two standard deviations from their historical mean. A crash can also be characterized as a fall in asset prices of 30% or more over a period of several months; bubbles usually take much longer to form. Behavioral biases exhibited during bubbles are overconfidence, confirmation bias, self-attribution bias, hindsight bias, regret aversion, and the disposition effect.
- *Value stocks*. Low price-to-earnings, high book-to-market, low price-to-dividend ratios. Growth stocks have the opposite characteristics.

CONCEPT CHECKERS

1. Identify three uses and three limitations of classifying investors into behavioral types.
2. List and explain two areas that are considered critical to a successful client/adviser relationship and how incorporating behavioral finance can enhance the relationship.
3. Which of the following is *least* indicative of the pyramid structure seen when individuals create portfolios?
 - A. The correlation between the assets in the pyramid is ignored.
 - B. Individuals subconsciously view the pyramid as having a single level of risk.
 - C. People tend to place their money into different “buckets,” which is referred to as mental accounting.
4. Behavioral finance would support building portfolios using which of the following techniques?
 - A. In a pyramid with low priority investment goals funded with low risk assets.
 - B. In a balanced fund with stocks and bonds.
 - C. Using target date funds.

5. Explain why and how hindsight bias is used in an analyst forecasts.

6. Which of the following is the *least* desirable trait to have in an investment committee?
 - A. The committee members come from diverse backgrounds.
 - B. The committee members are generally in consensus with one another.
 - C. The chairperson of the committee encourages individuals to speak out.

7. Explain what causes bubbles and crashes and list two ways of quantitatively identifying them.

ANSWERS – CONCEPT CHECKERS

1. Uses of classifying investors into behavioral types include:
 - Portfolios that are closer to the efficient frontier and more closely resemble ones based on traditional finance theory.
 - More trusting and satisfied clients.
 - Clients who are better able to stay on track with their long-term strategic plans.
 - Better overall working relationships between the client and adviser.

Limitations of classifying investors into behavioral types include:

 - Individuals may display both emotional and cognitive errors at the same time, with either behavior appearing irrational.
 - The same individual may display traits of more than one behavioral investor type at the same time; therefore, the investment adviser should not try to classify the individual into only one behavioral investor type.
 - As investors age, they will most likely go through behavioral changes, usually resulting in decreased risk tolerance, along with becoming more emotional about their investing.
 - Even though two individuals may fall into the same behavioral investor type, each individual would not be treated the same due to their unique circumstances.
 - Individuals tend to act irrationally at different times, seemingly without predictability.
2. A successful client/adviser relationship can be defined in four areas, with each one being enhanced by an understanding of how behavioral finance can play an important part in the relationship.
 - The adviser understands the long-term financial goals of the client. Behavioral finance helps the adviser understand the reasons for the client's goals, making the client feel like they are better understood.
 - The adviser maintains a consistent approach with the client. Behavioral finance adds structure and professionalism to the relationship, which helps the adviser understand the client before investment advice is given.
 - The adviser invests as the client expects. Once the adviser understands the motivations for the client's goals, the adviser is better equipped to meet the client's expectations.
 - Both client and adviser benefit from the relationship. The primary benefit of incorporating behavioral finance into the client/advisor relationship is a closer bond between them, resulting in happier clients and an enhanced practice for the adviser.
3. B In the pyramid structure, investors view each separate layer or investment within that layer as having a separate level of risk associated with the goal they are trying to accomplish with that investment. It is in the traditional finance theory approach of portfolio construction where all the investor's assets are viewed as one complete portfolio with a single level of risk. In the pyramid structure, the correlation between the assets in the pyramid is ignored, whereas in the traditional finance portfolio construction, the correlation between the assets is taken into consideration. In the pyramid structure, individuals tend to think of each layer separately, which is referred to as mental accounting.
4. C Target date funds overcome the status quo bias of individuals and adjust the portfolio as they age. A simple balanced approach does not make the adjustment and a pyramid approach is suggested, but low priority goals can be funded with higher risk assets.

5. Hindsight bias is an ego defense mechanism analysts use to protect themselves against being wrong in their forecast. It is used by selectively recalling what actually happened, allowing the analyst to adjust their forecast accordingly and making it look like their forecast was more accurate than it actually was. Hindsight bias is possible when the original forecast is vague and ambiguous, a poor forecasting trait, allowing the forecast to be adjusted.
6. **B** Committee members always being in consensus with each other is an undesirable trait of a committee, which could lead to poor investment decision making. It is more desirable to have a committee comprised of individuals with diverse backgrounds who are encouraged, and not afraid, to voice their opinions, even if the opinion differs from the others. These traits lead to better overall decisions being made.
7. Financial bubbles and crashes are periods of unusual positive or negative returns *caused by panic buying and selling*, neither of which are based on economic fundamentals. In a bubble, the buying is due to investors believing the price of the asset will continue to go up. Another way of defining a bubble or crash is a period of prices for an asset class that is two standard deviations away from the price index's mean value. A crash can also be characterized as a fall in asset prices of 30% or more over a period of several months.

SELF-TEST: BEHAVIORAL FINANCE

Use the following information for Questions 1 through 6.

Frank Brooks and Peter Timmons are portfolio managers for the largest mutual fund of Liberty Financial Advisers, which provides a variety of mutual funds for both individuals and institutions. Brooks has been a portfolio manager for eight years and has seen both bull and bear markets. Timmons is his assistant and has been at Liberty Financial Advisers for the two years following his graduation from a prestigious Master of Science in Finance program.

In their discussion over lunch, Brooks and Timmons discuss the latest quarterly earnings announcements for several firms in their portfolio. Despite optimistic projections for some firms, most announcements were quite disappointing. Timmons states that he is not convinced that their prospects are as grim as the announcements suggest.

The next day, Brooks and Timmons provide a presentation to Liberty Financial Advisers' clients. Their guest presenter is Stephen Davis, an economist at the local university who frequently provides economic commentary for national media outlets. During his presentation, Davis states that it is likely the United States will enter a recession next year. He recommends that the clients shift their assets into investment grade bonds and noncyclical stocks. He states that he has been successful in predicting recessions over the past 15 years and is certain of his forecasts. He states further that the only time he has been wrong in predicting the business cycle is when Congress unexpectedly increased spending beyond that expected. He states that if that had not happened, his prediction of a mild recession would have been correct, instead of the mild expansion that actually occurred.

During the afternoon session, Brooks discusses the various strategies at Liberty Financial Advisers. In the value/neglected firm strategy, Liberty Financial Advisers seeks out firms trading at reasonable valuations with no analyst following. Brooks states that several academic studies showed these firms to be good investments over a 3-year time horizon from July in year $t = 0$ to June 30 of year $t = +3$, following their identification on June 30 of year $t = 0$. Brooks states that he has adopted this strategy for his portfolio.

Later that evening at dinner, Brooks, Timmons, and Davis discuss the day's events. Commenting on investment strategies, Davis states that he focuses on growth stocks with 6-quarter earnings growth and monitors his portfolio on a quarterly basis. Davis also states that when the short-term moving average rises above the long-term moving average, this signals an opportune time to trade.

1. Which of the following *best* describes Timmons's behavioral characteristic?
Timmons:
 - A. uses frame dependence.
 - B. uses anchoring.
 - C. is loss averse.

2. Which of the following *best* describes Davis's behavioral characteristic? Davis:
 - A. uses frame dependence.
 - B. is overconfident.
 - C. is loss averse.
3. Which of the following *most likely* explains Davis's behavioral characteristic? Davis:
 - A. uses a bottoms-up approach to assess his skills.
 - B. is susceptible to cognitive dissonance.
 - C. is susceptible to feelings of regret.
4. Which of the following *best* explains Davis's defense of his past inaccurate forecast? Davis is exhibiting the behavioral bias of:
 - A. self attribution.
 - B. representativeness.
 - C. illusion of knowledge.
5. Which of the following *best* describes Brooks's investment strategy regarding value/neglected firms? Brooks's strategy is based on a:
 - A. support level.
 - B. moving average.
 - C. resistance level.
6. Which of the following *best* describes the trading signal indicated by Davis's investment strategy? Davis is describing a:
 - A. resistance level in which the stock is thought to be overvalued, eventually reverting back to its mean.
 - B. moving average where the short-term moving average is above the long-term moving average, indicating a "buy" signal.
 - C. moving average where the short-term moving average is above the long-term moving average, indicating the stock is overvalued, and the investor should sell.

SELF-TEST ANSWERS: BEHAVIORAL FINANCE

1. B Timmons uses anchoring. Despite the disappointing earnings announcements, he states that he is not convinced that the firms' prospects are as grim. He under-adjusts to new information because his beliefs about the firms are anchored in his previous optimistic forecasts.
2. B Davis is overconfident. He states that he is certain of his forecasts and reports a remarkable (and perhaps not fully disclosed) performance record.
3. B When professionals are overconfident, they tend to be susceptible to cognitive dissonance. The professional will ignore information that conflicts with his image of being successful. Davis admits only one past forecasting mistake in 15 years, which he then blames on an event outside of his control.
4. A Davis states that if Congress had not unexpectedly increased spending above what he had expected, then his prediction would have been correct. He is exhibiting self attribution bias, in which the analyst takes credit for successes and blames external events for failures, by claiming their forecast would have been accurate if the factors that were incorporated into the forecasting model hadn't changed. The illusion of knowledge bias is when analysts think they are smarter than they actually are, which can be fueled by collecting a large amount of data. The representativeness bias is when the analyst judges the probability of a forecast being correct based on how much the available data represents the outcome.
5. A This is the sort of odd question you do see occasionally on the exam. It is based more on the general CFA curriculum than on the specific reading. It is completely unpredictable, and the most important issue is to not spend too long on it. If you do not think of an answer, guess and move on.

First, recognize Brooks's strategy is to buy out of favor cheap stocks. Second, notice all of the answer choices are technical analysis charting terms. Third, think creatively to select or eliminate answers. A support level refers to a price moving down and then rallying back up. It vaguely fits in with buying a low-price stock. Nothing in the data or question relates to a moving average of price. So eliminate answer "B". A resistance level might refer to a ceiling or floor on a price chart. It is not a wrong answer but "A" is the best-fit answer.

6. B Davis is describing the moving average trading tactic in which the short-term moving average is above the long-term average, indicating a buy signal.