R52 The Behavioral Biases of Individuals

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1. Introduction and Categorization of Behavioral Biases

Traditional finance assumes that individuals act rationally by considering all available information in their decision-making process. This leads to optimal outcomes and efficient markets.

Behavioral finance challenges these assumptions by incorporating research on how individuals and markets actually behave. It assumes that people act "normal" rather than rational. It recognizes that people have behavioral biases that impact financial decision making. Behavioral biases can cause decisions to differ from the "rational" decisions of traditional finance.

This reading is organized as follows:

- Section 2 broadly characterizes behavioral biases into cognitive errors and emotional biases.
- Section 3 explains cognitive errors, the consequences of each bias, detection of the bias, and guidance for overcoming these biases.
- Section 4 describes emotional biases, the consequences of each bias, detection of the bias, and guidance for overcoming these biases.
- Section 5 discusess how behavioral finance influences market behaviour and the occurance of market anomalies

2. Categorizations of Behavioral Biases

Behavioral biases can be either cognitive errors or emotional biases.

Cognitive errors:

- Stem from statistical, information-processing, or memory errors.
- Can occur as a result of faulty reasoning.
- Are more easily corrected than emotional biases.
- Can be corrected through better information, education, and advice.

Emotional biases:

- Stem from impulse or intuition.
- Are influenced by feelings and emotion.
- Are spontaneous.
- Are less easy to correct as compared to cognitive errors.
- Can be recognized and "adapted" to.

3. Cognitive Errors

There are two categories of cognitive biases: 1) belief perseverance biases and 2) information-processing biases.

Instructor's Note: A summary of the nine cognitive errors is provided below. They are covered in detail in the subsequent sections. Memorize this summary.

Belief perseverance biases

- Conservatism bias: Maintain prior views by inadequately incorporating new information.
- Confirmation bias: Look for and notice what confirms their beliefs.
- Representativeness bias: Classify new information based on past experiences.
- Illusion of control bias: False belief that we can influence or control outcomes.
- Hindsight bias: See past events as having been predictable.

Information-processing biases

- Anchoring & adjustment bias: Incorrect use of psychological heuristics.
- Mental accounting bias: Treat one sum of money different from other.
- Framing bias: Answer question differently based on how it is asked.
- Availability bias: Heuristic approach influenced by how easily outcome comes to mind.

3.1 Belief Perseverance Biases

Belief perseverance is the tendency to cling to one's previously held beliefs irrationally or illogically. Belief perseverance biases are closely related to cognitive dissonance. Cognitive dissonance is the mental discomfort that occurs when new information conflicts with old beliefs or cognitions.

The belief perseverance biases discussed in this reading are: conservatism, confirmation, representativeness, illusion of control, and hindsight.

Conservatism Bias

Individuals maintain prior views by inadequately incorporating new information. From the traditional finance perspective, this can be described as the failure to update probabilities using Bayes' formula.

This bias has aspects of both statistical and information-processing errors. It causes individuals to overweight initial beliefs about probabilities and outcomes; and under-react to new information.

Consequences of conservatism bias:

- Maintain or be slow to update a view or a forecast, even when new information is available.
- Opt to maintain a prior belief rather than deal with the mental stress of updating beliefs given complex data. This relates to an underlying difficulty in processing new information.

- As a consequence of conservatism, an investor may hold a security longer than a rational decision maker.

Detecting and overcoming conservatism bias:

- Recognize that bias exists.
- Ask questions when presented with new information: "How does this information change my forecast?" "What is the impact of this information?"
- Updating of beliefs is inversely correlated with the effort involved. The more effort it takes to change a prior view, or the more effort it takes to process new information, the more likely the individual will ignore it.
- Should conduct careful analysis incorporating the new information.
- When it is difficult to interpret new information, seek advice from experts.

Confirmation Bias

Confirmation bias occurs when individuals look for and notice what confirms their beliefs and ignore what contradicts their beliefs.

Embedded Example

A client insists on continuing to hold stock, even when the adviser recommends otherwise because the client's follow-up research seeks only information that confirms his belief that the investment is still a good value.

Consequences of confirmation bias:

- Consider only positive information about an existing investment and ignore negative information.
- Develop screening criteria and ignore information that refutes the screening criteria' validity or supports other screening criteria.
- Under-diversify portfolios, leading to excessive exposure to risk.
- Hold a disproportionate amount of their investment assets in their employing company's stock. Because of the confirmation bias, the FMP(Financial market participant) is convinced of the company's favorable prospects and ignores unfavorable information.

Detecting and overcoming confirmation bias:

- Seek information that challenges your (FMPs) beliefs.
- Get corroborating support on an investment decision. If you are a technical analyst and you believe that the stock will go up. Before giving investment advice, it is advisable to get supporting information from (say) your colleague, a fundamental analyst. Because your colleague may have a completely different valuation of the stock. It is essential to make the extra effort to gather complete information, positive and negative, for better

decisions.

Representativeness Bias

Representativeness bias is when people classify new information based on past experiences and classifications. The two types of representativeness bias are 'base-rate neglect' and 'sample-size neglect'.

In base-rate neglect the base rate, or probability of the categorization is not adequately considered. For example, categorizing Company ABC as a "growth stock" without appropriate due diligence. FMPs rely on stereotypes when making investment decisions without adequately incorporating the base probability of the stereotype occurring. So, the classification of ABC is based on FMPs stereotypes about growth companies, but it ignores the base probability that the company may not be a growth company.

In sample-size neglect FMPs incorrectly assume that small sample sizes are *representative* of populations (or "real" data). In the investment context, sample size neglect can be seen when a few data points are naïvely extrapolated as being representative of a long-term trend. For example, an investor who puts too much emphasis on short-term results when considering a potential investment.

Consequences of representativeness bias:

- Adopt a view or a forecast based almost exclusively on new information or a small sample.
- Update beliefs using simple classifications rather than deal with the mental stress of updating beliefs given complex data.

Detecting and overcoming representativeness bias:

- Be aware of statistical mistakes you may be committing.
- Continually ask yourselves, "Are you overlooking the reality of the investment situation?"

Illusion of Control Bias

Illusion of control bias occurs when individuals incorrectly believe that they can control or influence outcomes when they cannot.

Consequences of illusion of control:

- Trade more than is prudent. For example, day traders believe that they have "control" over their investments' returns. This view leads to excessive trading, which may lead to lower realized returns.
- Inadequate diversification. An investor prefers to invest in a company where he works because he feels he controls its future. This leads to concentrated positions.

Detecting and overcoming illusion of control bias:

- Recognize that investing is a probabilistic activity.
- Global capitalism is complex; even the most powerful investors have little control over the outcomes of their investments. For example, AIG did not have control over what happened in 2008-2009.
- Seek contrary viewpoints.
- Maintain records of your transactions, the rationale behind each trade, the attributes that you have determined to be in favor of the investment's success. This will make you realize that you do not control the outcome of the investment.

Hindsight Bias

Hindsight bias is a bias where people may see past events as having been predictable and reasonable to expect. In hindsight, poorly reasoned decisions with positive results may be described as brilliant tactical moves, and poor results of well-reasoned decisions may be described as avoidable mistakes. Also, people will remember their own predictions of the future as more accurate than they actually were because they are biased by the knowledge of what has actually happened.

Consequences of hindsight bias:

- Overestimate the degree to which they predicted an investment outcome, which can lead to a false sense of confidence.
- Unfairly assess a money manager's or security's performance. For example, a money manager might have performed well in the past, given his value-investing strategy. But in the present year, growth stocks gave better returns. As a result, investors with the hindsight bias will believe that growth managers show superior performance to value managers because of what has taken place in securities markets. Performance is compared against what has happened as opposed to expectations.

Detecting and overcoming the bias:

- Recognize the bias.
- Ask such questions as, "Am I re-writing history or being honest with myself about the mistakes I made?"
- Carefully record and examine investment decisions, both good and bad.

3.2 Processing Errors

The second category of cognitive error is information-processing biases. These biases result in information being processed and used illogically or irrationally. In contrast to belief perseverance biases, these are less related to errors of memory and more to do with how information is processed. The processing errors discussed in this reading are

anchoring and adjustment, mental accounting, framing, and availability.

Anchoring and Adjustment Bias

Anchoring and adjustment bias is an information-processing bias in which the use of a psychological heuristic influences the way people estimate probabilities. People set an anchor that influences their decisions; they adjust the anchor up or down to reflect subsequent information. Irrespective of how the initial anchor was chosen, people often fail to adjust their anchors properly, and as a result produce biased approximations.

This bias is closely related to the conservatism bias. In the conservatism bias, people place undue weight on past information compared to new information. In anchoring and adjustment, people place undue weight on an "anchored" value.

Consequences of anchoring and adjustment bias:

- FMPs may stick too closely to their original estimates when new information is learned. For example, an FMP originally bought a technology stock for $25, and the stock kept doing well until the company started experiencing difficulties during the year. As the stock price dived, the FMP did not adequately adjust the $25 given the difficulties. He remained "anchored" to the $25 he had paid and refused to sell the stock. This mindset is not limited to downside adjustments; the same can happen when companies have upside surprises.

Detecting and overcoming anchoring and adjustment bias:

- Consciously ask questions that may reveal an anchoring and adjustment bias. For example, "Am I holding onto this stock based on rational analysis, or am I trying to attain a price that I am anchored to, such as the purchase price or a high-water mark?"
- Recognize that past prices and market levels are not an indication of what will happen in the future. They should not significantly influence buy and sell decisions.

Mental Accounting Bias

Mental accounting bias is a bias in which people treat one sum of money differently from another sum based on which mental account (layer) the money is assigned to.

An investor may create three layers of money – the first layer includes conservative investments, the second layer has moderate risk investments, and the third layer has high-risk assets. Investors assign investments into discrete "buckets," i.e., several non-fungible mental accounts. This method is problematic and contradicts rational economic thought because money is inherently fungible (interchangeable).

Consequences of mental accounting bias:

- Money is placed in "buckets" or "layers" without considering correlations among assets.

FMPs neglect opportunities to reduce risk by combining assets with low correlations.
- Irrationally distinguish between returns derived from income and from capital appreciation. Some FMPs are more comfortable spending the income generated but try to preserve the principal. As a result, they may overweight income generating assets, which may result in a lower total return.
- Irrationaly distinguish between investment principal and investment returns. Some FMPs invest the original principal rationally but are willing to take a very high risk with the investment returns. In the casino sector, "playing with house money" is a typical term used for this situation.

Detecting and overcoming mental accounting bias:

- Recognize the drawbacks of putting money in different buckets.
- Combine all assets onto one spreadsheet to see the true asset allocation of various mental account layers.
- Focus on total return instead of dividing return into income and capital appreciation components. Say you buy a stock that is increasing in value but does not pay dividends. You can always sell a part of your stock and create an income stream.

Framing Bias

Framing bias occurs when an individual answers a question differently, depending on how it is asked (framed).

Embedded Example

A situation may be presented within a gain context (one in four start-up companies succeed) or within a loss context (three out of four start-ups fail).

Given the first frame, an FMP may adopt a positive outlook and make venture capital investments. Given the second frame, the FMP may avoid making the investment.

Consequences of framing bias:

- FMPs' willingness to accept risk can be influenced by how situations are presented or framed. This can result in misidentifying risk tolerances. Because of how questions are framed, FMPs may become more risk-averse when presented with a gain frame of reference and more risk-seeking when presented with a loss frame of reference.
- Choose suboptimal investments based on how information about the specific investments is framed.
- Have a narrow frame when evaluating an investment. Focus on short-term price fluctuations may result in excessive trading.

Detecting and overcoming framing bias:

- Ask such questions as, "Is the decision the result of focusing on a net gain or net loss

position?"

- Try to be neutral and open-minded when evaluating investments.

Availability Bias

Availability bias is when people take a heuristic (sometimes called a rule of thumb or a mental shortcut) approach to estimating the probability of an outcome based on how easily the outcome comes to mind. Easily recalled and understandable outcomes are perceived as more likely than harder to recall ones.

The four sources of the bias most applicable to FMPs are retrievability, categorization, narrow range of experience, and resonance.

Retrievability: If an answer or idea comes to mind more quickly than others, it will likely be chosen as correct even if it is not. For example, a study was done in which subjects listened to a list of 50 names and were then asked to judge if the list contained more men or women. The list contained 30 generic women names, but the 20 men were all famous. As availability theory would predict, most of the subjects concluded that the list contained more men than women because they immediately recalled the famous men's names.

Categorization: When solving problems, people gather information from what they recognize as relevant search sets. If it is difficult to come up with a search set, the estimated probability may be biased. For example, in the US, baseball is a popular sport, but soccer is not. If an American is asked to list famous baseball players and famous soccer players, the list of soccer players will be relatively short. An American may incorrectly conclude that there are more famous baseball players than soccer players. Because in their categorization, there are more baseball players than soccer players.

Narrow Range of Experience: This bias occurs when a person with a narrow range of experience uses too narrow a frame of reference based upon that experience when he makes an estimate. For example, assume that an investor advisor has only been in the market for three years. When he makes conclusions or decisions, his availability bias will be based on three years of experience. He would not have seen the great stock market crashes, the booms/bursts of the past.

Resonance: The conclusions or decisions people take are often biased by how closely a situation resonates with their personal experience. For example, jazz music lovers are likely to overestimate how many people listen to jazz music. On the other hand, people who dislike jazz music are likely to overestimate the number of people who dislike jazz music.

Consequences of availability bias:

- Choosing an investment, investment adviser, or mutual fund based on advertising rather than appropriate analysis. For instance, when choosing a mutual fund to invest

with, many people will choose the fund that does extensive advertising because its name will easily come to mind. Choices based on advertising are consistent with retrievability as a source of availability bias.
- FMPs limit their investment opportunity set.
- Fail to diversify.
- Fail to achieve an appropriate asset allocation.

Detecting and overcoming availability bias:

- Recognize the bias. It is a human tendency to overemphasize the most recent financial events because of easy recall.
- Follow a disciplined approach to investing. To develop an appropriate investment policy strategy, carefully research, and analyze investment decisions and focus on the long-term.
- Ask such questions: "How did I hear about the stocks?" Was it on Bloomberg, or saw them on CNBC, or read a research report?" and "Am I buying or selling investments because of a recent market event without doing a thorough analysis?"
- Recognize that we forget events that happened a few years ago.

4. Emotional Biases

Instructor's Note: A summary of the six types of emotional biases is presented below. They are covered in detail in the subsequent sections. Memorize this summary. Use the acronym 'LOSSER' to remember this list.

- Loss-aversion bias: Prefer avoiding losses over achieving gains.
- Overconfidence bias: Unwarranted faith in one's abilities.
- Self-control bias: Fail to act in pursuit of long-term goals.
- Status quo bias: Do nothing rather than make a change.
- Endowment bias: People value asset more when they hold rights to it.
- Regret-aversion bias: Avoid pain of regret associated with bad decisions.

4.1 Loss-Aversion Bias

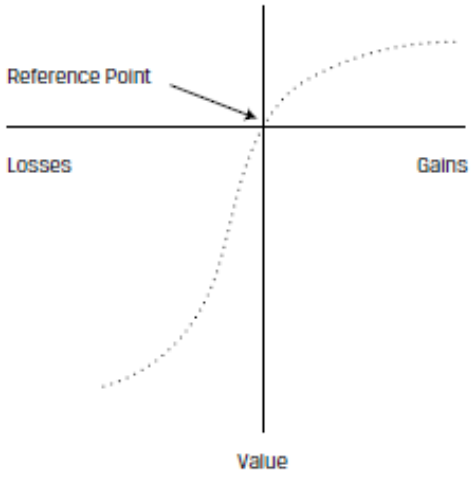
Loss-aversion bias is a bias in which people prefer avoiding losses over achieving gains. When comparing absolute values, the utility derived from a gain is much lower than the utility given up with an equivalent loss. Stated simply, people hurt more when there is a loss and are less happy when they gain the same value.

Loss-averse behavior is explained as the evaluation of gains and losses based on a reference point. A value function that passes through this reference point is seen in Exhibit 1 below. The x-axis has gains/losses, and the y-axis has value. Say we have a 5% gain, the positive value is 5 units, but for the same amount of loss, 5%, notice from the exhibit that

the value is much higher, say -15 units. So, the value of gain is not symmetric to the value of the loss.

The value function is s-shaped and asymmetric; it has a greater impact of losses than gains for the same variation in absolute value. This utility function implies risk-seeking behavior in the domain of losses (below the horizontal axis) and risk avoidance in the domain of gains (above the horizontal axis).

Exhibit 1 Value Function of Loss Aversion



An important concept based on this utility function is *disposition effect*: the holding of investments that have experienced losses too long, and the selling of investments that have experienced gains too quickly. Hence the resulting portfolio may be riskier than the one based on the investor's risk/return objectives.

Consequences of loss aversion:

- Hold investments in a loss position for a longer period of time than is justified by fundamentals in the hope that they will return to breakeven.
  For example, you bought a stock for 20, and after a while, its price declined to 15. This was a reasonable price to sell, given the fundamental value of the stock. But you held on to the stock in the hope of regaining value rather than recognizing a loss. Such behavior leads to a riskier portfolio than one that was based on risk/return objectives and fundamental analysis.
- Sell investments in a gain position earlier than justified by fundamentals. Trade excessively as a result of selling winners.
  Here, say you bought a stock that increased by 10%, and you sold it because you were afraid that price would decrease if you held on. As a result, you would trade excessively. Fundamentals should justify your selling decisions.
- Limit the upside potential of a portfolio by selling winners and holding losers.

Detecting and overcoming loss aversion:

- Use a disciplined approach to investment based on fundamental analysis.

4.2 Overconfidence Bias

Investors demonstrate unwarranted faith in their own intuitive reasoning, judgments, and/or cognitive abilities. For example, people generally think they do a better job of estimating probabilities than they actually do. This is known as illusion of knowledge bias.

The two basic types of overconfidence bias within the illusion of knowledge bias are *prediction overconfidence* and *certainty overconfidence*.

- Prediction overconfidence happens when the confidence intervals assigned (for investment predictions) are too narrow. For example, when estimating a stock's value, you are overconfident that there will be too little variation—use a narrower expected payoffs' range and a lower standard deviation of returns than justified by the fundamental value.
- Certainty overconfidence occurs when the probabilities for outcomes are too high because FMPs are too certain of their judgments. For example, if you are certain that the investment will increase in value, the probability that you will assign to this scenario will be too high. Thus, you do not consider the prospect of a loss and predict high returns with virtual certainty.

Self-attribution bias is a bias in which people take credit for successes and blame exogenous factors (such as bad luck) for failures. This bias can be divided into two subsidiary biases: *self-enhancing* and *self-protecting*. Self-enhancing bias describes people's propensity to claim too much credit for their successes. Self-protecting bias describes the denial of responsibility for failures.

Consequences of overconfidence bias:

- Underestimate risks and overestimate expected returns.
- Hold poorly diversified portfolios.

Detecting and overcoming overconfidence bias:

- Review trading records, identify the winners and losers. Look at your data, the stocks you bought, how they performed, and if it was in line with your expectations. Keeping a track of your performance history can adjust the overconfidence bias.
- Calculate portfolio performance over at least two years.
- There is an old Wall Street adage, "Don't confuse brains with a bull market." In a bull market, an average person will select stocks that will do well. Because in a bull run of the market, all stocks will be going up, and it does not take a genius to pick winning stocks.

- Conduct a post-investment analysis of both successful and unsuccessful investments.

4.3 Self-Control Bias

Self-control bias is a bias in which people fail to act in their long-term best interest because of a lack of self-discipline. Individuals are impulsive, and there is an inner conflict between short-term satisfaction and achievement of some long-term goals. For example, "People pursuing the CFA charter may fail to study sufficiently because of short-term competing demands on their time."

Consequences of self-control bias:

- Save insufficiently for the future. If an individual does not have self-control, he may spend on, say, a new car or a vacation, instead of saving for retirement.
- Upon realizing that the savings are insufficient, FMPs may accept excessive risk in their portfolios to generate higher returns. This is done to compensate for inadequate savings, which puts the capital base at risk.
- Borrow excessively to finance current consumption.

Detecting and overcoming self-control bias:

- Create a proper investment plan.
- Execute the plan. Adhere to a saving plan and an appropriate asset allocation strategy.

4.4 Status Quo Bias

Status quo is an emotional bias in which people do nothing (i.e., maintain the "status quo") instead of making a change. People are generally lazy and keep things the same. They do not necessarily look for opportunities where a change is beneficial. A phrase commonly used can be understood in the context of status quo, "if it ain't broke, don't fix it." This saying means leave something, avoid correcting or improving it.

Status quo bias is often discussed in tandem with endowment and regret-aversion biases (described later) because the outcome of the biases may be similar. However, the reasons differ among the biases. In the status quo bias, positions are maintained primarily due to inertia rather than conscious choice. In the endowment and regret-aversion biases, the positions are maintained because of conscious, but incorrect choices.

Consequences of status quo bias:

- FMPs unknowingly maintain portfolios with risk characteristics that are inappropriate for their circumstances.
- They fail to explore other opportunities.

Detecting and overcoming status quo bias:

- Education is crucial.

- Quantify the risk-reducing and return-enhancing advantages of diversification and proper asset allocation.

4.5 Endowment Bias

Endowment bias is an emotional bias in which people value an asset more when they hold rights to it than when they do not. For example, a person owns his house, and it has a specific value to him. After some time, he decides to buy another house next door, very similar to his house. But he feels the price quoted for it is too high. However, if he were to sell his own house, he would perhaps ask for a higher price. Standard economic theory states that similar assets should be bought/sold at the same price. Because he has lived and owned this house for the past 30 years, endowment bias has affected his attitudes toward it. Effectively, ownership "endows" the asset with added value.

Endowment bias may also occur when someone inherits or purchases securities. The value in their minds is more than what it should be. Consequently, FMPs may irrationally hold on to securities or assets they already own even though it violates the law of one price.

Endowment bias can be combined with the status quo bias. Clients are reluctant to sell securities bequeathed by previous generations.

Consequences of endowment bias:

- Fail to sell off certain assets and replace them with other assets.
- Maintain an inappropriate asset allocation.
- Continue to hold assets with which they are familiar.

Detecting and overcoming endowment bias:

- In the case of inherited investments, ask such a question, "If I were given an equivalent amount in cash, how would I invest it now?"
- Address emotional attachment.

4.6 Regret-Aversion Bias

Regret-aversion bias is a bias in which people tend to avoid making decisions out of fear that the decision will turn out poorly. For example, many years ago, there was a saying that no one gets fired for selecting IBM. Because IBM was a big company, and it was considered safe to buy merchandise from it. Even if your decision went wrong, you could save face by saying, "I bought from the biggest company," which is commonly accepted as the appropriate thing to do. Generally, people try to avoid the pain of regret associated with bad decisions. Thus, no action becomes the default decision.

Consequences of regret-aversion bias:

- Be too conservative in their investment choices because of poor outcomes

on risky investments in the past. To avoid the regret of coping with another bad decision, FMPs will invest in low-risk assets failing to reach investment goals in the long-term.

- Engage in herding behavior. FMPs may feel safer investing in popular investments. It seems safe to be with the crowd; if the investment turns out to be unsuccessful, everyone faces the loss, reducing emotional pain.

Detecting and overcoming regret-aversion bias:

- Education is crucial.
- Quantify the risk-reducing and return-enhancing advantages of diversification and proper asset allocation.
- Recognize that losses happen to everyone; keep in mind long-term objectives.

5. How Behavioral Finance Influences Market Behavior

Traditional finance assumes that markets are efficient, that they instantly and fully incorporate all information into asset prices. However some persistent market patterns such as momentum, value, bubbles, and crashes challenge this assumption. In this section we will use behavioral finance to understand why these patterns occur.

5.1 Defining Market Anomalies

Market anomalies are persistent deviations from the efficient market hypothesis (EMH). Anomalies are identified by persistent abnormal returns that differ from zero and are predictable in direction. Possible explanations of anomalies are:

- Shortcomings in the underlying asset pricing model – For example, the CAPM model uses return relative to risk (beta) incurred. If the mispricing of security is due to other types of risks not considered in the model, then the market is not anomalous; the model is limited. Examples are low returns following initial public offerings (called the "IPO puzzle") and the positive abnormal returns in the 12 months after a stock split.
- Small sample involved.
- Statistical bias in selection or survivorship, or data mining that overanalyzes data for patterns and treats spurious correlations as relevant.
- Temporary disequilibrium behavior - unusual features that may survive for years but ultimately disappear.

Despite the challenges, behavioral finance has identified several market anomalies and offered explanations based on individual investors' behavioral biases. Three such anomalies are momentum, bubbles, and crashes, and value stocks vs. growth stocks.

5.2 Momentum

Momentum (or trending) occurs when future price movements are correlated with recent

past prices. Correlation is positive in the short term, up to two years, but for longer periods of two to five years, correlation is negative, and returns revert to the mean.

Why does this phenomenon occur?

Momentum can be partly explained by availability and hindsight biases.

Several studies have found that traders have faulty learning models in which their reasoning is based on their most recent experience. This is also referred to as availability bias. The *recency effect* is the tendency to recall recent events more vividly and give them undue weight. If the price of a security rises for a period, investors extrapolate this rise to the future. Recency bias causes investors to place too much emphasis on small samples because of the readily available information.

Regret is the feeling that an opportunity has been missed and is related to *hindsight bias*. Hindsight bias is the tendency to see past events as having been predictable. Suppose a mutual fund or stock did well a year ago; the regret of not owning this well performing asset can drive investors to remedy it by purchasing the asset. These behavioral factors can explain short-term year-on-year trending and overtrading creating a *trend-chasing effect*. Investors have a bias to buy investments they wish they had owned the previous year.

5.3 Bubbles and Crashes

Bubbles and crashes are defined as periods of unusual positive or negative asset returns. Bubbles and crashes appear to be panics of buying and selling. A continuous increase in asset price is fueled by further expectations of increase; asset prices become decoupled from economic fundamentals. Bubbles typically develop more slowly relative to crashes, which can be rapid. This asymmetry is because of the behavioral factors involved. A crash is a fall of 30% or more in asset prices over several months. Recent examples are the technology bubble of 1999–2000 and the residential property boom of 2005–2007.

Rational and behavioral finance explanations for asset bubbles is given in Example 16. Both managers did not understand the risks involved in the technology stock bubble and exhibited the illusion of control bias.

Example: Investor Behaviour in Bubbles
(*This is Example 16 in the curriculum.*)

Consider the differing behavior of two managers of major hedge funds during the technology stock bubble of 1998–2000:

The manager of Hedge Fund A was asked why he did not get out of internet stocks earlier even though he knew by December 1999 that technology stocks were overvalued. He replied, “We thought it was the eighth inning, and it was the ninth. I did not think the NASDAQ composite would go down 33% in 15 days.” Faced with losses, and despite his previous strong 12-year record, he resigned as Hedge Fund A’s manager in April 2000.

The manager of Hedge Fund B refused to invest in technology stocks in 1998 and 1999

because he thought they were overvalued. After strong performance over 17 years, Hedge Fund B was dissolved in 2000 because its returns could not keep up with the returns generated by technology stocks.

The behavioral biases associated with bubbles and crashes are

- Overconfidence is, almost by definition, abundant during bubbles (but not necessarily in crashes). This bias causes investors to overestimate expected returns, underestimate risk, trade excessively, and hold undiversified portfolios. The overconfidence and excessive trading are linked to *confirmation bias* and *self-attribution bias*. Confirmation bias exists because investors can select news that supports an existing decision or investment.
- Even if winners are being sold too soon in a bubble, sales will be profitable because of a rising market. Investors can demonstrate hindsight, in which individuals can reconstruct prior beliefs and deceive themselves that they are correct more often than they truly are.
- Regret aversion is also present in a bubble, as investors may think they are "missing out" on profit opportunities.
- As a bubble unwinds, there can be underreaction that can be caused by anchoring when investors do not update their beliefs sufficiently.
- There can be cognitive dissonance, ignoring losses, and attempting to rationalize flawed decisions as a bubble unwinds. Investors may initially be unwilling to accept losses.
- In crashes, the disposition effect leads investors to hold on to losers and postpone regret. This leads to an initial underreaction to bad news but later causes capitulation and acceleration of share price decline, which results in a crash.

5.4 Value

Studies show that value stocks outperform growth stocks over long periods. Value stocks are typically characterized by low price-to-earnings ratios, high book-to-market equity, and low price-to-dividend ratios. A growth stock has the opposite characteristics of a value stock. For example, growth stocks are characterized by low book-to-market equity, high price-to-earnings ratios, and high price-to-dividend ratios.

The Fama and French three-factor model incorporates additional factors, size, and value, alongside market beta in their asset pricing model to explain this anomaly and other apparent anomalies. Fama and French claim the value stock anomaly disappears in their three-factor model. They believe that the factors are associated with risk exposures that show the greater potential to suffer distress during economic downturns. In other words, it is not the mispricing of value and growth stocks that lead to the difference in their performance but the difference in risk between the two classes of stocks.

Some studies present anomalies as mispricing rather than risk. These studies identify the

emotional factors involved in valuing stocks. The **halo effect**, for example, is based on a favorable evaluation of some characteristics relative to others. This view is related to representativeness that can lead investors to extrapolate recent past performance into future returns. A company with a sound growth track and share price performance might be seen as a good investment with higher returns than its risk would merit. This means that the risk of growth stocks is underestimated.

Emotions play a role in estimating risk and expected return of stocks. An emotional rating in a company leads investors to perceive the company's stock as less risky. Although the capital asset pricing model assumes risk and expected return are positively correlated, many investors behave as if the correlation is negative, expecting higher returns with lower risk.

The emotional attraction of a stock can be enhanced by personal experience of products, the brand's value, and the proximity of its head offices to the analyst or investor. This last issue is known as the **home bias** anomaly, whereby domestic securities are favored over international securities in global portfolios.

Summary

LO.a: Compare and contrast cognitive errors and emotional biases.

- Cognitive errors can be broken down into two types
  - Belief perseverance biases: People hold on to original beliefs, and they react selectively to new information. Examples: Conservatism, Confirmation, Hindsight, Illusion of control, Representativeness.
  - Information processing biases: Also called statistical errors. These errors can occur because people process information incorrectly or because of memory errors or faulty reasoning. Examples: Framing, Anchoring & Adjustment, Mental Accounting, Availability.
- Emotional biases are influenced by feelings and emotion and usually related to human behavior to avoid pain and produce pleasure; arise spontaneously due to attitudes and feelings; are less easy to correct and can only be "adapted to." Examples: loss-aversion, overconfidence, self-control, endowment, regret aversion, and status quo.

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

Belief perseverance Bias	Description	Examples/Implications
Conservatism	Maintain prior views by inadequately incorporating new information	• Hold winners or losers too long • Under-react to new information • exhibit discomfort or difficulty in processing new information
Confirmation	Look for and notice what confirms prior beliefs	• Focus on confirmatory/positive information about existing investments • Over-react to confirmatory/positive information • Hold under-diversified portfolio
Hindsight	See past events as having been predictable	• Overestimate the degree to which a prior event was predictable
Illusion of Control	False belief that we can influence or control outcomes	• Feeling of control over company where one works • Hold under-diversified portfolio

Representativeness	Classify new information based on past experiences	• Look for patterns in new information • Over-optimism about a past winner • Treat small sample as "representative" of entire population • Invest in companies that remind one of successful clients • Over-react to new information and neglect base rate • Excessive trading and high manager turnover (owing to focus on short-term performance)

Information-Processing Biases	**Description**	**Examples/Implications**
Framing	Answer question differently based on how it is asked/framed	• Exhibit risk-averse (risk-seeking or loss-aversion) attitude when outcomes are framed in terms of gains (losses)
Anchoring and Adjustment	developing estimates based on "anchor" value (e.g., target price) and adjusting decisions up or down based on that value	• Place high weight on anchor • Under-react to new information • Influenced by purchase price or arbitrary price levels
Mental Accounting	Treat one sum of money different from another depending on source or use	• Investing some money very conservatively and the rest in speculative stocks. • Ignore correlations among various assets and total return • Hold suboptimal portfolio due to inefficient asset allocation
Availability	Influenced by how easily outcome comes to mind	• Place high weight on easily available information → influenced by advertising • Select alternatives with which one has greater resonance; select alternatives that are easily retrievable • Focus on a limited set of investments ("categorization") • Make investment decisions based on their familiarity with the industry or country ("narrow range of experience")

Emotional Bias	**Description**	**Examples/Implications**

Loss Aversion	Prefer avoiding losses over achieving gains	• Hold on to losing stocks too long and sell winning stocks too early (also called "disposition effect")
Overconfidence	Unwarranted faith in one's abilities (Illusion of knowledge; self-attribution)	• Excessive trading • Narrow confidence intervals • Assign high probability of success
Self-Control	Fail to act in pursuit of long- term goals	• Focus on short-term satisfaction • Fail to save enough for the future
Endowment	Exhibit an emotional attached to the asset owned	• Shares in father's company a source of family pride • People value asset more when they hold rights to it • Hold inherited/purchased securities
Regret Aversion	Avoid pain of regret associated with bad decisions	• Hold losing positions for too long • Prefer low risk assets • Engage in "herding behavior" • Prefer maintaining positions in familiar investments
Status Quo	Do nothing rather than make a change	• Hold on to securities even if they are inconsistent with risk/return objectives; trade very infrequently

LO.c: Describe how behavioral biases of investors can lead to market characteristics that may not be explained by traditional finance.

Observed Market Behavior	**Behavioral Explanation**
Momentum or trending effect	Herding behavior Availability bias: more recent events easily recalled and given relatively high weight (recency effect) Hindsight bias → regret → trend-chasing effect
Bubbles	Overconfidence bias (illusion of knowledge and self-attribution) leads to underestimation of risk and over-trading
Crashes	Disposition effect in the context of loss aversion bias: tendency to sell winners quickly and hold on to losers too long

Value stocks outperform growth stocks in the long-run	**Halo effect:** tendency of people to generalize positive views/beliefs about one characteristic of a product/person to another characteristic; related to ***representativeness bias*** refers to classifying new information based on past experiences. Underestimating risk and overestimating returns based on emotional factors.

