



# SUSTAINABILITY IN VOLATILITY: THE BEHAVIORAL FINANCE PERSPECTIVE

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## Synopsis

The recent waves, swings and bumps in the financial markets (both domestic and global) have presented superior levels of volatility and challenges to investors, corporates, bankers, regulators and even the Governments themselves. Undoubtedly these developments and their consequences have drawn much attention and discussion among press, public, specialists, practitioners and academics. The focal point of such discussions has mostly (and correctly) been on the financial markets (which consist of money, equity and currency markets) and therefore, bulk of the analysis were attributed (and limited) to the financial markets themselves.

While recognizing such valuable analysis would contribute to fruitful intellect and collaborative synergies, which have always lead to remedial policy directives, this paper drifts from such intensely researched (and debated) standard finance perspective and dives towards the emotions and expressions of investors and the subsequent trading behavior of such investors.

The core of this paper strives to introduce and examine some of the unpredictable and irrational behaviors of investors and markets, by drawing upon notable research, experiments and analysis concluded throughout the last six decades. In challenging times with ever increasing complexity, such knowledge of investor psychology may prove to be the correct edge to ride the waves of market volatility, towards utter sustainability.

## Behavioral Finance vs. Standard Finance

Standard finance<sup>1</sup>(also known as modern portfolio theory) is prescriptive, i.e. it explains how rational investors “*should act*” based on numerous mathematical models and theories. Behavioral finance, on the other hand, is rather descriptive, i.e. it tries to explain how typical investors “*did act*” based on the observed real-world investor behavior in decision making, which is not fully explained by standard finance. Behavioral finance is commonly referred to as the application of psychology to finance.

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<sup>1</sup> As Meir Statman (1999)

elegantly articulated, “standard finance is the body of knowledge built on the pillars of the arbitrage principles of Miller and Modigliani, the portfolio principles of Markowitz, the capital asset pricing theory of Sharpe, Lintner, and Black, and the option-pricing theory of Black, Scholes, and Merton”.



Standard finance theory is designed to provide mathematically sophisticated explanations for financial queries that, when posed in real life, are often complicated by their imprecise, unsophisticated or unrealistic conditions and assumptions. Standard finance assumes investors exhibit risk aversion and make unbiased, utility maximizing decisions that would be considered appropriate for a Rational Economic Man (REM), a concept more formerly known as *Homo Economicus*.<sup>2</sup>

Economists prefer the concept of REM due to three primary reasons;

- i. REM makes economic analysis relatively easy and simple, since in real life, accurately predicting or explaining human behavior would be extremely difficult.
- ii. REM allows economists to quantify their findings, which makes their work more elegant and easier to digest. If humans are perfectly rational, possessing perfect information and perfect self-interest, then perhaps their behavior can actually be quantified.
- iii. REM generates results that confirm with the pet prejudices of economists by picking and choosing the right set of initial assumptions.

Most criticisms of *Homo economicus* challenge bases of its underlying assumptions, i.e. perfect rationality, perfect self-interest, and perfect information.

- a) **Perfect Rationality**  
Rationality is defined as “the ability to reason” and “to exercise good judgment”. A decision is “rational” if there has been a logical process in arriving at it (including an assessment of risks and rewards) and if it aligns with the individuals’ interests. When individuals are rational, they have the ability to logically reason and make optimal judgments.

However, rationality is not the sole driver of human behavior and in fact, it may not even be the primary driver, as many psychologists believe that the human intellect is actually submissive to human emotion. They oppose, that human behavior is less the product of logic than of subjective impulses, such as fear, love, hate, pleasure, and pain. Also, it is believed (and we have experienced for ourselves) that human behavior is often unique, irrational, complex, imperfect, limited, self-contradictory and unpredictable. Such irrationality is the fact that has brought us (the humans) to what we are today.

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<sup>2</sup> *Homo economicus* is a simple model of human economic behavior, which assumes that principles of perfect self-interest, perfect rationality, and perfect information govern economic decisions by individuals. It prescribes that REM will always selfishly seek perfectly rational utility maximizing decision, based on all available information.



- b) **Perfect Self-Interest**  
Perfect self-interest is defined as “selfish or excessive regard for one’s personal advantage or interest”. Many studies have shown that people are not perfectly self-interested. If they were, philanthropy would not exist and religions prizing selflessness, sacrifice, and kindness to strangers would also be unlikely to prevail. Perfect self-interest would preclude people from performing such unselfish deeds such as volunteering, helping the needy, or serving in the military. It would also rule out self-destructive behavior, such as suicide and alcoholism.
  
- c) **Perfect Information**  
Perfect information is defined as “information that completely eliminates uncertainty in a situation, as opposed to imperfect information which only reduces uncertainty”. Some people may possess perfect or near-perfect information on certain subjects, but it is (almost) impossible for every person to enjoy perfect knowledge of every subject. In the world of investing, there is nearly an infinite amount to know and learn, and even the most successful investors don’t master all disciplines. Many economic decisions are made in the absence of perfect information.

To sum up, “People in standard finance are rational. People in behavioral finance are normal”.<sup>3</sup>

## **Bounded Rationality and Satisficing**

In standard 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.

But, behavioral finance acknowledges that investors do not always make decisions consistent with utility maximization. Behavioral finance recognizes that investors’ decisions, individually and collectively, are influenced by a lack of perfect information and the inability to process, interpret and value such information they possess in an unbiased fashion. In other words, investors exhibit *bounded rationality*.<sup>4</sup>

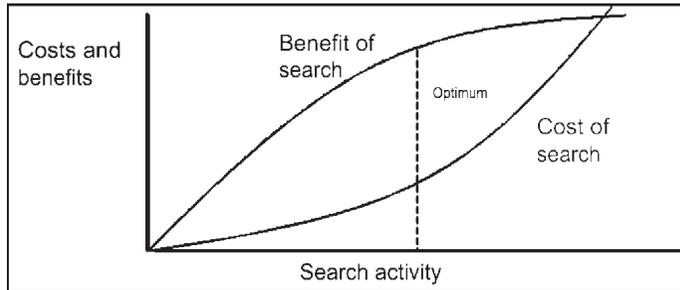
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<sup>3</sup> Statman, Meir, 1999. “Behavioral Finance: Past Battles and Future Engagements”. Financial Analyst’s Journal, Association for Investment Management and Research, November/December, 1999, pp. 18-27.

<sup>4</sup> *Bounded rationality is the idea that in decision-making, rationality of individuals is limited by the (a) information they have, (b) cognitive limitations of their minds, and (c) finite amount of time they have to make a decision.*



Bounded rationality means that individuals act as rationally as possible, while recognizing that they are constrained by a lack of knowledge, i.e. they do not possess all available information; as well as a lack of cognitive ability, i.e. they lack the processing power necessary to interpret and place a value on such information.



**Bounded Rationality Search Model**

Bounded rationality implies that decision makers truncate their search behavior as information can be hard to obtain, and processing information involves computational work. It is quite rational, in a more general sense, for a consumer to cease a search, when the costs of searching start to outweigh the benefits resulting from that search.

## **Bounded Rationality Search Model**

Assuming bounded rationality, investors make a satisfactory choice, rather than gathering and meticulously analyzing all relevant information to make the utility-maximizing choice, i.e. rather than optimize, individuals *satisfice*<sup>5</sup>. Investors gather what they consider to be an adequate amount of information and apply mental short-cuts to analyze and shape the information into an acceptable decision. The investor does not necessarily make the theoretically optimal decision from a traditional finance perspective.

Think about a simple example of an individual buying a digital camera from a large, crowded shopping mall. According to REM, the individual would visit numerous stores and evaluate the features and prices of countless models and brands to arrive at the optimum buying decision. Notwithstanding the fact that the astronomical time and capacity required to analyze such vast array of data, the possibility of gathering all available information needed to make an optimum decision would essentially be unrealistic.

According to behavioral finance, the individual would exhibit bounded rationality and satisfice by just going through a selected (and limited) set of stores and sample of models to arrive at the buying decision. Thus, instead of optimize, the individual would satisfice.

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<sup>5</sup> *Satisfice is a blended word combining "satisfy" with "suffice".*



Standard finance assumes investors exhibit the following three characteristics and utilized such assumptions when they developed asset pricing models such as Security Market Line and Capital Market Line.

- i. Risk aversion  
Investors either (a) minimize risk for a given level of return or (b) maximize return for a given level of risk, i.e. they avoid unnecessary risk.
- ii. Rational expectations  
Investor forecasts are unbiased and they accurately reflect all relevant information which affects asset valuation.
- iii. Asset integration  
Investors consider the co - variance of a potential investment with their existing portfolios. They focus not only on the asset's expected return and standard deviation, but also on how that asset interacts with (correlates with) other assets in the portfolio.

In contrast, behavioral finance is based on the following characteristics;

- i. Loss aversion  
Rather than focusing on traditional measures of risk and return, as assumed by modern portfolio theory, investors actually focus on gains and losses. Research has shown that investors prefer certain (riskless) gains and uncertain (risky) losses.

For example, given a choice between (a) small but certain loss and (b) a 50 -50 chance of either a larger loss or breaking even, individuals will tend towards choice (b), the uncertain loss. Conversely, given a choice between (c) small but certain gain and (d) a 50 -50 chance of either a larger gain or zero, individuals will tend towards choice (c), the small certain gain. Hence, individuals tend to prefer certain gains and uncertain losses, which are the classic symptoms of loss aversion.

- ii. Biased expectations  
When investors base decision on unbiased expectations, they objectively interpret all available information and learn from their past decisions and mistakes. When they exhibit biased expectations, however, they have too much confidence in their ability to forecast. They tend to discount or even ignore information that does not support their choices. They interpret information based on the medium through which it is received and their current frame of mind. This has been equated to looking at the world through rose-colored glasses, which affects and changes the way individuals see everything.
- iii. Asset segregation  
The principle of asset segregation implies that investors analyze individual assets on a stand-alone basis. They either do not understand or choose to ignore the concept of

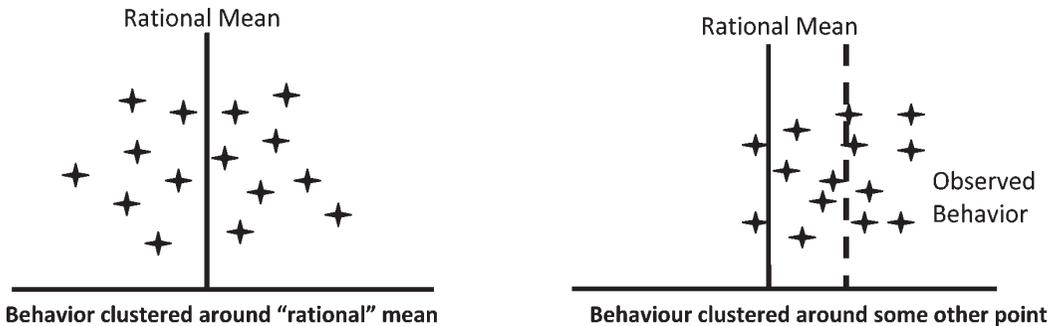


selecting investments from a portfolio perspective (i.e. consider the correlation of an asset with the current portfolio and its resulting impact on the portfolio risk and return). This could result in an exposure to more risk than is necessary, due to a lack of portfolio diversification.

## Behavioral Biases

Historically, the consensus among standard finance experts was that poor (i.e. suboptimal and irrational) decision making is a random and unpredictable departure from rationality. However, systematic and extensive research has revealed some distinct and consistent patterns in poor decision making. In the context of behavioral finance, these patterns are referred as *behavioral biases*.

They are known as “biases” because they are not random departures from rationality, clustered around some rational mean. Rather, they show consistent patterns of departure from rationality.



Therefore, individual decisions, actions and reactions almost always deviate from what is prescribed in standard finance and such deviation is termed as a behavioral bias. In addition, research suggests that such departures are only partially dependent on individuals’ general education. A classic experiment is the “bat and ball test”;<sup>6</sup>

*A bat and a ball cost \$1.10 in total. The bat costs a dollar more than the ball. How much does the ball cost?*

If your quick answer is ten cents, you are in the majority, in fact in a well-educated majority, for “smarter” people tend to handle problems faster than others, and are more likely therefore to fall into the ten cents trap. A more deliberative approach, using either trial and error or simultaneous equations, leads to the correct answer that the ball costs five cents.

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<sup>6</sup> Frederick, Shane, “Cognitive Reflection and Decision Making”. The Journal of Economic Perspectives, Volume 19 Number 4, 2005, pp. 25–42.

Behavioral finance lacks the classification neatness of standard finance, in part because in many aspects it is still in its infancy. While there have been many empirical studies of decision-making, particularly over the last fifty years, there is yet to emerge a standard set of terminology or classifications.

Behavioral biases fall into two broad categories, cognitive errors and emotional biases, with both varieties yielding irrational judgments.

- a) *Cognitive errors* are a result of mechanical or physical limitations, i.e. they result from the inability to analyze all information or from basing decisions on incomplete information. Although individuals may try to process information into rational decisions, they simply may not possess perfect information and also, may lack the capacity to process such a vast volume of information rapidly and accurately, i.e. cognitive errors stem from faulty reasoning.
- b) *Emotional biases* are caused by individuals' psychological predispositions and they affect how individuals digest information and arrive at decisions. It is a way individuals frame the information and the decision, rather than the mechanical or physical process used to analyze and interpret it. Emotional bias is not deliberate and it is more of a spontaneous reaction, i.e. emotional biases originate from impulse or intuition rather than conscious calculations.

The following table recollects a non-exhaustive list of common behavioral biases, classified as cognitive errors and emotional biases.

<b>Cognitive Errors</b>	<b>Emotional Biases</b>
<i>Anchoring and Adjustment</i>	Endowment
<i>Availability</i>	Loss Aversion
<i>Cognitive Dissonance</i>	Optimism
Confirmation	<i>Overconfidence</i>
Conservatism	Regret Aversion
Control	Self-control
<i>Framing</i>	Status Quo
Hindsight	
Mental Accounting	
<i>Representativeness</i>	

The remainder of this paper strives to introduce and examine some prominent cognitive errors and emotional biases that haunt individual investors, with an emphasis on their real-life applications and implications.



## Overconfidence Bias

Over-confidence is an unwarranted faith in one's intuitive reasoning, judgments, and cognitive abilities. Investors think they are smarter and have better information than they actually do. Such over-confidence causes people to over-estimate their knowledge, under-estimate risks, and exaggerate their ability to control events.

For example, research<sup>7</sup> has shown that 82% of the drivers surveyed feel they are in the top 30% of safe drivers, 86% of students at the Harvard Business School say they are better looking than their peers, and doctors consistently over-estimate their ability to detect problems. People who purchase lottery tickets as a way to make money are probably suffering from over-confidence bias as it is three times more likely for a person driving 10 miles to buy a lottery ticket to be killed in a car accident than to win the jackpot<sup>8</sup>.

Roger Clarke and Meir Statman demonstrated a classic example of prediction of over confidence when they surveyed investors on the following question:

*"In 1896, the Dow Jones Industrial Average (DJIA), which is a price index that does not include dividend reinvestment, was at 40. In 1998, it crossed 9,000. If dividends had been reinvested, what do you think the value of the DJIA would be in 1998? In addition to that guess, also predict a high and low range so that you feel 90 percent confident that your answer is between your high and low guesses."*

In the survey, few responses reasonably approximated the potential 1998 value of the Dow, and no one estimated a correct confidence interval<sup>9</sup>.

People tend to have too much confidence in the accuracy of their own judgments. As people find out more about a situation, the accuracy of their judgments is not likely to increase, but their confidence does increase, as they fallaciously equate the quantity of information with its quality.

Over-confident investors over-estimate their ability to evaluate a company as a potential investment. As a result, they can become blind to any negative information that might normally indicate a warning sign that either a stock purchase should not take place or a stock that was already purchased should be sold. They tend to trade excessively as a result of believing that

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<sup>7</sup> Tilson, W., 1999. "The Perils of Investor Overconfidence". Available at <http://www.fool.com/BoringPort/1999/BoringPort990920.htm> (Accessed 01<sup>st</sup> July 2012).

<sup>8</sup> Orkin, M., 1991. "Can You Win?: The Real Odds for Casino Gambling, Sports Betting, and Lotteries". New York: W. H. Freeman.

<sup>9</sup> The value of the DJIA in 1998, under the conditions postulated in the survey, would have been 652,230!



they possess special knowledge that others don't have and such excessive trading behavior has proven to lead to poor returns over time.

Because they don't know, don't understand, or don't heed historical investment performance statistics, over-confident investors can under-estimate their downside risks. As a result, they can unexpectedly suffer poor portfolio performance. Over-confident investors hold under diversified portfolios, thereby taking on more risk without a commensurate change in risk tolerance. Often, over-confident investors don't even know that they are accepting more risk than they would normally tolerate.

## **Representativeness Bias**

Representativeness is applied when making judgments about the probability of an event under uncertainty. With respect to forming expectations, people evaluate the probability of an uncertain future event by the degree to which it is similar to recently observed events. It is the source of the proverb;

“if it looks like a duck and quacks like a duck, it probably is a duck”.

Representativeness can be defined as “an assessment of the degree of correspondence between a sample and a population, an instance and a category, an act and an actor or, more generally, between an outcome and a model.”

Representativeness can be thought of as the reflexive tendency to assess the similarity of outcomes, instances, and categories on relatively salient and even superficial features, and then to use these assessments of similarity as a basis of judgment. People assume that “like goes with like”: things that go together should look as though they go together. Individuals feel that “if” information looks a certain way, “then” it fits to a certain category. When people rely on representativeness, i.e. “if - then” analysis to make judgments, they are likely to judge wrongly because the fact that something is more representative does not make it more likely.

Therefore, representativeness is the collective term used to describe the following range of fallacies people make when judging probabilities.

### **i. The problem of base-rate neglect**

There is a relatively easy way to analyze how an investor might fall prey to base-rate neglect. For example;

What is the probability that your new neighbor, X (Pubudu), who drives a sports car, goes to the gym every day and takes his friends to the cricket club every weekend, belongs to Group A (professional cricketers) rather than Group B (bankers)?



In answering this question, most people typically evaluate the degree to which “represents” A or B. They might conclude that Pubudu’s life style seems to be more representative of cricketers than bankers. This approach neglects base rates, that statistically, far more people are bankers than professional cricketers.

This concept can be applied to many practical investment situations.

What is the probability that AAA-rated Corporate Bond Y (issued by a leveraged corporate which saw the earnings tumble down during last three quarters, with key management personnel resigning) belongs to Group C (risky corporate bonds) rather than to Group D (safe corporate bonds)?

In answering this question, most investors would evaluate the extent to which Y seems representative of C or D. In this case, Bond Y’s characteristics may seem representative of Group C (risky bonds) because of the corporate’s weak financial performance and position. However, this conclusion ignores the base-rate fact that, historically, the default rate of AAA bonds has virtually been zero.

ii. The problem of sample size neglect

Investors, when judging the likelihood of a particular investment outcome, often fail to accurately consider the sample size of the data on which they inference their judgments. They incorrectly assume that small sample sizes are representative of the population. Some researchers call this phenomenon as the “law of small numbers.” Consider the following classic example;

There are two hospitals of different sizes in the same town. In the large hospital, 45 babies are born each day, whereas only 15 are born in the smaller hospital. 50% of all babies are boys, but on some days the percentage will be higher and on other days, it will be lower.

Which hospital would you expect to record more days per year, when over 60% of the babies born were boys?

The answer is the smaller one. A large sample is less likely to stray from the 50%. But most people believe that it would be the same for both hospitals – simply because they are described by the same (50%) statistic. So, most people answer that it would be the same for both hospitals. They assume the events are described by the same statistic and therefore equally representative of the whole population.

The sample size does matter and an elementary conclusion of statistics is that the larger a sample, more closely it resembles the population from which it is drawn.

iii. Misperception of chance and randomness

This arises when people rely on the law of small numbers whereby small samples are perceived to represent their population to the same extent as large samples. The famous *Gambler's Fallacy*<sup>10</sup> results from this thinking pattern.

This can be illustrated by considering the repeated toss of a fair coin.<sup>11</sup> With a fair coin, the outcomes in different tosses are statistically independent and the probability of getting heads on a single toss (H) is exactly 0.50 (one in two). It follows that the probability of getting two heads in two tosses (H - H) is 0.25 (one in four) and the probability of getting three heads in three tosses (H - H - H) is 0.125 (one in eight).

Now suppose that we have just tossed four heads in a row (H - H - H - H), so that if the next coin toss were also to come up heads, it would complete a run of five successive heads (H - H - H - H - H). Since the prior probability of a run of five successive heads is only 0.03125 (one in thirty-two), a believer in the gambler's fallacy might expect the next flip is less likely to be heads than to be tails (T), as they believe that tails are due.

However, this is not correct, as the event of "5 heads in a row" (H - H - H - H - H) and the event of "first 4 heads, then a tails" (H - H - H - H - T) are equally likely, each having probability of 0.03125. Given the first four rolls turn up heads, the probability that the next toss is a head is in fact 0.5. If six tosses of a fair coin all turn out to be heads, the probability that the next toss will turn up heads is still 0.50 (one in two).

While the prior probability of a run of five heads is 0.03125, it is only that before the coin is first tossed. After the first four tosses the results are no longer unknown, so their probabilities are 1. Reasoning that it is more likely that the next toss will be a tail than a head due to the past tosses, that a run of luck in the past somehow influences the odds in the future, is the fallacy. The effect of this behavioral bias can be summed up using the following quote:<sup>12</sup>

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<sup>10</sup> Gambler's Fallacy is the belief that if deviations from expected behavior are observed in repeated independent trials of some random process, future deviations in the opposite direction are then more likely.

<sup>11</sup> Wikipedia, the free encyclopedia. "Gambler's fallacy". Available at [http://en.wikipedia.org/wiki/Gambler's\\_fallacy](http://en.wikipedia.org/wiki/Gambler's_fallacy) (Accessed 01<sup>st</sup> July 2012).

<sup>12</sup> Shleifer, Andrei, 2000. "Inefficient Markets: An Introduction to Behavioral Finance". Oxford University Press.



“People often predict future uncertain events by taking a short history of data and asking what broader picture this history is representative of. In focusing on such representativeness, they often do not pay enough attention to the possibility that the recent history is generated by chance rather than by the ‘model’ they are constructing. For example, investors may extrapolate short past histories of rapid earnings growth of some companies too far into the future and therefore overprice these glamorous companies without a recognition that, statistically speaking, trees do not grow to the sky”.

## **Anchoring and Adjustment Bias**

When required to estimate a value with unknown magnitude, a common strategy would be to start with the information one does know and then adjust until an acceptable value is reached. Therefore, people generally begin by envisioning some initial, default number, i.e. an “anchor”, which they then adjust up or down to reflect subsequent information and analysis. The anchor, i.e. initial value, or starting point, may be suggested by the formulation of the problem, or it may be the result of a partial computation. The anchor, once fine-tuned and reassessed, matures into a final estimate.

Just as an anchored ship rarely strays too far away from its chaining point, individuals prefer to stick close to the references with which they feel most comfortable. Anchoring is an easy-to-demonstrate, hard-to-eradicate behavioral bias and, along with availability bias<sup>13</sup>, it has the claim to be the mother of all biases<sup>14</sup>.

Numerous studies demonstrate that regardless of how the initial anchors were chosen, people tend to adjust their anchors insufficiently and produce end approximations that are, consequently, biased. In either case, adjustments are typically insufficient, i.e. different starting points yield different estimates, which are biased toward the initial values.

Anchoring occurs not only when the starting point is given to the subject, but also when the subject bases his estimate on the result of some incomplete computation. A study of intuitive numerical estimation illustrates this effect.<sup>15</sup>

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<sup>13</sup> Availability bias is covered in the next section.

<sup>14</sup> The Psy-Fi Blog, “Anchoring, The Mother of Behavioral Biases”. Available at <http://www.psyfitec.com/2009/11/anchoring.html> (Accessed 01<sup>st</sup> July 2012).

<sup>15</sup> Kahneman, David, Slovic Paul, and Tversky Amos, 1982. “Judgment under Uncertainty: Heuristics and Biases”. Cambridge University Press.



Two groups of high school students estimated, within 5 seconds, a numerical expression that was written on the blackboard.

One group estimated the product;

$$8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

while another group estimated the product;

$$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$$

To rapidly answer such questions, people may perform a few steps of computation and estimate the product by extrapolation or adjustment. Because adjustments are typically insufficient, this procedure should lead to underestimation.

Furthermore, because the result of the first few steps of multiplication (performed from left to right) is higher in the descending sequence than in the ascending sequence, the former expression should be judged larger than the latter. Both predictions were confirmed. The median estimate for the ascending sequence was 512, while the median estimate for the descending sequence was 2,250. The correct answer is 40,320.

Consider one of the following questions. Then consider the other and contemplate whether you would have given a different answer.

- a) In July 2012, the one year Treasury Bill rate in Sri Lanka was 13.10 %. What was it in India?
- b) In July 2012, the one year Treasury Bill rate in Japan was 0.10 %. What was it in India? In this construction those who start with (a) tend to overshoot the correct answer<sup>16</sup>, while those who start with (b) undershoot. The initial given rate is an anchor, and although we know it is too high or low, we tend to be too conservative in our adjustment.

Sales people are well aware of this bias (although they may give it a different name), offering consumers an expensive product which they do not expect to sell. The salesman is trying to get the consumer anchored on the high price, so that when he offers a lower price, the consumer will estimate that the lower price represents a good value.

Investors exhibiting this bias are often influenced by purchase “points” or arbitrary price levels or price indexes and grip these numbers when facing questions like “should I buy or sell this security?” or “is the market over-valued or under-valued right now?” This is especially true when

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<sup>16</sup> By July 2012, one year Treasury Bill rate in India was approximately 8.05%.



the introduction of new information regarding the security further complicates the situation. Rational investors treat these new pieces of information objectively and do not reflect on purchase prices or target prices in deciding how to act. Anchoring and adjustment bias, however, implies that investors perceive new information through an essentially warped lens. They place undue emphasis on statistically arbitrary, psychologically determined anchor points. Hence, their decisions deviate from “rational” norms defined by standard finance.

The consequence of this bias is that people over-estimate conjunction of events (with high individual probabilities), and under-estimate a disjunction of events (with low individual probabilities). Anchoring effect also results in overly narrow confidence intervals, which means that people get surprised more frequently than what they expect.

Investors decide to invest in a stock; the stock goes up and then declines. They become conflicted and must evaluate the situation to determine whether to hold onto the stock. A rational investor would examine the company’s financial situation, i.e. make an objective assessment of its business fundamentals, and then decide to buy, hold, or sell the shares appropriately. Conversely, some irrational investors, even after going through the trouble of performing the aforementioned rational analysis, permit cognitive errors to cloud their judgment.

Understanding anchoring and adjustment can, for example, be a powerful asset when negotiating. Many negotiation experts suggest that the participants communicate radically strict initial positions, arguing that an opponent subject to anchoring can be influenced even when the anchor values are extreme. If one party begins a negotiation by offering a given price or condition, then the other party’s subsequent counter offer would likely reflect that anchor.

From the investment perspective, the best counter measure to anchoring and adjustment bias is awareness. Investors can overcome the anchoring bias by following a scientific method for investment analysis, replacing ignorance with knowledge and conjectures with facts. We might conjecture that annual stock returns do not deviate much from their long-term averages, but facts teach us otherwise.

## **Cognitive Dissonance**

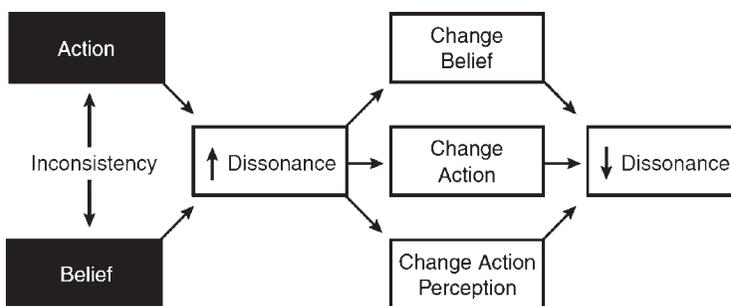
Cognitive dissonance is a theory of human motivation that asserts that it is psychologically uncomfortable to hold contradictory cognitions. Cognitions, for the purpose of this theory, may be thought of as a piece of knowledge, which represent attitudes, emotions, beliefs, or values, and cognitive dissonance is a state of imbalance that occurs when contradictory cognitions intersect.

The theory is that dissonance, being unpleasant, motivates a person to change his cognition, attitude, or behavior. Cognitive dissonance can be defined as “the mental conflict that people experience when they are presented with evidence that their beliefs or assumptions are wrong”.<sup>17</sup>

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<sup>17</sup> Montier, James, 2002. “Behavioral Finance: Insights into Irrational Minds and Markets”. Wiley.

Two cognitions are said to be dissonant if one follows from the opposite of another. If a person holds two cognitions that are psychologically inconsistent, he experiences dissonance, i.e. a negative drive state. Because the experience of dissonance is unpleasant, the person will strive to reduce it, usually by struggling to find a way to change one or both cognitions to make them more consonant with one another.



### Cognitive Dissonance Theory<sup>18</sup>

A classical illustration of cognitive dissonance is expressed in the fable “The Fox and the Grapes” by Aesop.

A fox sees some high-hanging grapes and wishes to eat them. But, when the fox is unable to think of a way to reach them, he decides that the grapes are probably not worth eating, with the justification the grapes probably are not ripe or that they are sour, i.e. “sour grapes”.

Investors, like everyone else, need to be able to live with their decisions. Investors often go to great lengths to rationalize decisions on prior investments, especially failed investments. Moreover, people displaying this tendency might also irrationally delay unloading assets that are not generating adequate returns, i.e. investors may hold losing securities position that they otherwise would sell because they want to avoid the mental pain associated with admitting that they made a bad decision.

In both cases, the effects of cognitive dissonance are preventing investors from acting rationally and, in certain cases, preventing them from realizing losses and reallocating at the earliest opportunity. Furthermore, the need to maintain self-esteem may prevent investors from learning from their mistakes. Cognitive dissonance can cause investors to continue to invest, i.e.

<sup>18</sup> Richard H. Hall, Psychology World, Department of Psychology, University of Missouri. “Cognitive Dissonance”. Available at [http://web.mst.edu/~psyworld/cognitive\\_dissonance.htm](http://web.mst.edu/~psyworld/cognitive_dissonance.htm) (Accessed 01<sup>st</sup> July 2012).



average down in a security that they already own, even after it has gone down, to confirm an earlier decision to invest in that security without judging the new investment with objectivity and rationality. A common phrase for this concept is “throwing good money after bad.”

In overcoming the negative behavioral effects of cognitive dissonance, investors need to immediately admit that a faulty cognition has occurred. Rather than adapting beliefs or actions in order to circumvent cognitive dissonance, investors must address feelings of unease at their source and take an appropriate rational action.

## **Availability Bias**

Decision-making is an integral part of everyday life and the range of decisions may vary based on their extent of complexity and importance. As human beings, when making decisions individuals often take into consideration their past experience and learning, even when such may be irrelevant for the present or the future. Moreover, individuals are subject to various external influences and may vary their behavior as a function of their concurrent feelings and emotions. As a result, their decisions and actions often depart from rationality.

The availability bias asserts that people estimate frequencies or probabilities by the ease with which related instances or associations could be recalled, i.e. how easily they are available in memory, and thus, over weigh current information, as opposed to processing all relevant information. Therefore, availability is a rule of thumb, or a mental shortcut, that allows people to estimate the probability of an outcome based on how prevalent or familiar that outcome appears in their lives. People exhibiting this bias perceive easily recalled, vividly described and emotionally charged possibilities as being more likely than those prospects that are harder to imagine or difficult to comprehend.

People often unconsciously assume that readily available thoughts, ideas, or images represent unbiased indicators of statistical probabilities. People estimate the likelihoods of certain events according to the degree of ease with which recollections or examples of analogous events can be accessed from memory. Impressions drawn from imagination and past experience combine to construct an array of conceivable outcomes, whose real statistical probabilities are, in essence, arbitrary.

A famous study<sup>19</sup> researched errors in quantifying the severity of risks, or judging which of two dangers occurred more frequently. The subjects of the study thought that accidents caused about as many deaths as disease and thought that homicide was a more frequent cause of death

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<sup>19</sup> Lichtenstein, Sarah; Slovic, Paul; Fischhoff, Baruch; Layman, Mark; Combs, Barbara; 1978. “Judged frequency of lethal events”. *Journal of Experimental Psychology: Human Learning and Memory*, Vol 4(6) pp. 551-578.



than suicide. Actually, as the statistics reveal, diseases cause about 16 times as many deaths as accidents, and suicide is twice as frequent as homicide. An obvious hypothesis to account for these skewed beliefs is that murders are more likely to be talked about than suicides, thus, someone is more likely to recall hearing about a murder than hearing about a suicide. Accidents are more dramatic than diseases and perhaps this makes them more likely to remember, or more likely to recall.

There are several categories of availability bias, of which retrievability, categorization, narrow range of experience and resonance are the biases mostly witnessed among investors.

i. Retrievability

Ideas that are retrieved most easily also seem to be the most credible, though this is not necessarily the case. For example, in an experiment<sup>20</sup> subjects were read a list of names and then were asked whether more male or female names had been read. In reality, the majority of names recited were unambiguously female; however, the subset of male names contained a much higher frequency of references to celebrities. In accordance with availability theory, most subjects produced biased estimates indicating, mistakenly, that more male than female names populated the list.

Similarly, investors will choose investments based on information that is available to them (advertising, newspaper headlines and columns, suggestions from advisors and friends, etc.) and will not engage in disciplined research or due diligence to verify that the investment selected is indeed a good one.

ii. Categorization

People attempt to categorize or summon information that matches a certain reference. The first thing that their brains do is generate a set of search terms, specific to the task at hand, that will allow them to efficiently navigate their brain's classification structure and locate the data they need. Different tasks require different search sets, however; and when it is difficult to put together a framework for a search, people often mistakenly conclude that the search simply references a lean array of results, i.e. investors will choose investments based on categorical lists that they have available in their memory and in their minds, other categories will not be easily recalled and, thus, will be ignored.

For example, U.S. investors may ignore emerging market economies where potentially rewarding investment opportunities may exist, because those countries may not be an easily recallable category in their memory.

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<sup>20</sup> KahnemanDavid, Slovic Paul, and Tversky Amos, 1982. "Judgment under Uncertainty: Heuristics and Biases". Cambridge University Press.



iii. Narrow range of experience

When a person possesses a too restrictive frame of reference from which to formulate an objective estimate, then narrow range of experience bias often results. Investors will choose investments that fit their narrow range of life experiences, such as the industry they work in, the region they live in, and the people they associate with.

For example, investors who work in the technology industry may believe that it is the only profitable industry to invest.

iv. Resonance

The extent to which certain, given situations resonate, i.e. echo, vis-à-vis individuals' own, personal situations can also influence judgment. For example, fans of classical music might be likely to overestimate the portion of the total population that also listens to classical music. Those who dislike classical music would probably underestimate the number of people who listen to classical music.

Investors will choose investments that resonate with their own personality or that have characteristics that investors can relate to their own behavior. Taking the opposite view, investors ignore potentially good investments because they can't relate to or do not come in contact with characteristics of those investments.

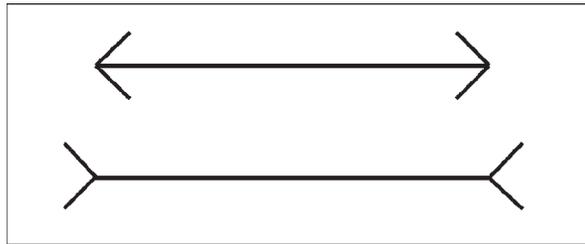
In order to overcome availability bias, investors need to carefully research and formulate investment decisions before executing them. Focusing on long-term results, while resisting chasing trends, are the best ways to battle the availability bias. When selecting investments, it is crucial to consider the effects of the availability, i.e. stop and consider how you decide which investments to research, before making an investment.

## **Framing Bias**

Framing bias notes the tendency of decision makers to respond to various situations differently, based on the context in which a choice is presented, i.e. framed. In real life, people usually benefit from some flexibility in determining how to address the problems they face. Framing can be explained visually using the following figure;<sup>21</sup>

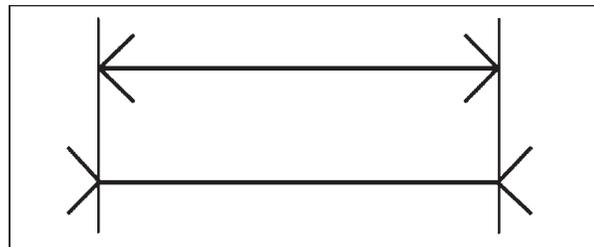
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<sup>21</sup> Pompian, Michael, 2006. "Behavioral Finance and Wealth Management: How to Build Optimal Portfolios That Account for Investor Biases". Wiley Finance.



Which line is longer?

People subject to framing experience an optical illusion, which leads them to insist that the second line is longer. The graphic is reproduced below, however, this time with vertical marks added in as a guide. With the framing effect of the “arrow” detail neutralized, it becomes clear that the line on the top and the line on the bottom are equal in length.



Which line is longer?

A frame is the combination of beliefs, values, attitudes, mental models, and so on which we use to perceive a situation. We effectively look through this frame in the way we would look through tinted spectacles. Frames are mental structures that simplify and guide our understanding of a complex reality.

The frame significantly effects how we infer meaning and hence understand the situation. A decision frame has been defined as “the decision-maker’s conception of the act, outcomes and contingencies associated with a particular choice”.<sup>22</sup>

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<sup>22</sup> Tversky, Amos; Kahneman, Daniel, 1981. “The Framing of Decisions and the Psychology of Choice”. Science 211, pp. 453–458.



It is almost always possible to frame a decision problem in more than one way. How one frames the same problem should not affect how one resolves the problem because the problem does not change.

A story is told about two monks who were heavy smokers. Concerned that smoking was inconsistent with their commitment to a life of prayer and devotion, they decided to approach their prefect for guidance.

The first asked, "Father, would it be permitted to smoke while I am praying to the Lord?" The answer was a resounding "no".

The second also sought counsel, but framed his question somewhat differently. "Father, when in moments of weakness I smoke, would it be permitted to say a prayer to the Lord?" "Yes", the prefect replied, "of course my son".

Frames generally emphasize a particular piece of information or view. Frames cause that information or view to weigh more heavily in the decision-makers' minds, and as a result, may change their decisions.

Tversky and Kahneman offered people one of the following choices:

Problem 1:

Examine and indicate the option you prefer.

A. 25% chance to win \$240 and 75% chance to lose \$760 (0%)<sup>23</sup>

B. 25% chance to win \$250 and 75% chance to lose \$750 (100%)

It is easy to see that B dominates A. Indeed, all respondents chose accordingly.

Problem 2:

Imagine that you face the following pair of concurrent decisions. Examine both decisions and indicate the options you prefer.

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<sup>23</sup> The figure in parenthesis corresponds to the percentage of participants who selected the given choice.



Decision (i): Choose between;

- C. sure gain of \$240 (84%)
- D. 25% chance to gain \$1,000 and 75% chance to gain nothing (16%)

Decision (ii): Choose between

- E. sure loss of \$750 (13%)
- F. 75% chance to lose \$1,000 and 25% chance to lose nothing (87%)

As expected, a large majority of subjects made a risk averse choice for the sure gain (C) over the positive gamble (D) in the first decision, and an even larger majority of subjects made a risk seeking choice for the gamble (F) over the sure loss (E) in the second decision. In fact, 73% of the respondents chose C and F and only 3% chose D and E.

Because the subjects considered the two decisions in Problem 2 simultaneously, they expressed a preference for C and F over D and E. The preferred conjunction, however, is actually dominated by the rejected one.

- D. 25% chance to gain \$1,000 and 75% chance to gain nothing
- E. sure loss of \$750 (13%)

Combining D and E in the second problem generates the outcome G, i.e.  $D + E = G$ .

- G. 25% chance to gain \$250 and 75% chance to lose \$750

But, G is same as B in the first problem, and therefore, D and E should dominate over C and F, i.e. D and E actually have higher expected utility than C and F. It also shows how framing a choice in terms of gain will push people towards a certain decision, whilst framing it in terms of a loss increases the chance that people will choose to gamble.

Often we are not aware of the frames we (or others) are employing, much the same way we might not notice the window pane as we admire the view beyond it. Even if the window is clear, frames can distort what we see by controlling what information is seen and what is not.



There is a unique relationship between framing and risk taking. Negatively framed problems decrease risk bearing and encourage risk seeking. Since losses emerge larger than gains, it appears that humans follow conservative strategies when presented with a positively-framed dilemma, and risky strategies when presented with negatively-framed ones. To illustrate, consider the experiment<sup>24</sup> where a representative sample of physicians were asked the following question.

Imagine that, the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

If program A is adopted, 200 people will be saved.

If program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.

Which of the two programs would you favor?

Notice that the preceding dilemma is positively framed. It views the dilemma in terms of "lives saved". When the question was framed in this manner, 72% of physicians chose A, the safe-and-sure strategy, but only 28% chose program B, the risky strategy.

An equivalent set of physicians considered the same dilemma, but with the question framed negatively:

Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

If program C is adopted, 400 people will die.

If program D is adopted, there is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.

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<sup>24</sup> Kahneman, D., Tversky, A., 1984. "Choices, values and frames". *American Psychologist* 39 (4), pp. 341-350.



Which of the two programs would you favor?

The two questions examine an identical dilemma. Two hundred of 600 people saved is the same as 400 of 600 lost. However, when the question was framed negatively, and physicians were concentrating on losses rather than gains, they voted in a dramatically different fashion. When framed negatively, 22% of the physicians voted for the conservative strategy (C) and 72% of them opted for the risky strategy (D)!

Clearly, framing can powerfully influence the way a problem is perceived, which in turn can lead to the favoring of radically different solutions.

An individual's willingness to accept risk can be influenced by how questions or scenarios are framed, i.e. positively (optimistic) or negatively (pessimistic). Optimistically worded questions are more likely to reap affirmative responses, and optimistically worded answer choices are more likely to be selected than pessimistically phrased alternatives. Recall, for example, the subjective difference between "25 percent of patients will be saved" and "75 percent of patients will die." The same optimism or pessimism in framing can affect investment decision making.

## **Conclusion**

Today, almost all people (hopefully) believe that the earth revolves around the sun and such belief is testimony to the power of scientific knowledge. Our eyes would tell us that the sun revolves around the earth, but scientific logic and evidence proves that the mental shortcut of our eyes misleads us into an illusion. Behavioral biases also thrive in our perceptions of investments as illusions created by our mind, and scientific knowledge can help us overcome them.

The behavioral biases arise from fear and greed associated with investing and therefore, investors make mistakes in investing when they mix emotions with rational decision making. The investors should understand the enemy within, i.e. behavioral biases, as this is an important step. The primary objective for overcoming behavioral biases is not to allow emotions to play a significant role in investing. There are several things that can be done for achieving a separation of psychology and finance, assuming predefined and realistic goals with respect to the portfolio.

There are no easy fixes for most of the behavioral biases that plague investors and markets. That is, merely learning about cognitive and emotional biases does not necessarily eliminate them. Also, some behavioral biases may have a flip side that is beneficial. For example, the tendency to weigh losses more heavily than gains may be a beneficial trait. If investors care too much about potential gains and too little about potential losses, they run a risk of experiencing losses that may threaten their survival.

A realistic approach in managing behavioral biases may involve accommodating emotional biases while mitigating cognitive errors. Cognitive errors are the result of faulty reasoning due to lack of information or lack of ability to evaluate information, and therefore, better information and



advice can often correct them. Conversely, because emotional biases originate from impulse or intuition rather than conscious calculations, they are difficult to rectify.

The following guidelines<sup>25</sup> may serve as a starting point in managing and overcoming cognitive biases and accommodating emotional biases.

- i. Understand and avoid behavioral biases  
As cognitive and emotional biases play an important role in investor behavior, overcoming investor mistakes should start with recognizing and avoiding the behavioral biases that can influence optimal, i.e. rational, decision making.
- ii. Identify investment objectives and constraints  
To reduce the influence of behavioral biases, investors can establish realistic investment objectives in terms of return requirements and risk tolerance. In addition, they should recognize and allow for various constraints such as liquidity, time horizon, taxes and legal requirements to formulate and achieve their investment objectives. Having clearly defined, realistic objectives can help investors avoid taking too much risk.
- iii. Develop quantitative, systematic and disciplined investment criteria  
By developing a set of quantitative investment criteria, investors can avoid investing on emotion, rumor, greed and fear. Following appropriate criteria can also help investors formulate and achieve their long-term investing goals.
- iv. Develop entry and exit strategies  
Decisions to take a new position in a security should include an exit strategy. If the decision is to buy, the decision should include the circumstances under which it will be sold, for example: percent drop in price, percent rise in price, a time horizon, etc.
- v. Diversify investments  
Portfolio diversification among various asset classes, such as stocks, bonds, money market instruments and real estate helps to increase the stability of returns and thus reduce risk. Proper diversification can help investors avoid tragic losses and shield them against the emotional biases.

The asset classes and weights that investors assign to each asset class within the portfolio are particularly important. Research<sup>26</sup> has shown that about 90% of the overall investment returns arise from the long-term asset allocation decision. Proper asset allocation adds much more value to investment performance than market timing and security selection.

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<sup>25</sup> Balter, Kent; Nofsinget, John; "Psychological Biases of Investors", *Financial Services Review* 11, No. 2. (2002), pp. 97-117.



vi. Review and reallocate assets

Investors should periodically review and keep track of their investments. For example, an investor should review the portfolio at least annually and compare it with specific investment objectives. If the weights of each asset class diverge too much from the desired weights, the investor can consider rebalancing the assets within the portfolio.

As emphasized throughout this paper, behavioral finance should play a critical role in investment analysis, planning, execution and management. Although standard and behavioral finance may seem as two competing philosophies with investors expected to choose one side or the other, it should be noted that, behavioral finance reinforces the benefits of standard finance. There is value in both disciplines and the precise blend of each other would present an excellent opportunity for investors to weather the storms of volatility in financial markets.

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