CHAPTER 2

HISTORY AND BACKGROUND OF BEHAVIORAL FINANCE

This chapter discusses the progression of the theories of behavioral finance from the traditional framework. It critically analyzes the importance of traditional theories in the field of finance followed by the situations where they fail. It then illustrates the significance of behavioral finance in bridging the gap between the traditional theories and real life situations. Finally, it provides a synthesis of academic events that substantiate the presence of behavioral biases, their underlying psychology and their impact on financial markets.

2.1 TRADITIONAL APPROACH TO INVESTOR BEHAVIOR

Mid eighteenth century is considered to be the onset of the classical period in economics (Pompian, 2011). It is during this time that the concept of utility was introduced which measured the satisfaction of individuals by consuming a good or a service [18]. In 1844, John Stuart Mill introduced the concept of rational economic man or *homo economicus* who tries to maximize his economic well being given the constraints he faces. The three underlying assumptions for this agent are; perfect rationality, perfect self- interest and perfect information. These assumptions became the basis of the traditional financial framework that sought equilibrium solutions by maximizing marginal utilities of individuals subject to situational constraint [122]. The behavior of individuals representing this paradigm is uniform as their main focus is on optimizing their marginal gains. As the noted researcher [157] once quoted that “Standard finance is 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 theories have been developed to find mathematical explanations to real life financial problems. Their basic assumption is based on rationality of people. This concept is further elucidated by [7]. According to them rationality has two pronged focus. First, when agents receive new information they update their beliefs correctly according to Bayes’ law. Second, given their beliefs, the agents take decisions which would maximize their expected utility. Table 2.1 provides the summary of these classical researches. It starts with the concept of rational economic man or *homo economicus* followed by the standard
theory of individual choice, i.e. the expected utility theory. Next, the classical models in asset pricing theories that are Markowitz portfolio model and the capital asset pricing model are elaborated. The discussion concludes with one of the most referred as well as equally criticized theories, the efficient market hypothesis.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Stuart Mill</td>
<td>1844</td>
<td>Introduced the concept of Economic Man or <em>homo economicus</em>.</td>
</tr>
<tr>
<td>Bernoulli</td>
<td>1738, 1954</td>
<td>Expected utility theory</td>
</tr>
<tr>
<td>Von Neumann and Morgenstern</td>
<td>1944</td>
<td>Expected utility theory</td>
</tr>
<tr>
<td>Harry Markowitz</td>
<td>1952</td>
<td>Markowitz portfolio theory</td>
</tr>
<tr>
<td>Treynor, Sharpe and Lintner</td>
<td>1962,1964, 1965</td>
<td>Capital asset pricing model</td>
</tr>
<tr>
<td>Jan Mossin</td>
<td>1966</td>
<td></td>
</tr>
<tr>
<td>Eugene Fama</td>
<td>1970</td>
<td>Efficient market hypothesis</td>
</tr>
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</table>

The concept of rational economic man or *homo economicus* was first given by [110]. It describes humans as rational and self interested agents who try to maximize their utility using rational assessments. This concept forms the basic assumption of most of the economic theories.

Expected Utility Theory [18] [172] states that the market participants make their decisions under risk by comparing the expected utility values of the available alternatives. Rational investors act to maximize their expected utility that is calculated as weighted sums of utility values multiplied by their respective probabilities. It categorizes the decision makers into risk averse, risk neutral and risk loving individuals. Further, it explains that the utility function for a risk averse investor is concave (figure 2.1a). This implies that, for an increase in expected wealth the utility function of a risk averse person decreases. In other words, for the same amount
of utility a risk averse person would like to take lesser risk than a risk loving person. It explains the difference between investors’ behavior with respect to their risk tolerance. This theory along with its variants like subjective expected utility theory [128] was the most accepted theory for decades in financial literature in decision making under risk.

![Figure 2.1: Expected utility functions for three risk attitude types](image)

The rationality of the agents turned out to be the key to unlock the stock market behavior. Alongside this assumption, several corresponding theories developed that established the groundwork of standard finance theories. The predominant theories amongst these were the Markowitz portfolio theory and the capital asset pricing model.

[106] introduces the portfolio selection model. It describes the process of optimal portfolio construction by selecting several risky securities and a risk free asset. It deals with maximizing the expected return of the portfolio for a given amount of risk, or, minimizing the risk for a given amount of expected return. It helps in diversification of portfolio by selecting securities with most optimal risk-return opportunity. Markowitz portfolio theory formed the basis of one of the most central asset pricing models in finance, the capital asset pricing model (CAPM).
CAPM is developed by [133], [97] and [112]. It gives the relationship that should be observed between the risk of the asset and its expected return. The expected return of an asset derived from this model provides an estimate of fair or benchmark return. It also helps the investors to make an educated guess of the expected return of securities that have not yet been traded in the stock market [22]. The basic assumptions of the CAPM are enlisted below. These assumptions, try to ensure the homogeneity (or similarity) in the behavior of individuals [22].

- It considers that there are many individuals in the market, each with a certain amount of wealth which is small as compared to the total wealth of all investors. Perfect competition prevails in the market where the investors are price-takers and the security prices are not affected by their trades.

- All investors have an identical holding period and their expectations are myopic such that they would ignore everything that might occur at the end of the period.

- The investments are limited only to publicly traded financial assets. The non-traded assets like that of private enterprises are excluded. It is also assumed that investors may borrow or lend any amount at a risk-free rate.

- Investors do not pay any taxes on returns and there are no transaction costs on trading securities.

- All investors are rational and they would try to optimize the risk-return tradeoff of their personal portfolio.

- The investors try to mimic the market portfolio, which is considered to be efficient as it incorporates all the relevant information about the universe of securities. Therefore, all the securities in market portfolio are fairly priced.

- Investors are as alike as possible and they analyze the securities in the same way i.e. they have homogeneous expectations.

The simplicity of CAPM makes it the most widely accepted asset pricing models. However, traditional theorists abandoned the CAPM in favor of [53] three-factor model when the CAPM produced anomalies inconsistent with market efficiency [157].
A great deal of asset pricing theories is based on the assumption of market efficiency, which is introduced and explained by [52]. He defines the efficient financial market as one in which security prices always fully reflect available information. It further identifies that in an efficient market all the investors are well informed, rational individuals who aim to maximize their profits. This means that if the efficient market hypothesis (EMH) holds true, then the investors cannot hope to beat the market and no amount of analysis would help in generating abnormal returns. This theory takes the standard finance literature one notch higher by taking into account irrational traders. It notes that the irrational or noise traders can distort the prices, but it is a temporary phenomenon and is quickly eliminated by the arbitrageurs. The theoretical and empirical assumptions of EMH [144] are illustrated.

Theoretical assumptions of the EMH

- Investors are assumed to be rational. Therefore, they value the securities rationally, incorporating all the available information.
- Irrational investors, if present, trade randomly; therefore their trades cancel each other out without affecting the prices.
- Further, the effect of irrational investors on prices is also eliminated by the trading activities of arbitrageurs.

Empirical assumptions of the EMH

The EMH turned out to be an enormous empirical success in the first decade of its conception. [80, pp. 95] stated that, ‘there is no other proposition in economics which has more solid empirical evidence supporting it than the Efficient Market Hypothesis’. The empirical focus of the EMH has two aspects. It first considers the impact of new information on security prices. It states that any new information in the market should be incorporated in the security prices quickly and correctly such that price trends or reversals could not exist after the initial impact of the news. Secondly, since the price of a security is equal to its value; therefore it should only move when there is a news about a change in its fundamental value and not otherwise. It is further noted that in an efficient market scenario old information has no monetary
value. [52] categorizes the old information into three types which gives rise to three forms of market efficiencies: weak, semi-strong and strong.

- In the *weak* form of market efficiency, the past prices and returns are taken as old information and here technical or trend analysis cannot yield superior abnormal returns.
- In *semi-strong* form of market efficiency, any publicly available information is considered old and its fundamental analysis also fails to give superior returns. This means that as soon as the information becomes public it gets incorporated into security prices.
- However, investors can still earn abnormal returns by having information that is not made public i.e. insider trading. Here comes the importance of *strong* market efficiency wherein even insider trading cannot provide abnormal return as this information leaks out quickly and gets incorporated into security prices.

For a very long period of time these theories were considered to be the ultimate explanation for investor and market behavior. However, in recent times researchers have been observing that traditional theories get significantly violated in actual market conditions. They have started accepting that these theories are based on the over-simplified assumptions. Its foundations are built on how market participants ought to behave rather than how they actually behave. This led to the emergence of behavioral finance which factors irrationalities and biases of investors.

### 2.2 BEHAVIORAL FINANCE APPROACH

The rationality of investors became debatable from the time standard finance theories could not give sufficient explanation for the stock market anomalies. One of the most apparent example of such an anomaly is the stock market bubble, for instance the dot-com bubble of the 1990’s [39] or the recent real estate bubble of 2006 [174]. A bubble is created when market participants drive the security prices way above their fair price. During this phase people disregard the fundamental valuation and get attracted to such overpriced securities which strengthen the mispricing even more. However, this ‘hot market’ situation ends when companies fail to achieve their promised targets or the demand declines. Experts like [102] highlight the importance of behavioral biases like herd mentality as the cause of this situation. The existence of such bubbles defies the very core of the “standard finance theories”.
The essence of standard finance theories can be captured into four foundation blocks: 1) investors are rational; 2) markets are efficient; 3) investors should design their portfolio according to the rules of mean variance portfolio 4) Expected returns are a function of risk and risk alone [158]. Behavioral finance offers an alternative for each of these blocks. It states that investors are “normal” not rational, the markets are not efficient even when they are difficult to beat, investors do not design their portfolio on mean-variance theory and the expected returns are measured by more than just risk [158]. We try to examine the traditional foundations and their behavioral counterparts in the subsequent section. We start with the brief history of the discipline itself.

Behavioral finance emerged as a branch of social psychology that captures the human side of decision making. Research in this field started in the eighteenth century with significant works like Theory of Moral Sentiments (1759) and Wealth of Nations (1776) by Adam Smith. In these studies Smith suggests the presence of an “invisible hand” or the morality of individuals that guides them in making social, economic and even financial decisions. [151] emphasizes on the role of sentiments like pride, shame, insecurity and egotism. Another contemporary thinker, [16] highlights the psychological aspects of utility function. [16] argues that human concern for happiness makes it impossible for them to make a decision that is entirely devoid of emotions. These researchers stress on the role of psychology on economic behavior, but their consensus was lost over the next century. This work was then reinstated in the twentieth century. [130] identifies that the stock price movements on the exchanges are dependent on the mental attitude of investors. The role of sentiment is also observed by [84] as the “animal spirits” of individuals. Keynes along with many other researchers criticized the concept of homo economicus and argued that human beings cannot be completely informed of every situation in order to maximize their expected utility. Instead, they advocate the theory of the bounded rationality given by [147]. This theory assumes that rationality of individuals is constrained by two factors: information they have at their disposal and the cognitive limitations of their minds. Bounded rationality is a more relaxed version of the standard expected utility theory. It is also more realistic to its traditional counterpart as it incorporates the limitations of the human judgment. The utility function is further explored by [123]. The author compares the utility with respect to local risk
aversion and global risk aversion and explains that the decision maker will have a greater local
risk aversion if he is globally more risk averse. The author also gives a related utility function
where risk is measured as a proportion of total assets.

In 1956 the US psychologist Leon Festinger introduces the concept of cognitive
dissonance [56] which occurs when two simultaneously held cognitions are inconsistent.
Moreover, this dissonance creates a feeling of unpleasantness or unrest in the people such
that they try to avoid it or reduce it by changing their beliefs. The mental processes that are a part
of cognitive psychology have been examined by various experts with respect to decision making
under uncertainty. One of the significant contributions to this body of literature is by [124]. The
author analyzes decisions under three approaches that provide a more pragmatic view of an
individual’s thought process. These approaches are mentioned as follows.

- Normative approach: It is concerned with rational decision making process. It provides
  ideal solution which a decision making process should strive to achieve.

- Descriptive approach: It deals with the manner in which people actually make decisions
  in the real life situations.

- Prescriptive approach: It provides the individuals with practical advice and tools that
  might help them in achieving results that are in close approximation to the normative
  analysis.

The path-breaking work in behavioral finance is credited to the psychologists Daniel
Kahneman and Amos Tversky. They introduced the concept of prospect theory for the analysis
of decision making under risk [83]. This theory is considered to be seminal in the literature of
behavioral finance. It was developed as an alternative model for expected utility theory. It throws
light on how individual evaluate gain or losses. This theory has three key aspects.

- Key Aspect 1: People sometimes exhibit risk aversion and sometimes risk loving
  behavior depending on the nature of the prospect. This is because people give lower
  weightage to the outcomes which are probable as compared to those that are certain. This
makes them risk averse for choices with sure gains while risk seeker for choices with sure losses. It is also known as certainty effect.

- **Key Aspect 2:** People assign value to losses or gains rather than final assets. Here two thought processes come into play. These are editing and evaluation. During the editing stage, the prospects are ranked as per the rules of thumb (heuristics) and in evaluation stage, some reference point is taken into account that provides a relative basis for determining gain or losses. This reference point is usually their status quo.

- **Key aspect 3:** The weightage given to losses is higher than given to gains of the same amount. This is because people are averse to losses as they loom larger than gains. This is called *loss aversion*.

The value function in the prospect theory replaces the utility function in the expected utility theory. In addition, instead of using simple probabilities as in the expected utility theory, it uses decision weights which are a function of probability. The value function of the prospect theory is shown below in figure 2.2.

![Value function of Prospect Theory](image)

**Figure 2.2:** Value function of Prospect Theory

In this figure the value function of loss is steeper than the gains which corroborate the fact that people overweigh their losses. Another finding is that this function is concave for gains while
convex for losses. This leads to the interpretation of four fold pattern of risk attitude in individuals [171] which is mentioned below.

- Risk seeker for gains with low probability.
- Risk aversion for gains with high probability.
- Risk aversion for losses with low probability.
- Risk seeker for losses with high probability.

Prospect theory is considered to be the seminal work in behavioral finance and it forms the underlying basis of biases like loss aversion, framing and the disposition effect.

It can be seen from the above literature that the work on incorporating behavioral aspects to traditional theories started quite early. This area started gaining importance in late 1970’s and 80’s. The works of [147], [123], [124] and [83] provide an alternative to the expected utility theory. In later years, the expected utility theory wasn’t the only theory which faced criticism. Proponents of behavioral finance also found flaws in other standard finance theories like the capital asset pricing model (CAPM), the Markowitz portfolio selection model and the efficient market hypothesis (EMH).

[137] develop a variant of CAPM called the behavioral asset pricing model (BAPM). This model explains the market interaction of two groups of traders, i.e. the informational traders and the noise traders. Information traders are the rational traders who follow the CAPM whereas noise traders are the ones who do not follow the CAPM and commit cognitive errors. Here the expected return on securities is determined by their behavioral betas. [157] further points that traditional asset pricing models like the CAPM determine the expected return of a security at a given point of time, but do not consider the same over a period of time that could provide an explanation for the stock market bubbles. The author also argues that the rationality in the security prices in the efficient market hypothesis reflects only the utilitarian characteristics like risk and not the value expressive characteristics such as sentiments. He states that both these characteristics influence the risk premium. Further, the author suggests that experts should explore the asset pricing models that reflect both value expressive and utilitarian characteristics.
[139] also develop an alternative to the Markowitz portfolio theory, named as the behavioral portfolio theory (BPT). In the Markowitz model, the investors build a mean variance portfolio, thereby trying to optimize their risk-return tradeoff. Here the portfolio is evaluated as a whole and the risk attitude of the investors is also consistent. In contrast, the BPT takes into account the behavioral investors that construct their portfolios as the pyramids of assets, layer by layer, where each layer is associated with its specific goal and risk attitude. This theory tries to explain a part of investor behavior that deals with their differential attitude towards risk.

Researchers like [144] and [141] challenge the predictions of efficient market hypothesis (EMH). [144] provides an alternative approach to study financial markets with the help of behavioral finance. The author acknowledges the fact that in actual financial markets, irrational investors trade against arbitrageurs whose resources are limited by risk aversion, short horizons, and agency problems. He presents behavioral models that explain various market anomalies such as the superior performance of value stocks, the closed end fund puzzle, the higher returns on stocks included in market indices, the persistence of stock price bubbles, and collapse of several well-known hedge funds in 1998. Some of the key points of [144] are enumerated below.

- It is impossible for investors being completely rational. Most of the investors react to irrelevant information or they trade on noise rather than information.
- These investors are prone to various biases like narrow framing, the disposition effect, loss aversion, representativeness and overreaction.
- It counters the assumption of the EMH which states that the irrational investors, if exist, trade randomly such that their trades cancel each other out leaving no impact on stock prices whatsoever. In contrast to this [144] argues that trades of irrational investors would not be random, rather they would buy or sell the same securities at the same time.
- The study suggests that, contrary to the EMH, arbitrage in real situations is risky and therefore limited. Since the prerequisite for any arbitrage is the availability of same or essentially similar substitutes, yet in many cases securities might not have such close substitutes. This constraint limits the effectiveness of arbitrage which contributes in making the markets inefficient.
[140], [141] presents further contradictions for the EMH. In 1981 the author analyzes the stock market volatility and shows that the stock prices are far more volatile than could be explained by standard financial theories. In his bestselling book *Irrational Exuberance*, [141] analyses the ups and downs of Dow Jones industrial average with a behavioral approach of market participants. He stresses on the impact on investor perception, along with psychological and cultural factors in creating the bubble phase of DJIA during late 1990’s.

In a separate research [79] also provide significant evidence for momentum. They found that individual stock prices over a period of six to twelve months tends to predict the future price movement in the same direction. This finding violates even the weak form of market efficiency.

The aforementioned literature substantiates that the standard finance theories alone cannot explain the anomalies of stock markets. In recent times, the researchers have recognized the importance of incorporating behavioral factors into the traditional theories to get a more realistic insight into the functioning of stock markets. These researches along with various other significant contributions are summarized in Table 2.2.

<table>
<thead>
<tr>
<th>Researcher Name</th>
<th>Year</th>
<th>Theory/ Concept/ Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbert Simon</td>
<td>1955</td>
<td>Models of bounded rationality</td>
</tr>
<tr>
<td>Festinger, Riecken and Schachter</td>
<td>1956</td>
<td>Theory of cognitive dissonance</td>
</tr>
<tr>
<td>Tversky and Kahneman</td>
<td>1973,1974</td>
<td>Introduced heuristic biases: availability, representativeness, anchoring and adjustment</td>
</tr>
<tr>
<td>Kahneman and Tversky</td>
<td>1979</td>
<td>The prospect theory, introduced loss aversion bias</td>
</tr>
<tr>
<td>Tversky and Kahneman</td>
<td>1981</td>
<td>Introduced Framing Bias</td>
</tr>
<tr>
<td>Richard Thaler</td>
<td>1985,1999</td>
<td>Introduced mental accounting bias</td>
</tr>
</tbody>
</table>
Barberis, Shleifer and Vishny 1998 Investor sentiment model for underreaction and overreaction of stock prices.

Meir Statman 1999 Behavioral asset pricing theory and behavioral portfolio theory

Andrei Shleifer 2000 Linkage of behavioral finance with Efficient market Hypothesis to find that stock markets are inefficient.

Barberis, Huang and Santos 2001 Incorporation of prospect theory in asset prices.

Grinblatt and Keloharju 2001 Role of behavioral factors in determining trading behavior.

Hubert Fromlet 2001 Importance of behavioral finance. Emphasis on departure from ‘homo economicus’ or traditional paradigm to more realistic paradigm.

Barberis and Thaler 2003 Survey of Behavioral Finance

Coval and Shumway 2005 Effect of behavioral biases on stock prices. The price reversal for biased investors is quicker than unbiased investors

In recent times, efforts have been made in the direction to reconcile traditional financial theories with behavioral theories. Noteworthy research has been made by [99], [100] who introduces the concept of adaptive market hypothesis as an alternative to efficient market hypothesis (EMH). [100] suggests that, EMH is not wrong as most behavioral experts believe, it is merely incomplete. He argues that the behavioral biases like overconfidence, overreaction, underreaction and loss aversion are not refuting the rational economic theory. These biases are in fact, consistent with evolutionary models of adaptation. He further explains that by viewing financial markets from the perspective of evolutionary biology can give much deeper and accurate insights on how they function.
The next section unveils some of the behavioral irrationalities identified by eminent psychologists and throws light on the role of these tendencies in creating financial market anomalies.

2.3 INTRODUCTION TO BEHAVIORAL BIASES

Behavioral finance captures the role of behavioral biases in investor decision making. [134] broadly classifies these biases into two types: heuristic driven biases and frame dependent biases.

- **Heuristic driven biases**: [134] recognizes that financial practitioners use rules of thumb or heuristics to process data and make decisions. For instance, people believe that future performance of the stock can be best predicted by past performance. The author categorizes such biases under heuristic theme which includes overconfidence, anchoring and adjustment, reinforcement learning, excessive optimism and pessimism.

- **Frame dependent biases**: The decision process of financial practitioners is also influenced by the way they frame their options. This theme includes biases like narrow framing, mental accounting and the disposition effect.

![Figure 2.3: Categorization of behavioral biases](image)

[122] categorizes the behavioral biases into cognitive and emotional biases. The **cognitive** biases include overconfidence, representativeness, anchoring and adjustment, framing, cognitive...
dissonance, availability, mental accounting, etc. The emotional biases include endowment bias, loss aversion, optimism and status quo.

The presence and impact of some of the prominent biases are discussed in this section. These biases are categorized along with the lines of [134] into heuristic and frame dependent biases. Table 2.3 summarizes the studies on these biases.

Table 2.3: Summary of literature on various behavioral biases

<table>
<thead>
<tr>
<th>Bias name</th>
<th>Author (Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss aversion</td>
<td>Kahneman and Tversky (1979), Coval and Shumway (2003), Berkelaar and Kouwenberg (2008), Hwang and Satchell (2010)</td>
</tr>
<tr>
<td>Mental accounting</td>
<td>Thaler (1999), Barberis and Huang (2001)</td>
</tr>
<tr>
<td>Herding behavior</td>
<td>Lakonishok et al. (1991), Scharfstein and Stein (1990), Christie and Huang (1995)</td>
</tr>
<tr>
<td>Status quo Bias</td>
<td>Samuelson and Zeckhauser (1988), Brown and Kagel (2009), Li (2009)</td>
</tr>
</tbody>
</table>

2.3.1 Heuristic driven biases

Heuristics are introduced by [169]. These are the rules of thumb or mental shortcuts that help people in reaching decisions quickly and easily. These shortcuts, although helpful, can lead to erroneous decisions. Three heuristics given by [169] that are used for decision making under uncertainty are representativeness, availability, and anchoring and adjustment.

Representativeness: It is the tendency of individuals to estimate the likelihood of an event by comparing it to a previous incident that already exists in their minds. This existing incident is
generally what they consider to be the most relevant or typical example of the current event. [49] provide the empirical evidence of representativeness bias. They examine the stock price trend for stocks bought by more than 62,000 households at a discount brokerage during a 5-year period. The authors find that investors tend to buy stocks with recent positive abnormal returns. This is consistent with the heuristic that the past price trend is representative of the future price trend. Another instance is presented by [81] who uses the data on current and past earnings for U.S. listed companies for the period of 1983-1999 and suggest that investor overreaction to earnings announcement could be attributed to representativeness bias. The author states that investors initially extrapolate the recent earnings surprise and hence overreact to subsequent earnings surprise.

*Availability bias:* In this case people evaluate the probability of an outcome based on the familiarity or prevalence of that particular outcome. People prone to availability bias give higher likelihood to the events which they can easily recall as compared to the ones that difficult to remember or comprehend. [86] identify this bias in investors’ reaction to analysts’ recommendation revisions. They use daily market returns as a proxy for information on outcome availability. They find that stock price reaction to recommendation revisions (up or down) is stronger when accompanied by index returns in the same direction.

*Anchoring and Adjustment bias:* This bias comes into play when people have to estimate an unknown value or magnitude. Here people start their estimation by guessing some initial value or an “anchor”. This anchor is then adjusted and refined to arrive at the final estimate. [29] investigate the presence of anchoring bias in analysts’ forecasts of monthly economic releases for a period of 1991 to 2006. They find that forecasts of any given release were anchored towards the recent months’ realized values of that release, thereby giving rise to predictable surprises. This effect is consistent for each of the key releases.

The aforementioned researches substantiate the importance of the representativeness, availability and anchoring bias. Representativeness is based on stereotypes and it causes positive earnings surprises to be followed by more positive surprises and negative surprises by more negative surprises [134]. This bias along with the availability heuristic can create overreactions in
investors and stock markets. Finally the influence of anchoring and adjustment bias can make the earnings surprises predictable.

Some of the other equally relevant and widely researched heuristic driven biases are overconfidence and optimism.

**Overconfidence:** It is defined as the investors’ tendency to overestimate the precision of their own valuation abilities, in the sense that they rely on their own private signals and ignore public signals [41]. Overconfidence is one of the most highly researched biases with abundant empirical findings. [61] find that overconfident investors trade more in practice and this effect is stronger in retail investors whose trades respond stronger to past returns. Overconfidence is also detected in relation to current trading volume and past returns. Studies show that this bias can be responsible for the positive relationship between current volume and past returns [35], [160]. [119], [5] and [6] empirically test the theory of overconfidence. They provide evidence that overconfidence leads to greater trading volume in financial markets. They further relate the high trading volume to poor portfolio performance as with an increase in trading volume the trading costs also inflate.

Most of these researches reveal that overconfidence is an illusion of superior knowledge in investors, which is strengthened by their past successes. This tendency makes them trade more as they become sure of the positive outcome. However increase in trading volume comes with high a trading cost which proves to be detrimental to the portfolio performance.

**Optimism:** Researchers define optimism as the tendency of individuals to overestimate the probability of a favorable outcome. In financial terms, it is the tendency of investors to overestimate the mean return expectations of a risky investment [70], [59], [12]. [82] explains that this bias plays a significant role whenever people or institutions voluntarily take on considerable risks. These risk-takers often underestimate the odds they face because of which they misread the risks. One category of such risk takers is the optimistic entrepreneurs who often believe they are prudent, even when they are not. [82] also suggests that optimism brings persistence in the face of obstacles. However, this persistence can be costly. In a Canadian study, it is seen that optimistic investors continue to remain invested in losing stocks even when they
are informed beforehand about their investments’ failure [2]. In yet another research, [155] finds the presence of “relative optimism” in domestic investors. The study uses a survey data of four regions, including Europe, U.K., U.S. and Japan, and shows that investors tend to be more bullish about home assets as compared to foreign. However, this optimism confines to equities and does not extend to bonds or currencies.

Optimism (pessimism) is a very influential bias. It is responsible for setting the mood of the financial markets. This bias is driven by past returns that have an impact on return expectations, return tolerance and risk perception of investors. The empirical evidence of this bias suggests that it is widespread, stubborn and costly. It also creates biasness towards domestic and foreign stocks.

These researches affirm that heuristic driven biases have a fair share of influence on the investors’ choices and actions. In the next section we analyze the role of second category given by [134], the frame dependent biases.

2.3.2 Frame dependent biases

The roots of frame dependence trace back to the study by [83]. This work is taken forward by [134] who mentions several frame dependent biases, the prominent ones amongst those biases are being discussed here. These are loss aversion, narrow framing, mental accounting and the disposition effect.

Loss aversion: It is introduced by [83] and refers to the tendency of individuals to avoid losses strongly as compared to obtain gains. This is because loss brings regret and impact is much greater than that of gains. Several researchers have studied the impact of loss aversion in financial markets. [40] analyze the effect of loss aversion bias in terms of risk taking in market makers. They show that in intra-day trading, a loss in the morning leads to higher risk taking behavior in the afternoon. [17] examine the impact of heterogeneous loss averse investors on asset prices using annual U.S. consumption data for a period of 1889 to 1985. Their study shows that in a good state loss averse investor gradually become less risk averse as wealth rises above their reference point, pushing equity prices up. On the other hand, when wealth drops below the reference point the investors become risk seeking and demand for stock increases drastically.
This eventually leads to forced sell-off and subsequently stock market busts. [77] investigate loss aversion in financial market using the typical asset allocation model for annual data of U.K. pension funds from 1963 to 2003. Their results reveal that financial markets are more loss averse than assumed in literature. Further, this bias change depending on market conditions, for instance, investors become more loss averse in bull markets as compared to bear markets. This indicates that the pain of a loss is larger when others are enjoying gains. They also find that investors are more sensitive to changes in loss than in gains.

These studies reveal that there is a differential impact of gains and losses on decision outcome. Further, the pain of loss is described to be greater than pleasure of an equal amount of gain, which makes the investors more sensitive to a change in the loss. These researches also throw light on the risk attitude pattern of individuals. It is seen that people become risk seeker or less risk averse in the prospect experiencing loss of high probability.

*Narrow framing:* [134] describes narrow framing as the tendency of investors to treat repeated risks as if they were a one-shot deal. [8] elaborate this bias in the context of gambling. They state that, it is the phenomenon wherein people evaluate each new gamble in isolation, separating it from their other risks. In other words, people will ignore all the previous choices that determine their overall wealth risk and directly derive the utility from their current risk. [98] document the presence of narrow framing effect in the options trading market. They used the daily trading volume data of Taiwan Futures Exchange for a period of 2001 to 2004. The findings of this study indicate that investors could easily become susceptible to narrow framing when trading in the complex derivatives market. They simplify complicated trading strategies into understandable trading decisions. The study also supports the fact that traders’ professionalism, sophistication and experience can reduce this bias to a certain extent.

*Mental accounting:* Its concept is given by [164]. It is defined as the tendency of individuals to separate their information into manageable mental accounts. [164] explains that mental accounting is a set of cognitive operations used by individuals to organize, evaluate, and keep track of financial activities. Mental accounting comprises of three components. First component captures how outcomes are perceived and experienced, how decisions are made and subsequently evaluated. Second component involves the assignment of activities to specific
accounts. The final component focuses on the frequency with which accounts are evaluated and 'choice bracketing'. [8] study investors’ mental accounting using simulated data of equilibrium firm-level stock returns. They find that the investors’ system of mental accounting affects asset prices. They track the changes in portfolio performance as the individual’s decision frame shifts from stock accounting to portfolio accounting. Their results reveal that when this happens, the mean value of individual stock return falls, the stocks become less volatile and more correlated with each other.

Both narrow framing and mental accounting are cognitive processes that simplify the complex decision making problem for investors. In narrow framing, individuals treat their risks in isolation rather than taking a holistic view. This bias can lead to overestimation of risk and make the investors myopic in their investment outlook. On the other hand, during mental accounting people segregate the information into different mental accounts. They evaluate the performance of each account separately instead of evaluating the performance of their portfolio as a whole. So although, this bias helps the investors in managing complex information, it can create distortion in asset prices.

The disposition effect:  [136], [118] and [173] document the tendency of investors to delay realizing capital losses, while realizing gains prematurely. [173] investigate this bias in an experimental setting. They find that the original purchase price serves as a reference point and the desire to avoid losses relative to this point leads to holding on to losers for too long. They also find the evidence that winners are sold too soon which amplifies the negative influence even further. This bias has a significant impact on market indicators like trading volume. [90] examine the aggregate market volume data and find that volume movement positively correlate with past price movements which are consistent with the disposition effect. [55] also determine the disposition effect with respect to volume. They first calculate the expected normal volume and then consider actual volume relative to the expected price changes. Their results reveal that price declines lead to negative relative volume and vice-versa. Researchers also study this bias with the help of a survey. [57] analyze the role of regret in the disposition effect using a data of individual investors. They find that people feel more regret about holding on to a losing stock for too long than about selling a winning stock too early.
The above mentioned empirical evidences on the disposition effect show that this bias can have a detrimental impact on portfolio performance as the investors either don’t know when to quit and continue to lose or they quit too early without realizing optimal gains. This bias also influences the trading volume of stocks. Further, regret plays an important factor in the occurrence of this bias.

Along with the above mentioned researches, behavioral finance includes several other biases that are equally important. Some of them are discussed below.

**Herding:** It is the tendency of investors to follow the crowd. In the past, various researchers captured herding behavior using statistical measures like the one given by [91]. This measure defines herding as the tendency of group of money managers to buy (sell) particular stocks at the same time, rather than trading independently. [36] identify herd behavior in the market using cross sectional standard deviation (CSSD) of individual asset returns. [156] analyze this bias further and explain that the tendency of humans to imitate, in its strongest form, leads to herding and crowd effects. They suggest that imitation and herding are one of the significant factors that cause financial and economic bubbles. [20] differentiate this bias into intentional and spurious. They state that intentional herding results from the intention of investors to copy others. On the other hand, spurious herding occurs when groups with similar problems and information take similar decisions. They also analyze herding in the context of investment managers. They suggest that the tendency to herd highly correlates with the managers’ tendency to pursue momentum strategies.

Past studies on herding suggest that it is an extremely powerful bias. When people start mimicking each other, the impact of their behavior gets intensified. It can result in bubbles when the demand is high and crashes when people detect overpricing and go on a selling spree [153], [154]. It is not only observed in common investors, but also in market experts like trade analysts, portfolio managers, investment managers, etc. This bias can have drastic effects on the stock markets, particularly during the periods of market stress i.e. bull and bear phases.

**Status quo bias:** [127] define the status quo bias as the tendency of individuals to maintain their previous decisions regardless of the changes in their environment. [27] conduct laboratory
experiment on the simplified stock market and find that the status quo bias is significant across individuals over time and is independent of the stock performance. Further, it sustains in an environment in which there are very low costs of identifying better performing stocks. They explain that the underlying factor behind this bias is individuals’ reluctance to receive information that might question their own abilities; therefore they choose to restrict their comparisons to their existing choices rather than considering other options that were at their disposal. [96] analyze the presence of status quo bias, its determinants, and its impact on investor decision making using the experimental method. Their study reveals that the factors affecting the status quo bias are framing, investors’ emotion and information structure. They demonstrate that investors have a lower level of status quo bias under positive emotion, while a higher level under negative emotion. They also explain that people in general try to elude vague options if they have a choice to do so and would rather maintain their original position.

Research work on the status quo, shows that individuals succumb to this bias when the existing alternatives are vague or inconsistent with their own beliefs. Further, emotional state of investors also contributes to this bias as the intensity of this bias is higher for negative emotion as compared to positive emotion.

These findings emphasize that behavioral biases have far reaching implications on the stock market and its players. Such implications are being pondered upon in subsequent sections.

This review is a representative account of behavioral biases that are much more numerous. However, the detailed discussion of every bias is beyond the scope of any meaningful research. Therefore, we focus our research on the detailed analysis of four behavioral biases. These are overconfidence, optimism (pessimism), the disposition effect and herding. The presence of overconfidence in the Indian markets is highlighted by [126], [161] and [32], while the relevance of overconfidence and the disposition effect in emerging markets is illustrated by [34]. [46] detect the presence of both overconfidence and the disposition effect in Indian stock market. The herd behavior is investigated in India by [93] and [161] and [15] provide the evidence of optimism as well as herd behavior in India. Out of these overconfidence and optimism fall under *heuristic driven biases* and the disposition effect and herding lie under *frame dependent biases* (table 2.4).
Table 2.4: Behavioral biases of interest in the study

<table>
<thead>
<tr>
<th>Heuristic Driven</th>
<th>Frame Dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overconfidence</td>
<td>Herding</td>
</tr>
<tr>
<td>Optimism</td>
<td>Disposition effect</td>
</tr>
</tbody>
</table>

These biases are particularly relevant because their impact has been studied on market indicators using secondary market data in foreign countries. In India, the research on behavioral biases is mostly survey based. However, the analysis of biases using secondary data is still under-researched. This research tries to narrow this gap by investigating these biases using historical data. Additionally, a field survey is also conducted to capture the psychology of investors that makes them prone to the selected biases.