HOW CONFIDENCE AFFECTS THE INVESTMENT DECISION RELATIVE TO FACTS?

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**Abstract**

Traditional finance theories based on Keynesian and Post-Keynesian tenets have often failed to explain investment decisions related to the concept of maximizing returns. As a result, behavioral finance started to become widely recognized in the field of capital investments. Among the different aspects of behavioral finance theory (BFT), overconfidence bias (OB) on investment decisions has remained an area of active interest. The evidence largely suggests that overconfidence bias is a function of the lack of logic and poor investment-related information on the part of the investor leading investment decisions and low return on investments. The present study, which involved primary and secondary data analysis, showed that overconfidence bias could impact investment decisions based on the demographics and experience of the investors. The study endorsed that professional investors should apply overconfidence bias because such bias might assure higher return on investment ROI. On the other hand, investors who are relatively inexperienced or those without professional qualifications in finance should make investment decisions based on facts and risk tolerance ability. As the Parkinson and Pearson’s estimate was both lower than VAEX in the secondary data analysis, it suggests that overconfidence bias exists in professional investors. Such biases are always not detrimental because the more OB is exercised by them, the better is the realized volatility. The secondary data analysis also confirmed that OB in professional investors might be a holistic function of information search, economic expectations, risk tolerance, and investment decisions, and trading experience, which is aligned with the previous findings.

***Keywords: overconfidence bias, behavioral finance, returns on investment, stock, S&P500***

HOW CONFIDENCE AFFECTS THE INVESTMENT DECISION RELATIVE TO FACTS?

**CHAPTER 1: INTRODUCTION**

**1.1. Background**

Investing in stocks has long remained an attractive investment option for investors, irrespective of their knowledge of the share market (Barber & Odean 261). Although investment in the stock market promises higher returns than any other financial instruments, the amount of risk is also substantially higher with the former (Graham & Harvey 185). Hence, the role of decision-making is important while making investment decisions (Debondt 831). Decision-making is acknowledged as an intellectual attribute of an individual in which a favored option is selected among the possible alternatives. The decision to invest in specific stocks or portfolios in investment is a challenging task. One needs to understand the market situation, the risk tolerance, and the experiences of the investors while making investment decisions. The investor should make optimal and rational decisions based on the market data. It is contended that investors tend to escape threats at the right time by adopting a higher risk of losing. A plethora of studies depicted that traditional finance theories are unable to explain investment decisions because investors are often tempted by different cognitive prejudices (Daniel et al. 1839). The irrational behavior related to investment decisions is often attributed to the deficiency of information and memory errors (Glaser & Weber 1).

According to the traditional investment theories, various econometric models and economics theories are in place for predicting the risk of investment in a specific stock option. However, they are often unable to predict the financial performance of stock both over the short or long runs. Market beta (risk) depends on different factors, some of which are tangible, while others are intangible. Therefore, the past performance of a stock is not often a reliable predictor of the future performance of the same stock. Stock prices are often dependent on the financial performances of firms, their market share, changes in the business models, strategic management decisions, and unexpected financial crises. Different cognitive bias ranging from overconfidence bias to risk-aversion bias tends to influence investment decisions (Manazir et al. 98). According to the traditional investment theories, it was contended that the investors are rational and make the decisions for investment by optimizing returns and minimizing risks. However, modern investment theory holds that investors do not think rationally because they are often influenced by emotional factors such as greed, fear, excitement, and anxiety, and overconfidence. Rational behaviors are often related to the traditional finance theories, while the irrational behaviors related to investment decisions are best defined by behavioral finance theories (Irwan & Roy, 223).

The impact of tangible factors that influence the market share and stock price is often predictable to some extent. On the contrary, the strategic decisions and strategic management-based fluctuations in the future performance of stock remain unpredictable even with the most competent fund managers. Similarly, the intangible factors that drive stock volatility include the changes in the business models of the firms, sudden or planned bankruptcy, and short-term business decisions of the firms. Even after controlling for the predictable and unpredictable factors that influence stock volatility returns, investment decisions often depend on the cognitive biases of the investors and fund managers. In most situations, the cognitive biases are illogical and impulsive. In certain instances, the experience and expertise of the investors and fund managers often make a stockless or more risky than its predicted market beta, which eventually leads to a higher return on investments. Therefore, the confidence of investors in investing in stocks or portfolios has become an area of active interest in the field of capital investment and the bond and securities market. Although the role of confidence in investment decisions has been well acknowledged, there is inconclusive evidence on the impact of confidence and overconfidence bias on investment decisions relative to facts. The present paper would explore the research question “How Confidence Affects the Investment Decision Relative to Facts?” The paper would explore Keynesian and Post-Keynesian theories in underpinning investment decisions as well as secondary data analysis to answer the research question.

Capital investment refers to the allocation of money and other instruments that ensures additional income. Therefore, investing in stock options or the share market warrants effective decision-making of the investors and fund managers (Alkaraan & Northcott 149). The traditional theories of finance are based on the assumption that investors are sensible and realistic in maximizing their returns by avoiding unnecessary and unforeseen risks. However, feelings, past experiences, and self-belief tend to influence the investment decisions of the concerned stakeholders. As a result, the individual investors and fund managers tend to act in an unexpected, illogical, and unwise manner that makes the investments risky. It is contended that the lack of reliability of the econometric models in predicting stock volatility often forces the investors to make such irrational, illogical, impulsive, and risky investments, which are associated with poor returns. Such observation not only relates to stock but to the entire portfolio, which leads to huge financial loss among the concerned stakeholders.

 To understand the influence of these intangible parameters on investment decisions, a new branch of finance called "Behavioural Finance" has not only emerged but is rapidly evolving (Abdul & Mishra n.p). Behavioral finance combines behavioral and traditional theories of finance to explain irrational and impulsive investor behaviors. Behavioral finance deals with internal and external behavioral factors that affect the investment decisions of the investors (Kapoor & Prosad 50). The specialty of behavioral finance emerged because investment decisions are considered to be an interaction between market outcomes (market performance and stock volatility) and different psychological biases of the individual investors and fund managers. Bias refers to the inclination for or against something that might be rational or irrational. In the field of finance, bias refers to the tendency of the investors to make financial decisions that one has faith in and trust. In making the investment judgments in stocks and the share market, the investor-mediated bias plays a significant role in investment decisions (Misal 206). Confidence in the experience and expertise of the investors is often the basis for overconfidence bias. Confidence refers to the self-assurance that arises from the approval of one's skill, judgment, and ability to make decisions (Sharma 2319). Hence, confidence is an internal feeling regarding the abilities and strength of an individual in confronting challenges. On the other hand, overconfidence is a prejudiced way of overcoming the referred challenges. If an investor is overconfident, one overestimates their skills, abilities, knowledge, judgments, and beliefs that reflect more than the level of confidence that is necessary to overcome the challenge or confront a situation.

Investment decisions are dependent on different factors, including habits, experience, emotions, reasoning, and social interaction. Behavioral finance theory has challenged traditional finance theories (TFT) governing investment decisions. The TFT includes the notion of efficient markets, portfolio theory, and risk-return trade-off theory. However, these tenets are often unable to explain the investment decisions of the investors. Modigliani & Merton, in their work on finance and their assumption on a rational individual who wants to maximize utility in terms of return-on-investment, has been challenged from the perspectives of behavioral finance theory. The standard finance models related to investment decisions are based on the rationality that investors appraise their belief in the current scenario and make reliable decisions with subjective expectations related to the utility theory (Markowitz 17).

The EM theory proposes that the non-rational investors are the ones who distort prices while the rational investor and expert traders are able to utilize the full advantage from arbitrage opportunities (Fama 383). Investors with different profiles tend to invest differently and behave in a manner that cannot be explained by TFT (Hodnett n.p.). Client profiling is necessary for framing investment policy statements, which could significantly reduce the risk of overconfidence bias (OB). Investors are divided into two types; passive and active. The former has the capital through inheritance while the latter collect capital by taking risks on their wealth and appear to be more confident than their passive peers. Studies suggest that active investors show more OB than passive investors. Such findings substantiate the observation that OB should not always be viewed negatively, irrationally, and as a risk, because active investors who exhibit overconfidence bias are often more knowledgeable about the market and could speculate the performance of the firms compared to the management.

**1.2. Problem Statement**

The CAPM model should have provided enough confidence to the investors and fund managers in investing in stocks if it is fairly valued. However, the model suffers from various bottlenecks that have reduced its application in practical settings. First of all, the securities market is very competitive and efficient because the necessary and relevant information about companies and their plan of action is quickly and uniformly distributed. Secondly, markets are dominated by rational and risk-averse investors who seek to maximize satisfaction from return on their investments (Fama 383). It is contended that beta could be estimated effectively by assessing the stock price volatility. However, the reality is price movements in both directions are not equally risky. On the other hand, lag performances of a stock (stock price volatility) are not effective predictors for their future performance because stock returns are not normally distributed over time. It is also contended CAPM assumes that the RFR would remain constant throughout the discounting period. However, the reality is that the RFR could increase or decrease with time. If the RFR is increased with time, the cost of capital that is used in the investment would also increase (Zucchi n.p). Under such circumstances, the stock would be overvalued. Overconfidence often makes investors think that the investment decisions of others are influenced by emotions, perceptions, feelings, and moods, while their own decisions are always purposeful, logical, and sensible. This attitude often leads them to such a level that they are often illogical and impulsive. Investors with overconfidence bias tend to trade excessively, and in doing so, they often risk their financial investments more than their confident and risk-aversive peers (Zucchi n.p).

Although it is contended that overconfidence bias could lead to risky and illogical investments, there is inconclusive evidence whether such risks translate into higher returns over the short and long terms. Moreover, there is also inconclusive evidence whether confidence and overconfidence bias could predict the volatility of stock returns more efficiently than market beta. Most theorists who believe that overconfidence is not a negative phenomenon are of the opinion that overconfidence often leads toward more trade that reduces the efficiency of the market. Investors with OB overvalue the expected return and do not consider the realism of the market. On the contrary, others feel that the efficiency of the market is improved because of the overconfidence bias of the investors as a lot of information is gathered by them before making the investments. The critics believe that investment decision stemming from overconfidence bias is not completely illogical or irrational rather it could be latent construct in predicting stock volatility over a time series in the future (Riaz 1737). The contradictory criticism of overconfidence bias on market efficiency has made it one of the active areas of interest in the field of behavioral finance research and the securities market (Shefrin & Stateman 323). Various studies have explored the role of overconfidence bias on investment decisions with behavior alone or in combination with economic expectations and information searches (Abaoub 213, Sindhu & Warris 128, Beenish 77). However, there is inconclusive evidence whether overconfidence bias could lead to rational investment decisions, especially over the long term.

The neo-classical and other orthodox theories of investment decisions are based on the assumption that fixed investors are well-informed profit maximizers (Markowitz 17). Every investor behaves in mechanical ways, and a number of assumptions are used to describe their behavior; formation of rational expectations, the uncertainty is measurable, macroeconomic relationships could be explained by aggregating the microeconomic behavior of firms and individuals (Mamassian 600). This aggregate process in investment decision-making is considered methodological individualism (Naveed 38). This means that the macroeconomic variables could be described by constituent microeconomic deliverables. These simplified assumptions allow the development of a logically coherent theory, which could be analyzed mathematically and is relatively easy to understand. The theory is based on the notion that people balance marginal benefits and marginal costs.

The orthodox theories of investment are criticized by Post Keynesian theorists because the logical, coherent theory did not fit well with the real-world investor behavior (Baddeley n.p.). The Post Keynesian theorists contend that investors are not always rational profit maximizers. Therefore, such theorists hold different views on investment behavior compared to orthodox theories. The traditional finance theory suggests that individuals make rational investments if they consider the risk and return appropriately to maximize their gains and limit their losses. Behavioral finance theory challenges the traditional finance theory and suggests that different types of biases, such as heuristic biases, including anchoring, representativeness, gambler's fallacy, and regret aversion, influence investment decisions. The necessity of behavioral finance theory emerged from the observation that humans do not always think rationally, while markets do not always perform efficiently or predictably. Hence, it is a misnomer to view behavioral finance theory in isolation of the traditional finance theory (Gongmeng 425). Behavioral finance theory incorporates not only traditional finance paradigms but also incorporate rational investment decision-making and an assessment of market returns. The traditional finance theory is grounded on the belief that human behavior is always rational and economic models that are used to predict the market returns work efficiently and in isolation to investor decision making (Rehan & Umer 12). Thus, the importance of psychological factors in driving investment decisions cannot be undermined under any circumstances.

Behavioral finance is often correlated to behavioral economics, which combines the fields of both psychology and economics. It aims to understand the irrational decisions related to investments, spending, and savings. Chaudhary (85) argued that humans are often influenced by several behavioral anomalies that lead them to make decisions against the basic principles of wealth maximization. However, irrational investment decisions are not always the function of biases but a combination of biases, information-seeking behavior, knowledge, and risk tolerance ability. From this perspective, risk-aversion and overconfidence biases cannot always be criticized as a determinant for irrational investment decisions (Gervais & Odean 1). This is because what might seem an irrational investment in the present could emerge as a rational investment decision in the future because the security market does not behave in a predictable manner (Adam 121). Nevertheless, the domain and extent of overconfidence bias that might seem rational remain unexplained objectively. Rather, there is a dilemma regarding the invisible boundary between confidence and overconfidence from the perspective of investment decisions. It might be an oversimplification to assume that confident investment decisions refer to the risk-minimizing and profit-maximizing behavior of the investor that is based on the tenets of traditional investment theories as well as behavioral psychology. However, the assumed definition of confidence from the perspective of investment decision is challenged by the traditional finance theories because the higher is market beta, the higher is the return on investments. On the other hand, studies suggest that overconfidence bias is a static construct ad influenced by both rational and irrational behaviors (Pennings & Garcia 373). The rational behaviors driving overconfidence include excessive trading and information searches, while irrational behaviors include self-attribution bias. Since there is a limit of overconfidence bias, it makes an ideal behavioral finance parameter to understand how different factors influence overconfidence bias.

The literature depicted in this thesis is grounded on the notion that overconfidence bias certainly influences investment decisions, but the rationality of the overconfidence bias from the perspective of return on investments has remained largely unexplored. One of the major reasons for such knowledge gap is the lack of standardized or objective measures for assessing overconfidence bias or confidence from the perspective of investment decisions, and not on the general attributes of overconfidence or confidence that is intrinsic within an individual irrespective they are investors or non-investors. On the other hand, there are also gaps in the literature regarding the differences in rationality and structure of overconfidence bias in direct and indirect investors. Finally, previous studies have suggested that overconfidence bias is a function of excessive trading. However, the evidence also suggests that excessive trading cannot independently explain overconfidence bias because attributes such as risk toleration, information search, and self-attribution bias could influence overconfidence bias. On the other hand, the evidence suggests that overconfidence bias is not the only cognitive bias that influences investment decision, but there are other cognitive biases which can influence investment decisions. Therefore, it could be hypothesized that overconfidence bias or confidence might not be the sole determinant for an investment decision. Rather, overconfidence bias or confidence of an investor might be modulated by other cognitive biases, or the former might moderate the latter biases in influencing investment decisions. However, such assumptions have not been reported in extant literature.

**1.3. Aims and Objectives**

The aims and objectives of this article are as follows:

1. To explore Post-Keynesian Theories underpinning overconfidence bias in investment decisions.
2. To identify the bottlenecks in traditional finance theories and the role of behavioural finance theory in explaining overconfidence bias.
3. To identify the factors and moderators of overconfidence bias in investors for investment decisions
4. To identify the ways by which overconfidence bias influence investment decisions
5. To understand the short term and long-term impact of overconfidence bias on investment decisions from the perspective of return on investment
6. To identify the way overconfidence bias interacts with other types of cognitive bias in influencing investment decisions.

**1.4. Purpose of the Study**

It remains inconclusive what are the major mediators for overconfidence bias in investors and the way overconfidence bias influences investment decisions. Studies suggest that OB often stems from behavioral bias, while others have reflected that knowledge management could either interact with overconfidence bias or modulate overconfidence bias that finally impacts the investment decision. Moreover, the evidence also suggests that excessive trading often leads to behavioral biases, which further moderate overconfidence bias to influence investment decisions of the investors. Therefore, the concept that overconfidence bias in investment decisions is beyond facts is not true. Rather, the outcome of investment decisions could moderate the behavioral biases of the investors to reduce their overconfidence bias. Such assumptions are substantiated by the performance of the fund managers and individual investors.

Since fund managers deployed for portfolio management are more aware of the business models and performance of the firms that are offering stick options, they could be contended to be more active investors than the individual investor considering the volume of investments. As a result, the return-on-investment varies within a common business sector when the fund managers are different. Nevertheless, overconfidence bias in fund managers could make the investments risky too compared to an individual investor. Although the importance of behavioral finance theory in explaining investor behavior is well-recognized, the way traditional finance paradigms and human psychology interacts have remained largely unexplored. For example, the attribute of overconfidence bias is often assumed to be irrational if it is not moderated by the information search, trading experience, and risk tolerance ability of the investors. From such an assumption, it might seem that the traditional finance paradigms should be used to control cognitive biases such as overconfidence and risk-aversion bias. On the contrary, information searches on market behavior might be inadequate or inappropriate because security markets tend to behave irrationally.

Under such circumstances, it could be contended that irrational or far-sighted decisions could help to negate the inadequacies and inappropriateness of the information that investors use in combination while making investment decisions (Grinblatt & Keloharju 549). From such a perspective, cognitive biases used by investors might seem rational. Therefore, five situations are possible from the perspective of behavioral finance theory and traditional financial paradigms that underpin such theory; the investor is a profit maximizer, and alternatively uses bias or traditional finance paradigms while making investment decisions, investors are always rational and use overconfidence and traditional finance paradigms equally before making investment decisions, investors are irrational because they tend to rely on overconfidence while making investment decisions without considering the traditional financial paradigms, and investors are rational and risk aversive because they tend to prioritize information search and traditional financial paradigms in preference to their overconfidence, and the investors are completely risk-aversive because they tend to prioritize information search and traditional financial paradigms in preference to their overconfidence (Baddeley n.p.).

These assumptions suggest that traditional finance paradigms often interact with the psychological attributes of an investor in influencing their investment. Since the rationality of an investment decision is determined by the performance of a stock or portfolio in the security market over the short or long term, the present study would help to identify the extent to which overconfidence bias or other cognitive biases should be adopted in addition to traditional financial paradigms so that the investment is deemed rational in terms of return on investment either over the short term or the long term or both. The study would provide conclusive evidence whether overconfidence bias should be adopted while making investment decisions, and if so, what would be the involvement and structure of such biases in modulating or mediating the investment decisions.

* 1. **Research Questions**

The present study explored one major research question followed by 10 sub-research questions. The sub-research questions were investigated to address the main research question comprehensively and conclusively. The research question would pivot around the factors that affect the confidence of the investor in addition to the facts or market information that an investor seeks before making investment decisions. Therefore, the main research question is grounded on the tenets that facts or market information could provide the necessary confidence to an investor for making an investment decision and also the way an investor uses their confidence in ignoring such information. From a working model, if investors exhibit confidence in their investment decision despite there is information that such investments could be risky or irrational would be considered as the overconfidence bias. The main research question that was explored in this study was “How confidence affects the investment decision relative to facts?”The sub-research questions and their respective hypotheses were as follows:

SRQ1. Whether overconfidence bias significantly influences investment decisions?

SRQ2. Whether investment decisions made under overconfidence bias is always irrational?

SRQ3. Whether traditional finance theories mediate overconfidence bias?

SRQ4. Whether overconfidence bias could be accurately measured through objective measures?

SRQ5. Whether information search, self-attribution bias, risk tolerance, and excessive trading interact with overconfident bias in influencing investment decisions?

SRQ6. Whether overconfidence bias significantly interacts with cognitive biases in influencing investment decisions?

SRQ7. Whether overconfidence bias is the independent predictor for investment decisions apart from the traditional financial paradigms?

SRQ8. Whether overconfidence bias-based investment decision is significantly correlated with volatility of stock returns?

SRQ9. Whether overconfidence bias significantly influence return on investments?

SRQ10. Whether overconfidence bias and confidence related to investment decisions could be significantly demarcated?

**CHAPTER 2: LITERATURE REVIEW**

**2.1. Traditional and Behavioral Finance Paradigms**

The traditional finance paradigm that has dominated for several decades in the field of investment endorses that investors make rational choices that maximize expected utility or in other words, investors are viewed as profit maximizers. The fundamental concepts of traditional finance include the classical decision theory, rationality, risk aversion, modern portfolio theory, CAPM, and Efficient market hypothesis. The evidence suggests that most of the findings, assumptions, and models associated with traditional finance are invalid (Baddeley n.p.).  Therefore, behavioral finance emphasizes that investor’s exhibit certain intrinsic behavior before making investment decisions, and such decisions are often cannot be explained by the traditional finance paradigms.  Behavioral finance researchers tend to incorporate the observed behaviors of the investors for developing models as to how investors reach such decisions. Behavioral finance draws insights from social sciences and psychology for understanding investor behavior for individuals, groups, and markets. The major tenets of behavioral finance pivot around the behavioral decision theory, bounded rationality, prospect theory, framing, heuristics, overconfidence, regret theory, and mental accounting. Based on the combination of traditional and behavioral finance paradigms, research is fostered in the areas of behavioral portfolio theory, the behavioral asset pricing model, and adaptive market hypothesis which could better explain investment behavior. Although a discussion of different tenets of traditional and behavioral finance is beyond the scope of this thesis, the thesis would discuss the relevant context and content of traditional and behavioral finance paradigms from the perspective of overconfidence bias only.

* 1. **Efficient Market Hypothesis**

  Efficient market hypothesis (EFH) contends that share price depicts all the information and consistent generation of alpha is impossible. Therefore, stocks must trade at their fair value that would make it impossible for investors to purchase undervalued stocks and compel them to sell stocks at inflated prices (Garg n.p.). Investors would benefit from investing in a low-cost passive portfolio while the opponents of the theory believe that stocks could deviate from their fair market value. Although EMH is a cornerstone of modern financial theory, it is criticized from the perspective that there is no point in searching for undervalued stocks or trying to predict trends in the market through technical analysis. This is because such analyses are inefficient in predicting risk-adjusted excess returns. Investors such as Warren Buffet have beaten the market consistently for long periods, which is impossible considering the definition of EMH. The prediction of risk-adjusted excess return has been also been evident from the performance of the stock market.  For example, the stock market crash in 1987 caused the DJIA (Dow Jones Industrial Average) to fall over 20% in one day and asset bubbles produced as a consequence suggested that stock prices could significantly deviate from their values (Zucchi n.p.).

EMH is supported by various investment companies such as Morningstar Inc. A study showed that only 23% of the active managers were able to outperform their passive peers over 10 years. Lower success rate was observed for U.S. large-cap funds while the performances were better in low-cost index funds and ETFs. It is contended that less than 25% of the top-performing active managers are able to outperform passive managers. From the perspective of EFH, it could be contended that behavioral finance explains that part of the investment decision which predicts risk-adjusted excess returns (alpha) consistently. Although it might not be possible to make an oversimplification that the behavioral finance paradigm is overconfidence bias, but going by the notion that EFH-based investment decision is “confidence,” while prediction of alpha is the overconfidence bias. Nevertheless, these assumptions once again substantiate that behavioral finance theory incorporates traditional finance paradigms. However, it remains unclear whether overconfidence bias which is an attribute of behavioral finance incorporates traditional finance paradigms (Zucchi n.p.).

* 1. **Traditional Finance Forecasting Models: CAPM**

Despite the unpredictability over return on investments (ROI) for a specific stock or portfolio, various econometric regression models such as the Capital Asset Pricing Model (CAPM) developed by Fama and Fench have long remained a roadmap for fund managers and investors for investing in stocks. The CAPM describes the relationship between systematic risks and expected return on investments. The model is widely used in the finance and securities market for pricing risky securities and predicting expected returns for assets provided the risk of those assets and cost of capital. Investors expect to be compensated for the risk and time value of money invested. The risk-free rate in the CAPM model accounts for the time value of money. The rest of the components of the CAPM include the investors taking on the additional risk, which is often referred to as the beta. The beta of a potential investment refers to the measure of the additional risk the investment would add to the portfolio that is often representative of the market. If the stock is riskier than the market, the beta would be greater than one, while it would be less than one if the stock is relatively less risky than the market (Zucchi n.p.).

The beta of the stock or the portfolio is then multiplied by the market risk premium, which represents the expected return from the market above the risk-free rate (RFR). The RFR is then added to the product of the beta and market risk premium. The result of the addition of the two parameters provides the required return or discount rate over time for the asset or capital. The major goal of CAPM is to evaluate whether the stock is fairly valued when its risk and time value for money is compared to expected returns. CAPM assumes that the RFR would remain constant throughout the discounting period. However, the reality is that the RFR could increase or decrease with time. If the RFR is increased with time, the cost of capital that is used in the investment would also increase. Under such circumstances, the stock would be overvalued. CAPM is often considered impractical because the securities market is very competitive and efficient. This is because the necessary and relevant information about companies and their plan of action is quickly and uniformly distributed to the investors. Markets are dominated by rational and risk-averse investors who seek to maximize satisfaction from return on their investments and hold back the capital that is necessary for providing fiscal stimulus to the security market. CAPM also holds that beta could be estimated effectively by assessing the stock price volatility. If such assumptions hold true, then higher ROI beyond that predicted by beta or alpha would not have emerged (Zucchi n.p.).

* 1. **Behavioral Biases**

 Biases in the behavior of investors would always impact their judgment over investment decisions (Aggarwal 80). Although it is impossible for an investor to eliminate behavioral biases, it is necessary for them to avoid specific biases in certain situations. Stock price anomalies and financial decision-making are a function of psychological factors. Heuristics is the domain that explains the behavioral biases that are witnessed in investors. Heuristics is defined as the cognitive shortcuts that enable the individual to take decisions by eliminating the difficult question and replacing it with easier ones. Therefore, individuals make quick decisions and judgments by adopting strategies from personal experience, training, error, and experimentation. Although heuristics might sound to be rational from the perspective of decision making, most often they are ineffective in financial decision-making. Heuristic decision trees are subjected to behavioral biases such as representativeness and anchoring. The former holds investors to be stereotyped, as they put more emphasis on the financial decision that has been successful in the past. Therefore, investors do not consider the law of averages on long-term trends. On the contrary, short-term trends such as an increase in the price of a current stock with a superior performance of a firm in the recent past get undue importance. If the security market was assumed to be fully rational, then changes in the recent stock prices should not have any impact on the future prices of that stock (Aggarwal 83).

 Anchoring refers to the process, when investors tend to focus on a single piece of information or fact for making investment decisions. There could be many reasons for such behavior that include but not limited to the challenges with data processing, time constraints, and the lack of understanding. Relying heavily on a single trait over and investment decisions would lead to low return on investment. Therefore, information search and knowledge of the investors have been strongly solicited in generating long-term returns. Moreover, investors tend to anchor onto specific information speculation regarding their future expectation of a stock price. As a result, investors tend to under-react to new information. The evidence suggests that bad news influence overconfidence bias (Aggarwal 86). Therefore, an under reaction of the investors to new information (either bad or good from the perspective of investment) might lower overconfidence bias or it could reach the level of confidence. However, the definition and domain of anchoring cannot describe confidence in the investors simply because the investor is ignorant to information search.  This leads to the concept of overconfidence bias which is the ability of an individual to predict and secure above-average returns than that predicted by market beta and alpha. Overconfidence bias develops when the investor overestimates their ability to evaluate a particular stock, company, or industry, as a potential investment option compared to others. As a result, they engage in excess trading without giving adequate weight to the past trends future predictions as per the traditional finance forecasting models. Nevertheless, it could be contented that excess trading and experiences of the investors exhibiting overconfidence bias might be helpful for the market for attracting immediate or sustained investments that might not be possible if investors  exhibited confidence or high risk-aversion.

* 1. **Prospect Theory and Different Types of Investment Biases**

 Economists define “utility” as the usefulness that individuals gain from a particular object of service. Traditional finance theory suggests the net benefit from any investment the sum of gains and losses that an individual receives over a long period. However, investors are seldom rational and behave irrationally when they tend to invest beyond the rationalities of traditional finance. Kahneman & Tevrsky who are the proponents of the Prospect theory stated that " People processes probable gain and losses differently and give preference to probable gains in preference to probable losses even if the net results from both the options is the same." Different types of biases contribute to the behavior of the investors as proposed by the prospect theory. Framing is one such bias that depict that when investors are faced with different choices for investing money, they would prefer the communication or phrases that would talk about probable gains rather than probable losses (Syed & Bansal n.p.). Under such circumstances, individuals are more distressed by probable losses rather than probable gains. Framing can be of three types; risky choice framing, attribute framing, and goal framing.  Loss aversion is another bias when individuals prefer to avoid loss rather than seeking equivalent gains. Under such circumstances, losses seem to appeal twice more powerfully as the same amount of gains. If the impact of loss is perceived to be higher than the impact of the gain despite the gains are higher than the associated loss. Hence, if the investors are loss-averse they might be tempted to use the law of averages and end in invest in poorly performing stocks to recover prior losses as well as to prevent future losses/

 Therefore, loss-aversion bias should not be considered as a rational investment behavior while comparing it to overconfidence bias. Rather, the definition and tenets of loss-aversion bias indicate that overconfidence bias should be a part of the behavioral finance paradigm governing rational investment decisions. On the other hand, going by the notion that investment decisions made based on the traditional finance paradigms of CAPM and EFH as "confidence," then loss-aversion bias could be considered as "under confidence." This assumption indicates that investment decisions are interplay of different types of biases, and the rationality of an investment decision depends upon the impact of the overall behavioral bias of the investor. Regret aversion bias is the tendency of individuals to regret decisions when the outcome is not favorable. Therefore, if the investment has not produced the desired ROI, investors tend to regret the investment decision more than the actual loss suffered. Investors should hold themselves responsible for the investment which could lead to further incorrect financial decisions in the future. For example, regret aversion bias often influences investors to invest in stocks that have recently done well rather than investing in stocks, which are poorly performing in the present. Risk aversion bias also incorporates herd bias because they feel more secured to invest in stocks where a major portion of the investment community is investing. Investors with a high regret aversion bias actually cannot take any investment decision either rational or irrational. Hence, regret aversion bias could define the barrier between uncertainties over investment decisions and the necessary confidence in the investment decision.  The feature of regret has been adequately explained in choice behavior that suggests that individuals always make risk-minimizing decisions.

Mental accounting is another bias where individuals separate their money and investments in their mental accounts based on certain criteria such as the source of earning and the use of money. Investors might use mental accounting as a resource for self control. Since most of the investors have imperfect knowledge about the market, they divide their money into investments and expenditure pools to ensure that they do not over-spend. In doing so, the investors treat both these mental accounts as unconnected entities that prevent them from obtaining the benefits of portfolio diversification. Thaler (199) highlighted investors treat money earned from diverse sources differently. For example, investors treat capital gains favorable for investment compared to their salary amount and are more inclined to take greater risks than their peers who depend on their salaried income for investment. Disposition effect is another behavioral bias where an investor seeks to realize paper gains and avoid realizing paper losses. This means that investors would not sell the stock unless the paper value goes beyond the price at which they bought.

Investors eventually end selling stocks whose values have increased or increasing and keeping assets whose value has dropped and which could drop further in the future. Chen et al. (425) suggested that investors in emerging markets such as China and India tend to suffer from disposition effects by selling stocks which has received appreciation on price and holding stocks that have depreciated on price. From the perspective of dispositional effect bias, it could be inferred that overconfidence bias or confidence in investment decisions is the ability to hold stocks that would be appreciated on price in the immediate or distant future and quickly selling stocks that have depreciated and would continue to depreciate on price in the immediate or distant future. Thus, disposition effect bias might be the boundary between confidence and overconfidence bias in investment decisions. Going by this notion, mental accounting bias could be one of the determinants of confidence along with the traditional finance paradigms. From this perspective, it could be contended that confidence in the investment decision is the rationality of spending or reinvesting a part of the capital gains, while overconfidence might implicate greater spending or reinvestment of capital gains along with spending from salaried income. These findings suggest that overconfidence bias could be limited by the source of capital that the investor wants to invest or reinvest.

The contenders of the EMH are of the notion that biases do not influence markets and any anomalies stemming from bias is automatically adjusted for diving stocks to their fundamental prices. They contend that changes in the market happen due to a variety of reasons and cannot be solely attributed to behavioral bias. If stocks are sufficiently analyzed in terms of past trends and updated information on the stock or firm, market changes are more of a matter of chance and not behavioral biases of the investor. If such notions were true, then stock prices would not have exhibited volatility than that could be defined or predicted by market beta or alpha. In reality, both situations are observed because overconfidence bias and low confidence tend to ignore or over relies on beta and alpha. On the other hand, the presence of anomalies in the financial markets was the major reason for the introduction of behavioral finance paradigms such as the behavioral asset pricing model. Such models tend to incorporate uncertainty in security markets. The behavior of these anomalies tends to violate the fundamental behavior of the financial markets because they assume that all investors are logical and rational (Chen et al. 428).

The anomalies in the investment market that solicited the introduction of behavioral finance paradigms include the January effect (a phenomenon where the average monthly return of a small firm is uniformly higher in January compared to any other month in a year, an observation that is completely opposed to the EFH), winners curse (traders and gamblers tend to pay more than the true value of an asset in auction bids, which is also against the concept of EFH because it proposes that investors are always aware of the true value of an asset and would pay or bid in accordance to that), and the equity premium puzzle (equity premium for stocks must be lower than what is prevalent in the market, whereas behavioral finance paradigm suggests that loss-aversion bias would require a higher premium to overcompensate investors for reducing their aversion to loss). Behavioral finance theorists contend that most of these biases would not be present simultaneously across all the investors; some of the biases could be impacting the financial market in general. For example, heuristic biases such as representativeness and anchoring could make investors over-optimistic about stocks which have not performed well in the past, or are over pessimistic over the stocks that are poorly performing in the given timeframe, so that the actual share prices deviate from the fundamental prices. Hence, cognitive biases could lead to over-reactions or under-reactions to any news regarding the sudden fluctuations in stock price, ignoring the information related to fundamentals of stock pricing, using past trends for extrapolating future trends or ROI, and undue preference for hot stocks .

* 1. **Keynesian and Post-Keynesian Notion on Investment: Neoclassical theories**

John Maynard Keynes’s ideas fundamentally changed the theory and practice of macroeconomics and the economic policies of governments. Originally trained in mathematics, he built on and greatly refined earlier work on the causes of business cycles, and was one of the most influential economists of the 20th century. His ideas are the basis for the school of thought known as Keynesian economics and its various tenets. Keynes’s views on investment are based on effective demand which is the combination of autonomous consumption and investments. Keynes hypothesized that spending creates income, which creates sales, which creates jobs. When it comes to investments, he has a different perspective such as the long-term expectation. According to Keynes, investment activities that are governed by uncertain expectations are bound to be unstable. How the stock market exaggerates this instability and why expectations once disappointed take such a long-time to recover are the key tenets of Keynesian philosophy. To be specific, the state of long-term expectations, upon which our decisions are based, does not solely depend on the most probable forecast but also on the confidence with which such forecasts are made. Furthermore, the state of confidence is the most practical attribute that people always pay the closest and most anxious attention.

Keynes and Minsky (one of the most notable Post-Keynesian economists) have similar points of view towards investments. To be specific, Keynes’s discussion of “the state of long-term expectation” explains why uncertainty about the future makes investment unstable. Minsky used Keynes’s ideas to explain why every economic boom sets the stage for a financial crisis. Based on Keynes’s perspectives, we understand that “The actual results of an investment over a long term of years very seldom agree with the initial expectations. Nor can we rationalize our behavior by arguing that to a man in a state of ignorance errors in either direction is equally probable, so that there remains a mean actuarial expectation based on equi-probabilities. For it can easily be shown that the assumption of arithmetically equal probabilities based on a state of ignorance leads to absurdities because existing knowledge does not provide a sufficient basis for a calculated mathematical expectation (Van Den Berg,1). In that aspect, if existing knowledge is not sufficient enough to create a good logical explanation it would be debated whether adding confidence would be a surplus for investment decisions. If one cannot predict an investment outcome, then how do lenders give loans or investors invest. To address this dilemma, Keynes stated that “Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as a result of animal spirits. of a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities.” (Van Den Berg, 2). Therefore, Keynes hypothesized that people remain confident and willing to engage in uncertain investment and innovative activities so long as outcomes from investments and innovations seem to follow conventional patterns.”

 Minsky’s perspectives towards investment are similar towards Keynes’ investment analogy. Based on Minsky’s perspectives, he emphasized that investors rely on recent experience more than long-term trends. In that case, we see that those types of investors are not the risk willing type as they want to make sure that every investment gives them a major ROI back. However, using past experiences to make decisions would not be considered as a smart move to do because when things do not work out, the consequences can be severe. To explain further: “Minsky (1978) elaborated on Keynes’s observation that investors rely on recent experience rather than long-run trends to predict the future. Thus, as exceptional economic times persist, investors and lenders gradually come to view this exceptional period as normal, and they increase financing accordingly. When long-run trends finally prevail, as they inevitably will, projects perceived as safe suddenly turn out to be, in Minsky’s terminology, speculative or Ponzi in nature. Defaults occur and financial contraction, economic recession, and unemployment follow. This reasoning led Minsky to formulate his financial instability hypothesis: every prolonged period of economic growth will always end with a financial collapse.” (Van Den Berg,4). Minsky contended that when confidence wanes, the boom in investment comes to a sudden and abrupt end. Short-term projections fueled the real estate bubble that caused the 2007– 2008 financial crisis. But once banks were bailed out directly with loans and indirectly with open-market operations that gave banks near-unlimited money at near-zero interest, calls for financial regulation have diminished. Therefore, there is a need where the investor behavior should move from confidence to overconfidence to prevent the boom in investment, which could impact the security market over the long run.

* 1. **Empirical evidence how overconfidence bias influence investment decisions**
		1. **Overconfidence Bias and its influence on Investment Decisions**

The emergence of globalization coupled with the complexities, competitiveness, unpredictability, and volatility of the business environment has led to radical transitions financial market. Investors not only rely upon the dynamics of the stock market but depend on their impulses and instincts while making investment decisions. It is contended that such investment decisions are primarily due to behavioral biases (Manazir et al. 98) . In this regard, behavioral finance theory which is based on the tenets of psychological theory assumes that information structures and characteristics of investors influence their investment decision. Such attributes invoke overconfidence in them which causes them to take ambitious decisions that might result in a higher or lower return on investments. It is often contended that behavioral bias which is also the basis of overconfidence bias weakens the decision-making ability of the investors leading to risky Investments. On the contrary, behavioral finance helps an investor take rational investment decisions with less influence of behavioral bias. This assumption leads to the theory that behavioral bias that is often the basis of overconfidence bias might get moderated by various factors that are either intrinsic to the investor or dependent on information structures. Overconfidence bias might not always result in poor investment decisions if they are moderated or mediated through logic. The logic could be broadly divided into two aspects; information structures that are governed by market dynamics and historical trends as speculated by the capital asset pricing models and the experience of the investors that helped them to gain higher returns on investments that were not predicted by the regression models.

 Overconfidence is a behavioral bias that reflects the self-beliefs of the investor (Manazir et al. 1998). Therefore, overconfidence bias is the overestimation of return on investments.  It is contended that overtrading is the major predictor of overconfidence bias because overtrading increases the experience of an investor in investing. Overconfidence reflects the extent to which people understand their abilities as well as the limitations of their knowledge. From this perspective, it could be contented that behavioral bias might lead to impulsive and risky investment decisions, while overconfidence bias might be the result of the interaction between information structures and impulsivity. An investor, who is overconfident, neglects important market parameters or underestimates the market beta while making investment decisions. Hence, overconfident investors tend to overtrade and hold risky stocks. It remains inconclusive whether overtrading or information structures are the only factors mediating overconfidence. It also remains inconclusive whether overconfidence bias mediates other factors that ultimately lead to investment decisions. Finally, there is also little evidence on overconfidence bias that is mediated or moderated by the referred factors leads to effective investment decisions as evident from return on investments.

* + 1. **Overconfidence Bias and Risk Tolerance in Investment Decisions**

Overconfidence bias causes investors to overestimate their skills, knowledge, and ability to control the risks before an investment decision. This assumption challenges the theory that overconfidence bias is primarily the interaction of information structures and impulsivity. Rather, it could be contended that effective investment decisions stemming from overconfidence bias are significantly moderated by latent constructs that accurately predict the risk of an investment which seems risky as estimated from the risk ratios that are incorporated in the financial models.

In this regard, Malik et al. (154) contended that risk tolerance is a significant mediator between overconfidence bias and investment decisions.  Risk tolerance has been an area of active interest in the field of behavioral finance. Risk tolerance reflects the ability of an investor to bear losses and the willingness to invest in risky stocks. Risk tolerance is a function of aggressive behavior because the investor is ready to bear the probability of losses at the expense of the probability of profits. Thus, investors with high risk tolerance ability are able to make high returns. Malik et al. (154) conducted a survey based on confidence sampling (n=283) across investors from the Islamabad and Lahore stock exchanges in Pakistan. The authors constructed logistic regression analysis which showed that overconfidence bias significantly influences investment decisions (p=0.000), overconfidence bias significantly influences risk tolerance (p=0.000), risk tolerance significantly influences investment decisions (p= 0.000).

The moderating effect of risk tolerance on overconfidence bias was less than the moderating effect of the latter on the former because the standardized beta coefficients of the independent variables (OC and RT) were 0.61 and 0.73 when they were separately evaluated as predictors for ID. When the two constructs were combined as predictors for ID, the standardized beta coefficients were 0.43 and 0.14 for OC and RT, respectively. Hence, the study showed that risk tolerance is the major mediator of OC for making investment decisions. However, the regression analyses also depicted interesting findings with respect to the significance of the p-values for the intercepts. Since the p-values of the intercepts of all the regression models were less than 0.05, it indicated that investment decisions are significantly influenced by factors other than OC and RT. Such findings are not surprising because the others did not include information structures, experiences, and impulsivity of the investors as the independent variables. Nevertheless, the impact of risk tolerance on investment decisions was found to be higher than overconfidence bias in terms of standardized beta-coefficients (0.61 versus 0.73). In this regard, it could be contended that overconfidence bias is a positive attribute in mediating the risk tolerance of an investor, thereby reducing the probability of the investor in making risky investments (Malik et al. 156).

However, the evidence remains inconclusive whether reducing the RT component of investment ultimately results in higher returns. For example, disseminating regression models of Malik et al. (2019) suggests that if the risk tolerance is zero then the investment decisions would increase by 1.56 considering overconfidence bias increases by 1. On the other hand, if the overconfidence bias is zero, then the investment decisions would increase by 1.24 considering that risk tolerance increases by 1. This finding suggests that if the overconfidence bias is high and the risk tolerance is low, then the investment decision could be risky it might result in overtrading. On the other hand, if the risk tolerance is high and the overconfidence bias is low, the probability of risk Investments and overtrading would decrease. These findings suggest that overconfidence bias and risk tolerance interact with each other in influencing investment decisions. Individuals, who tend to have a high risk-tolerance, might not eventually end up with overtrading and risky investments, if their confidence is low. Likewise, individuals who do not have a high risk-tolerance would lead into investing more. Such investments could be more in risky stocks through overconfidence and overtrading. However, Malik et al. (154) did not evaluate the impacts of OC and RT on ROI which could have helped to identify the importance of these variables on investment decisions. Nevertheless, the Malik et al. (158) study provided comprehensive evidence regarding the positive role of overconfidence bias in reducing risk tolerance from the perspective of secured investments. The findings of Malik et al. (159) challenged the notion that overconfidence bias would always lead to overtrading and risky investments.

* + 1. **Overconfidence Bias and Information Search**

 The role of other attributes that mediate and moderate overconfidence bias in investment decisions was substantiated by Gill et al. (758). The authors contended that overconfidence in investment decisions is not impulsive but is a rational behavior that helps an investor to weigh the tangible and intangible attributes behind an investment. The first attribute considered by the authors was information search. Due to the unpredictability and uncertainty of investments, investors should obtain appropriate market information and manage the same for preventing financial losses and risky investments. The Risk-Taking Theory (RTT) supports the role of information search in making investment decisions because such attributes minimize the probability of making risky investment decisions to lower the uncertainty over ROI.  More informed investors are able to make better investment decisions. However, it could be argued that whether better investment decisions translate into higher ROIs or prevent the probability of financial losses which is not the objective of investors trading in the securities market. Rational investors should take into account the operational, financial, and growth prospects of a stock before investing in it (Gill et al. 738). The question arises that the operational and financial information regarding a company does not always help to predict the growth of stock either over the short term or over the long term. Therefore, cognitive intelligence in the form of overconfidence bias or rational expectations should come into play to govern investment decisions.

Economic expectations are defined as the forecast expectations regarding the future performance of a firm in the event of the economy of a nation. These expectations stem from anticipations regarding the level of employment, supply-demand function of the respective firm or firms within the same industry category, the expansion of the organizations, the balance of trade, and inflation rate. Therefore, economic expectations include the financial aspect of a firm and the economy of a nation in the future. Some of the economic expectation parameters that are used by investors include the performance of the firm in the previous years, anticipated growth in capital and bonus, dividend distribution plans, anticipated profits. Unfortunately, the past performance of a firm is not a robust predictor for future performance. These findings suggest that if the economic expectations are not favorable, the decision to invest would get lowered. However, if it was so, then the market size of the companies would not have increased in situations of financial or economic crisis. Hence, economic expectations might be moderated by other attributes while taking investment decisions.

* + 1. **Overconfidence Bias and Rational Investment**

The Rational Expectations Theory (RET) supports this hypothesis because investors make decisions based on rational viewpoints, the experience they gather, the way investors measure a risk separately from market beta, and the overall information that they have in hand related to the securities market. The RET theory challenges the popular opinion that investment decisions a driven by government policies or the economy of a nation when an investor decides to invest. On the other hand, the prospect theory (a behavioral economics theory) contends that investment decisions could take place in risky environments. This concept supports the finding of Malik et al. (154) who also showed that investment decisions are moderated by the risk tolerance of the investors. The prospect theory contends that investors make choices for investments through a two-step process; the investors should revise a complex judgment into simple ones based on profit and loss, and the next step is to select a decision from the various simplified decisions developed in the first step. The decision of choosing an alternative or edited option includes two tenets; the value of the alternative options and the weight allocated to the referred values. Gill et al. (738) showed that overconfidence bias and economic expectations interact with each other through information search to influence investment decisions. Hence, information search is the mediator between overconfidence bias and economic expectations in modulating investment decisions.

* + 1. **Overconfidence Bias and Economic Expectations**

Similar to Malik et al. (154), Gill et al. (758) conducted a cross-sectional study across 229 investors from the Lahore Stock Exchange and Faisalabad Trading Floor, Pakistan. Gill et al. (766) showed that the regression model that includes economic expectations and information search as the independent variables and investment decision as the dependent variable exhibited the highest R-square values (0.88) compared to when the independent variables were considered separately in separate regression models. However, the R-square values of the regression of investment decision on information search were comparable to the regression model that included both economic expectations and information search as the independent variables (0.887 versus 0.888) (Gill et al., 766). These findings suggested that information search is the major influencer for investment decisions, and the role of economic expectations on investment decisions seems to be moderated through information search only. Therefore, economic expectations did not emerge as a robust or independent predictor of investment decision, when considered in combination with information search.

On the contrary, the Gill et al. (666) study further showed that overconfidence bias could significantly influence investment decisions if moderated through information search compared to without such searches as depicted by the R-square values (0.94 versus 0.64). The findings further implicate that overconfidence bias is a more robust moderator of information search than economic expectations in driving investment decisions. This finding is important because it shows that overconfidence bias would not always result in poor investment decisions, rather it has the potential for the investor to engage with information searches that are beyond the performance of a firm or the economy of a nation. These assumptions are supported by the R-square values of independent regression analysis of the relation between economic expectations and investment decisions and overconfident bias and investment decisions (0.332 versus 0.64). Hence, it could also be speculated that the information search that was driven by economic expectations which could have discouraged investment decisions might be reverted by overconfidence bias which translated into information searches that was not driven by economic expectations. Going with the reality that the past performance of a firm is not a significant predictor of its future performance and volatility in stock returns are often influenced by intangible aspects, overconfidence bias might be the rational behavior that is desirable in the event of a poor economy or shockwaves in the stock market.

* + 1. **Overconfidence Bias: A Relook into the Excessive Trading Hypotheses and Self-Attribution Bias**

Mishra and Metilda (27) evaluated the impact of investment experience, gender, educational level of the investors on overconfidence and self-attribution biases. The study was conducted across mutual fund investors (n=309) that showed overconfidence bias is higher in men and increases with investment experience and education. Self-attribution bias also increases with education, but there was no significant relationship between such bias and gender or investment experience. The study showed a significant association between self-attribution and overconfidence. Mishra and Metilda (27) reflected that self-attribution bias might not lead to overconfidence bias unless there is investment experience. This assumption also supports the excessive trading hypothesis that overconfidence in investment decisions is the result of excessive trading behavior. Such assumptions are not surprising, considering excessive trading increases investment experience. Therefore, overconfidence bias in investment decisions is not always irrational, illogical, or impulsive. Rather, the Mishra and Metilda (27) study implicated that overconfidence bias that stem from self-attribution bias could be moderated by investment experience. Thus, overconfidence bias could be increased or decreased based on investment experience. The presumptive model indicates that investors who have sufficient investment experience or education would exhibit overconfidence bias that would not be impulsive or irrational. On the contrary, if the overconfidence bias stems only from self-attribution bias, the investment decisions might be risky.

Mishra and Metilda (27) reported self-attribution bias has cognitive and motivational components. Hence, self-attribution bias stems from the Limited information processing ability of the individuals that explains the cognitive component. The motivational component is the internal attributions for success and external attributions of failure so as to maintain one's self-esteem and feel good factor. Self-attribution bias comprises self-enhancing bias and self-protecting bias. The former is the tendency of individuals to claim an irrational sense of credit for their success, while the latter is the irrational denial of responsibility for a decision or failure. Billet and Qian (2005) stated overconfidence and self-attribution bias are static and dynamic counterparts. Self-attribution often makes an individual to become overconfident rather than converging on self-assessment. This is an interesting finding from the perspective of behavioral finance because overconfidence might be controlled due to its static nature more than self-attribution which is highly dynamic. In this regard, the role of information search and investment experience becomes important in ensuring the rationality of overconfident investments. Investment decisions are influenced by overconfident bias but the outcome of the decision would depend on the drivers of overconfidence bias.

As Malik et al. (154) showed that overconfidence bias influences investment decisions more than information searches or risk tolerance; overconfidence bias could be considered a positive determinant for investment decisions provided such biases do not stem from self-attribution. However, the relationship between overconfidence bias and investment experience has remained inconclusive (Obamuyi et al. 141). Some studies showed that with age and experience, overconfidence bias decreases while others showed overconfidence bias increases with age and experience. Hence, it could be inferred that the experience and age of the investor might moderate the influence of excessive trading on overconfidence bias.

Such assumptions challenge the excessive trading hypothesis because experience does not always translate into high overconfidence bias. In this regard, it could be argued that excessive trading or overconfidence bias would not impact investment decisions because experience might be a moderator between excessive trading behavior and investment decision. The finding also substantiates the observations of Billet and Qian (1037) who showed that overconfidence bias is a static construct. Therefore, investment experience and self-attribution bias are both dynamic constructs that interact with each other in influencing overconfidence bias. It would be interesting to identify whether excessive trading influences experience or self-attribution. Excessive trading that is mediated through self-attribution might lead to high overconfidence that might be irrational and impulsive which could lead to poor investment decisions. On the contrary, excessive trading that is mediated through experience might rationalize investment decisions by optimizing overconfidence bias. The discussion reflects excessive trading would always not lead to overconfidence bias.

**CHAPTER 3: METHODOLOGY**

 The methodology for this study involved a quantitative study design involving both primary and secondary data analysis. The quantitative study design was governed by the ontological and epistemological stances of research philosophy. The detailed research philosophy, data collection, data analysis strategies, and ethical considerations are presented in the subsequent sections.

 3.1. **Research philosophy**

The research philosophy for the present study was grounded on the ontological stance of objectivism and the epistemological stance of positivism. This is because the research contented that the realism of investment decisions could be measured tangibly and objectively from the return on Investments or stock price volatility over a specific period. Similarly, the study contended that the realism witnessed on investment decisions in terms of ROI or stock price volatility could be explained by behavioral biases among which overconfidence bias could be quantified. It would have been ideal to incorporate interpretivism stance of epistemology considering that behavioral biases are qualitative in nature and are influenced by a number of latent constructs that cannot be expressed in quantitative or objective. On the contrary, the present study was grounded on the evidence that overconfidence bias could be significantly measured in terms of quantitative indices.

**3.2. Study Design**

The study involved a methodological triad based on quantitative data analysis whereby the findings of primary data analysis were combined with secondary analysis to answer the research questions considered in this research.The primary data analysis involved an analysis of investment behavior across 10 investors (who were indirect investors and traded independently). The secondary data involved three studies that explored the objective measurement of overconfidence bias, the interaction of different types of cognitive bias on investment decisions, and the relationship between overconfidence bias and return on investment, respectively. The aim of secondary data analysis was to evaluate literature that provided data on overconfidence bias based investment decisions and return on investment. The secondary data coupled with extant literature helped critique the findings of the primary data analysis.

**3.3. Data Collection**

 The primary data was collected through a cross-sectional survey on 10 investors (who had trading experience from 5 years to 15 years but did not hold any professional qualification or portfolio in finance and financial management). All participants belonged from the United States and the researcher conducted telephonic interview with the concerned stakeholders. The researcher contacted 31 individuals who were known to him and were either relatives or peers. However, if the prospective participants confirmed that they traded regularly for at least five years were included in the study. From the 31 individuals, ten individuals had a trading experience of more than 5 years and were willing to participate in the study. After the participants (n=10) provided their informed consent, they were interviewed with a semi-structured questionnaire (table 1) that included closed-ended questions on various attributes of information search, overconfidence bias, investment decision, economic assessment, and risk tolerance. The subjective responses of the participants on the referred attributes were obtained on a 10-point Likert scale. High scores on the Likert scale depicted higher agreeableness with the question, while lower scores on the referred scale depicted low agreeableness with the question inquired.  Each of the investment attributes were sorted into three sub-questions so that each investment attribute had a total score of 30. The participants were also asked to judge their return on investment on four consecutive days from 10th May 2021 to 13th May, 2021 on a scale of -5 to +5 based on the investments they have already done. However, the participants were neither influenced to hold nor to sell the stocks. Moreover, the participants were also not required to trade for the referred days. They were simply asked to state their return on investment (ROI) if they would have decided to sell the stocks on each of the four days. Finally, the volatility index of the S& P500 from 10th May 2021 to 13th May, 2021 was obtained to find out the relation between overconfidence bias, ROI, and actual volatility of S&P 500. The semi-structured interview that was used to obtain the subjective responses of the participants is presented in table 3.1.

***Table 3.1: Semi-Structured Questionnaire***

|  |
| --- |
| Could you kindly allow me to ask a few questions as you have trading for quite some time in the S&P500 Index? Please provided your rating on a scale of 1 to 10. 1. **Economic Expectations**
2. The best time to invest in shares is when the economic conditions of the country are good.
3. Future stock price of a company with a weak performance over the past 3 to 5 years would yield lower returns.
4. The future return on the stock from a company with a strong performance during the past 3 to 5 years would yield higher returns.
5. **Overconfidence bias**
6. I feel that I can predict future share prices better than others.
7. Although I do not have complete knowledge of the stock market, the mathematical and statistical analysis I do provide me the enough confidence to make investment decisions.
8. My investments would provide higher returns compared to others, especially during the long-term.
9. **Investment Decision-Making Behavior**
10. I consider risks associated with different stocks before investing in the share market.
11. I feel it better to invest in local stocks compared to investing in international stocks.
12. I would want to realize the gains as soon as I witness increase in price
13. **Information search**
14. I would like to do detailed financial analysis before making an investment decision
15. I am happy to seek advice on investments but would rely on my own decision.
16. I would like to search for the firms’ growth opportunities and expected earnings while taking an investment decision.

**Risk tolerance Ability**1. I am ready to wait if I see persistent fall in share price, so I sell those stocks.
2. I am ready to take risk because I believe my portfolio would balance losses in gains over the long term.
3. I am able to take the risk of investment if the share prices provide higher returns than banks or other financial instruments.

**ROI Expectations**  What is the likely level of satisfaction for the return on investments considering you also sell the stock on the days of assessment (10th May to 13th May, 2021)? (Please answer this question on a scale of -5 to +5) and for each day please. |

The secondary data was based on the findings of Huisman et al. (69). The inclusion criteria for the secondary data were governed by the objectives of the research. The secondary data analysis aimed to evaluate whether overconfidence bias exhibited by investment professionals and experienced traders have correlation with return on investment that is more than that could be explained by the actual volatility. Therefore, the results would provide reliable and reproducible relation between overconfidence bias and ROI. This is because very few studies have reported the relationship between overconfidence bias and performance of the stocks over the long term in terms of tangible parameters. Some studies that have explored such relationships have adopted a subjective measure of overconfidence bias along with the related variables such as investment decision; information search, risk toleration profile, self-attribution bias, and economic assessment which are also assessed qualitatively, despite the performances of stocks were reported in objective terms. On the contrary, some studies (Huisman et al. 69) did assess overconfidence bias objectively; they did not report the effect of overconfidence bias on ROI. Based on this background and literature gap, the secondary data analysis was appropriate. A keyword search involving the two keywords (overconfidence bias and return on investment) reflected 14 studies but except Huisman et al. (69) no studies reported overconfidence bias as objective measurement and stock performances as objective measurements. Even the primary data analysis that was considered in this study reported OB as a subjective parameter, but the stock performance was assessed in real terms. However, Huisman et al. (69) did not want to explore the relationship between OB and ROI. Rather, they also mentioned that in their study because their main aim was to standardize and identify a novel and quantitative measure of OB which they termed it Pearson's estimate compared to the conventional Parkinson's estimate that was used to measure OB.

* 1. **Data Analysis**

The data analysis both for primary and secondary data involved descriptive and inferential statistics. The descriptive statistics that were used include mean, median, and standard deviation while the inferential statistics were correlation coefficient, regression analysis, and t-tests. All statistical tests for the present study were interpreted at the 0.05 level of significance. The regression models for primary data analysis involved ROI and actual volatility of S&P 500 as the dependent variables, while the investment parameters such as information search, overconfidence bias, investment decision, economic assessment, and risk tolerance were considered as the independent variables. On the contrary, the regression models for secondary data analysis included gain (stock price on the day of survey and forecasted stick price on a later date) or VAEX (volatility of the Amsterdam Stock exchange) as the dependent variables while Pearson’s estimate and Parkinson’s estimate and period of survey was considered as the independent variables. The data analysis was undertaken to test different hypothesis that were considered for the various sub-research questions which were as follows:

H10: overconfidence bias do not significantly influence investment decisions (p>0.05)

H11: overconfidence bias significantly influences investment decision (p<0.05)

H20: Investment decisions made under overconfidence bias are always irrational (p>0.05).

H21: Investment decisions made under overconfidence bias are not always irrational (p<0.05).

H30: Traditional finance theories do not mediate overconfidence bias (p>0.05).

H31: Traditional finance theories mediate overconfidence bias (p<0.05)

H40: Overconfidence bias could not be accurately measured through objective measures (p>0.05).

H41: Overconfidence bias could be accurately measured through objective measures (p<0.05).

H50: Information search, self-attribution bias, risk tolerance, and excessive trading do not interact with overconfident bias in influencing investment decisions (p>0.05).

H51: Information search, self-attribution bias, risk tolerance, and excessive trading interact with overconfident bias in influencing investment decisions (p<0.05).

H60: overconfidence bias does not significantly interact with cognitive biases in influencing investment decisions (p>0.05).

H61: overconfidence bias significantly interacts with cognitive biases in influencing investing decisions (p<0.05).

H70: overconfidence bias is not the independent predictor for investment decision apart from the traditional financial paradigms (p>0.05)

H71: overconfidence bias is the independent predictor for investment decision apart from the traditional financial paradigms (p<0.05).

H80: Overconfidence bias-based investment decision is not significantly correlated with volatility of stock returns (p>0.05)

H81: Overconfidence bias-based investment decision is significantly correlated with volatility of stock returns (p<0.05).

H90: Overconfidence bias do not significantly influence return on investments (p>0.05).

H91: Overconfidence bias significantly influence return on investments (p<0.05)

H100: overconfidence bias and confidence related to investment decisions cannot be significantly demarcated (p>0.05).

H101: overconfidence bias and confidence related to investment decisions could be significantly demarcated (p<0.05).

All statistical analysis for the present study was conducted with the MS-Excel data analysis add-in software.

* 1. **Ethical Considerations**

Participants for the primary data analysis were included only after they provided informed consent. The participants were never manipulated to buy or sell shares at any moment during the period of the study. The researcher adopted a non-committal stance even if the participants inquired whether their investment decision was appropriate an whether such investments would provide higher returns in the immediate or in the distant future. The source and authenticity of the data for the secondary data analysis was referenced both as in-text citation and in bibliography. Since only the published data was used for secondary data analysis, there was no requirement of obtaining permission from the authors. Moreover, the present study explored different dimensions than the authors of the secondary data explored.

**CHAPTER 4: RESULTS AND DISCUSSION**

**4.1. PRIMARY DATA ANALYSIS**

The raw data that was obtained from the semi-structured interview (Table 3.1) is presented in tables 5.1.1 and 5.1.2

***Table 5.1.1: The total and individual measures of Economy, Overconfidence, and Investment Decision of the 10 participants***

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Economy good | Return weak | Return high |  ECONOMY | Predict Better | My analysis | Others Return | OVERCONFIDENCE | consider risks  | local stocks  | realize gains | INVESTMENT DECISION |
| 5 | 7 | 6 | 18 | 6 | 8 | 7 | 21 | 4 | 5 | 6 | 15 |
| 3 | 6 | 5 | 14 | 6 | 6 | 7 | 19 | 2 | 4 | 6 | 12 |
| 5 | 5 | 4 | 14 | 4 | 5 | 8 | 17 | 4 | 6 | 7 | 17 |
| 4 | 5 | 6 | 15 | 7 | 3 | 4 | 14 | 5 | 6 | 8 | 19 |
| 2 | 4 | 6 | 12 | 7 | 3 | 4 | 14 | 1 | 8 | 5 | 14 |
| 4 | 6 | 7 | 17 | 5 | 1 | 1 | 7 | 3 | 2 | 4 | 9 |
| 3 | 6 | 4 | 13 | 6 | 6 | 7 | 19 | 2 | 4 | 6 | 12 |
| 5 | 5 | 6 | 16 | 4 | 5 | 3 | 12 | 8 | 6 | 7 | 21 |
| 4 | 3 | 3 | 10 | 7 | 3 | 4 | 14 | 5 | 4 | 8 | 17 |
| 2 | 4 | 6 | 12 | 7 | 3 | 4 | 14 | 1 | 8 | 8 | 17 |

***Table 5.1.2: The total and individual measures of Information search, Risk tolerance, and Reported Return on Investment of the 10 participants***

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| financial analysis | seek advice | firm parameters | INFORMATION SEARCH | wait | overall return | Banks | RISK TOLERANCE | ROI1 | ROI2 | ROI3 | ROI4 | ROITOT\* |
| 7 | 3 | 4 | 14 | 5 | 6 | 8 | 19 | 1 | -1 | 2 | -3 | -0.25 |
| 7 | 3 | 4 | 14 | 1 | 8 | 8 | 17 | 2 | 1 | 1 | -2 | 0.5 |
| 5 | 1 | 1 | 7 | 3 | 2 | 4 | 9 | 1 | -1 | 0 | 1 | 0.25 |
| 6 | 8 | 7 | 21 | 5 | 7 | 6 | 18 | 3 | 1 | -1 | -1 | 0.5 |
| 6 | 6 | 7 | 19 | 3 | 6 | 6 | 15 | 2 | 2 | 3 | 2 | 2.25 |
| 4 | 5 | 8 | 17 | 5 | 5 | 6 | 16 | 1 | 2 | 1 | -1 | 0.75 |
| 7 | 3 | 4 | 14 | 1 | 8 | 6 | 15 | 2 | 1 | 1 | -2 | 0.5 |
| 5 | 1 | 1 | 7 | 3 | 2 | 4 | 9 | 2 | -1 | 2 | -1 | 0.5 |
| 6 | 8 | 5 | 19 | 5 | 7 | 6 | 18 | 3 | 1 | -1 | -1 | 0.5 |
| 6 | 6 | 3 | 15 | 3 | 6 | 6 | 15 | -1 | 1 | 3 | 1 | 1 |

* Note: The ROI total was a summation of the individual ROI (reported) from 10th May to 13th May, 2021.

The raw data presented in tables 5.1.1 and 5.1.2 was used to calculate the descriptive statistics (tables 5.1.3. and 5.1.4).

***Table 5.1.3: Descriptive statistics of total and individual measures of Economy, Overconfidence, and Investment Decision***

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Economy good | Return weak | Return high | ECONOMY | Predict Better | My analysis | Others Return | OVERCONFIDECE | consider risks  | local stocks  | realize gains | Investment Decision |
| Mean | 3.7 | 5.1 | 5.3 | 14.1 | 5.9 | 4.3 | 4.9 | 15.1 | 3.5 | 5.3 | 6.5 | 15.3 |
| Standard Error | 0.366667 | 0.378594 | 0.395811 | 0.781025 | 0.378594 | 0.650641 | 0.706321 | 1.286252 | 0.687184 | 0.597216 | 0.428174 | 1.145523 |
| Median | 4 | 5 | 6 | 14 | 6 | 4 | 4 | 14 | 3.5 | 5.5 | 6.5 | 16 |
| Mode | 5 | 6 | 6 | 14 | 7 | 3 | 4 | 14 | 4 | 4 | 6 | 17 |
| Standard Deviation | 1.159502 | 1.197219 | 1.251666 | 2.469818 | 1.197219 | 2.057507 | 2.233582 | 4.067486 | 2.173067 | 1.888562 | 1.354006 | 3.622461 |
| Sample Variance | 1.344444 | 1.433333 | 1.566667 | 6.1 | 1.433333 | 4.233333 | 4.988889 | 16.54444 | 4.722222 | 3.566667 | 1.833333 | 13.12222 |
| Kurtosis | -1.22679 | -0.36854 | -0.49279 | -0.59303 | -0.87847 | -0.26412 | -0.85185 | 0.516943 | 0.638853 | -0.32155 | -0.46753 | -0.43106 |
| Skewness | -0.34212 | -0.2331 | -0.70544 | 0.023231 | -0.73814 | 0.262147 | -0.14359 | -0.48642 | 0.812081 | -0.04454 | -0.50356 | -0.21493 |
| Range | 3 | 4 | 4 | 8 | 3 | 7 | 7 | 14 | 7 | 6 | 4 | 12 |
| Minimum | 2 | 3 | 3 | 10 | 4 | 1 | 1 | 7 | 1 | 2 | 4 | 9 |
| Maximum | 5 | 7 | 7 | 18 | 7 | 8 | 8 | 21 | 8 | 8 | 8 | 21 |
| Sum | 37 | 51 | 53 | 141 | 59 | 43 | 49 | 151 | 35 | 53 | 65 | 153 |
| Count | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Confidence Level(95.0%) | 0.829458 | 0.856439 | 0.895388 | 1.766801 | 0.856439 | 1.471852 | 1.597808 | 2.909704 | 1.554519 | 1.350996 | 0.968598 | 2.591352 |

Among the economic expectations factor, the highest mean was noted for the assumption that investors believe that the company which has performed better over the last three to five years would provide the highest return. This is one of the common misconceptions in unprofessional and indirect investors because past performance of a stock is never a robust predictor for future investment. If investments are done based on past performance only, the ROI would not only be poor but would be highly risky. The overconfidence factor that exhibited the highest mean was the response that investors feel that they are capable to predict the future performance of a stock better than other. This finding clearly implicated that unprofessional investors who are not employed in financial institutions or have a professional degree in finance have intuitive feelings regarding their capacity to predict the future performance of a stock. Such findings suggest that the probability of self-attribution bias could be higher in the concerned stakeholders compared to professional investors. Although the respective participants considered in the primary data analysis were general investors, it cannot be speculated that they were unprofessional because seven out of the 10 participants have been trading over the past 10 years. Extrapolating the years of trading experience with OB, it cannot be said that the excessive trading experience would help them to predict better by fostering overconfidence. The mean for investment decision was highest among all the other variables and the highest mean was noted for the realization of gains factor. This is not a surprising observation because OC or economic assessment summed up to influence investment decision, while the major motivation for investment is to achieve ROI.

***Table 5.1.4: Descriptive statistics of the total and individual measures of Information search, Risk tolerance, and Reported Return on Investment***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | financial analysis | seek advice | firm parameters |  ***Information search*** | wait | overall return | Banks |  ***Risk tolerance*** | ROI1 | ROI2 | ROI3 | ROI4 | ***Reported Return*** |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Mean | 5.9 | 4.4 | 4.4 | 14.7 | 3.4 | 5.7 | 6 | 15.1 | 1.6 | 0.6 | 1.1 | -0.7 | 2.6 |
| Standard Error | 0.314466 | 0.819214 | 0.763035 | 1.498518 | 0.498888 | 0.683943 | 0.421637 | 1.110055 | 0.371184 | 0.371184 | 0.458258 | 0.495536 | 0.819214 |
| Median | 6 | 4 | 4 | 14.5 | 3 | 6 | 6 | 15.5 | 2 | 1 | 1 | -1 | 2 |
| Mode | 6 | 3 | 4 | 14 | 5 | 6 | 6 | 15 | 2 | 1 | 1 | -1 | 2 |
| Standard Deviation | 0.994429 | 2.590581 | 2.412928 | 4.738729 | 1.577621 | 2.162817 | 1.333333 | 3.510302 | 1.173788 | 1.173788 | 1.449138 | 1.567021 | 2.590581 |
| Sample Variance | 0.988889 | 6.711111 | 5.822222 | 22.45556 | 2.488889 | 4.677778 | 1.777778 | 12.32222 | 1.377778 | 1.377778 | 2.1 | 2.455556 | 6.711111 |
| Kurtosis | -0.15745 | -1.2963 | -0.92255 | -0.30604 | -1.07416 | 0.017265 | 0.080357 | 0.196723 | 1.854653 | -1.18069 | -0.98693 | -0.5902 | 4.658325 |
| Skewness | -0.61014 | 0.118872 | 0.004745 | -0.64326 | -0.40749 | -0.99995 | 0 | -1.0862 | -1.0718 | -0.55651 | -0.21359 | 0.463455 | 1.702551 |
| Range | 3 | 7 | 7 | 14 | 4 | 6 | 4 | 10 | 4 | 3 | 4 | 5 | 10 |
| Minimum | 4 | 1 | 1 | 7 | 1 | 2 | 4 | 9 | -1 | -1 | -1 | -3 | -1 |
| Maximum | 7 | 8 | 8 | 21 | 5 | 8 | 8 | 19 | 3 | 2 | 3 | 2 | 9 |
| Sum | 59 | 44 | 44 | 147 | 34 | 57 | 60 | 151 | 16 | 6 | 11 | -7 | 26 |
| Count | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Confidence Level(95.0%) | 0.711372 | 1.85319 | 1.726105 | 3.389883 | 1.128562 | 1.547186 | 0.953809 | 2.511119 | 0.839677 | 0.839677 | 1.036651 | 1.120979 | 1.85319 |

Likewise, the table 5.1.4 showed that the highest mean for the information search parameter was noted for financial analysis. This is not surprising because general investors also make financial analysis before investment decision and it is the major aspect of information search across them. The highest mean for the risk tolerant parameter was the return from the stocks versus return from the bank factor. Therefore, investors are ready to invest if they perceive that investment in the security market is likely to provide them higher returns compared to the financial instruments such as banks and gold. The most interesting attribute that was featured by the descriptive statistics was that risk tolerance and OB emerged jointly as the topmost factors in driving investment decision, which was followed by information search and economic assessment. The findings from the descriptive statistics typically defined the general investor because they are divided whether they should use risk tolerance or OB before making an investment decision. There could be an assumption that experienced investors (even if they are not professional investors) would opt for OB that would provide them higher returns, while the relatively less experienced traders would prioritize risk tolerance before making an investment. However, such assumptions could be an oversimplification because higher OB or OB as such does not guarantee higher ROI, while high risk toleration does not necessarily mean that the returns would be more predictable. From this perspective, it is necessary that OCB should interact with risk tolerance in making investment decision at least in investors who are not finance professionals. Moreover, the attributes of OB and risk toleration should be governed by information search and economic forecasting. Unfortunately, considering the highest mean for the different factors in each category, it seems that a general investor defined by the terms “predict better, high returns, and past performance.” If the concerned stakeholders are only defined by these attributes, it might apparently be inferred that the general investors often engage in illogical and irrational investment decision and tend to exhibit OB that would negatively impact on ROI. However, such assumptions could be an oversimplification because the descriptive statistics equally showed that the general investors could be defined by forecasting savvy based on financial assessment and risk tolerant in terms of a specific comparison parameter (bank interest) which depicts that they might be rational and logical. Nevertheless, the evidence suggests that information search, OB, economic assessment, and risk tolerance should be integrated while making an investment decision so that the ROI are not risky. However, there is no sacrosanct rule that integrating the referred parameters would lead to high return on investment which could have been possible if OB was allowed to get a priority over rest of the attributes. Likewise, it could be argued that eliminating OB might have resulted into conservative investments with lower risk of return as well as risky return. Table 5.1.5 depicted the actual volatility in the S&P500 that was obtained for 10th May 2021 to 13th May 2021.

**Table 5.1.5: actual volatility in the S&P500 that was obtained for 10th May 2021 to 13th May 2021**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Volatility1 (10/5/21) | Volatility2 (11/5/21) | Volatility3 (12/5/21) | Volatility4 (13/5/21) | Average volatility |
| 18..44 | 21.52 | 27.67 | 23.12 | 24.10333 |
|  |  |  |  |  |

Fig 1: Trend of **actual volatility in the S&P500 that was obtained for 10th May 2021 to 13th May 2021**

The volatility analysis depicted that there was significant fluctuations in volatility during the four days which makes it difficult for the prediction of market return in the short term unlike the Huisman et al. (69) which showed that ROI could be better predicted over the long term. The relationship between investments attributes were evaluated from the correlation matrix of the attributes considered holistically (table 5.1.6) as well as independently (table 5.1.7 and table 5.1.8).

**Table 5.1.6: Correlation analysis between investments attributes were evaluated from the correlation matrix of the attributes considered holistically**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *ECONOMY* | *OVERCONFIDENCE* | *INVESTMENT DECISION* | *INFORMATION SEARCH* | *RISK TOLERANCE* | *ROITOT* |
| ECONOMY | 1 |   |   |   |   |   |
| OVERCONFIDENCE | -0.03429 | 1 |   |   |   |   |
| INVESTMENT DECISION | -0.1155 | 0.020361 | 1 |   |   |   |
| INFORMATION SEARCH | -0.29145 | -0.2058 | -0.26603 | 1 |   |   |
| RISK TOLERANCE | -0.02691 | 0.185988 | -0.36962 | 0.816916 | 1 |   |
| ROITOT | -0.4793 | -0.39648 | -0.15155 | 0.387384 | -0.06842 | 1 |

**Table 5.1.7: Correlation analysis between investments attributes were evaluated from the correlation matrix of the attributes in terms of individual factors**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Economy good* | *Return weak* | *Return high* | *ECONOMY* | *Predict Better* | *My analysis* | *Others Return* | *OVERCONFIDENCE* |
| Economy good | 1 |  |  |  |  |  |  |  |
| Return weak | 0.344176 | 1 |  |  |  |  |  |  |
| Return high | -0.08422 | 0.348493 | 1 |  |  |  |  |  |
| ECONOMY | 0.593626 | 0.82293 | 0.636176 | 1 |  |  |  |  |
| Predict Better | -0.66434 | -0.37984 | -0.0519 | -0.52232 | 1 |  |  |  |
| My analysis | 0.321362 | 0.572857 | -0.25455 | 0.299552 | -0.212 | 1 |  |  |
| Others Return | 0.115837 | 0.336563 | -0.54449 | -0.05841 | -0.08726 | 0.805116 | 1 |  |
| OVERCONFIDENCE | 0.030627 | 0.36279 | -0.44304 | -0.03429 | 0.139183 | 0.885556 | 0.930709 | 1 |
| consider risks  | 0.815802 | -0.02135 | -0.06128 | 0.341589 | -0.49114 | 0.111829 | -0.19458 | -0.19485 |
| local stocks  | -0.36026 | -0.45702 | 0.145713 | -0.31682 | 0.260452 | 0.002859 | 0.086924 | 0.12584 |
| realize gains | 0.106159 | -0.51407 | -0.42615 | -0.41532 | 0.239901 | 0.059826 | 0.165328 | 0.191661 |
| INVESTMENT DECISION | 0.34125 | -0.44323 | -0.12008 | -0.1155 | -0.06917 | 0.090937 | -0.00961 | 0.020361 |
| financial analysis | -0.318 | 0.195988 | -0.33029 | -0.22167 | 0.550633 | 0.667956 | 0.645315 | 0.854315 |
| seek advice | -0.43649 | -0.55171 | 0.027413 | -0.45846 | 0.838306 | -0.62954 | -0.47238 | -0.3311 |
| firm parameters | -0.34948 | -0.01539 | 0.360538 | 0.011187 | 0.553863 | -0.56399 | -0.50716 | -0.40077 |
| INFORMATION SEARCH | -0.48331 | -0.26831 | 0.129258 | -0.29145 | 0.855861 | -0.49117 | -0.38107 | -0.2058 |
| wait | 0.437337 | -0.14119 | 0.270089 | 0.273754 | 0.141186 | -0.38338 | -0.4919 | -0.42249 |
| overall return | -0.57155 | 0.055784 | -0.16828 | -0.32657 | 0.802427 | 0.047441 | 0.131102 | 0.332175 |
| Banks | -0.28748 | 0.417635 | 0.133156 | 0.134963 | 0.556846 | 0.324017 | 0.223856 | 0.450729 |
| RISK TOLERANCE | -0.2648 | 0.129549 | 0.068279 | -0.02691 | 0.769365 | -0.02 | -0.05527 | 0.185988 |
| ROI1 | 0.228589 | -0.12651 | -0.36301 | -0.13798 | 0.126507 | 0.009201 | -0.01695 | 0.032581 |
| ROI2 | -0.75108 | -0.28464 | 0.16638 | -0.40626 | 0.600908 | -0.68091 | -0.48314 | -0.43287 |
| ROI3 | -0.44305 | 0.121682 | 0.532941 | 0.121073 | 0.006404 | 0.137882 | -0.09955 | 0.016965 |
| ROI4 | -0.43418 | -0.66925 | 0.062314 | -0.49667 | 0.076993 | -0.54795 | -0.21269 | -0.37131 |
| ROITOT | -0.74721 | -0.52305 | 0.24672 | -0.4793 | 0.379745 | -0.55867 | -0.41093 | -0.39648 |

**Table 5.1.8: Correlation analysis between investments attributes were evaluated from the correlation matrix of the attributes in terms of individual factors**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *consider risks*  | *local stocks*  | *realize gains* | *INVESTMENT DECISION* | *financial analysis* | *seek advice* | *firm parameters* | *INFORMATION SEARCH* | *wait* | *overall return* | *Banks* | *RISK TOLERANCE* | *ROITOT* |
| consider risks  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| local stocks  | -0.14891 | 1 |  |  |  |  |  |  |  |  |  |  |  |
| realize gains | 0.358746 | 0.41279 | 1 |  |  |  |  |  |  |  |  |  |  |
| INVESTMENT DECISION | 0.656347 | 0.586313 | 0.804195 | 1 |  |  |  |  |  |  |  |  |  |
| financial analysis | -0.33421 | 0.136076 | 0.206302 | -0.05244 | 1 |  |  |  |  |  |  |  |  |
| seek advice | -0.21711 | 0.0863 | 0.253413 | 0.009472 | 0.060383 | 1 |  |  |  |  |  |  |  |
| firm parameters | -0.33905 | -0.27309 | -0.44212 | -0.51102 | -0.07409 | 0.71812 | 1 |  |  |  |  |  |  |
| INFORMATION SEARCH | -0.36147 | -0.06332 | -0.04329 | -0.26603 | 0.205136 | 0.925016 | 0.886229 | 1 |  |  |  |  |  |
| wait | 0.388922 | -0.11934 | 0.104031 | 0.209978 | -0.39661 | 0.500236 | 0.420313 | 0.404261 | 1 |  |  |  |  |
| overall return | -0.53192 | -0.22034 | -0.01897 | -0.44106 | 0.707758 | 0.559229 | 0.53653 | 0.727442 | -0.15631 | 1 |  |  |  |
| Banks | -0.46018 | -0.26475 | -0.24618 | -0.5061 | 0.670402 | 0.257343 | 0.414434 | 0.492396 | 0 | 0.7706 | 1 |  |  |
| RISK TOLERANCE | -0.32773 | -0.28995 | -0.05844 | -0.36962 | 0.512466 | 0.667127 | 0.67689 | 0.816916 | 0.35312 | 0.838586 | 0.854627 | 1 |  |
| ROI1 | 0.435607 | -0.29071 | 0.069911 | 0.135884 | 0.152305 | 0.241165 | 0.298152 | 0.315619 | 0.096003 | 0.253849 | 0 | 0.199552 |  |
| ROI2 | -0.60985 | -0.14034 | -0.34956 | -0.56967 | -0.03808 | 0.679647 | 0.808148 | 0.775064 | -0.024 | 0.603986 | 0.283981 | 0.469216 |  |
| ROI3 | -0.40576 | 0.47501 | -0.36808 | -0.13335 | 0.084814 | -0.27821 | -0.13982 | -0.20549 | -0.31105 | -0.13117 | 0.115011 | -0.17692 |  |
| ROI4 | -0.30998 | 0.679563 | 0.078551 | 0.197697 | -0.40643 | 0.186121 | -0.00588 | 0.013467 | -0.05393 | -0.3639 | -0.53179 | -0.45045 |  |
| ROITOT | -0.49343 | 0.481465 | -0.28509 | -0.15155 | -0.14664 | 0.374172 | 0.419496 | 0.387384 | -0.174 | 0.095188 | -0.12867 | -0.06842 | 1 |

The correlation analyses provided a comprehensive picture regarding the impact of investment decision parameters on return on investment for investors who might be experienced but does not hold academic or professional qualifications in finance or financial management. This is because the highest correlation coefficients were noted for ROI were OB and information search and the correlation coefficients were almost same (0.38 versus 0.39). This finding substantiated the earlier assumptions that the unprofessional investor could be both rational and irrational. If they emphasize more on self-attribution bias or OB it would likely to be negatively related with ROI because the present study showed that the relation between OB and ROI was negative (r=-0.39) which was completely different direction from the Huisman et al. (69) study because the latter showed positive correlation between ROI and OB. On the contrary, the relationship between information search and ROI was found to be positive which showed that investments should be planned and made in a logical manner based on economic forecasts and information. The correlation analyses further showed more interesting findings such as the negative correlation between OB and information search and a positive correlation between OB and investment decision. This means that the less an individual searches investment-related information, they tend to exhibit more OB. It could also be said that the more is the OB, the less is the intention of the investors to search investment-related information in making an investment. However, this assumption and finding is absolutely intrinsic to the general investors who are not professional investors and do not have professional qualifications in finance. In case the investors are investment professionals, the relation between information search and OB is just the reverse than that observed for general investors. This was evident from the Huisman et al. (69) study which showed that the bankers were able to exercise OB because they had adequate information and knowledge on the securities market. However, such knowledge could also be present in the general investors but they might be limited to certain individuals and in a non-uniform manner. If every general investor would have used adequate, appropriate, and timely investment-related information, then the relation between OB and information search would have been positive. Nevertheless, both the secondary and primary data analysis agreed on the point that OB does influence investment decisions and that too through positive correlations. This means that more is the OB; the more is the likelihood of investment. These findings were also substantiated by the regression analysis (table 5.1.9).

**Table 5.1.9: Regression analysis of ROI on economic assessment, information search, investment decision, Risk tolerance, and OB**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SUMMARY OUTPUT |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |
| *Regression Statistics* |  |   |   |   |   |   |   |   |
| Multiple R | 0.83234 |   |   |   |   |   |   |   |
| R Square | 0.692789 |   |   |   |   |   |   |   |
| Adjusted R Square | 0.308776 |   |   |   |   |   |   |   |
| Standard Error | 0.538452 |   |   |   |   |   |   |   |
| Observations | 10 |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |
| ANOVA |   |   |   |   |   |   |   |   |
|  | *df* | *SS* | *MS* | *F* | *Significance F* |   |   |   |
| Regression | 5 | 2.615279 | 0.523056 | 1.804075 | 0.293696 |   |   |   |
| Residual | 4 | 1.159721 | 0.28993 |   |   |   |   |   |
| Total | 9 | 3.775 |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |
|  | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
| Intercept | 2.546227 | 2.166866 | 1.175074 | 0.305138 | -3.46996 | 8.562411 | -3.46996 | 8.562411 |
| ECONOMY | -0.03412 | 0.093441 | -0.36512 | 0.733512 | -0.29355 | 0.225317 | -0.29355 | 0.225317 |
| OVERCONFIDENCE | 0.024575 | 0.066438 | 0.36989 | 0.730216 | -0.15989 | 0.209035 | -0.15989 | 0.209035 |
| INVESTMENT DECISION | -0.05345 | 0.054376 | -0.98293 | 0.381292 | -0.20442 | 0.097524 | -0.20442 | 0.097524 |
| INFORMATION SEARCH | 0.194816 | 0.109352 | 1.78155 | 0.149414 | -0.10879 | 0.498425 | -0.10879 | 0.498425 |
| RISK TOLERANCE | -0.25379 | 0.143768 | -1.7653 | 0.152272 | -0.65296 | 0.14537 | -0.65296 | 0.14537 |

Although the regression analysis (table 5.1.9) was non-significant (p=0.29), it depicted two interesting findings that should be helpful for investors who does not have a professional qualification in finance. Firstly, the regression showed that the most significant variables that determine ROI positively are information search and risk tolerance with p values of 01.4 and 0.15 respectively. Investors who are not investment professional should not make investment based on their intuition or self-attribution because they are likely to influence OB more than information search or trading experience. The regression model presented a bold and novel finding that OB rarely influences ROI if such investments are done by unprofessional investors. Hence, it could be possible that the tendency of the average investor to search for information and limitations on risk tolerance prevent them from exercising OB and even f they do exercise OB while making an investment decision, the attributes of information search and risk tolerance might reduce the component of self-attribution bias which is either a part of or strongly related to OB. The final question that needs to be assessed was the extent of correlation between ROI and actual volatility as reported by S&P500. The average ROI was calculated for each day from 10th May to 13th May, 2021 to generate the correlation and regression analysis (tables 5.1.10 and 5.1.11).

***Table 5.1.10: Correlation Analysis between ROIAVG (as expected by the participants) and actual volatility of S&P500***

|  |  |  |
| --- | --- | --- |
|  | *ROIAVG* | *VOLATILITYACTUAL* |
| ROIAVG | 1 |   |
| VOLATILITYACTUAL | -0.20324 | 1 |

***Table 5.1.11: Regression analysis of actual volatility of S&P500 on ROIAVG (as expected by the participants) and***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| SUMMARY OUTPUT |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| *Regression Statistics* |  |  |  |  |  |  |  |
| Multiple R | 0.203236 |  |  |  |  |  |  |  |
| R Square | 0.041305 |  |  |  |  |  |  |  |
| Adjusted R Square | -0.43804 |  |  |  |  |  |  |  |
| Standard Error | 4.61422 |  |  |  |  |  |  |  |
| Observations | 4 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| ANOVA |  |  |  |  |  |  |  |  |
|  | *df* | *SS* | *MS* | *F* | *Significance F* |  |  |  |
| Regression | 1 | 1.834622 | 1.834622 | 0.086169 | 0.796764 |  |  |  |
| Residual | 2 | 42.58205 | 21.29103 |  |  |  |  |  |
| Total | 3 | 44.41668 |   |   |   |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
| Intercept | 23.20184 | 2.897047 | 8.008792 | 0.015235 | 10.73686 | 35.66683 | 10.73686 | 35.66683 |
| ROIAVG | -0.7913 | 2.695656 | -0.29355 | 0.796764 | -12.3898 | 10.80718 | -12.3898 | 10.80718 |

The correlation analysis and regression analysis suggested that the correlation between ROI average and actual S&P500 volatility is not only low (r=0.2) but negative too. This means that the prediction of ROI by the general investors were poor and risky too because losses were recorded as per their verbatim. The regression analysis confirmed that general investors perform poor in predicting future performance of a stock compared to their professional peers, despite both of them exhibit OB. This is an interesting finding which suggests that if the investors without formal knowledge on finance tend to make investment decisions on their own, they should search adequate investment-related information and assess their risk toleration ability to prevent OB-induced illogical and irrational investment decisions.

**4.2. SECONDARY DATA ANALYSIS**

**Background of Secondary Data Analysis**

Before the method proposed by Huisman et al. (69), Parkinson's estimate was used to measure confidence or overconfidence in investment decisions. By convention, if the PE was higher than the observed volatility, it reflected that the investors do not have OB but are confident in making appropriate investment decisions if the observed volatility matched with the PE or was near to that. One of the major fallacies of the PE was that it was more valid for measuring OB over the short term, while the Pearson's estimate that was devised by Huisman et al. (69) is estimated to be valid and reliable over both the short and long terms. On the other hand, if the PE was lower than the observed volatility of the market as estimated from the opening and closing prices of the stock index on a specific trading day, it was assumed that the investment decision carried substantial amount of OB. Therefore, the Huisman et al. (69) study was considered as the major and only article for secondary data analysis. The authors showed that the Pearson’s estimate was a more valid measure for estimating OB compared to PE because the volatility predictions for the former was lower than the PE and actual volatility. However, the Huisman et al. (69) study had several shortcomings such as they did not incorporate the investment demographics of the investors, their risk toleration profile, information search, and economic forecasts that justified the primary data analysis. The only one demographic factor that was pertinent and relevant in the Huisman et al. (69) was the professional profile of the investors.

**Study Design and Variables Selected**

Huisman et al. (69) examined OB in retail investors neither as a function of realized returns in the security market nor as a theoretical or experimental model. Rather, the authors directly tested the investment s of individual investors with accounts in biggest Dutch Banks as a function of their OB that might have emerged from their experience on stock market predictions. The confidence measures (Pearson and Parkinson estimates) were run on a biweekly basis from December 2009 to October 2010. The PE is an estimate of volatility which is based on the predictions of the highest and lowest bound around two-week Amsterdam Exchange Index (AEX) or any other stock exchange index forecast. The authors searched for an alternative to PE as they argued that the maximum and minimum bounds have easy appeal to respondents either in the short or long terms. The authors used the volatility of the AEX (VAEX) as the actual or observed volatility. The participants and participant banks (Dutch ABN Amro Bank) were so selected because the investors traded multiple times per week which ensured that they have an excessive trading background as well as information search and economic forecasting competence. Although these attributes related to investment demographics was not reported by the authors, the background of the participants is sufficient to justify such assumptions. Therefore, the Huisman et al. (69) study provided the opportunity to evaluate whether excessive trading is significantly related to OB. The designation of the investors depicted that they had formal and professional degrees in financial management which further segregated from the general investors. Since Huisman et al. (69) incorporated participants who had a highly experienced investor background; the primary data analysis was justified because it incorporated general and unprofessional investors. Likewise, as the Huisman et al. (69) evaluated OB over the long term (2009 to 2010), the primary data analysis evaluated OB for a shorter period (10th May 2021 to 13th May 2021). Therefore, both the primary and secondary data analysis complemented each other from the perspective of study design and end-points evaluated. The professionals selected in Huisman et al. (69) are known as the ABN Amro Trading Clients.

**Study Protocol and Assumptions**

The authors did a number of surveys (n=21) that ranged from 81 participants to 216 participants in terms if survey date and forecast date. The stock price of the AEX index on the survey date (St) was considered along with the average forecast Ei.t (St+1) of the investors. However, the latter is not necessarily a measure of OB because the lags of St could also be correlated with Ei.t (St+1) which means that the forecasted price is more of a market or time-series phenomenon. Nevertheless, the difference between Ei.t (St+1) and St is certainly a volatility parameter that is realized or unrealized. The volatility could be considered to be real if there is high correlation between Ei.t (St+1) and St but the volatility cannot be considered an estimate of OB. The Parkinson’s estimate was calculated with the traditional formula where Hi.t and Li.t were considered the traders estimate for the maximum and minimum value of the AEX index that would be achieved after two weeks from the day investment was made and the survey was taken (Parkinson 61). The Parkinson estimate by definition is the trader’s expected uncertainty or volatility in a survey regarding prediction of the value of the stock index or investment return (Yu et al. 11). The authors modified the PE with square root of 26 multiplied with the original PE formula. The modification was referred to as Pearson’s estimate and it accommodated the issue of annualizing the volatility estimate. In other words, Huisman et al. (69) evaluated OB over one year. However, as the expectations of the investors are assessed over a two-week period, the Pearson’s estimate reflected a forward-looking measure of volatility. Although PE is affected by discontinuous trading and market frictions, Pearson estimate provides unbiased and highly efficient estimation of volatility. The PE and Pearson’s volatility estimates were compared with the VAEX. The data that was used by Huisman et al. (69) and for the secondary data analysis are depicted in tables 5.2.1 and 5.2.2. Although the number of surveys conducted by Huisman et al. (69) was 21, only 11 surveys starting from 11th to 21st survey were considered because the sample size was stable from the 11th survey onwards. Hit ratio depicted the percentage of individuals having a volatility prediction as per the Parkinson estimate.

***Table 5.2.1: Observed volatility (VAEX), Parkinson Estimate and Hit ratio***

|  |  |  |  |
| --- | --- | --- | --- |
| PERIOD | VAEX | PARKINSON | HIT RATIO |
| 11 | 37.68 | 30.11 | 72.4 |
| 12 | 41.25 | 23.29 | 90.2 |
| 13 | 32.35 | 24.89 | 79.01 |
| 14 | 24.1 | 17.95 | 82.76 |
| 15 | 30.27 | 23.07 | 73.91 |
| 16 | 24.38 | 20.07 | 71.26 |
| 17 | 26.65 | 18.59 | 80.72 |
| 18 | 26.02 | 19.96 | 76.92 |
| 19 | 21.89 | 17.58 | 69.41 |
| 20 | 21.55 | 17.61 | 71.59 |
| 21 | 17.62 | 16.56 | 55.42 |

The table 5.2.1 showed that for all the surveys PE was lower than the actual volatility (VAEX), which signified that OB exists in investment professionals. The hit ratio showed that the prediction of volatility by investors fell below the Parkinson Estimate which confirmed that there volatility estimations were narrow than predicted by PE. This finding signified that professional investors exhibit OB which is higher than the PE.

***Table 5.2.2: Stock price, forecasted price, and expected ROI (gain)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PERIOD | ST | Average (Et (St+1) | SAMPLE SIZE | GAIN |
| 11 | 312.35 | 320.75 | 87 | 8.4 |
| 12 | 313.41 | 318.84 | 82 | 5.43 |
| 13 | 321.22 | 319.85 | 81 | -1.37 |
| 14 | 336.06 | 337.44 | 87 | 1.38 |
| 15 | 308.2 | 312.48 | 69 | 4.28 |
| 16 | 323.99 | 323.99 | 87 | 0 |
| 17 | 323.92 | 326.45 | 83 | 2.53 |
| 18 | 317.04 | 322.01 | 104 | 4.97 |
| 19 | 334.96 | 338.73 | 85 | 3.77 |
| 20 | 337.85 | 340 | 88 | 2.15 |
| 21 | 336.49 | 341.64 | 83 | 5.15 |

The table 5.2.2 showed that the average forecasted value for the stock was higher than the actual stock price that prevailed on the date of the survey, which signified that the stock market would show growth within two weeks. The expected gain was calculated by subtracting St from the forecasted value {Average (Et (St+1)}. The relation between the St, Average (Et (St+1), and Period (survey) showed that there is a high correlation (r=0.96) between St and Average (Et (St+1) which is higher than the correlation between period and Average (Et (St+1) and period and St (0.68 and 0.66, respectively). This finding indicated that information search and economic analysis must have influenced investment decision because the period of survey was correlated with forecasted values. However, an element of OB stemmed from the observation that the correlation between Average (Et (St+1) and St was highest. This means there could be other attributes apart from information search that influenced the forecasting ability of the stakeholders more than that predicted from the stock price on the day of trading (table 5.2.3).

***Table 5.2.3: Correlation Analysis St, Average (Et (St+1), and Period (survey)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *PERIOD* | *ST* | *Average (Et (St+1)* | *SAMPLE* |
| PERIOD | 1 |   |   |   |
| ST | 0.662521 | 1 |   |   |
| Average (Et (St+1) | 0.680074 | 0.96719 | 1 |   |
| SAMPLE | 0.235587 | 0.204391 | 0.244638 | 1 |

***Table 5.2.4: Descriptive Statistics of the Variables Considered in the Huisman et al. (69) study***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | *ST* |   | *Average (Et (St+1)* |   | *SAM* |
|   |   |   |   |   |   |
| Mean | 324.1355 | Mean | 327.4709 | Mean | 85.09091 |
| Standard Error | 3.256983 | Standard Error | 3.059026 | Standard Error | 2.46965 |
| Median | 323.92 | Median | 323.99 | Median | 85 |
| Mode | #N/A | Mode | #N/A | Mode | 87 |
| Standard Deviation | 10.80219 | Standard Deviation | 10.14564 | Standard Deviation | 8.190904 |
| Sample Variance | 116.6873 | Sample Variance | 102.934 | Sample Variance | 67.09091 |
| Kurtosis | -1.57822 | Kurtosis | -1.51243 | Kurtosis | 3.792128 |
| Skewness | 0.012586 | Skewness | 0.265125 | Skewness | 0.561367 |
| Range | 29.65 | Range | 29.16 | Range | 35 |
| Minimum | 308.2 | Minimum | 312.48 | Minimum | 69 |
| Maximum | 337.85 | Maximum | 341.64 | Maximum | 104 |
| Sum | 3565.49 | Sum | 3602.18 | Sum | 936 |
| Count | 11 | Count | 11 | Count | 11 |
| Confidence Level(95.0%) | 7.25701 | Confidence Level(95.0%) | 6.815935 | Confidence Level(95.0%) | 5.502724 |

***Table 5.2.5: T-test for comparing St and Average (Et (St+1)***

|  |  |  |
| --- | --- | --- |
| t-Test: Paired Two Sample for Means |   |   |
|   |   |   |
|  | *St* | *Average (Et (St+1)* |
| Mean | 324.1355 | 327.4709 |
| Variance | 116.6873 | 102.934 |
| Observations | 11 | 11 |
| Pearson Correlation | 0.96719 |   |
| Hypothesized Mean Difference | 0 |   |
| df | 10 |   |
| t Stat | -4.00681 |   |
| P(T<=t) one-tail | 0.001245 |   |
| t Critical one-tail | 1.812461 |   |
| P(T<=t) two-tail | 0.002491 |   |
| t Critical two-tail | 2.228139 |   |

The descriptive statistics (table 5.2.4) showed that the mean average forecasted value was more than the stock price prevailing on the day of prediction and the difference was statistically significant (327.4 versus 324.13, p=0.002) (Table 5.2.5)

Table 5.2.6: Correlation analysis between VAEX and PE

|  |  |  |  |
| --- | --- | --- | --- |
|  | *GAIN* | *VAEX* | *PARKINSON* |
| GAIN | 1 |   |   |
| VAEX | 0.314514 | 1 |   |
| PARKINSON | 0.339608 | 0.850232 | 1 |

Table 5.2.7: T test comparing VAEX with PE

|  |  |  |
| --- | --- | --- |
| t-Test: Paired Two Sample for Means |   |   |
|   |   |   |
|  | *VAEX* | *PARKINSON* |
| Mean | 27.61455 | 20.88 |
| Variance | 51.24423 | 16.7454 |
| Observations | 11 | 11 |
| Pearson Correlation | 0.850232 |   |
| Hypothesized Mean Difference | 0 |   |
| df | 10 |   |
| t Stat | 5.238911 |   |
| P(T<=t) one-tail | 0.00019 |   |
| t Critical one-tail | 1.812461 |   |
| P(T<=t) two-tail | 0.000379 |   |
| t Critical two-tail | 2.228139 |   |

The correlation analysis (table 5.2.6) and t-test (table 5.2.7) showed that PE was more correlated with the expected gains compared to VAEX (r=0.33 versus r=0.31). Therefore, overconfidence bias in the form of PE seems to be a robust influencer for ROI (expected or realized). However, it could be argued that the forecasted returns are not realized returns so ROI should not be judged from the same. Despite this argument, the analysis showed very high correlation between VAEX and Parkinson which signified that OCB is necessary for accurate prediction of volatility. However, such assumptions could only be restricted professional investors as considered by Huisman et al. (69) in their study. This is because the authors incorporated participants associated with financial instruments and not general or indirect investors. This is another reason why the primary data analysis was undertaken. The correlation analysis (table 5.2.6) and t-test (table 5.2.7) and the descriptive statistics (Table 5.2.4) suggested that trading experience might be a determinant of OB in professional investors. For this reason, the OB was not only high but provided a near accurate estimate of actual volatility (r=0.85). The assumptions were further substantiated by the regression analysis (table 5.2.8 and table 5.2.9).

***Table 5.2.8: Regression analysis of GAIN on VAEX and PE and period***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| SUMMARY OUTPUT |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| *Regression Statistics* |  |  |  |  |  |  |  |
| Multiple R | 0.58057 |  |  |  |  |  |  |  |
| R Square | 0.337061 |  |  |  |  |  |  |  |
| Adjusted R Square | 0.052945 |  |  |  |  |  |  |  |
| Standard Error | 2.686832 |  |  |  |  |  |  |  |
| Observations | 11 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| ANOVA |  |  |  |  |  |  |  |  |
|  | *df* | *SS* | *MS* | *F* | *Significance F* |  |  |  |
| Regression | 3 | 25.693 | 8.564333 | 1.186349 | 0.381758181 |  |  |  |
| Residual | 7 | 50.53348 | 7.219068 |  |  |  |  |  |
| Total | 10 | 76.22647 |   |   |   |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
| Intercept | -27.0727 | 17.5014 | -1.54689 | 0.165813 | -68.4569509 | 14.31153 | -68.457 | 14.31153 |
| VAEX | 0.300542 | 0.284757 | 1.055431 | 0.326288 | -0.37280245 | 0.973886 | -0.3728 | 0.973886 |
| PARKINSON | 0.379573 | 0.416542 | 0.911249 | 0.392463 | -0.6053917 | 1.364538 | -0.60539 | 1.364538 |
| PERIOD | 0.886459 | 0.5825 | 1.521819 | 0.171866 | -0.49093396 | 2.263853 | -0.49093 | 2.263853 |

Although the regression analysis was non-significant (p=0.38), it showed that the standardized beta-coefficient for PE is more than VAEX in explaining the gains. On the other hand, the p-value for period was the least (p=0.17) compared to VAEX and PE which suggested that ROI might be more influenced by time.

***5.2.9: Regression analysis of Regression analysis of GAIN on VAEX and PE and period***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SUMMARY OUTPUT |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |
| *Regression Statistics* |  |   |   |   |   |   |   |   |
| Multiple R | 0.343118 |   |   |   |   |   |   |   |
| R Square | 0.11773 |   |   |   |   |   |   |   |
| Adjusted R Square | -0.10284 |   |   |   |   |   |   |   |
| Standard Error | 2.899404 |   |   |   |   |   |   |   |
| Observations | 11 |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |
| ANOVA |   |   |   |   |   |   |   |   |
|  | *df* | *SS* | *MS* | *F* | *Significance F* |   |   |   |
| Regression | 2 | 8.974119 | 4.487059 | 0.533758 | 0.605908 |   |   |   |
| Residual | 8 | 67.25235 | 8.406544 |   |   |   |   |   |
| Total | 10 | 76.22647 |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |
|  | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
| Intercept | -1.32537 | 4.832404 | -0.27427 | 0.790829 | -12.4689 | 9.818179 | -12.4689 | 9.818179 |
| VAEX | 0.035866 | 0.243312 | 0.147406 | 0.886459 | -0.52521 | 0.596944 | -0.52521 | 0.596944 |
| PARKINSON | 0.175786 | 0.425636 | 0.412996 | 0.690457 | -0.80573 | 1.157304 | -0.80573 | 1.157304 |

When period was removed from the regression analysis (table 5.2.9), not only the regression model (table 5.2.8) became more non-significant (p=0.6) as well as the individual beta coefficients of PE and VAEX decreased. This was further followed by an increase in the p-values of the respective variables than it was in regression model in Table 5.2.8. This finding suggested that OB might not be a single predictor of gain but might interact with time of investment and time of forecast as evidenced from the influence of period on gain (p=0.17) (table 5.2.8).Hence, it could be inferred that professional investors takes into account adequate knowledge (information search and economics), the ability to forecast, and trading experience before making a investment decision.

***Table 5.2.10: Correlation analysis between Period, VAEX PE, and HIT Ratio***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *PERIOD* | *VAEX* | *PARKINSON* | *HIT RATIO* |
| PERIOD | 1 |  |  |  |
| VAEX | -0.8856 | 1 |  |  |
| PARKINSON | -0.83156 | 0.850232 | 1 |  |
| HIT RATIO | -0.65402 | 0.662204 | 0.290943 | 1 |

When the hit ratio was included for correlation analysis with VAEX and PE, it showed that Hit ratio was weakly correlated with PE (r=0.29). This is an interesting finding because it meant that the percentage of investors who predicted the volatility beyond PE was significantly. Therefore, hit ratio (based on Pearson Estimate) seems a more robust measure for OB compared to PE. However, the next question that appears whether hit ratio (an indirect estimator of OB) is associated with accurate predictions of volatility (VAEX). The correlation analysis (Table 5.2.10) justified the assumption because Hit ratio was negatively correlated to VAEX compared to Parkinson. This means as the percentage of individuals predicting a volatility equivalent to PE decreases, the VAEX increases. This means that OB exist in professional investors and higher is the OCB the greater is the chances of higher ROI. The findings also support the hypothesis that both Parkinson and Pearson estimates are robust measures of OB but the later is more powerful than the former. The assumption was further substantiated by the regression analysis (Table 5.2.11, which showed that hit ratio is the most significant predictor of Gain (p=0.31) while its standardized beta-coefficient to PE was comparable (0.24 versus 0.239). On the other hand, VAEX remained the highest significant variable in predicting Gain because VAEX is the realized volatility. Interestingly, VAEX and period exhibited the highest standardized beta-coefficients of 0.6 and 0.4, respectively compared to PE or Hit ratio. This is not surprising because VAEX and period are realized and tangible measures that are actual, while PE and Hit ratio despite being objective measures of OB are relatively intangible than VAEX or period in explaining ROI.

***Table 5.2.11: Regression of Gain on VAEX, PE, Hit ratio, and period***

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SUMMARY OUTPUT |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |
| *Regression Statistics* |  |   |   |   |   |   |   |   |
| Multiple R | 0.668892 |   |   |   |   |   |   |   |
| R Square | 0.447417 |   |   |   |   |   |   |   |
| Adjusted R Square | 0.079028 |   |   |   |   |   |   |   |
| Standard Error | 2.649574 |   |   |   |   |   |   |   |
| Observations | 11 |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |
| ANOVA |   |   |   |   |   |   |   |   |
|  | *df* | *SS* | *MS* | *F* | *Significance F* |   |   |   |
| Regression | 4 | 34.10502 | 8.526256 | 1.214524 | 0.395208 |   |   |   |
| Residual | 6 | 42.12145 | 7.020242 |   |   |   |   |   |
| Total | 10 | 76.22647 |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |
|  | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
| Intercept | 3.131086 | 32.54529 | 0.096207 | 0.926489 | -76.5044 | 82.76654 | -76.5044 | 82.76654 |
| VAEX | 0.601995 | 0.39331 | 1.530589 | 0.176748 | -0.3604 | 1.56439 | -0.3604 | 1.56439 |
| PARKINSON | -0.24099 | 0.700077 | -0.34423 | 0.742419 | -1.95401 | 1.472041 | -1.95401 | 1.472041 |
| PERIOD | 0.406639 | 0.722563 | 0.562773 | 0.593978 | -1.36141 | 2.174687 | -1.36141 | 2.174687 |
| HIT RATIO | -0.23899 | 0.218327 | -1.09465 | 0.315656 | -0.77322 | 0.295236 | -0.77322 | 0.295236 |

**5.2.12:Correlation analysis between Gain, VAEX, PE, Hit ratio, and period**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *GAIN* | *VAEX* | *PARKINSON* | *PERIOD* | *HIT RATIO* |
| GAIN | 1 |   |   |   |   |
| VAEX | 0.314514 | 1 |   |   |   |
| PARKINSON | 0.339608 | 0.850232 | 1 |   |   |
| PERIOD | -0.09304 | -0.8856 | -0.83156 | 1 |   |
| HIT RATIO | -0.16003 | 0.662204 | 0.290943 | -0.65402 | 1 |

The correlation analysis (table 5.2.12) between Gain, VAEX, PE, Hit ratio, and period further substantiated the regression models which showed that PE holds on to its positive correlation with Gain which was even more than VAEX. This is an interesting finding because it suggested that OB in the form of PE is necessary to make higher predictions on gain than that could be accounted by VAEX.

**CHAPTER 5: COCLUSION AND RECOMMENDATIONS**

The present paper explored the main research question "How Confidence Affects the Investment Decision Relative to Facts?” by evaluating extant literature on Keynesian and Post-Keynesian theories in underpinning investment decisions as well as primary and secondary data analysis that involved tenets of behavioral finance. The role of confidence or overconfidence bias in influencing investment decisions is going recognized in the field of behavioral finance (Qadri & Shabbir 38, Misal 206). However, the extent to which overconfidence bias influence investment decisions relative to information search (facts) and trading experience remained largely inconclusive (Loibl & Hira 24, Tseng 133, Sindhu & Waris 128). The present study provided comprehensive evidence that would add on to the literature regarding the way overconfidence bias influence investment decisions and whether such investment decisions translate into appropriate predictions on return on investment. From this perspective, the present study was novel because it challenged the traditional notion that overconfidence bias often leads to risky and poor return on investments. Although the study acknowledged the findings of the previous authors that information search and risk tolerance are the moderators of overconfidence bias, this study challenged the notion that such moderation would always reduce overconfidence bias in making investment decisions as was proposed and substantiated by the previous studies. Rather, the present study showed that overconfidence bias and its relation to investment decisions and return on investments is dependent upon the demographics of the investor. From this perspective, it might be argued that the findings are in line with the excessive trading hypothesis.  The present study did confirm that EFH leads to overconfidence bias but it does not necessarily mean that the respective investment decision based on overconfidence bias would produce higher returns. This research showed that professional investors should apply overconfidence bias because such bias might assure higher ROI than that can be predicted by traditional finance theories or the dogma of Keynes and Post-Keynesian theorists. On the other hand, investors who are relatively inexperienced in trading or those without formal and professional qualifications in finance tend to exhibit overconfidence bias which is beyond their information search (facts) and risk tolerance ability leading to poor investment decisions and lower ROIs (Rana et al. 81).

The findings of the present study were not only complimented by the extant literature but also from the primary and secondary data analysis.  The primary data analysis explored those tenets of investment decision (such as investor profile and period of assessment) that was different than secondary data analysis which further ensured the reliability and reproducibility of the findings of this study. The findings of the present study confirmed that overconfidence bias significantly influences investment decisions and investment decisions made under overconfidence bias is not always irrational as was hinted by previous studies (Shah et al. 984). This study also showed that traditional finance theories mediate overconfidence bias because forecasting and information search and background of the investors influenced OB. The Huisman et al. (93) study did confirm that overconfidence bias could be accurately measured through the objective measures pf Parkinson's and Pearson's. The study could not confirm whether information search, self-attribution bias, risk tolerance, and excessive trading interact with overconfident bias in influencing investment decisions but extrapolated the same. Nevertheless, the study did show that overconfidence bias significantly interacts with cognitive biases (such as self-attribution bias) in influencing investment decisions). Like previous studies, this study also showed that overconfidence bias is an independent predictor for investment decision and the novel finding of this study was overconfidence bias-based investment decision is significantly correlated with volatility of stock returns. Therefore, it is not surprising why overconfidence bias was shown to significantly influence return on investments.

One of the fascinating part of this research was to establish the boundary between confidence and overconfidence bias while making investment decisions from the perspective of actual volatility of the stock index. The secondary data analysis indicated that if the Parkinson's estimate is comparable to the actual volatility of the stock index, then the investment decision for the respective stock or the portfolio could be considered a confident investment. On the other hand, if the Parkinson's estimate or the Pearson's (Pearson & Tucky 533) estimate is significantly lower than the actual volatility of the stock index, then the investment decision guiding a specific stock or a portfolio would be considered an overconfident investment. Hence, the study confirmed the hypothesis that overconfidence bias and confidence related to investment decisions could be significantly demarcated. The secondary data analysis based on Huisman et al. (69) showed that OB could be measured accurately and objectively (quantitatively) by Parkinson and Pearson’s estimate. Overconfidence would mean that the referred estimates should be lower than VAEX (realized or actual volatility). Since both the Parkinson and Pearson’s estimate was both lower than VAEX in this study, it suggested that overconfidence bias exists in professional investors. Such biases are always not detrimental because the secondary data analysis showed that more is the OB, the better is the prediction of realized volatility. The secondary data analysis also confirmed that OB in professional investors might be a holistic function of information search, economic expectations, risk tolerance, and investment decisions, and trading experience.

**5.1. Strength and Limitations**

 The major strength of the study was its robustness of data both in terms of data collection and data analysis. The methodology of the study was so framed to ensure the gaps in investment literature  due to overconfidence bias and return on investment adequately addressed based on the demographics of the investors and the investment market. However, one of the major limitations of the primary data analysis was its small sample size (n=10). Although the sample size was small, the target population was appropriate because it involved only those investors who were not into professional trading and expect higher returns both in the short and long terms.

**5.2. Future Research**

 Future studies should be conducted with much larger sample sizes and the period of assessment of the stock returns should be at least 2 to 3 years.  Moreover, future studies should use the Pearson's estimate for measuring overconfidence bias rather than measuring it as a subjective criterion (Martens & Djik 181). The return on investments should be similarly report it in future studies in actual, rather than leaving it to the judgment of the participants to report their losses and gains.

**5.3. Recommendations**

a. Professional investors must exercise overconfidence bias because such biases often assure higher ROI.

b. Inexperienced investors should base their investment decision on information search and risk toleration ability and should not be swayed into investment decisions from self-attribution and intuitive instincts.

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