

DO COGNITIVE BIASES INFLUENCE INVESTMENT DECISIONS BASED ON TECHNICAL FACTORS?

Dr. Dhruva Jyoti Sharma

Assistant Professor, Department of Business Administration
Girijananda Chowdhury University, Guwahati-781017
Email: dhruva_mgmt@gcuniversity.ac.in, Mobile no. 8011835762
ORCID Number-<https://orcid.org/0000-0003-0527-2657>

Abstract

Objective: The purpose of this research is to examine the influence of investors' Cognitive biases on the technical analysis component of investment decisions made by retail investors in Guwahati, Assam, India. **Design/Methodology/Approach:** Technical analysis of investment decisions is the dependent variable, whereas cognitive biases are the independent factors evaluated. To determine the bearing of these biases on the choice to invest, multinomial logistic regression is used. **Findings:** 1. Confirmation and Hindsight bias and Herding bias impacts investment decision based on Price Action analysis. 2. Herding bias impacts investment decision based on Relative Strength Index analysis.

Keywords: Behavioural finance, Emotional biases, technical analysis, Investment decision

JEL Classification: G4, G41, G11

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INTRODUCTION

Traditional financial models have ruled the industry since the 1950s. The rationality of people is a cornerstone of conventional economics. The core financial theories rest on the assumption of investor rationality, which allows bond and stock markets to function efficiently. Miller and Modigliani, William Sharpe's Capital Assets Pricing Model (CAPM), Scholes, Linter, Black and Merton, and Markowitz's Portfolio Principles provide the basis of standard finance (Statman, 1999). The standard view of finance is that investors act in their own self-interest when making investment choices. The idea of market rationality rests on this assumption. According to Jensen and Merckling, the "rational man," a person who is considerably different from the individual, is at the core of traditional finance theory (1994). Behavioural finance provides a fresh viewpoint on the study of finance by exploring the motivations behind investors' monetary choices. It melds the fields of economics and finance with those of psychology and cognitive science. Research in behavioural finance and the psychological elements of investment decision making increased as a consequence of the inability of the efficient market hypothesis to account for the failure of rational man to maximise the anticipated value he would obtain. Baker, Kent J., and John Nofsinger (2002) describe behavioural finance as an effort to understand human conduct and reconcile the contradiction between the predicted utility-maximization of a rational man and an efficient market.

EVOLUTION OF BEHAVIOURAL FINANCE

The use of financial standards is universally acknowledged. New information in psychology was introduced in the 1960s and 1970s. They looked at biases and heuristics that affected people's limited cognitive capacity and, by extension, their financial judgements. After doing considerable study on investors and stock brokers, Slovic (1969, 1972) established it. As long as you are self-aware, it is OK to be what Slovic (1972) calls a "collection of emotions, tics, and prejudices." Successful speculators don't need to have perfect self-awareness, but they do have the intrinsic capacity to stop quickly when they're no longer in balance. As Slovic puts it, "if you don't know who you are, this is an expensive place to find out."

Professor of psychology and recipient of the Nobel Prize in economics Daniel Kahneman emphasised the fallacies and heuristics that are unavoidable when making judgements in uncertain circumstances while discussing his research on behavioural factors in finance.

BEHAVIOURAL FINANCE AND DECISION MAKING

The field of psychology defines decision-making as the mental exercise of narrowing down a set of options in order to settle on one theory or action plan. Decisions reached via deliberation procedures may or may not represent the optimal next steps. The study of human decision-making processes is known as "behavioural finance," and it offers a wealth of insight. All of us are vulnerable to the kind of ingrained biases that lead to illogical judgements. When making decisions, people with fewer resources are especially vulnerable to the negative effects of heuristics and biases.

The investor in classical economics is assumed to be a rational, self-interested actor who is aware of all relevant market data and seeks to maximise his or her personal utility given the available options and the limits imposed by the investment aim. The term "Homo-Economicus" (Persky, 1995) is used to describe this outlook.

Although classical theorists have segmented the decision-making procedure into four stages, the order in which they occur is not fixed. Here are a few of them, as outlined by Doya (2008):

1. Understand the present situation or circumstances.
2. Think about the rewards and penalties that may result from each choice.
3. The needs of the individual drive their behaviour.
4. Depending on the outcome, the person may rethink their decision to take action.

When making a decision, there is often a lack of complete or accurate information. The economics of uncertainty and the economics of information are frequently used when making these sorts of choices. The decision maker recognises his ignorance but nevertheless works hard to make the right choice. According to the economics of information, consumers seek for more data before committing to a course of action (Gilboa, 2010). According to Ackert and Deaves (2009), the economics of information looks at how to be ready to make a choice, whereas the economics of uncertainty focuses on the decisions themselves.

Recent behavioural finance research (Odean, 1999; Barber and Odean, 2001) have shown that investors are not always rational and may be swayed by irrational emotions and other irrational influences.

REVIEW OF LITERATURE

Investor biases

1. Anchoring bias: The phenomenon of individuals' inclination to prioritise current events and attribute relatively less significance to past occurrences is well known as anchoring, as described by Shiller (2000). Investors use the concept of Anchor to maintain a degree of consistency in stock prices throughout consecutive trading days. Pompian (2006) provides an explanation of the idea of anchoring, whereby investors tend to rely on a reference point that is logically irrelevant while making investing decisions. Tversky and Kahneman (1974) assert that individuals often start their estimation or prediction process by adopting an arbitrary value, which they then modify. Estimations are often formulated by individuals via the utilisation of a value that has been adjusted to account for potential outcomes. The problem formulation may suggest a beginning value, or it may arise through incomplete computations. Tversky and Kahneman contended that adjustments often prove to be inadequate, and further posited that distinct beginning values provide estimates that exhibit a bias towards the original value.

2. Cognitive dissonance: According to Festinger's Theory (1957), individuals possess a proclivity to engage in behaviours that may not be conventionally considered rational, with the purpose of reducing cognitive dissonance. These behaviours include disregarding new information or constructing distorted arguments in order to uphold existing beliefs or assumptions. Festinger's theory of cognitive dissonance posits that individuals seek to reduce internal conflict by two primary strategies: (i) altering their previous values, emotions, or choices, and (ii) engaging in justification or rationalisation of their decisions. Montier (2002) posits that cognitive dissonance refers to the psychological state of conflict that arises inside individuals when they are presented with knowledge that challenges their existing ideas or preconceptions.

3. Mental Accounting: Thaler (1999) posits that investors use a set of cognitive processes known as mental accounting to structure, assess, and monitor their investing endeavours. The term "mental accounting" was coined by Thaler (1985) to elucidate individuals' cognitive processes and analytical approaches towards their financial endeavours. Accounts have the potential to be reconciled on a daily, weekly, monthly, or yearly frequency, and their scope may be delineated in either a limited or wide manner. The concept of mental accounting is fundamentally at odds with the economic notion of fungibility in all respects. Consequently, mental accounting exerts influence on the process of decision-making, thus signifying its significance. The concept of fungibility pertains to the interchangeability of money, wherein its origins or intended purposes do not affect its inherent value or characteristics. Certain investors use a strategy whereby they allocate their assets into distinct portfolios, namely a safe investment portfolio and a speculative investment portfolio. This approach is adopted in order to safeguard their overall portfolio from the potential adverse outcomes associated with speculative investments. One challenge associated

with this technique is to the fact that, despite the allocation of significant resources in terms of time and money in segregating portfolios, the overall net worth of the investor would remain unchanged compared to the scenario where a single, bigger portfolio was maintained.

4. Gambler's fallacy: Rabin (2002) posits that the absence of recognition or comprehension of the statistical independence between two occurrences results in the first event having no statistical influence on the occurrence of the second event. Each gambling "strategy" is often based on the premise that individuals' perception of the likelihood of an event occurring may be influenced by irrational factors. The term "rule of small numbers" pertains to the notion that even very small samples possess the ability to accurately represent the characteristics of the larger population from which they are drawn. The phenomenon known as the rule of small numbers gives rise to the Gambler's fallacy when individuals had prior knowledge of the data-generating process. The gambler's fallacy occurs when individuals erroneously anticipate a reversal in a given trend. The term "bias" may be defined as a prevailing conviction in the phenomenon of regression to the mean. The misinterpretation of regression to the mean arises from the desire to adhere to the rule of averages, leading to the belief that an upward trend would always be followed by a subsequent downward trend.

5. Herding bias: According to Scharfstein and Stein, 1990, herding bias is the inclination of investors to embrace groupthink, compelling them to conform to prevailing sentiment in circumstances when they have uncertainty over their own analytical assessments. The phenomenon of herding may be attributed to investors' neglect in thoroughly evaluating the potential of individual securities and financial markets as a whole, coupled with their tendency to rely on collective opinions.

Another intriguing aspect of human psychology is the phenomenon whereby the emotional distress experienced by an investor after a financial loss is notably diminished when shared with a group of other investors, as opposed to experiencing the loss alone. The aforementioned fundamental aspect of human psychology often compels investors to emulate others, since it allows them to attribute their failures on market conditions. In the context of financial markets, it is important for an investor to base their actions on an understanding of the behaviours shown by other investors. Investors exhibit "herd behaviour" due to their apprehension around the perceptions of their financial choices by others.

6. Confirmation & Hindsight Bias: Raymond S. Nickerson (1998) has observed that the term "confirmation bias" is often used within the psychological literature. It denotes the tendency to acquire or interpret facts in a manner that is predisposed towards existing beliefs, expectations, or a certain hypothesis. Shiller (2000) defines hindsight bias as the inclination to hold the belief that if an individual had been there at a certain event or had possessed sufficient awareness, they would have accurately predicted the occurrence of these events prior to their actual happening.

TECHNICAL ANALYSIS

Previous research on technical analysis's value has mostly focused on the market for data. Professional forecasters, who presumably utilise technical analysis and other tools, have been studied empirically from at least Cowles' (1933) work. However, he discovered that this strategy is no match for the buy-and-hold approach. Using data from the Dow Jones Industrial Average (DJIA) from 1956 to 1962, Fama and Blume (1966) analysed a variety of filter rules and came to the conclusion: trade rules cannot defeat the buy-and-hold strategy. Moving averages (Cootner, 1962; Van Horne and Parker, 1967, 1968; Dale and Workman, 1980) and relative strength (Levy, 1967; Jensen and Benington, 1970) are two more widely used examples of technical indicators. Technical trading principles are also shown to not result in lucrative performance by the research. In a nutshell, much of the research done until now has been suspicious about technical analysis' efficacy in the stock market. Later studies have typically enhanced the testing technique with more data and more intricate tactics with the availability of cheaper computer power and the development of electronic database. Brock, Lakonishok, and LeBaron (1992) use the DJIA from 1897 to 1986 to analyse the effectiveness of two widely used technical trading rules: moving average and trading range breach. In contrast to previous research, they discover that the majority of the 26 technical techniques they examined provide positive returns. Bessembinder and Chan (1995) used the same technical principles to find similar levels of predictability in index return forecasts for a collection of Asian stock markets that includes Malaysia, Thailand, and Taiwan. Incorporating indicators based on trading volume, Kwon and Kish (2002) expand upon the work of Brock, Lakonishok, and LeBaron (1992). According to their findings, technical trading principles are more beneficial than a buy-and-hold approach. However, bias in data snooping is a concern. Using the White (2000) reality check bootstrap approach, Sullivan, Timmermann, and White (1999) discovered low profitability during a 10-year out-of-sample period, which they interpreted as evidence for increased market efficiency. We find that revenues decrease when we replicate the work of Brock, Lakonishok, and LeBaron (1992). Technical strategies for stock indices are often stronger in developing markets than in established markets (Bessembinder and Chan, 1995; Ratner and Leal, 1999; Bessembinder and Chan, 1998). However, Neely, Rapach, Tu, and Zhou (2014) demonstrated that, in addition to the 14 macroeconomic variables compiled by Welch and Goyal (2008), technical indicators, such as moving averages, momentum indicators, and volume-based indicators, can provide useful information for predicting the equity risk premium. They also demonstrated that technical indicators become more reliable predictors of economic downturns. Since trend breaks have become more frequent in recent years, Garg, Goulding, Harvey, and Mazzoleni (2020) constructed dynamic multi-asset trend-following portfolios that have outperformed the standard strategies by a factor of more than two over the past decade.

GAPS IN EXISTING LITERATURE

Most studies in the area of finance concentrated on traditional finance theory, while the alternative theory of finance known as behavioural finance received noticeably less attention. Investors are irrational decision makers, according to previous studies that examined the investing decision making process with the psychological biases (Cognitive & Emotional).

Reviewing the literature for this study yielded conceptual papers discussing the theoretical framework of behavioural finance; behavioural biases in investment decisions; studies on technical analysis and reviews of literature-based studies, but we were unable to locate any Assam- or Northeast India-based empirical research on the impact of emotional biases on the technical analysis aspect of investment decision making. Hence this study is carried out to fulfil this gap.

STATEMENT OF THE PROBLEM

Evidence from research conducted outside of India shows that retail investors in the stock market are susceptible to cognitive biases while making investing choices. It is yet to be determined and established in the case of Assam and other regions of Northeast India whether or not the behavioural biases of investors are correlated with the technical analysis element of investment decision making.

RESEARCH QUESTION

Do cognitive biases have an impact on the investment decision based on technical factors?

OBJECTIVE OF THE STUDY

To find out the impact of cognitive biases on the technical analysis aspect of investment decision

HYPOTHESIS

H₀₁- Cognitive biases have no impact on the technical analysis aspect of investment decision making.

SIGNIFICANCE OF THE STUDY

When making financial decisions, investors often ignore or deny the role that their emotions play. Investments and the financial sector as a whole may benefit from the study of emotional elements. Financial advisors can better serve their customers if they have a firm grasp of the psychology behind investment choices. Investors in Assam would benefit from this research since it would provide light on the role that emotions play in the technical analysis phase of their investing decision-making process. Their investing strategies would benefit greatly from this new insight. Researchers would have a solid foundational study from which to build their work. A strong understanding of the sentiments of Assam's investors may be constructed using empirical data.

METHODOLOGY

The survey technique is used to gather data by using a questionnaire using a five-point Likert scale. The questionnaire is built utilising questions from Neelakantan (2015), who used the structural equation model (SEM) technique to establish a relevant model for investor behaviour. Responses are gathered using a two-stage area sampling procedure. Martin and Polivka (1995) employed pilot testing to evaluate the questionnaire on a small sample of respondents in order to detect and remove any difficulties. The pilot test respondents were identical to those who participated in the second survey, i.e., they were recruited from the same demography. Cronbach's alpha is employed for factor reliability in the current research. Cronbach's alpha is a measure of internal consistency, or how closely linked a collection of things is. Cronbach's Alpha values of 0.70 or above are regarded as consistent and dependable (Nunnally, 1978). In this research, the Ordinal Scale is employed. Scales were evaluated using Cronbach's Alpha (a measure of internal consistency) after the pilot survey. The Cronbach's Alpha value obtained after the test is 0.7036, which is within the acceptable range. Questionnaires were issued to 430 stock investors in Guwahati, with 391 viable replies included for this research. The timeframe for data collection is August 2021 till January 2023. The data is analysed using Multinomial Logistic Regression Analysis. The same has been interpreted, and the findings have been discussed.

DATA ANALYSIS AND INTERPRETATION

Multinomial Logistic Regression is used to find the impact of cognitive biases on the technical factors of investment decision making.

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	973.240	40.015	24	.021
Final	933.226			

As significant value is less than 0.05, hence the final model fit was accepted.

	Chi-Square	df	Sig.
Pearson	1446.626	1480	.728
Deviance	919.363	1480	1.000

As the significant value is more than 0.05, the model is adequately fit.

Cox and Snell	.097
Nagelkerke	.106
McFadden	.040

Nagelkerke value lies between 0 and 1, '0' signifies No variation and '1' signifies perfect variation. Here as Nagelkerke value is 0.106, which shows that emotional biases have 10.6 percent impact on investment decision.

Q51 ^a	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Price Action	Intercept	3.815	4.343	.772	1	.380		
	ANCHORING	.090	.129	.491	1	.483	1.095	.850 1.410
	COGNITIVE DISSONANCE	.060	.143	.175	1	.676	1.062	.802 1.404
	CONFIRMATION AND HINDSIGHT	-.313	.151	4.320	1	.038	.731	.544 .982
	GAMBLERS FALLACY	-.236	.141	2.822	1	.093	.790	.599 1.040
	HERDING	.324	.120	7.328	1	.007	1.383	1.094 1.748
	MENTAL ACCOUNTING	-.009	.146	.004	1	.951	.991	.745 1.319
RSI	Intercept	4.367	4.426	.974	1	.324		
	ANCHORING	.058	.131	.194	1	.660	1.060	.819 1.371
	COGNITIVE DISSONANCE	-.044	.145	.091	1	.763	.957	.720 1.272
	CONFIRMATION AND HINDSIGHT	-.288	.153	3.535	1	.060	.750	.555 1.012
	GAMBLERS FALLACY	-.257	.143	3.241	1	.072	.773	.584 1.023

	HERDING	.343	.122	7.836	1	.005	1.408	1.108	1.790
	MENTAL ACCOUNTING	.034	.149	.053	1	.818	1.035	.773	1.386
MACD	Intercept	8.097	5.016	2.606	1	.106			
	ANCHORING	-.107	.151	.506	1	.477	.898	.668	1.207
	COGNITIVE DISSONANCE	-.094	.166	.320	1	.571	.911	.658	1.260
	CONFIRMATION AND HINDSIGHT	-.226	.176	1.645	1	.200	.798	.565	1.127
	GAMBLERS FALLACY	-.073	.165	.196	1	.658	.930	.673	1.284
	HERDING	.050	.136	.136	1	.712	1.052	.805	1.374
	MENTAL ACCOUNTING	-.091	.172	.281	1	.596	.913	.652	1.278
		Intercept	2.597	5.116	.258	1	.612		
Trading volume	ANCHORING	-.090	.152	.353	1	.553	.914	.679	1.230
	COGNITIVE DISSONANCE	.160	.172	.869	1	.351	1.174	.838	1.645
	CONFIRMATION AND HINDSIGHT	-.156	.178	.771	1	.380	.855	.604	1.212
	GAMBLERS FALLACY	-.091	.166	.299	1	.584	.913	.659	1.265
	HERDING	.108	.143	.573	1	.449	1.114	.842	1.473
	MENTAL ACCOUNTING	-.066	.170	.150	1	.698	.936	.670	1.307

a. The reference category is: Delivery volume.

1. Confirmation and hindsight bias and Herding bias impacts investment decision based on Price Action.
2. Herding bias impacts investment decision based on RSI (Relative Strength Index).

Observed	Predicted					
	Price Action	RSI	MACD	Trading volume	Delivery volume	Percent Correct
Price Action	176	6	2	0	0	95.7%
RSI	119	6	1	0	0	4.8%
MACD	27	3	1	1	0	3.1%
Trading volume	30	1	0	0	0	0.0%
Delivery volume	15	1	2	0	0	0.0%
Overall Percentage	93.9%	4.3%	1.5%	0.3%	0.0%	46.8%

Classification is not adequate to see cumulative investment decision; only 46.8 % is explained by the factors considered, more parameters are needed to be considered to explain complete investment decision.

RESULTS AND DISCUSSION

The table 1 on model fitting information shows that the final model is fit. Table 2 shows that the model is adequately fit as the Pearson coefficient is '0.728', which is more than '0.05'. Table 3 on Pseudo R-square shows that the Nagelkerke value is '0.106' which is close to '0'. 0 signifies no variation and 1 signifies perfect variation. Hence, Nagelkerke value signifies that cognitive biases are having only 6.5 percent impact on investment decision. Table 4 on parameter estimates showcases that Confirmation and hindsight bias and Herding bias impacts investment decision based on Price Action and Herding bias impacts investment decision based on RSI (Relative Strength Index). Table 5 on Classification shows percent correct value to be only 46.8 percent, which showcases that the classification based only on Price Action,

Relative strength index, moving average convergence divergence, Trading volume and delivery volume is not enough to identify the complete impact on investment decision, more parameters can be considered to see the cumulative impact on investment decision.

LIMITATION AND FUTURE IMPLICATIONS

The limitation of this study is its scope i.e., only the individual retail investors of Guwahati were considered for the study. Again, only the retail investors were included in this analysis, however institutional investors like broker firms, banks and security firms may also be considered in future studies. The inherent ambiguity of human psyche and situational nature of response by respondents may impact the consistency of the response when collected through the Likert scale questions. The impact of cognitive biases on the investment decision based on technical analysis carried out by the retail investors would start a new front of discussion among the researchers and this would surely add to the present knowledge on the impact of cognitive biases on the investment decisions of individual retail investors.

CONCLUSION

Among the cognitive biases it is observed that only Confirmation and Hindsight bias and Herding bias impacts investment decision of investors which are based on Price Action and Relative Strength Index analysis. Addition of more variables is required to find the adequate impact on the technical analysis factors of investment decision making. The variables like demographic factors, cultural diversity, economic issues etc. may expand the scope of this study.

AUTHOR CONTRIBUTION

All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

DECLARATION OF CONFLICTING INTERESTS

The authors declared no potential conflict of interests with respect to the research, authorship and publication of this article.

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