
Cognitive Biases in Investment Decisions: A Cross-Generational Analysis

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Abstract

Building on extensive research that highlights the role of cognitive biases in investor decision-making, this study examines how biases such as Overconfidence, Anchoring, Bandwagon Effect (Herding Behaviour), Loss Aversion, Confirmation Bias, and Hindsight Bias influence investment decisions across various age groups within the Indian financial market. By analysing these biases in the context of age-based demographic profiles, the paper seeks to uncover age-specific patterns that may affect susceptibility to psychological biases in financial behaviour. This study focuses on group dynamics that work differently for different biases. This includes examining the role of age in decision-making, and the impact of age on cognitive bias resistance.

Key Words: Overconfidence, Anchoring Bias, Herding Behaviour or Bandwagon Effect, Confirmation Bias, Loss Aversion and Prospect Theory, Hindsight Biases

1. Introduction

In the last three decades, there has been a significant paradigm shift in financial theory, transitioning from traditional finance to the more sophisticated realm of behavioural finance. Initially, classical economics was built upon the assumption that the market acts rationally. The utility theory was logically and rationally the best arguable explanation for the financial decision-making process. However, this theory failed to explain anomalies in decision making that may have seemed sporadic and non-explainable from the point of view of an individual as to why would one take a decision which is sub optimal. The behavioural scientist introduced cognitive biases and heuristics to explain such anomalies. They empirically proved that emotions and beliefs can interfere with decision-making, leading individuals to choose suboptimal options despite their best efforts to remain rational. For instance, the framing effect demonstrates how the presentation of information influences choices; people tend to favour options framed positively over those framed negatively, even when the underlying information is identical (Tversky & Kahneman, 1981). Similarly, the Prospect theory shows that individuals tend to avoid risk when they are experiencing gains, but they become risk-seeking when they are faced with losses. This phenomenon illustrates that people are risk-averse when it comes to gain and risk-seeking when dealing with losses. (Kahneman & Tversky', 1979). Utility theory or any amount of logical interpretation fails to explain why in financial markets generally one holds on to its losses for a long period of time but cuts their profits before it reaches its peak (Shefrin & Statman, 1985).

A fundamental question posed by several theorists in behavioural finance is, "Are investors always rational?" (De Bondt & THALER, 1985; Robert J. Shiller, 2003). An equally intriguing follow-up question is, if not, what drives them to act irrationally? Key findings by behavioural scientists suggest that cognitive biases and heuristics or mental shortcuts are significant contributors to the distorted rational decision-making processes in individuals. According to them, individuals' rationality becomes impaired when the real world presents options embedded with elements of risk, probability, and uncertainty. Decisions influenced by an individual's perspective on various external factors—whether real or perceived—are often shaped by cognitive biases. Consequently, these decisions may not align strictly with the parameters of rationality (M. Baker et al., 2004; Gilovich et al., 2002; Odean et al., 1998; Shefrin, 2002)

The impact of cognitive biases on decision-making extends beyond low-stakes choices to decisions with significant financial consequences, such as those in the stock market. Although the financial market offers investors opportunities to learn from their mistakes, they often remain influenced by their biases, relying on mental shortcuts in their decision-making. This psychological influence typically causes market distortions that cannot be fully accounted for by theories of rationality. Proponents of the Efficient Market Hypothesis (EMH), recognize the existence of short-term anomalies. However, they contend that these anomalies are usually brief, economically insignificant, or disappear once transaction costs are considered, and therefore do not meaningfully challenge the

efficient markets model (Fama, 1970). Behavioural scientist's work stands in contrast to the efficient market hypothesis (EMH), emphasizing that markets are not always efficient and psychological factors often play a crucial role in determining asset prices (Robert J. Shiller, 2003). Papers have been published supporting the view that the market is inefficient to the extent of intrusion of cognitive biases in the decision-making of the investors. The frequent bubbles and bursts in the market demonstrate that both individual and institutional investors are vulnerable to the influence of cognitive biases (Barberis & Thaler, 2002). The underperformance of equity mutual funds compared to benchmark indices indicates that institutions are significantly influenced by biases, particularly survivorship bias (Burton, 1995).

And now after three decades of research by various behavioural scientists, it is proved well beyond doubt that cognitive biases and heuristics of investors do influence an individual's financial decision in the stock market. (Kahneman & Tversky, 1979; Odean et al., 1998; Thaler, 2016). The Efficient Market Hypothesis has also come under scrutiny due to the significant impact of psychological influences on investors, which extend beyond purely rational behavior. Therefore, while the intensity of impact may vary among individuals, there is no denying the influence that biases have on investment decisions (K. Baker et al., 2014; M. Baker et al., 2004; Barberis & Thaler, 2002; Kimani, 2011; Shleifer & Vishny, 1997).

Previous research has extensively documented cognitive biases that influence investor decision-making, showing how factors beyond purely rational analysis can impact financial choices. Based on this foundation, this paper explores the varying degrees to which these psychological biases manifest across different age groups in the Indian market. This paper will examine the impact of cognitive biases, including overconfidence, anchoring, and availability, along with heuristics like representativeness, on decision-making across different age-based demographic groups. These effects may vary due to differences in experience, risk tolerance, and exposure to market conditions. By analyzing these differences, this research aims to provide insights into how age-related factors influence susceptibility to cognitive biases in investment behaviour, particularly within the context of the Indian financial market.

2. Literature Review

Cognitive Biases and Heuristics in Financial Decision-Making:

The decision-making process has long been a captivating study area for economists and psychologists. Why an individual makes irrational financial decisions has been a point of debate amongst economists. When financial stakes are low, people's irrational behaviour can often be seen as a result of short-term factors or a more casual approach. However, when it comes to decisions involving substantial financial consequences, irrationality cannot simply be brushed aside as short-sightedness or misinformation. In the world of financial markets, where decisions can deeply impact an investor's financial security, irrational behaviour can lead to much more serious outcomes. Therefore, it would make sense to believe that decisions in financial markets are guided by rational thinking. Yet, behavioural economists have questioned this view, arguing that investors' decisions in the markets are not always rational. Despite the common belief in efficient markets and rational behaviour, there is clear evidence of irrational exuberance among investors. This behaviour causes market anomalies that do not align with the traditional financial theory of rationality (Gupta & Ahmed, 2017; Lee et al., 1990; Leković, 2020; Li et al., 2009; Minsky, 1977; Sadi et al., 2011)

Individuals typically make rational decisions based on the information they have and their methods of analysing it. It's reasonable to assume that investors and traders in the stock market aim to act rationally. However, cognitive biases often lead people to deviate systematically from logical judgment. Shiller explores how financial theory has evolved from the efficient market hypothesis to include behavioural finance, which takes psychological factors into account in financial decision-making (Shiller, 2000). Study of cognitive biases and heuristics can explain the paradox of human nature: at a time when faced with choices under uncertainty, individuals strive to make rational and optimized decisions but often paradoxically end up making illogical, risky, or suboptimal choices. Moreover, they tend to justify these flawed decisions afterward, a phenomenon known as hindsight bias.

To understand the decision paradox, researchers have extensively studied the impact of various cognitive biases and heuristics. These biases and heuristics have a significant influence on an individual's decision-making process. Below are some key cognitive biases and heuristics that are central to research in behavioural finance.

Overconfidence:

Overconfidence is a well-documented cognitive bias where individuals tend to overestimate their knowledge or abilities. One common manifestation of this is overconfidence in estimation, where people are overly certain about their judgments of uncertain quantities (Pikulina et al., 2017). In financial decision-making, overconfident investors believe they have superior information or insights, leading them to take excessive risks (Chauhan et al., 2024). For example, overconfident investors may trade more frequently, believing they can time the market better than others, often resulting in lower returns due to transaction costs and poor timing (Barber et al., 2000).

Anchoring Bias:

Anchoring occurs when individuals rely too heavily on an initial piece of information (the "anchor") when making decisions (Andrea Caceres-Santamaria, 2021; Tversky & Kahneman, 1974). In the context of financial markets, investors might anchor to a stock's past price or a particular valuation metric, even if market conditions or the company's fundamentals have changed. For instance, an investor may fixate on the historical high price of a stock and expect it to return to that level, ignoring current market realities. This can result in poor decisions by establishing unrealistic price targets (Matsumoto et al., 2013; E. Xu, 2022). It has been observed that anchoring biases not only effects individual investors, but it also affects professionals. Analysts' earnings forecasts are influenced by anchoring bias they anchor on past earnings while predicting future price of the stock. Anchoring and overconfidence tends to influence one another in the process of decision making (Block and David & Harper, 1991)

Herd Behaviour or Bandwagon Effect:

Herd behaviour occurs when individuals mimic the actions of a larger group, even if those actions do not align with their own information or beliefs. In financial markets, herding can cause investors to follow trends without conducting independent analysis, leading to market bubbles and crashes (Bikhchandani & Sharma, 2001). For instance, during a bull market, investors might buy into rising stocks simply because others are doing so, inflating prices beyond their intrinsic value. Conversely, during a downturn, fear-driven herding can lead to panic selling, exacerbating market declines. Herding is particularly influential in speculative markets, where emotions like fear and greed dominate. This behaviour is visible in almost all the historical bubble and crash of the market be it the first set of bubbles like Tulipmania, Netherlands, 1636-37 (McClure & Thomas, 2017), Mississippi Bubble, France, 1719-20, South Sea Bubble UK, 1719-20 (Garber, 1990) or bubbles of modern days such as crash of 1929 (Shiller, 2000) Dot-Com bubble of 2000 (CRAIN, 2021; Y. Xu, 2023), and Hosing boom of 2000-2008 (Pollock et al., 2024)

Confirmation Bias:

Confirmation bias occurs when individuals favour information that confirms their existing beliefs while ignoring or downplaying evidence that contradicts them. In the financial realm, investors may selectively seek out news, reports, or data that support their preconceptions about a stock or the market (Leković, 2020). This leads to an over-reliance on supporting evidence, resulting in poor investment decisions. For instance, an investor who is bullish on a particular stock may focus on positive news while disregarding negative earnings reports or adverse market trends, leading to an inaccurate assessment of the stock's value (Chauhan et al., 2024; Park et al., 2010). Additionally, confirmation bias leads investors to selectively focus on information that supports the outcome while ignoring or dismissing evidence that contradicts it (Nickerson, 1998).

Loss Aversion and Prospect Theory:

Prospect theory, developed by Kahneman and Tversky, provides a framework for understanding how people perceive gains and losses. It suggests that individuals are more sensitive to losses than gains, leading to risk-averse behaviour when facing potential gains but risk-seeking behaviour when trying to avoid losses (Kahneman & Tversky, 1979). In financial decision-making, this theory helps explain why investors may avoid taking risks in some situations (e.g., not investing in stocks despite potential returns) but engage in irrational risk-taking in others (e.g., doubling down on losing investments).

Loss aversion, a concept introduced by Kahneman and Tversky, refers to the tendency for individuals to prefer avoiding losses rather than acquiring equivalent gains. In financial contexts, this bias means that the pain of losing money is felt more acutely than the pleasure of gaining the same amount. This can cause investors to hold on to losing stocks longer than they should, hoping to "break even," or to sell winning stocks too early to lock in gains, missing out on potential further upside. Loss aversion contributes to phenomena like the "disposition effect," where investors sell assets that have gained value while holding onto assets that have lost value (Shefrin & Statman, 1985)

Hindsight Biases

The mind sometimes tricks us into thinking we could predict an event that was actually determined by chance, making it seem as though the outcome was known all along—a phenomenon known as the "I-knew-it" effect. This bias can prevent investors from learning from past mistakes and can lead to overconfidence in predicting future events. In essence, it's the tendency to believe that one "knew it all along" after the event has occurred. A primary aspect of this bias is memory distortion, where individuals reshape past events to make the outcome appear inevitable (Fischhoff, 1975). The desire for certainty drives the mind to oversimplify complex forecasting situations, hindsight bias can have impact on the investor's portfolio decisions (Monti et al., 2014).

3. Research Methodology

Behavioural scientists have identified a wide range of cognitive biases and heuristics that deeply shape human thought processes, influence judgments, decision-making, and problem-solving in complex and often unconscious ways. This study will focus on six particular cognitive biases and heuristics, which are as follows.

1. Overconfidence
2. Anchoring
3. Bandwagon effect or Herding Behaviour
4. Loss Aversion
5. Confirmation
6. Hindsight

The above biases and heuristic will be tested on the respondent pertaining to following age group

1. Respondent with age below 45 years.
2. Respondent with age between 45 to 55 years.
3. Respondent with age above 55 years.

Research Objectives

The various objective of this study is:

- A. To investigate the susceptibility of various age groups to different cognitive biases and mental shortcuts.

Null Hypothesis: The influence of different biases on the age groups is not significant enough to categorize them as distinct from each other.

Alternative Hypothesis: The influence of different biases on the age groups is significant enough to categorize them as distinct from each other.

- B. To ascertain correlation between the biases

Null Hypothesis: there is no significant relation between the biases

Alternative Hypothesis: There is significant relation between the biases.

4. Data Analysis

The questionnaire was developed to assess the impact of six behavioral biases on the rational decision-making process of investors in India. It includes six sections, each dedicated to one of the biases: overconfidence, bandwagon, loss aversion, confirmation, and hindsight bias.

The number of questions and group of biases that has been considered in the study is given here below:

S l. No.	Name of Biases	Number of questions
1	Loss aversion	8
2	Overconfidence	8
3	Confirmation	8
4	Bandwagon effect	6
5	Anchoring	6
6	Hindsight	4

To minimize the influence of unrelated biases and economic factors, data was collected specifically from individuals with a regular job who have some experience of investing in the Indian market. This approach was taken to ensure that the responses are reflective of typical retail investors who are not professional investors by occupation but engage in stock market investment as part of their personal financial activities. This helped in reducing the noise of other social factors influencing the risk-taking abilities of the respondents.

To assess the reliability of each question within the set of questionnaires, a Cronbach's alpha test was conducted on each of the six categories: Overconfidence, Anchoring, Bandwagon Effect, Loss Aversion, Confirmation, and Hindsight bias. An overall test was also conducted to assess the respondent's consistency in reply to the questionnaires across the subset of questions. The result of the test is hereunder:

Reliability Test (Table-1)

Biases	Value
Loss Aversion	0.76
Overconfidence	0.75
Confirmation	0.74
Bandwagon	0.72
Anchoring	0.71
Hindsight	0.7
Overall	0.87

The results in Table 1 show that Cronbach's alpha values for each group of questions, categorized under the six biases, meet the threshold for reliability. Since all groups surpass the 0.70 benchmark, we can confidently conclude that the questionnaire delivers consistent and dependable insights into the biases under investigation.

To analyses group dynamics across age groups, the Mann-Whitney U test was conducted individually on each bias. This approach allowed for a focused examination of how each bias may impact respondents in different age categories.

The test was conducted on two age groups at a time. For each test, the null hypothesis (H₀) was defined as "The two populations under consideration are the same," meaning that there is no significant difference in how the bias affects the two age groups. The alternative hypothesis (H_a) was defined as "The two populations are not the same," suggesting a significant difference in the impact of the bias across age groups. This hypothesis testing framework enabled the evaluation of whether each bias had a consistent or varied impact across age groups, providing insights into potential differences or similarities in behavioural responses among these age cohorts. The P-value of the test results is tabulated below:

Cohesiveness test of the different age groups (Table-2)

Biases	A vs B	B vs C	A vs C
Loss Aversion	0.03	0.01	0.00
Overconfidence	0.43	0.47	0.18
Confirmation	0.04	0.47	0.01
Bandwagon	0.3	0.64	0.12
Anchoring	0.73	0.83	0.62
Hindsight	0.48	0.05	0.03

A= Investor with age below 45 years, B = Investor with age between 45 and 55 years and C = Investors Age above 55 years

The cohesiveness test (Table – 2) on the collected data shows inconsistent results for various biases across different age groups, indicating that biases do not affect all people in the same way. Analyzing the biases individually, we find that the impact of Loss Aversion varies significantly across the three age groups, with statistical measures distinguishing each group from the others. The p-value for each group is below 0.05.

In contrast, biases such as Overconfidence, the Bandwagon, and Anchoring do not statistically distinguish between age groups. This suggests that, while there may be slight differences in how these biases affect different age groups, these differences are not significant enough to separate the respondents into distinct groups at a 95% confidence level.

The impact of confirmation bias reveals that respondents under the age of 45 differ significantly from those in the other two age groups—45-55 and over 55. Furthermore, the test indicates that respondents aged 45-55 and those over 55 can be grouped together, as they do not show statistically significant differences in the impact of this bias.

The results of the hindsight bias test contrast with those of the confirmation bias test. For hindsight bias, respondents aged 55 and above show a significantly different impact compared to those in the under-45 and 45-55 age groups. Meanwhile, the impact on the latter two groups (under 45 and 45-55) is similar enough that they can be considered as a single group.

To assess the association between two sets of biases, a Spearman rank correlation analysis was conducted. The null hypothesis (H₀) states that there is no monotonic relationship between the biases, while the alternative hypothesis (H_a) proposes that a monotonic relationship does exist. This two-tailed test was performed at a 95% confidence level, meaning that the null hypothesis would be rejected if the p-value was less than the alpha level of 0.05. The P-value of the tests are plotted below to visualize any significant correlations between the biases.

Correlation Between Biases (Table-3)								
Biases	P-Value	Result	Biases	P-Value	Result	Biases	P-Value	Result
LA Vs OC	0.87	FR	OC Vs CO	0.00	R	CO Vs BW	0.05	R
LA Vs CO	0.08	FR	OC Vs BW	0.05	R	CO Vs AN	0.02	R
LA Vs BW	0.10	FR	OC Vs AN	0.17	FR	CO Vs HS	0.00	R
LA Vs AN	0.48	FR	OC Vs HS	0.00	R			
LA Vs HS	0.89	FR						

Biases	P-Value	Result	Biases	P-Value	Result
BW Vs AN	0.01	R	AN Vs HS	0.67	FR
BW Vs HS	0.01	R			

LA = Loss Aversion, OC Overconfidence, CO = Confirmation, BW = Bandwagon effect, AN = Anchoring and HS = Hindsight, FR= Fail to Reject the null hypothesis, and R = Reject the null hypothesis.

The results, shown in Table 3, reveal significant correlations among overconfidence, bandwagon, and hindsight, each has a p-value below 0.05. Similarly, bandwagon and hindsight biases are significantly correlated. However, confirmation bias emerges as a core underlying bias, displaying association with nearly all other biases. Specifically, confirmation bias correlates with bandwagon, anchoring, hindsight, and overconfidence biases at a 95% confidence level and with loss aversion Bias at a 90% confidence level. In contrast, Loss Aversion Bias appears largely independent of other biases, except for a weak correlation with confirmation bias at the 90% confidence level. The table highlights the complex interconnections among biases that influence investors' decision-making processes.

Based on the past research, this paper, assume that investors' decisions are influenced by cognitive biases and mental shortcuts, though the extent of this influence differs from person to person. Our goal is to explore how strongly these biases impact individuals, focusing specifically on variations based on age. To achieve this, a Likert-scale questionnaire was developed with response options: Always, Often, Sometimes, Rarely, and Never, assigned numerical values from 1 to 5. To analyse how impact varies across age groups, we focused on responses indicating strong opinions for that response representing 1-2.5 on a 5-point Likert scale has been considered(Kartini & Nahda, 2021). The percentage of respondents falling under this span is depicted here under.

Percentage of respondent opted the option from 1 to 2.5. (Table-4)

Biases/ Age Group	<45	45-55	55<
Loss Aversion	36	49	66
Overconfidence	55	61	67
Confirmation	57	71	76
Bandwagon	52	58	63
Anchoring	55	64	65
Hindsight	52	59	74

The data in Table 4 reinforces the findings discussed above, highlighting the varying influence of biases across age groups. For instance, loss aversion significantly impacts only 36% of respondents under 45, compared to 66% of those over 55—a substantial increase of 83%. In contrast, the bandwagon effect impacts 55% of respondents under 45 and 65% of those over 55, showing a minor increase of 18%. These results support the conclusion that different biases affect age groups to differing extents, underscoring the varied impact of each bias across age demographics.

Implications and Conclusion

Based on the discussions and analysis undertaken in this study, several important implications emerge for financial practitioners, policymakers, and future researchers. The findings provide valuable insights for financial advisors and institutions in designing age-specific financial products and advisory strategies that account for behavioural biases prevalent among different age groups. By recognizing how biases such as loss aversion, confirmation bias, and hindsight bias vary with age, advisors can construct more appropriate investment portfolios, assist investors in making informed decisions, and potentially enhance portfolio performance.

Furthermore, the results highlight the broader relevance of behavioural insights for regulatory and market-level interventions. A deeper understanding of age-related behavioural biases can serve as a guiding framework for stock exchanges and regulatory bodies in formulating policies aimed at minimizing irrational trading behaviour, reducing excessive market volatility, and preventing extreme market events such as speculative bubbles and subsequent crashes. From an academic perspective, the study also opens avenues for future research to validate and extend these findings across diverse demographic groups and market contexts. Further exploration of interrelationships among multiple behavioural biases and their combined influence on investor behaviour would enrich behavioural finance literature and strengthen its practical applicability.

In conclusion, the findings of this study underscore the significant role of age in categorizing investors for the analysis of behavioural bias patterns. While certain biases, including overconfidence, bandwagon effects, and anchoring, appear to influence investors uniformly across age groups, others—such as loss aversion, confirmation bias, and hindsight bias—exhibit varying degrees of impact depending on age. Notably, confirmation bias emerges as a dominant cognitive bias that often reinforces other mental shortcuts, whereas loss aversion is more closely associated with individual risk tolerance, which tends to differ age groups. Overall, this study contributes to a more subtle understanding of the relationship between age and behavioural biases in investment decision-making, emphasizing the importance of incorporating behavioural and demographic factors into both investment practice and policy formulation.

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