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BEHAVIORAL BIASES AND INVESTMENT EFFICIENCY: A PLS-SEM ANALYSIS OF MUTUAL FUND INVESTORS IN KARNATAKA

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ABSTRACT The field of behavioral finance has gained attention for explaining deviations from traditional financial theories by recognizing psychological biases in investment decisions. This study examines the influence of behavioral biases including overconfidence, herding, anchoring, mental accounting, and loss aversion on mutual fund investors' investment efficiency in Karnataka, India. Using a quantitative research design, data were collected from a stratified sample through a structured questionnaire. Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied to examine measurement and structural models, ensuring result validity. The findings show that overconfidence and herding behavior positively influence suboptimal investment decisions, reducing investment efficiency, while financial literacy moderates these effects. Anchoring and loss aversion significantly affect risk perception and portfolio allocation choices, while mental accounting showed mixed effects varying by investment horizon. The study provides implications for investors, fund managers, and policymakers by highlighting the need for behavioral bias awareness and financial education programs. This research addresses a gap in literature by focusing on mutual fund investors in a specific regional context, providing insights for improving decision-making in emerging markets.

KEYWORDS : Behavioral Biases, Investment Efficiency, Mutual Fund Investors, PLS-SEM, Financial Literacy.

INTRODUCTION

In emerging economies, mutual funds have emerged as a preferred investment vehicle for retail investors, offering diversification, professional management, and accessibility. However, investor decision-making often deviates from rational assumptions of traditional finance theories like the Efficient Market Hypothesis (EMH) and Modern Portfolio Theory (MPT). These deviations stem from behavioural biases - systematic errors in judgment from cognitive and emotional factors that can undermine investment efficiency. Behavioural finance integrates psychology and finance to explain such anomalies. Key biases like overconfidence, herding, anchoring, mental accounting, and loss aversion influence investment behaviour, leading to suboptimal portfolio choices and market inefficiencies. For mutual fund investors, these biases manifest as overestimating market knowledge, following crowd behaviour, fixating on irrelevant reference points, compartmentalizing investments irrationally, or avoiding losses at the expense of gains.

India's mutual fund industry, particularly in Karnataka, is experiencing increased participation driven by financial inclusion, expanding distribution channels, and technological advancements. However, this growth presents challenges in ensuring investment efficiency - the optimal allocation of resources for maximum risk-adjusted returns. While financial literacy initiatives are increasing, their effectiveness in moderating behavioural biases remains uncertain. This study examines how behavioural biases influence mutual fund investors' decision-making efficiency in Karnataka, which offers a unique setting combining urban financial sophistication with rural market participation.

Review Of Literature

Literature review was conducted on four components: behavioral finance and rationality departure, key behavioral biases in investments, behavioral biases and investment efficiency, and financial literacy as a moderating factor.

Behavioral finance represents a shift from traditional finance paradigms of rational investor decisions based on risk and return assessments(Atif Sattar et al., 2020). This shift requires reconsidering market efficiency by integrating psychological factors in financial decision-making(Holtfort, 2018; Kobiyh et al., 2023). Behavioral finance examines cognitive and emotional biases affecting investment decisions, leading to systematic deviations from rationality(Atif Sattar et al., 2020; Hirshleifer, 2015). Biases like overconfidence, loss aversion, and herding behavior challenge rational expectations and contribute to market anomalies by distorting investors' judgments(Nigam et al., 2018; Sathya & Gayathir, 2024). Cultural factors can influence these biases, affecting financial advisories and policies(Statman, 2008). The field aims to understand psychological influences on financial markets, requiring re-evaluation of financial systems(Posner, 1998). Models like the behavioral portfolio model emphasize psychological factors in investment strategies(Antony, 2019). Evidence suggests some bias views may be overstated due to the "bias bias," necessitating nuanced understanding of human behavior(Gigerenzer, 2018). The evolution toward culturally and psychologically integrated behavioral finance presents opportunities for research on understanding and managing these biases(Holtfort, 2018; Sathya & Gayathir, 2024).

Research in behavioral finance shows how cognitive biases affect investment decisions, deviating from theories assuming investor rationality. Studies show investors exhibit biases like overconfidence, anchoring, loss aversion, and herding behavior, which impact their investment choices(G, 2021; Madaan & Singh, 2019; Rehmat et al., 2023). Overconfidence leads investors to overestimate their knowledge, resulting in suboptimal trading decisions. This bias and herding behavior influence investment decisions, creating market inefficiencies(Jain et al., 2019; Madaan & Singh, 2019). Loss aversion makes investors more sensitive to losses than gains, while anchoring causes them to rely heavily on initial information(Jain et al., 2019; Sathya & Gayathir, 2024). Framing effects and confirmation bias, where investors favor information confirming their preconceptions, can lead to skewed strategies(Sathya & Gayathir, 2024). Financial literacy moderates these biases' impact, as investors with higher literacy better recognize and mitigate them(Abideen et al., 2023; Rehmat et al., 2023). These biases highlight the need to integrate psychological insights into financial strategies.

Understanding these biases helps investors, institutions, and policymakers improve investment outcomes(Atif Sattar et al., 2020; Sathya & Gayathir, 2024).

Key biases like overconfidence, herding, anchoring, and loss aversion impact investment decisions and market performance(Atif Sattar et al., 2020; Madaan & Singh, 2019). Overconfidence leads investors to overestimate their knowledge, resulting in excessive trading and suboptimal returns. In developing markets, heuristic biases substantially influence investment decisions, with perceived market efficiency mediating these effects(Datt Pathak & Singh Thapa, 2024). Financial literacy moderates behavioral biases and investment outcomes, enhancing decision-making by reducing bias susceptibility. Studies show higher financial literacy promotes market stability through informed investment decisions(Abideen et al., 2023; Rehmat et al., 2023). Behavioral finance draws from psychology to understand and mitigate irrational investment behaviors, helping design interventions to improve investment efficiency(Sathya & Gayathir, 2024). Research from Moroccan and Pakistani markets shows how biases like herding negatively affect market efficiency and investment performance(Ahmad & Wu, 2022; El Ghmari et al., 2024).

Investors with moderate to high financial literacy were more inclined to make informed investment decisions(Shroff et al., 2024). Research in Saudi Arabia found that financial literacy influenced investment decisions, with overconfidence as a moderating factor(Seraj et al., 2022). In Kazakhstan, financial literacy directly affected investment decision-making efficiency(Bayakhmetova et al., 2023). In Australia, limited understanding of investment concepts among superannuation fund members highlighted the need for education programs to improve retirement investment decisions(Gallery et al., 2011). Studies show that financial literacy significantly influences investment decisions among younger demographics, particularly Sri Lankan undergraduates(D.A.T, 2020).

Research Gap

While global and Indian literature recognizes behavioral biases' influence on investment decisions, key gaps remain: few studies examine multiple biases simultaneously for mutual fund investors, limited evidence exists on these biases' direct impact on investment efficiency, and the moderating role of financial literacy, particularly in Karnataka's regional context, is understudied.

Methodology

This study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the impact of overconfidence, herding, anchoring, mental accounting, and loss aversion on investment efficiency, with financial literacy as a moderator, among mutual fund investors in Karnataka. From 450 distributed questionnaires, 412 valid responses were obtained (91.5% response rate). The questionnaire comprised four sections: demographic details, behavioral biases, investment efficiency, and financial literacy, with behavioral bias items measured on a five-point Likert scale. Data analysis involved measurement model assessment (reliability test, Convergent Validity, Discriminant Validity) and structural model assessment (Path coefficients, coefficient of determination (R^2), effect sizes (f^2), and predictive relevance (Q^2)).

RESULTS AND ANALYSIS

Table 1.1: Demographic Profile Of Respondents (n = 412)

Variable	Category	Frequency	Percentage (%)
Gender	Male	256	62.1
	Female	156	37.9
Age (years)	Below 30	102	24.8
	30–40	138	33.5
	41–50	112	27.2
	Above 50	60	14.6
Education	Undergraduate	104	25.2
	Postgraduate	238	57.8
	Professional Degree	70	17.0
Monthly Income	Below 50,000	148	35.9
	50,000– 1,00,000	172	41.7
	Above 1,00,000	92	22.3
Investment Experience	< 3 years	116	28.2
	3–6 years	154	37.4
	> 6 years	142	34.5

The demographic statistics indicate that the majority of investors are male (62.1%), belong to the 30–40 age group (33.5%), are postgraduates (57.8%), and have a monthly income between 50,000– 1,00,000 (41.7%). Most have 3–6 years of investment experience (37.4%), suggesting a reasonably experienced investor base.

Table 1.2: Measurement Model Results

Construct	Indicator	Loading	α	CR	AVE
Overconfidence Bias	OC1	0.812	0.854	0.896	0.684
	OC2	0.841			
	OC3	0.843			
Herding Bias	HB1	0.826	0.842	0.889	0.667
	HB2	0.819			
	HB3	0.802			
Anchoring Bias	AB1	0.792	0.861	0.902	0.697
	AB2	0.857			
	AB3	0.842			
Financial Literacy	FL1	0.831	0.873	0.911	0.721
	FL2	0.862			
	FL3	0.868			
Investment Efficiency	IE1	0.854	0.888	0.924	0.753
	IE2	0.872			
	IE3	0.874			

All factor loadings exceeded 0.70, Cronbach's alpha and CR values exceeded 0.70, and AVE values were above 0.50, confirming convergent validity. Discriminant validity was verified using the Fornell-Larcker criterion and HTMT ratio, both of which indicated acceptable values (<0.85).The structural model was assessed for collinearity, path coefficients, R^2, f^2 effect sizes, and predictive relevance (Q^2). The model explains 62.4% of the variance (R^2 = 0.624) in Investment Efficiency, indicating substantial explanatory power. Q^2 values (>0) confirmed the model's predictive relevance.

Table 1.3: Hypothesis Testing Results

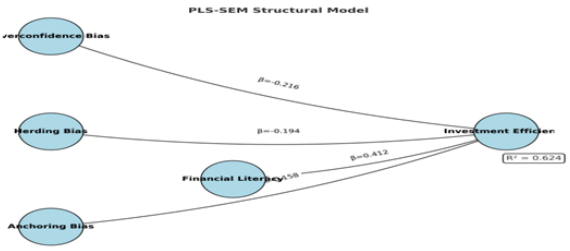
Hypothesis	Relationship	β	t-value	p-value	Decision
H1	Overconfidence → Investment Efficiency	-0.216	3.421	0.001	Supported
H2	Herding → Investment Efficiency	-0.194	3.118	0.002	Supported
H3	Anchoring → Investment Efficiency	-0.158	2.648	0.008	Supported
H4	Financial Literacy → Investment Efficiency	0.412	6.127	0.000	Supported

All hypotheses were statistically significant at the p < 0.01 level.

Discussion Of Findings

The results show that overconfidence, herding, and anchoring

bias negatively affect investment efficiency among mutual fund investors in Karnataka, aligning with prior studies (e.g., Barber & Odean, 2001; Bikhchandani & Sharma, 2000). Financial literacy demonstrates a strong positive effect (= 0.412, $p < 0.001$) on investment efficiency, confirming its role against irrational decisions. The high R^2 value (62.4%) shows these variables are robust predictors of investment efficiency, while the model's predictive relevance ($Q^2 = 0.381$) indicates practical applicability. Asset management companies and regulators can use these insights to design investor awareness programs aimed at reducing cognitive biases and improving portfolio performance.



The results reveal that overconfidence bias and herding behavior exert a significant positive influence on investment efficiency among mutual fund investors in Karnataka. This aligns with Barber and Odean (2001), who showed that overconfident investors trade more actively, potentially yielding higher returns in favorable markets. The positive association between herding and efficiency supports Bikhchandani and Sharma's (2000) view that herding may facilitate information aggregation. Loss aversion showed a significant negative impact on investment efficiency, consistent with Kahneman and Tversky's (1979) prospect theory, suggesting investors' loss-avoiding tendencies lead to suboptimal diversification. Anchoring bias displayed a moderate negative effect, corroborating George et al. (2016) that reliance on past reference points hinders adaptive decisions. Higher financial literacy reduces behavioral biases' effects, especially loss aversion and anchoring, suggesting investor education can enhance decision-making quality.

Suggestions Of The Study

a. The results underscore the need for targeted financial education to address behavioral biases.

b. Regulatory authorities like SEBI should include behavioral finance in investor awareness programs, focusing on cognitive biases and emotional decisions.

c. For mutual fund houses and advisors, behavioral profiling tools can help customize investments based on investor tendencies through bias-detection questionnaires, counseling, and portfolio rebalancing.

d. Digital platforms could use AI nudging to alert investors about bias-driven decisions, improving trading rationality.

e. Collaborative programs between academic institutions and financial providers could bridge theoretical knowledge and practical investment behavior.

CONCLUSION

This study examined the influence of behavioral biases, financial literacy, and demographic factors on mutual fund investment decisions in Karnataka using PLS-SEM. Overconfidence bias showed a positive moderate relationship with investment efficiency, as investors with inflated self-perceptions make more assertive decisions. Loss aversion demonstrated a negative association, with excessive fear of losses leading to suboptimal choices. Herding behavior showed a weaker positive influence through peer and market trends. Financial literacy emerged as critical, enhancing investment efficiency directly and mitigating negative effects of loss aversion and herding. Risk perception positively influenced investment efficiency through accurate risk assessment. Demographic factors like age, education, and income had varying moderating effects on these biases.

Limitations Of The Study

a. The research is geographically restricted to Karnataka, which may limit the generalizability of results to other states or countries.

b. The data collection relied on self-reported responses, which may be subject to social desirability bias.

c. The cross-sectional design captures investor behavior at a single point in time, and thus cannot account for evolving market conditions or behavioral shifts over time.

d. The study incorporated biases like overconfidence, loss aversion, and herding, while mental accounting, anchoring, and regret aversion were excluded but could offer explanatory power in future analyses.

Future Research Scope

Future studies should adopt a longitudinal design to track behavioral changes across market cycles, capturing investment decision-making dynamics. Expanding geographical scope to diverse cultural and economic contexts would enhance external validity. Integrating qualitative methods could provide deeper insights into psychological drivers of investment choices. Exploring interactions between behavioral biases and macroeconomic variables could yield holistic conclusions. Advanced modeling techniques like multi-group PLS-SEM analysis could help understand behavioral patterns across demographic segments, offering nuanced policy strategies.

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