

Investment under Uncertainty: Effects of Investors' Knowledge and Age on Risk Preferences in the Indian Stock Market

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Abstract: *This paper examines how stock market knowledge and age of an investor influence his risk-appetite in the Indian stock market. It draws on three behavioural theories- theory of herd behaviour, prospect theory, and regret theory- to understand investor behaviour while making their investment decisions. Applying the logistic regression model on the primary data obtained through interviews with 86 investors, the research attempts to identify causal relationships between market knowledge, age and risk preference, where risk preference is proxied by the proportion of investment in small-cap stocks. We find that investors with better stock market knowledge exhibit greater risk appetite, while age appears to be negatively associated with risk-taking attitudes. In other words, the young and/or experienced investors tend to invest more in the risky portfolios indicating that more than half of their portfolios is comprising small and micro-cap stocks. These findings suggest that government should adopt steps towards improving and spreading investors' financial education in sustaining equity market participation in India.*

Keywords: Risk Preference; Financial Literacy; Behavioural Finance; Logistic Regression; Indian Stock Markets; Investor Behaviour.

1. Introduction

The stock market is a place where equity shares of companies are bought and sold by the participants (buyers and sellers of stocks). The participants can be investors and traders who seek profits over the short or long run. The investors mainly have a long-term horizon (at least over more than one year) and benefit from capital appreciation over time. Traders, however, look for quick profits by focusing on the small price changes in equity shares. Emotions are one of the driving forces behind their investment decisions in the dynamic landscape of the stock market. From the joy of seeing a rising stock to the losses during market fluctuations, emotions like joy, fear, excitement, and regret shape our financial choices and affect investment decisions on one's own hard-earned money in a pool of uncertainty.

The primary focus of this article is to understand the complexity of the Indian stock market through a behavioural economic lens. This study seeks to contribute valuable insights that can inform our understanding of investor behaviour and market dynamics in the Indian context. The objective of this study is to examine how demographic factors such as age and stock market knowledge influence risk-taking behaviors and investment strategies.

When investors lack complete information, they often mimic the actions of others, leading to market trends driven more by

social conformity than by individual analysis [1]. Investors may follow the crowd to reduce perceived risk, especially when they lack confidence in their own decisions. This behaviour, while potentially irrational on a broader scale, can be seen as rational for individuals who believe others have better information [2]. Abhijit Banerjee's seminal study in 1992, examining the behaviour of professionals in developed countries, highlights a distinctive trend. Unlike the prevalent herding behaviour observed in less-informed market participants, well-informed professionals exhibit a diverse range of strategies. The diversity in their approaches is rooted in a deep understanding of market dynamics, fostering confidence in their decision-making processes [3]. Informed professionals are less susceptible to blindly following the crowd. Instead, they leverage their market knowledge to make strategic decisions, contributing to market efficiency. This stands in stark contrast to the disruptive impact of herding behaviour, where less-informed participants collectively deviate prices from fundamental values, compromising market effectiveness.

2. Literature Review

The behaviour of the investors in the stock market can largely be explained by three psychological theories: (i) Theory of herd behaviour, (ii) Prospect theory, and (iii) Regret theory. We discuss these briefly below.

Theory of Herd behaviour:

Herd mentality or herd behaviour is a phenomenon where individuals, particularly investors, follow the actions of a larger group rather than making independent decisions. This behaviour can often occur without a thorough analysis, and while the collective choice might not be optimal, individuals still follow what everyone else is doing [4]. For instance, when investors collectively follow a rising market trend, often spurred by positive news. Particularly, if a few investors start buying a particular stock and achieve success, others may follow, thereby contributing to a sustained increase in the stock's value [3]. This is called positive herding. Whereas, the collective selling of assets in response to negative market information or events is negative herding. Panic selling can result in a sharp decline in stock prices, as investors rush to withdraw their holdings [5].

Herding occurs when a collective surge of investor actions leads to deviations in stock prices from their intrinsic values, thereby impacting market efficiency [6]. To illustrate, consider a scenario where a stock gains sudden attention on social media platforms. In response to this, investors, driven by the emotional fervour of the crowd, rush to buy the stock without thorough information. The ensuing increase in demand propels the stock price upward. Witnessing this success, other investors join the bandwagon, further inflating the stock's value. This emotional buying frenzy, fuelled by incomplete information, can result in overvaluation. Conversely, herd behaviour can also lead to undervaluation, triggered by panic selling. In essence, Bikhchandani and Sharma's study establishes a clear association between incomplete information, herding behaviour, and market movements [6]. It reveals how the interplay of these factors contributes to fluctuations in stock prices, underscoring the intricate relationship between incomplete information, herd behaviour, and market efficiency.

Prospect Theory:

Prospect theory stands as a cornerstone in the exploration of decision-making under uncertainty [7]. This theoretical framework delves into the processes through which individuals navigate choices when confronted with ambiguous outcomes. At its core, Prospect Theory posits that people evaluate potential outcomes in relation to a subjective reference point, a point of origin often moulded by their initial investment or financial objectives. The subjective nature of this reference point introduces a unique dimension, varying from person to person. Investors exhibit a tendency to adopt risk-averse behaviour in the face of portfolio gains. This risk aversion manifests as a heightened conservatism, where individuals become more reluctant to undertake additional risks, opting for safer choices. Conversely, when confronted with losses, investors under the influence of Prospect Theory display a risk-seeking inclination. The emotional impact of losses becomes a driving force, compelling them to embrace higher risks in a bid to recover from financial setbacks.

During times when the stock market is declining, investors struggle with the fear of losses, a psychological response intricately predicted by Prospect Theory. Investors tend to tightly cling to declining stocks, displaying a notable reluctance to sell at a loss. This happens as they hope that they will eventually gain on these stocks with time. Investors

might also buy more of the declining stocks at lower prices to average down their losses. This emotional reluctance precisely mirrors the heightened aversion to losses outlined in the foundational principles of Prospect Theory [8]. Investors showcase a more pronounced emotional reaction to losses than gains. This asymmetry significantly influences their buy/sell decisions, contributing to the intricate tapestry of investor behaviour. When gaining, people tend to become risk averse and sell off their investments to book profits and a real-life example of this behaviour can be seen in the insurance industry [9].

Regret Theory:

Regret is a painful feeling caused by “counterfactual thinking” that compares the true outcome of a choice with “what might have been.” In financial markets, it is natural for investors to have counterfactual thinking because they can easily compare the performance of their portfolios with those of other assets and then calculate “how much they might have earned.” People regret wrong actions more in the short-term but tend to have more regrets about missed opportunities in the long-term. In financial contexts, while regret over bad investments tends to make investors more cautious about future decision making, regret over missed opportunities may lead to more risk taking. The regret over action tends to be stronger than regret over inaction [10]. The reason for this may be that inaction is generally thought to be more normal than action. It has been found that emotional responses after action are stronger than emotional responses after inaction [10].

Regret aversion can contribute to market turbulence as investors, aiming to avoid regret, engage in counterintuitive behaviour like buying at high prices and selling at low prices. This behaviour, driven by a desire to sidestep regret, fosters market instability and the formation of herds. Anticipating regret for not capitalizing on a stock during a market upswing, investors grapple with the fear of missing out. This fear can lead to impulsive decision-making, such as hastily buying stocks without a thorough analysis, driven by the remorseful anticipation of not benefiting from the upward trend [11]. For instance, the Chinese stock market reveals a notable phenomenon – investors, haunted by regret over their past decisions, tend to sell underperforming stocks. This selling behaviour, driven by the desire to avoid further regret, contributes to market turbulence [12]. Investors, grappling with the emotional aftermath of their choices, engage in actions aimed at mitigating anticipated remorse. Both studies converge on the insight that regret plays a pivotal role in shaping buying and selling decisions. When investors regret not acting upon a perceived opportunity, they may engage in aggressive buying to compensate. Conversely, regret over losses may trigger mass selling, contributing to market volatility. In summary, understanding regret in the context of the stock market provides valuable insights into the emotional intricacies that influence investor decisions. The exploration of regret aversion theory offers a nuanced perspective on how anticipation of regret shapes trading strategies, market turbulence, and the formation of investment herds.

3. Data and Methodology**Sampling Method**

A comprehensive survey was conducted from August 2025 to January 2026 to understand investors' behaviours. A referral sampling technique was employed to reach potential investors. Referral sampling is a non-probability sampling technique often used when the target population is difficult to reach or identify. This technique is particularly useful in studies where potential participants are part of a network or community, making them more accessible through personal referrals. This sampling technique is most suitable in a conflicting environment. A conflicting situation is one where the respondent's needs, goals, or interests are contradicted with those of the researchers ([13]). Therefore, respondents often mistrust researchers leading to problem of response biases in the form of respondents' overstatement and understatement. According to [13], some important characteristics of a conflicting survey environment are that researchers do not know whom to interview due to lack of contact and system information and even technical and cultural limitations (e.g., language barriers). Examples abound such as surveys on investment, tax compliance and personal space of an individual etc. In such situations, random sampling techniques do not work effectively due to response biases, and referral sampling/snowball sampling approach appears to be well-suited than it [14]. Through this process of referrals, we contacted 1154 individuals and 344 (around 30%) individuals expressed willingness to participate in our surveys. Since referral sampling is a non-probability sampling approach, we adopted a mixed method approach to minimize selection and other biases. So, in the second stage we selected every 4th individual from the pool of interested people. Due to this multistage technique, our data was thus free from sampling biases such as selection biases. This way of reducing biases, especially in conducting surveys in conflicting environments, has been widely utilized in economic literature (e.g., [15]). This way we shortlisted 86 retail investors. The snowball effect of referral sampling allowed for a more comprehensive and diverse group of participants, with ample trust because of references which might not have been possible through direct recruitment methods as investors are more reluctant to reveal their investment details to strangers. Thereby snowball sampling technique increases data reliability in such environments [13].

Data collection was carried out through telephonic and face-to-face interviews which allowed for real-time interaction, providing an opportunity to clarify questions and to probe deeper into respondents' answers. Interviews were conducted at a convenient time for the respondents, thereby enhancing the response rate. In case of the relatively distant respondents, we conducted telephonic interviews to facilitate participation from a geographically diverse group of investors. On the other hand, face-to-face interviews were carried out, allowing us to build a more personal connection with respondents. These interactions enabled a more nuanced understanding of the participants' perspectives and allowed for observation of non-verbal cues, which can be significant in understanding attitudes and emotions related to investment. Each interview lasted for 30 to 40 minutes. We covered all aspects of the questionnaire while allowing respondents to elaborate on their experiences without feeling rushed. The in-depth nature of these interviews was crucial for gathering detailed qualitative data on investor behaviours. The questionnaire addressed various critical aspects, including but not limited to

the demographic factors such as age, income level, and educational background. It included the investors' investment choices such as the type of assets held, including stocks, bonds, mutual funds, and their risk appetite and its alignment with the nature of investment choices. To facilitate in-depth responses and account for the sensitivity of financial information, an unstructured format was adopted for the questionnaire. This approach allowed respondents to articulate their views and experiences freely without being restricted to predetermined answer choices. This helped obtain rich qualitative data, providing deeper insights into the underlying motives and attitudes shaping investors' behaviours.

Study Variables

The dependent or the outcome variable is the *Risk Preference* of the investor. It is a measure of risk appetite of the investor in the Indian stock market. We define it as the proportion of total investment in the small-cap stocks since small-cap stocks are associated with the highest amount of risk. If a person has more than half of total investment in micro and small-cap stocks, then the person is called risk-taking individual = 1. If a person invests only in other stocks, then he is risk-averse investor = 0 since other stocks such as the large cap and midcap stocks are less risky than the micro and small cap stocks. We noted that respondents were reluctant to reveal their numerical figures of investment before the researchers, and hence a binary approach of more risky/less risky investment as defined above was chosen. It was effective to extract their risk attitudes. Also, as investment in stock market is a continuous long enduring process, at a point in time the respondents may suffer from recall bias. Our binary approach helped to reduce this bias. To examine whether they have stated their true risk preferences, we further conducted a simple version of Holt and Laury (2002) lottery experiment where we asked them to participate in a choice experiment. Respondents had to choose between two options—option A of sure gain of INR 100 and option B with an uncertain outcome from a flip of an unbiased coin (INR 0 if Head appears, or INR 500 if Tail appears) [16]. An individual was defined as risk-taking if he participated in the lottery while those with option A were called risk averse respondents. This measures the revealed risk preference of the respondents. We found that the two measures of risk preference (self-reported binary risk preference versus revealed preferences as emerged from the choice experiment) were highly correlated (Pearson's $r=0.89$). This ensures the reliability of the collected investment data (in terms of both measures).

To explain the variation in the dependent variable, we have two explanatory variables: (i) the *age* of the investor; and (ii) the *stock market knowledge* of the investor.

Knowledge score calculation: The respondents were asked the following 18 questions to assess their knowledge about the stock market:

- Do you have notional concept of loss and gain?
- What are the types of trading?
- What are the types of Moving Average?
- Do you know the concept of 'return on capital employed'?
- Do you know the concept of 'debt to equity ratio'?
- Do you know the concept of 'return on equity'?

- Do you know what large cap, midcap and small cap companies are?
- Do you know what is price to earning (PE) ratio?
- Do you know what is profit & loss (P&L) statement?
- Do you know what is CAGR?
- Do you know what is PEG?
- Do you know what is XIRR?
- List two NIFTY50 companies.
- What is the duration of holding a stock for considering it as a long- term investment?
- What is the full form of NHPC?
- What does the term "dividend yield" indicate?
- Explain the concept of "market capitalization".
- What is the concept of earning per share (EPS)?

For each of these questions, a score of 1 was awarded if a respondent answered it correctly. Otherwise, 0 was given if the person could not answer it correctly. Lastly, all the points were added up for each person to compute the knowledge score of a respondent.

Finally, it may be noted that since we did not adopt any risk perception scale such as the Grable and Lytton (1999) Scale, which are close-ended response choices, and the above questions posed were open ended, examining the internal consistency via Cronbach's Alpha or measures like is beyond the scope of the current study [17].

Empirical Strategy

We employed a logistic regression model to estimate the causalities as our dependent variable is binary. The regression equation used is expressed as follows:

$$\text{Log-odds (Risk_Preference}_i) = \ln(P_i / (1 - P_i)) = \beta_0 + \beta_1 \text{ Knowledge_Score}_i + \beta_2 \text{ Age}_i + e_i \quad (1)$$

P_i refers to the probability of investor i to have more than 50% investment in small and microcap stocks, while $1 - P_i$ implies the probability of a respondent i to have less than 50% investment in small and microcaps. β_1 measures the estimated probability effect of knowledge score on the log odds of the dependent variable. It measures the effect of stock market knowledge on the attitude toward risk. Similarly, β_2 captures the effect of investor's on the probability of his being risky. e_i is the random disturbance term. It may be noted that while checking the robustness of the impacts of these explanatory variables, the same equation applies to the determinants of revealed risk preferences, and then P_i refers to the probability of investor i to participate in the lottery, while $1 - P_i$ implies the probability of non-participation in the lottery.

4. Results and Discussions

Understanding the determinants of risk preference among investors in the Indian stock market is crucial for comprehending their investment behaviours. In this study, we empirically investigate determinants of investors' risk preferences using interview data with both investors and brokers. We identified two key determinants: age and stock market knowledge of the surveyed investors. Table 1 describes this below.

Table 1: The effects of investors' age and knowledge on their risk preferences: The Logit estimates

Risk Preference: Risk-taking investor (Individual is a risk taker =1, 0 otherwise)	No control	Gender control	Income control
Knowledge Score	0.118** (0.050)	0.101** (0.043)	0.126** (0.056)
Age	-0.040** (0.018)	-0.078 (0.047)	-.061** (0.023)
Constant	.451(.33)	0.88(.15)***	-.50(0.12)***
Log-likelihood	-45.47	-79.31	-50.53
LR Chi ²	49.20	51.42	.56.66
df	2	3	3
Prob > Chi ²	0.001	0.001	0.001
Pseudo R ²	0.351	0.245	0.359

Note: *, **, and *** indicate significance at 10%, 5% and 1% respectively. Standard errors within parenthesis.

From the table above it is evident that the preference towards the investment in the risky stocks increases with the increase of the stock market knowledge. In other words, the investors with a better knowledge of stock market are more likely to invest in risky shares that is, the small and micro-cap shares. In our sample, this effect remains unchanged even when we take the gender and income of the investors as control variables indicating the robustness of the finding. One of the plausible reasons is that the experienced and knowledgeable investors have better understanding and confidence in managing riskier investments, potentially leading to a higher tolerance for risk. Hence, they invest in the risky micro and

small-cap stocks which have often produced higher return, compared to the mid-cap and large-cap stocks. Along with the financial knowledge, the age of the investor also determines their preference toward risk. We found that the older investors are likely to adopt more conservative investment strategies, possibly due to a shorter investment horizon or a desire to protect their capital. From table 2 we also find that these effects are robust as even if risk measure changes from stated preferences to revealed preferences, these effects on risk-loving attitudes do not change. Moreover, we found that the explanatory variables are not correlated ($r=0.23$, $p > 0.10$) thereby rejecting the possibility of multi-collinearity.

Table 2: Robustness check of the determinants of investors’ risk preferences based on choice experiment data: determinants of investors’ participation in the lottery

Risk Preference: Individual is a risk taker (that is, he/she participated in the lottery=1, 0 otherwise)	No control	Gender control	Income control
Knowledge Score	0.232*** (0.035)	0.983** (0.041)	0.152***(0.055)
Age	-0.037** (0.015)	-0.066 (0.041)	-.057** (0.024)
Constant	-0.61(0.52)	.97(0.33)***	-.91(0.72)
Log-likelihood	-122.50	-167.65	-101.44
LR Chi2	195.54	163.78	152.04
df	2	3	3
Prob> Chi2	0.001	0.001	0.001
Pseudo R2	0.444	0.328	0.428

Note: *, **, and *** indicate significance at 10%, 5% and 1% respectively. Standard errors within parenthesis

The implication is that the young investor with the financial knowledge is more likely to invest in the risky stocks. From policy perspective sharing knowledge by Government via different media with the investors and conducting educational programs can better raise confidence in investors. Such measures may reduce potential financial losses among

investors. Thus, the current study contributes to a broader understanding of behavioural perspectives of investors in emerging markets like India, where the interplay between demographic factors, financial literacy and behavioural biases (e.g., herd behaviours) significantly shape their market behaviours.

Table 3: Investors’ emotions and risk-preferences

Respondents	Regrets	Herd Behaviours	Greed	Fear	Fear of Missing out (FOMO)
	Did you have ever any regret in buying/not buying/selling/not selling as tock? (%Yes)	Did you ever buy/sell stocks when you see price rise/fall and others were buying/ selling? (%Yes)	Did you ever buy stocks out of greed seeing that the stock is already giving you gain? (%Yes)	Did you ever sell stocks out of fear seeing that the stock is already giving you loss? (%Yes)	Did you ever suffer from FOMO? (%Yes)
Risk-takers (n=54)	74.07	90.74	81.48	62.96	83.33
Risk-averse (n=32)	59.37	62.50	56.25	59.37	43.75

Note: Respondents have experienced these emotions in more than one category and so the sum of % exceeds 100.

Table 3 shows that respondents’ risk preferences are markedly aligned with different investment-related emotions. Clearly, those who invest more in small and micro-cap stocks (Risk-takers) have experienced regrets, joy (in panic buying) and fear (in selling of loss-making stocks and FOMO buying) by significantly greater percentage compared to the risk-averse respondents. One plausible reason is that the risk-takers may be mostly traders while the risk-averse respondents may be investors. These findings show that risk-preferences and human emotions are inextricably associated with each other.

5. Contribution and Limitations of the Current Study

This article contributes to the current literature in several ways. It provides an insight into the Indian stock market as an emerging market where we explore the role of demographic characteristics and financial knowledge of the retail investors drawing on behavioural economics. In India, there is significant dearth of micro-level evidence on how human behaviours are associated with investment under uncertainty. Most of the studies either focus on national level data in developed countries (e.g., [18]) or they are often confined to one specific shade of human behaviour such as regrets (e.g., [18], [19]) or scholars tend to examine the determinants of risk attitudes without a focus on such a relevant integration of behavioural theories (e.g., [20]) The present study deviates from them and empirically identifies and confirms causal relationships between stock market knowledge, age, and risk preference integrating three behavioural theories- heard

behaviours, prospect theory and regret theory and showcases that the association between investors’ financial knowledge and risk-taking is robust. Thus, our article significantly extends the literature by creating a comprehensive framework for understanding retail investors’ behaviours under uncertainty accompanied with robust association between investors’ emotions (such as greed, regrets, fear etc), investments and financial knowledge.

However, one of the limitations of our research is the narrow consideration of assets and investment segments. Future research can focus on broadening the asset diversification that include investors’ fund allocation in not only in equity but in gold and debt instruments, and their participation in future and options along with cash segment in stock market to provide a more comprehensive view of the determinants of risk preferences in investment under uncertainty.

6. Conclusion

The relationship between financial knowledge, age, and risk preferences in the Indian stock market is investigated in this study. We find that higher knowledge of stock market is associated with increased risk-taking, while age is negatively associated to risk preference. These results highlight the importance of financial knowledge in shaping investment decisions, and it underscore the demographic influences on the investors behaviour. In conclusion, this study portrays the critical roles of age and knowledge in shaping individuals’ risk preferences in stock markets, providing valuable

guidance for investment strategy formulation and financial education efforts.

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