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The Mediating Role of Risk Tolerance in the Relationship between Financial Literacy and Investment Performance

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Abstract

The main objective of this research paper is to study the impact of financial literacy on investment performance, with the mediating effects of risk tolerance. Data was collected using a standardised questionnaire from 203 individual investors in Chennai, India and the results indicate that there is a significant positive relationship between financial literacy and investment performance while the level of risk tolerance is partially mediating that relationship. This study is the first of its kind which has explored the mediating role of risk tolerance, and it demonstrated that higher levels of financial literacy make investors more tolerant towards risk which in turn makes a better and satisfying investment performance. This study has several implications for investors, financial advisors and policymakers. It also aids in understanding the significance of financial literacy for the investors and ameliorating awareness and intention to invest among the non-investors.

Keywords: Financial Literacy, Investment Performance, Risk Tolerance, Structural Equation Modelling

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Introduction

The crucial notion of decision making and information processing is 'product knowledge' (Brucks, 1985; Raju et al., 1995). This Product Knowledge is depicted as financial literacy (also called as financial numeracy) in the purview of financial products (Huhmann & McQuitty, 2009). Various authors have given different definitions of financial literacy based on the context in which it is dealt with. According to Mandell (2006), Financial Literacy is what individuals ought to be aware of in order to make crucial financial decisions out of their interest at its best. In the words of Lusardi and Mitchell (2011), financial literacy is the knowledge pertaining to the fundamental financial investments, ideas, concepts (risk diversification and inflation) and the capability of doing calculations pertaining to interest rates. According to Atkinson and Messy (2011), financial literacy is the integration of attitude, awareness, skills, knowledge and behaviour needed to make efficient financial decisions and eventually make individuals achieve their financial well-being. Similar to any other form of literacy, financial literacy also leads to development. It is very closely related to the individual as well as a country's development; it brings success aiming to bring overall well-being, socio-economic development by means of informed decision making related to financial matters. It increases the quality and efficiency of financial services (The World Bank, 2009). The importance and expediency of financial literacy extend way beyond creating the stronger household balance sheets to making a strong and effective financial system which eventually makes the optimal and effective resource allocation in a real economy.

Financial literacy is viewed as a significant skill for enriching the financial well-being of individuals. The shortage of financial literacy ends up in making poor financial decisions that are harmful to both the individuals and the society as a whole due to inappropriate decisions in the complicated financial markets (Tustin, 2010). The ultimate aim of financial literacy is to make proper wealth management and investment decisions. Investment performance refers to the extent to which investors derive satisfaction with the rate of return of their recent stock investment comparing to their expected returns and with their investment decisions (Trang & Tho, 2017; Luong & Ha, 2011). This investment performance is related to risk tolerance (Trang & Tho, 2017). According to Grable (2008), risk tolerance refers to a person's readiness to involve in financial behaviour in which the uncertainty lingers in the outcome.

According to Klapper et al. (2015), 76% of Indian adults are not aware of the primary financial concepts like compound interest, risk diversification and inflation.

Moreover, this report had disclosed that there is a substantial gap between men and women in terms of financial literacy almost in all countries. Worldwide, 70% of women and 65% of men are financially illiterate. When it comes to India, the gap is wider with 80% of women and 73% of men being financially illiterate. Similarly, the National Financial Literacy and Inclusion Survey of 2013-14 (National Institute of Securities Market, 2015) revealed that only 20% of Indians are financially literate. Further the report explained the financially literate rate according to the zones as follows: west zone 27%, south zone 25%, north zone 20%, east zone 15% and central zone 13%.

Many research studies (Kersting et al., 2015; Lusardi, 2012; Mouna & Anis, 2016; Mouna & Jarboui, 2015; Müller & Weber, 2010; Sivaramakrishnan et al., 2017; van Rooij et al., 2011) have examined the relationship between financial risk tolerance and investment decisions. But when it comes to the relationship between financial literacy and investment performance, only a few were carried out (Grable, 1997; Sabri et al., 2012; Mahdzan & Tabiani, 2013; Sabri & Juen, 2014), but these studies were not performed on Indian investors, for whom the financial literacy level is different and they have not included the role of any other variables in the relationship between financial literacy and investment performance. The studies of Lusardi (2012), Mouna and Anis (2016), Mouna and Jarboui (2015), Müller and Weber (2010) and Sivaramakrishnan et al. (2017) have addressed the impact of financial literacy on investment decisions and stock market participation, however, they have not concentrated in measuring the extent to which the individual investor is having a satisfactory investment performance and whether the financial literacy impact their investment performance. Hence, this research study aims to study the impact of financial literacy on investment performance with the mediating effect of risk tolerance.

Literature Review

Financial literacy is considered as a significant ability to be possessed by individuals to enhance their financial prosperity. Absence of financial literacy brings about inappropriate financial choices that are in the long run dangerous for individuals and for the society as a whole. (Tustin, 2010). A positive relationship of financial literacy with wealth accumulation, savings and retirement planning is established in various research studies. (Hastings & Mitchell, 2020; Lusardi & Mitchell, 2007; Van Rooij et al., 2012). This section of the paper delineates the relationship of financial literacy with investment performance and risk tolerance.

Financial Literacy and Investment Performance

Grable (1997) recommended from a financial planning perspective, tolerance related to financial risk has a critical part in directing individuals toward a psychologically satisfactory and suitable investment. Sabri et al. (2012) established that financial literacy significantly influences students perceived financial wellbeing. Their results also recommend that more knowledge of personal finances among students results in better well-being in terms of current financial situation, money saved and financial management skills. No financial socialisation agents (peers, parents, school, media, school, and religion) have an effect on financial literacy and better financial planning, and more risk-tolerant people tend to have more investments.

Aren and Zengin (2016) found that financial literacy and risk perception affect the investment preferences of individuals. Investors with high-risk propensity prefer equity, foreign exchange and portfolio. On the other hand, risk averse investors tend to choose deposits. It is also found that there is a significant relationship between investment preferences and financial literacy. When the financial literacy level is low, investors prefer foreign currency and deposit and when there is an increase in the financial literacy level, investors opt to develop a portfolio or buy equities. At the basic level of financial literacy, there is no change in financial literacy between genders, whereas in the case of advanced financial literacy men are more financially literate than women. Mouna and Anis (2016) found that people with low financial literacy are less likely and hesitant to invest in the stock market and men are more financially literate than women. Ates et al, (2016) found that half of the investors lack in financial literacy (parents or friends happen to be their main source of information) and they encounter the behavioural biases at a high level. The biases like over-optimism, representativeness and confirmation have a positive relationship with financial literacy and the biases like loss aversion, overconfidence, framing and cognitive dissonance have a negative relationship with financial literacy. The research studies of Mahdzan and Tabiani (2013) and Sabri and Juen (2014) have found that people who have better financial literacy are better in wealth accumulation.

According to Agarwal et al. (2007) most financial mistakes are made by individuals who possess a very low level of financial literacy. Bernheim and Garrett (2003) explained that improper financial decisions lead to economic vulnerability at a larger scale and education can come to rescue by providing awareness and knowledge on financial decisions.

The foundational relationship between financial literacy and investment performance claimed by Grable (1997) is again empirically evidenced by Sabri et al. (2012), Mahdzan and Tabiani (2013) and Sabri and Juen (2014). On the other hand, Bernheim and Garrett (2003) and Agarwal et al. (2007) made it very clear that financial mistakes and improper financial decisions happen because of poor financial literacy. The studies of Grable (1997), Sabri et al. (2012), Agarwal et al. (2015), Mahdzan and Tabiani (2013) and Sabri and Juen (2014) have measured the impact of financial literacy in different dimensions of investment performance namely, financial well-being, satisfaction and wealth accumulation. But the other aspects of investment performance like satisfaction, meeting the expected return and exceeding the market return are not widely studied in the previous literature. Hence, this study makes an attempt in measuring the investment performance in terms of above mentioned aspects (satisfaction of the investors, meeting the expected return and exceeding the market return). With the adequate literature support the following hypothesis is proposed:

H₁: Financial literacy has a significant and positive relationship with investment performance.

Financial Literacy and Risk Tolerance

Sjöberg and Engelberg (2009) concluded that financially literate students exhibited a more prominent positive attitude towards financial risk-taking compared to financially illiterate students. Huhmann and McQuitty (2009) explained that individuals with a low level of financial literacy will encounter a higher level of difficulties in understanding financial concepts and this tends to total risk scores. Von Gaudecker (2011) explained that more financially knowledgeable individuals are good at possessing better-diversified funds. Gustafsson and Omark (2015) concluded that individuals who have a higher level of financial literacy score higher in total risk and vice versa. According to Bajo et al. (2015), the households with a low level of financial knowledge tend to be more risk-averse. Earl et al. (2015) found that there is no significant relationship between risk tolerance and financial literacy.

Sjöberg and Engelberg (2009) and Gustafsson and Omark (2015) demonstrated that there is an association between financial literacy and risk tolerance, that is, individuals with a higher level of financial literacy tend to be more tolerant towards risk. The ones with a low level of financial literacy will find it difficult to understand financial concepts (Huhmann & McQuitty, 2009) and become risk-

averse (Bajo et al., 2015). Based on this literature support, the following hypothesis is proposed:

H₂: Financial literacy has a significant and positive relationship with risk tolerance.

Risk Tolerance and Investment Performance

The market being risk-averse, investments that carry a higher level of systematic risks can generate a higher level of return and vice versa (Sharpe, 1964). The study of Koutmos et al. (1993) has shown that there is a significant and positive relationship between returns and risk premium. Salman (2002) also affirms that there is a significant and positive relationship between risk and return. Nofsinger (2005) reported that people will not be interested in undertaking a financial risk after encountering a loss. He added that investors tend to choose risky shares after reaching a successful position in order to minimise the regret of missing out on the next bull market. Grable et al. (2004) found that there is a significant relationship between financial risk tolerance and positive short term investment performance. Through a longitudinal study, Yao et al. (2004) found that during a bull market (i.e. when prices of securities are increasing), the financial risk tolerance increases while during a bear market (i.e, when prices of securities are decreasing) it decreases. Santacruz (2009) found that there is no relationship between financial risk tolerance and stock market performance. Grable and Joo (2000) reported that higher financial risk tolerance scores are found in those who have positive economic expectations.

The studies of Koutmos et al. (1993), Grable and Joo (2000) and Grable et al. (2004) made it clear that risk tolerance impacts the investment performance, however, the study of Santacruz (2009) claimed that there is no relationship between financial risk tolerance and stock market performance (in terms of returns). But the investment performance construct of our study is intended to measure the consolidated performance of an investment in terms of returns and satisfaction. Hence the following hypothesis is proposed:

H₃: Risk tolerance has a significant and positive relationship with investment performance.

Risk Tolerance as a Mediator

According to Economic Times (2013), "a higher risk is connected with a larger likelihood of higher return and lower risk with a larger likelihood of low level of return. This trade-off which an investor faces between risk and return while

considering investment decisions is called the risk-return trade-off". This has been empirically supported by the studies of Sharpe (1964), Koutmos et al. (1993) and Salman (2002). On the other hand, the studies of Grable (1997), Sabri et al. (2012), Agarwal et al. (2015), Mahdzan and Tabiani (2013) and Sabri and Juen (2014) have demonstrated that there is a relationship between financial literacy and investment performance. The studies of Sjöberg and Engelberg (2009), Huhmann and McQuitty (2009) and Gustafsson and Omark (2015) shown that there is a significant positive relationship between financial literacy and risk tolerance. However, no study has so far established the total effects of financial literacy and risk tolerance on investment performance. Hence, this study makes an attempt of doing so by proposing financial literacy as an exogenous variable, risk tolerance as a mediator and investment performance as an endogenous variable.

H₄: Risk tolerance does mediate the relationship between financial literacy and investment performance.

Conceptualisation and Operational Definitions

The conceptual model shown in Figure 1 is derived from the literature review. The model has three variables, namely, Financial Literacy as an independent variable, Risk Tolerance as a mediating variable and Investment Performance as the dependent variable. This conceptual model attempts to delineate that there is a significant positive relationship between financial literacy and investment performance and that relationship is mediated by risk tolerance. In the context of individual investors, it explains that if an investor is financially literate he becomes more risk-tolerant and his investment performance increases.

Figure 1: Conceptual Model



Operational definitions for the variables used in the study are given in Table 1.

Variables	Definition and Author
Financial literacy	"Financial literacy refers to the financial knowledge to differentiate stock and bonds and to understand the functions of the stock market, risk diversification, bond prices and interest rate" (van Rooij et al, 2007).
Risk tolerance	"Risk tolerance is the maximum amount of uncertainty someone is willing to accept when making a financial decision" (Grable, 2000).
Investment performance	"The tendency of measuring the investors' return and satisfaction" (ul Abdin et al., 2017).

Table 1: Variables and their Definitions

Measurement of Variables

The variables are measured through proper standardised Likert scale from one to five, one being 'Strongly Disagree' and five being 'Strongly Agree'. For measuring financial literacy, we have obtained six items from the advanced literacy scale developed by van Rooij et al. (2007). For measuring risk tolerance, we have adopted six items from the scale developed by Grable and Lytton (1999). The items for measuring investment performance as used by ul Abdin et al. (2017) was adopted from Luong and Ha (2011) and Waweru et al. (2008).

Research Methods

This research study is explanatory in nature. Data were collected through the convenience sampling method from investors in Chennai. Investors in Chennai region, trading in both National Stock Exchange and Bombay Stock Exchange are included in this study. The data were collected through distributing questionnaires and also through online Google forms. In order to determine the same size along with power calculations the GPower software is used (Faul et al., 2007, 2009) and it is found that with medium effect size, we would need at least 111 respondents to detect that effect at 80% power. However, with the anticipation of unresponsiveness to the questionnaire and to discard the semi filled questionnaires, a total of 440 questionnaires were distributed (including Google form and hard copy). Out of that 210 filled questionnaires were received back; seven responses were found to be not completely filled and they were rejected. Hence, the sample size is made to be 203 which is more than what is predicted by GPower. Among the 203 respondents, 135 are male. In terms of education, 123 respondents hold bachelor's degrees, 70 respondents have postgraduate qualifications, 8 respondents are diploma holders

and remaining two respondents have high school education. In terms of occupation, 130 respondents work in private sector, 71 respondents in the public sector and the remaining two respondents are entrepreneurs.

Analysis and Interpretation

Reliability and Convergent Validity

The reliability is measured through Cronbach's Alpha and Composite reliability value, and, the convergent validity is measured through Average Variance Explained (AVE). The Cronbach's alpha value for Financial literacy is found to be only 0.546, hence, we adopted the item deletion method to increase the reliability. After deleting two items (using the option available in SPSS) the reliability values were found to be 0.601 which is acceptable (Hulin et al., 2001). Risk tolerance had the Cronbach's alpha value of 0.743 with six items but while calculating Average Variance Explained (AVE) and Composite Reliability (CR), the results were not satisfactory, hence the researchers have adopted item deletion method to increase AVE and CR. As a result, three items were deleted in risk tolerance and then the values are found to be satisfactory. The Cronbach's alpha, AVE and CR values for the variables are given in Table 2.

Variable	Cronbach's alpha	Composite Reliability	AVE
Financial literacy	0.601	0.826	0.546
Risk Tolerance Investment Performance	0.721 0.668	0.766 0.819	0.522 0.602

Table 2: Reliability and Validity Analysis

Correlation, Discriminant Validity and Multicollinearity

Correlation results indicate that variables are correlated to each other. With the correlation output in Table 3, we can infer that the correlation between financial literacy and investment performance is 0.498, financial literacy and risk tolerance is 0.374 and between risk tolerance and investment performance is 0.492.

Discriminant validity between two constructs exists when the square root of the AVE of each construct exceeds the correlation between the two constructs. From Table 2 it is quite evident that the square root values of AVE of each construct are

higher than the correlation between the constructs; hence, the discriminant validity is perfectly established. All the correlation values are significant at a 99% confidence level and none of them is above 0.9, hence there is no problem of multicollinearity. In addition to the correlation coefficients, Variance Inflation Factor (VIF) values are also calculated to check for the problem of multicollinearity and it is found that the value of VIF is less than 5 (1.109), hence it is confirmed that there is no multicollinearity issue (Hair et al., 2014).

Table 3: Correlation Matrix

Pearson Correlations (r)						
	FL	IP	RT			
IP	0.498*					
RT	0.374 *	0.492 *				
Square root of AVE	0.739	0.722	0.776			

Notes: 1. FL – Financial Literacy; IP – Investment Performance; RT – Risk Tolerance 2. * denotes statistical significance at p < 0.001

Normality and Linearity

From the histogram in Figure 2, we can infer that the data follows the normal distribution and it is between -3 and +3. The P-P plot in Figure 3 makes it clear that there is linearity in the relationship among the variables. Hence the assumptions of normality and linearity are met.

Figure 2: Histogram







Test of Model Fit and Construct Validity

The model fit is tested by conducting Confirmatory Factor Analysis in Amos version 24. Anderson and Gerbing (1988) suggested that any disturbing indicator/indicators can be removed to increase the model fit. We have conducted reliability and other validity analyses and no disturbing indicators were found. This could be because we had previusly removed disturbing items while analysing the reliability and validity values. Overall the CFA yielded satisfactory values as per the recommendations of Doll et al. (1994) and Baumgartner and Homburg, (1996). Hence in addition to model fit, the construct validity is also established. The results are shown in Table 4.

Table 4: Confir	matory Factor	• Analysis	Values
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	Absolute Fit Indices			Incremental Fit Indice			
	CMIN/df	GFI	AGFI	RMSEA	NFI	TLI	CFI
Observed values	2.467	0.930	0.879	0.085	0.853	0.866	0.905

It is inferred from Table 4 that values of both absolute and incremental fit indices are found to be acceptable based on the recommendations of Doll et al. (1994) and Baumgartner and Homburg (1996). In absolute fit indices, CMIN/df is 2.467 against the recommended value of less than 3. The Goodness of Fit Index (GFI) is found to be 0.92 against the recommended value of above 0.90. The

Adjusted Goodness of Fit Index (AGFI) is found to be 0.879 which is very close to the recommended value of above 0.90. The Root Mean Square Error of Approximation (RMSEA) is found to be 0.085 against the recommended value of less than 0.08; however, the RMSEA being very close to zero represents a good fit. In incremental fit indices, the Comparative Fit Index (CFI) is found to be 0.905 against the recommended value of above 0.90. The values of Normed Fit Index (NFI) is found to be 0.853 which is very close to the recommended value of above 0.90. The values of above 0.90. Tucker Lewis Index (TLI) is found to be 0.866 which is close to the recommended values of above 0.90. In summary, our GFI and CFI values are meeting the recommended value and the other index values (AGFI, RMSEA, NFI and TLI) are very close to the recommended value of 0.9. The diagrammatic representation of Confirmatory Factor Analysis with loadings is demonstrated in Figure 4. The Confirmatory Factor Analysis showed an overall acceptable model fit, hence, we proceeded with the path analysis using Structural Equation Modelling (SEM).





Structural Equation Model

In order to find the relationship between the exogenous (financial literacy) and the endogenous (risk tolerance and investment performance), the structural equation model is made using AMOS version 24.

Hypothesis	Relationship	β	t	Decision
H_1	Financial literacy \rightarrow Investment Performance	0.42	3.56	Supported
H_2	Financial literacy → Risk Tolerance	0.39	3.69	Supported
H ₃	Risk tolerance \rightarrow Investment Performance	0.54	4.56	Supported

Table 5: Results of Structural Equation Model

It is inferred from Table 5 that there is a significant positive impact of financial literacy on investment performance ($\beta = 0.42$, t = 3.56) and risk tolerance ($\beta = 0.39$, t = 3.69), hence H₁ and H₂ are supported. Similarly, it is also inferred from Table 4 that there is a significant positive impact of risk tolerance on investment performance ($\beta = 0.54$, t = 4.56), hence H₃ is supported.

Mediation Analysis

In order to explore the mediating effects of the risk tolerance in the relationship between financial literacy and investment performance, the path analysis is conducted with bootstrapping (2000 samples).

Table 6: Mediation Results of Risk Tolerand

Hypothesis	Relationship	Direct Effect	Indirect Effect	Total Effect	Mediation Result	Decision
H4	Financial literacy → Risk Tolerance → Investment Performance	0.42*	0.21*	0.63*	Partial	Supported

Note: * denotes p < 0.01

It is inferred from Table 6, that the direct effect is 0.42, the indirect effect is 0.21 and the total effect is 0.63. All these values are significant at p < 0.01 which indicate the mediation to be partial in nature. Hence, it can be concluded that there is a significant positive relationship between financial literacy and investment performance and this relationship stays significant and positive with the mediating role of risk tolerance as well, hence the hypothesis H₄ is supported. The

diagrammatic representation of Beta coefficient values between the variables is shown in Figure 5.



Figure 5: SEM Output with Beta Coefficient Values between the Variables

Discussion

The first finding of our Structural Equation Model is that when an investor is having required knowledge about the market (financial literacy), his investment performance will be better than those with low financial literacy. This finding is in line with the findings of Grable (1997), Sabri et al. (2012), Mahdzan and Tabiani (2013) and Sabri and Juen (2014). Our next finding is that financial literacy is having a significant positive relationship with risk tolerance. It can be interpreted that the increase in financial literacy of individual investors increase their level of risk tolerance. This finding is in line with findings of Sjöberg and Engelberg (2009) and Gustafsson and Omark (2015). The finding related to the third hypothesis reveal that risk-tolerant investors tend to have better investment performance. When investors are aware of the functions of the stock market, they perform the fundamental and technical analyses before making an investment decision, hence their return will be satisfactory and in fact better than others who make investments without proper analyses. This finding is in line with findings of Koutmos et al. (1993), Grable and Joo (2000) and Grable et al. (2004). The last and crucial finding of our research study is that the risk tolerance partially mediates the relationship between financial literacy and investment performance. The findings of our study add to the literature of financial literacy, risk tolerance and investment performance.

Implications of the Study

Ameliorating financial literacy in countries such as India (where equity investment participation of individuals is only around 3%) not only make the investors aware of the securities market but also it makes the unintended people to be intended in investments. This study also makes it obvious for investors that there is a direct relationship between financial literacy and investment performance; the higher the literacy the higher the performance. This will help investors to understand their financial capacity and improve it further. Moreover, studies that exhibit the significance of financial literacy help investors to get rid of the psychological compounding factors that affect their investment choices and decisions.

The higher the risk, the higher the return is the profound phenomenon in choosing the investment instruments (Patil, 2018). The understanding of the importance of risk tolerance along with financial literacy helps investors to make their portfolio selection wisely. From the perspective of financial advisors, studies of this kind show them the importance of making their clients more financially literate which in turn makes them more risk-tolerant so that the risky investments suggested by the financial investors will not go untouched. This study is significant to policymakers as well in terms of conducting more programmes to make the people more financially literate. When people become more financially literate, they tend to invest more and that contributes to the overall economic growth and stability of the country.

Conclusion

This study set out to find the relationship between financial literacy and investment performance of individual investors with the mediating effects of risk tolerance. The Structural Equation Model has revealed that there is a significant and positive relationship between financial literacy and investment performance of individual investors and this relationship is partially mediated by risk tolerance. The results of this research support the idea that when an investor becomes financially literate it increases his risk tolerance level which in turn increases his investment performance. This research work appears to be the first study to explore the mediating role of risk tolerance in the relationship between financial literacy and investment performance; thereby, it contributes considerably to the existing body of literature. The main limitation of this study is that it is conducted only among the individual investors of Chennai city only. It does not include investors from the Northern part of India who are extremely different from investors in the South. In spite of this limitation, this study contributes in understanding the importance of financial literacy thereby helps the policymakers to devise policies in such a way that people not only get interested to invest but also to make wise decisions.

Future studies can be conducted across the country by including a greater number of predictors and exploring the multiple mediation effects of other variables like financial sophistication and satisfaction in the relationship between financial literacy and investment performance in relation to individual investors and households. Studies can also be conducted to examine the moderating role of financial literacy in the relationship between psychological factors and investment decisions and performance because it is important for the investors to control their emotions through the ups and downs of the securities market. This task is made easy when an investor is a financially literate person. Finally, the phenomenon examined in this study can also be explored qualitatively through in-depth interviews for understanding how the investors perceive risk tolerance and differ in evaluating their own investment performance.

Declaration of Conflict of Interest

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

References

- Agarwal, S., Amromin, G., Ben-David, I., Chomsisengphet, S., & Evanoff, D. D. (2015). Financial literacy and financial planning: Evidence from India. *Journal* of Housing Economics, 27, 4–21. <u>https://doi.org/10.1016/j.jhe.2015.02.003</u>
- Agarwal, S., Driscoll, J. C., Gabaix, X., & Laibson, D. (2007). *The age of reason: Financial decisions over the lifecycle* (No. w13191). National Bureau of Economic Research. <u>https://www.nber.org/papers/w13191</u>
- Aren, S., & Zengin, A. N. (2016). Influence of financial literacy and risk perception on choice of investment. *Procedia-Social and Behavioral Sciences*, 235, 656– 663. <u>https://doi.org/10.1016/j.sbspro.2016.11.047</u>
- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411–423. <u>https://doi.org/10.1037/0033-2909.103.3.411</u>
- Ateş, S., Coşkun, A., Şahin, M. A., & Demircan, M. L. (2016). Impact of financial literacy on the behavioral biases of individual atock investors: Evidence from Borsa Istanbul. *Business & Economics Research Journal*, 7(3), 1–19.

https://www.berjournal.com/impact-of-financial-literacy-on-the-behavioralbiases-of-individual-stock-investors-evidence-from-borsa-istanbul

- Atkinson, A., & Messy, F.-A. (2011). Assessing financial literacy in 12 countries: An OECD/INFE international pilot exercise. *Journal of Pension Economics & Finance*, 10(4), 657–665. <u>https://doi.org/10.1017/S1474747211000539</u>
- Bajo, E., Barbi, M., & Sandri, S. (2015). Financial literacy, households' investment behavior, and risk propensity. *Journal of Financial Management, Markets and Institutions*, 3(1), 157–174. <u>https://econpapers.repec.org/article/muljdp901/doi</u> <u>3a10.12831_2f80534_3ay_3a2015_3ai_3a1_3ap_3a157-174.htm</u>
- Baumgartner, H. & Homburg, C. (1996). Applications of structural equation modeling in marketing and consumer research: A review. *International Journal* of Research in Marketing, 13(2), 139–161. <u>https://doi.org/10.1016/0167-8116(95)00038-0</u>
- Bernheim, B. D., & Garrett, D. M. (2003). The effects of financial education in the workplace: Evidence from a survey of households. *Journal of Public Economics*, 87(7-8), 1487–1519. <u>https://doi.org/10.1016/S0047-2727(01)</u> 00184-0
- Brucks, M. (1985). The effects of product class knowledge on information search behavior. *Journal of Consumer Research*, *12*(1), 1–16. <u>https://doi.org/10.1086/209031</u>
- Doll, W. J., Xia, W., & Torkzadeh, G. (1994). A confirmatory factor analysis of the end-user computing satisfaction instrument. *MIS Quarterly*, 18(4), 357–369. <u>https://doi.org/10.2307/249524</u>
- Earl, J. K., Gerrans, P., Asher, A., & Woodside, J. (2015). Financial literacy, financial judgement, and retirement self-efficacy of older trustees of selfmanaged superannuation funds. *Australian Journal of Management*, 40(3), 435– 458. <u>https://doi.org/10.1177/0312896215572155</u>
- Economic Times (2013). What is risk return trade off? Definition of risk return trade off, risk return trade off meaning. <u>https://economictimes.indiatimes.com/</u><u>definition/risk-return-trade-off</u>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160. <u>https://doi.org/10.3758/BRM.</u> 41.4.1149
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <u>https://doi.org/10.3758/ BF03193146</u>

- Grable, J. E. (1997). *Investor risk tolerance: Testing the efficacy of demographics as differentiating and classifying factors* (Unpublished Doctoral dissertation), Virginia Tech, United States of America.
- Grable, J. E. (2000). Financial risk tolerance and additional factors that affect risk taking in everyday money matters. *Journal of Business and Psychology*, *14*(4), 625–630. <u>https://doi.org/10.1023/A:1022994314982</u>
- Grable, J. E. (2008). Risk tolerance. In J. J. Xiao (Ed.), *Handbook of consumer* finance tesearch, (pp. 3–19). Springer. <u>https://doi.org/10.1007/978-0-387-</u> 75734-6_1
- Grable, J. E., & Joo, S. H. (2000). A cross-disciplinary examination of financial risk tolerance. *Consumer Interests Annual*, *46*, 151–157.
- Grable, J., & Lytton, R. H. (1999). Financial risk tolerance revisited: The development of a risk assessment instrument. *Financial services review*, 8(3), 163–181. <u>https://doi.org/10.1016/S1057-0810(99)00041-4</u>
- Grable, J., Lytton, R., & O'Neill, B. (2004). Projection bias and financial risk tolerance. *The Journal of Behavioral Finance*, 5(3), 142–147. <u>https://doi.org/10.1207/s15427579jpfm0503_2</u>
- Gustafson, C., & Omark, L. (2015). Financial literacy's effect on financial risk tolerance - A quantitative study on whether financial literacy has an increasing or decreasing impact on financial risk tolerance (Dissertion). Umeå School of Business and Economics, Sweden.
- Hair, J., Black, W., Babin, B., & Anderson, R. (2014). *Multivariate data analysis* (7th ed.). Pearson.
- Hastings, J., & Mitchell, O. S. (2020). How financial literacy and impatience shape retirement wealth and investment behaviors. *Journal of Pension Economics & Finance*, 19(1), 1–20. <u>https://doi.org/10.1017/S1474747218000227</u>
- Huhmann, B. A., & McQuitty, S. (2009). A model of consumer financial numeracy. *International Journal of Bank Marketing*, 27(4), 270–293. https://doi.org/10.1108/02652320910968359
- Hulin, C., Netemeyer, R., & Cudeck, R. (2001). Can a reliability coefficient be too high? Journal of Consumer Psychology, 10(1/2), 55–58. <u>www.jstor.org/stable/</u> <u>1480474</u>
- Kersting, L. M., Marley, R. N., & Mellon, M. J. (2015). The association between financial literacy and trust in financial markets among novice nonprofessional investors. *Academy of Accounting and Financial Studies Journal*, 19(3), 201– 213.
- Klapper, L., Lusardi, A., & Van Oudheusden, P. (2015). Financial literacy around the world. Insights from the Standard & Poor's Ratings Services Global Financial Literacy Survey. Standard & Poor's.

- Koutmos, G., Negakis, C., & Theodossiou, P. (1993). Stochastic behaviour of the Athens stock exchange. *Applied Financial Economics*, *3*(2), 119–126. https://doi.org/10.1080/758532830
- Luong, L., P., & Ha, D. T. T. (2011). Behavioral factors influencing individual investors' decision-making and performance.: A survey at the Ho Chi Minh Stock Exchange (Unpublished master's dissertation). Umea Universitet. https://www.diva-portal.org/smash/get/diva2:423263/FULLTEXT02.pdf
- Lusardi, A. (2012). Numeracy, financial literacy, and financial decision making (NBER Working Paper Series No.17821). National Bureau of Economic Research, Cambridge. <u>https://www.nber.org/papers/w17821</u>
- Lusardi, A., & Mitchell, O. S. (2007). Baby boomer retirement security: The roles of planning, financial literacy, and housing wealth. *Journal of Monetary Economics*, 54(1), 205–224. https://doi.org/10.1016/j.jmoneco.2006.12.001
- Lusardi, A., & Mitchell, O. S. (2011). Financial literacy and planning: Implications for retirement wellbeing (No. w17078). National Bureau of Economic Research. <u>https://www.nber.org/papers/w17078</u>
- Mahdzan, N. S., & Tabiani, S. (2013). The impact of financial literacy on individual saving: An exploratory study in the Malaysian context. *Transformations in Business and Economics*, 12(1), 41–55.
- Mandell, L. (2006). Financial literacy: If it's so important, why isn't it improving? (2006-PB-08). Networks Financial Institute. <u>http://dx.doi.org/</u><u>10.2139/ssrn.923557</u>
- Mouna, A., & Anis, J. (2017). Financial literacy in Tunisia: Its determinants and its implications on investment behavior. *Research in International Business and Finance*, 39, 568–577. <u>https://doi.org/10.1016/j.ribaf.2016.09.018</u>
- Mouna, A., & Jarboui, A. (2015). Financial literacy and portfolio diversification: An observation from the Tunisian stock market. *International Journal of Bank Marketing*, 33(6), 808–822. <u>https://doi.org/10.1108/IJBM-03-2015-0032</u>
- Müller, S., & Weber, M. (2010). Financial literacy and mutual fund investments: Who buys actively managed funds?. *Schmalenbach Business Review*, 62(2), 126–153. <u>https://doi.org/10.1007/BF03396802</u>
- National Institute of Securities Market (2015). *Financial literacy and inclusion in India*. Retrieved from https://ncfe.org.in/images/pdfs/nasional-surveyy/NISM_Final%20Report%20-%20All%20India.pdf.
- Nofsinger, J. R. (2005). *The psychology of investing*, (2nd ed.). Routledge.
- Patil, M. (2018). Investors can expect returns of 8-9% from Nifty this year. https://economictimes.indiatimes.com/markets/expert-view/not-a-time-to-takerisk-more-money-coming-into-multi-cap-large-cap-funds-maheshpatil/articleshow/63281467.cms

- Raju, P. S., Lonial, S. C., & Glynn Mangold, W. (1995). Differential effects of subjective knowledge, objective knowledge, and usage experience on decision making: An exploratory investigation. *Journal of Consumer Psychology*, 4(2), 153–180. <u>https://doi.org/10.1207/s15327663jcp0402_04</u>
- Sabri, M. F., Cook, C. C., & Gudmunson, C. G. (2012). Financial well-being of Malaysian college students. Asian Education and Development Studies, 1(2), 153–170. https://doi.org/10.1108/20463161211240124
- Sabri, M. F., & Juen, T. T. (2014). The influence of financial literacy, saving behaviour, and financial management on retirement confidence among women working in the Malaysian public sector. *Asian Social Science*, 10(14), 40–51. <u>http://www.ccsenet.org/journal/index.php/ass/article/view/37912</u>
- Salman, F. (2002). Risk-return-volume relationship in an emerging stock market. Applied Economics Letters, 9(8), 549–552. <u>https://doi.org/10.1080/</u> <u>13504850110105727</u>
- Santacruz, L. (2009). Effect of general economic mood on investor risk toleranceimplications for financial planning. *JASSA The FINSIA Journal of Applied Finance*, (1), 35–42.
- Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, 19(3), 425–442. <u>https://doi.org/</u> <u>10.1111/j.1540-6261.1964.tb02865.x</u>
- Sivaramakrishnan, S., Srivastava, M., & Rastogi, A. (2017). Attitudinal factors, financial literacy, and stock market participation. *International Journal of Bank Marketing*, *35*(5), 818–841. <u>https://doi.org/10.1108/IJBM-01-2016-0012</u>
- Sjöberg, L., & Engelberg, E. (2009). Attitudes to economic risk taking, sensation seeking and values of business students specializing in finance. *The Journal of Behavioral Finance*, 10(1), 33–43. https://doi.org/10.1080/15427560902728712
- The World Bank (2009). *The case for financial literacy in developing countries: Promoting access to finance by empowering consumers.* Author.
- Trang, P. T. M., & Tho, N. H. (2017). Perceived risk, investment performance and intentions in emerging stock markets. *International Journal of Economics and Financial Issues*, 7(1), 269–278.
- Tustin, D. H. (2010). An impact assessment of a prototype financial literacy flagship programme in a rural South African setting. *African Journal of Business Management*, 4(9), 1894–1902. <u>https://academicjournals.org/journal/</u> <u>AJBM/article-abstract/4692E2532393</u>
- Ul Abdin, S. Z., Farooq, O., Sultana, N., & Farooq, M. (2017). The impact of heuristics on investment decision and performance: Exploring multiple mediation mechanisms. *Research in International Business and Finance*, 42, 674–688. <u>https://doi.org/10.1016/j.ribaf.2017.07.010</u>

- Van Rooij, M., Lusardi, A., & Alessie, R. (2007). *Financial literacy and stock market participation* (Working paper No. 13565). National Bureau of Economic Research.
- Van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy and stock market participation. *Journal of Financial Economics*, 101(2), 449–472. <u>https://doi.org/10.1016/j.jfineco.2011.03.006</u>
- Van Rooij, M. C., Lusardi, A., & Alessie, R. J. (2012). Financial literacy, retirement planning and household wealth. *The Economic Journal*, 122(560), 449– 478. <u>https://doi.org/10.1111/j.1468-0297.2012.02501.x</u>
- Von Gaudecker, H. M. (2011). How does household portfolio diversification vary with financial sophistication and advice? (MEA Discussion Paper No. 238-11). Available at SSRN: <u>https://papers.ssrn.com/sol3/papers.cfm?abstract_id</u> =1797565
- Waweru, N. M., Munyoki, E., & Uliana, E. (2008). The effects of behavioural factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, 1(1), 24–41. <u>https://www.inderscience.com/info/inarticle.</u> <u>php?artid=19243</u>
- Yao, R., Hanna, S. D., & Lindamood, S. (2004). Changes in financial risk tolerance, 1983-2001. *Financial Services Review*, *13*(4), 249–266.

Appendix-1: Questionnaire Used for the Study

Name (optional):				
Gender:	1. Male	2. Female	3. Others	4. Prefer not to say
Education:	1. High School	2. Diploma	3. Under graduati	ion
	4. Post-graduatio	n		
Occupation :	1. Private sector	2. Public sector	3. Entrepreneurs	
	4. Others, specify	/		

SA

А

Ν

D

SD

FINANCIAL LITERACY

When somebody buys a share of a company, he owns a part of the company

*When somebody buys a share of a company, he has lent money to that company.

The equity shares displays fluctuations (often increase and decrease in price) over time

	SA	А	Ν	D	SD
If I invest my money in different investment avenues (like shares, bonds, deposits) the risk of losing my money decreases.					
INVESTMENT PERFORMANCE					
The return rate of my recent stock investment meets my expectation					
My rate of return is equal to or higher than the average return rate of the market					
I feel satisfied with my investment decisions in the last year (including selling, buying, choosing stocks, and deciding the stock volumes)					
RISK TOLERANCE					
I find it very comfortable to invest in shares.					
I prefer the 5% chance at winning Rs.1,00,000 than a sure amount of Rs.1000 in a game show					
If I have some amount of money, I will prefer 10% in low-risk investments; 40% in medium-risk investment and 50% in high-risk investment.					

Notes: 1. * Reverse coded item 2. SA – Strongly Agree; A – Agree; N – Neutral; D – Disagree; SD – Strongly Disagree