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The Mediating Role of Risk Tolerance in Realtionship Between Heusrtic and Prospect Theory and Investment Performance

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Abstract

The current study aims at investigating the factors affecting investment Performance. Moreover, the mediating effect of risk tolerance was also tested. The study utilized a quantitative research design for that the data was collected using a structured questionnaire. The questionnaire was sent to 200 individuals out of those 189 complete questionnaires were received. The study framework had constructs namely heuristics, Prospect theory, were independent variables while investment performance making was dependent variable and risk tolerance was the mediating variable. All the latent construct were measured using multi-items based on 5-point Likert scales from 5 strongly disagree to 1 strongly disagree. This study set out to find the relationship behavioural factors 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 behavioural factors and investment performance of individual investors and this relationship is partially mediated by risk tolerance.

Keywords: Heuristics; Prospect theory; risk tolerance; Investment performance.

INTRODUCTION

As the investment dynamic changes, so does the importance of decision make, which is a component of behavioural finance. This discipline is concerned with an investor's decision-making criteria. Complete understanding of behavioural finance enables the investor to make the best and most appropriate decision that maximises profit while minimizing risk of loss. Behavior finance is still in its early stages, but it already includes a number of concepts that help to replace traditional financial methods and definitions.

The investment in the stock market is always uncertain because of the nature of stock volatility (Odeh et al., 2019). These uncertainties in the stock market make it more appealing to investors and pique the interest of academics, investors, and professionals. To make an informed investment decision, the investor employs a variety of tools and measures. In case of personal investment by the investor, it is assumed that the market can act differently with the variation of information and other factors that influence the market even the outcome of the market depends on it (Mehta and Chaudhari, 2016).

Investment decisions are critical for any organisation or individual. Different assumptions and factors influence investment decisions, and investment influences many other factors. If the organization makes an appropriate decision of investment it will result in an increase of firm productivity and outcome (Mayfield et al., 2008). Researchers such as Kengatharan and Kengatharan (2014), Qadri and Shabbir (2014), Nofsinger and Varma (2013), also highlighted the positive relationship between behavioural factors and decision making of investment in the stock market by an investor.

Research shows that different tools are affected differently in decision making. Such as daily experiences (Brown and Ryan, 2003), overconfidence (Tapia and Yermo, 2007) and optimism (Gervais et al., 2002); all factors have a positive impact on the investment decision making. On the other hand, there are some researchers that show the negative impact of a different factor on investment decision making such as culture (Saunders and Jones, 1990).

The current study focuses to discover the shortcoming of a prior study by using the following ways. This research focuses on the detailed analysis of the behavioural factors such as heuristic and prospect theory which covers both theoretical and observed involvement of the factor in the decision making of investment. The variety in decision-making is brought on by the variation in daily stock market experiences, and it has a favourable impact on the choice of an investment. The study examines the investment performance of Chennai investors, but it makes a valuable contribution to the body of knowledge in the field of behavioural finance by taking into account mediating factors including the investors ‘risk tolerance.

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2. LITERATURE REVIEW

a) Heuristic and Investment Performance

In order to take appropriate investment decision-making, investor required expertise which is called Heuristic (Gigerenzer and Gaissmaier, 2011). An experienced investor typically sticks to the rule of thumb rather than examining the data. According to the notion of heuristics, it enables the investor to make a choice in a challenging circumstance by applying common sense. By simply adhering to the established rules and criteria, judgement is made simple. Research shows a positive relationship between Heuristic and investment decision making (Bakar and Yi, 2016). Research shows that investors can appropriate decision in a short span of time with the help of heuristic (Brabazon, 2000; Ritter, 2003), History shows different and inconsistence relationship between investment decision making and Heuristic. Such as Bakar and Yi (2016) show a significant and positive relationship. On the other hand, Kengatharan and Kengatharan (2014) research on the Sri Lanka and Malaysia context and reveal negative influence oh heuristic in order to make an investment decision. One more study conduct in Pakistan by using the data of the fund manager.

b) Prospect theory and Investment Performance

Kahneman and Tversky (1979) propose prospect theory as an alternative to expected utility theory (also called Morgenstern–von Neumann utility theory) and provide robust evidences that people's actual decision making does not follow rational calculation. The value function is defined on deviations from a reference point, which is concave for gains with the implication of risk aversion and convex for losses, implying risk seeking.

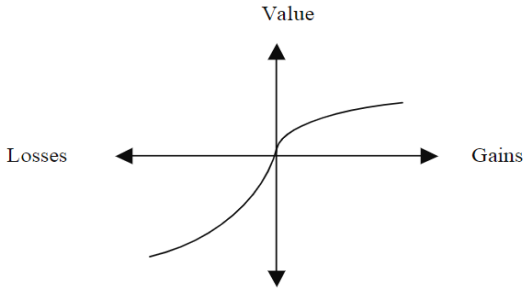

Figure 1. Value function

As shown in figure 1, the value function is an S-shaped curve, concave for gains and convex for losses, suggesting tendencies toward risk aversion when facing gains and toward risk seeking when facing losses. In addition, the curve is generally steeper for losses than for gains, the tendency of loss aversion. Under prospect theory, people underweight the outcome that are merely probable in comparison with the outcome that are obtained with certainty. This tendency, called the certainty effect, contributes to risk aversion in choices involving sure gains and to risk seeking in choices involving sure losses. Behavior in the loss's domain opposite to the behavior in gains domain is called reflection effect.

Prospect theory has already been applied fruitfully to a range of areas including economics, finance, and management (Bernasconi, 1998; Bromiley 1991; Dhami and al-Nowaihi, 2007; Kyle et al., 2006; Odean, 1998; Rieger and Wang, 2006; Shimizu, 2007). The existing literature on prospect theory has focused on behavior of individuals and non-corporate financial issues. Few papers apply prospect theory to the decision making of organizations, but the empirical literature on corporate finance is insufficient. Kyle et al. (2006) solves a liquidation problem for an agent with preferences consistent with prospect theory.

c) Risk Tolerance and Investment Performance

Dickason and Ferreira (2018a) conducted a study whereby they examined which behavioural finance biases are associated with a certain level of risk tolerance and investor personality (risk profiling category). Risk tolerance can be defined as the willingness of individual investors to take investment decisions where there is a desired goal, but the achievement of that goal is uncertain and there is a possibility of loss (Kogan and Wallach (1964) in Grable, 2008).

Risk tolerance affects the decisions of investors who invest their savings for short-term and long-term goals. Investors with various levels of risk tolerance behave differently when making investment decisions regarding various investment

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avenues. Furthermore Cordell (2001) divides investment risk tolerance into four elements: attitudes towards risk, financial ability to bear risk, knowledge, and the tendency for secrecy. Risk tolerance is not static but changes all the time. In good times, when asset prices rise, people tend to have a higher risk tolerance. On the other hand, in bad times, risk tolerance decreases to a low level (Grable et al., 2006). However, Roszkowski (1998) in Grable and Lytton (2001) states that to assess a person's risk tolerance is through a process that is not easy. This is because risk tolerance is difficult to understand, and the concept is unclear.

d) Age and Investment Performance

Research shows that the investors that are older make an inappropriate investment decision. Adult age ranges from 80 to 90 have medical issues which make them unstable for better decision making. That study further reveals that the old age investor usually makes problem in making transaction such as transfer of fund and use of credit card. The problem has U-shaped outline i.e. the cost reduce at the age of 53 (Kabra et al., 2010).

Study conducts in the United States to test the relationship of age and decision making of investment. Researcher use sample of investor ageing for more than 60 years. The result shows that investors over 60 years are poor in financial education. Whereas, the confidence has no link with the growing age (Finke et al., 2016). Above discussion shows that there is the impact of age in making the investment decision making and it creates the gap for the current research to check the moderating effect of age in investment decision making.

d) Gender and Investment Performance

Study conducts to investigate the factors that influence investment performance making in the different age group of male and female. The planning of investment varies from person to person. The result shows that gender has an impact on the investment made. Most importantly gender creates a difference in taking the risk margin (Agarwal *et al.*, 2009).

Another study reveals the gender effect on the financial ability of a firm. Research focus on the CFO gender and its capability to conduct the financial transaction. The result shows that woman CFO is usually risk averse as compare to the man CFO. It concludes that male CFO is more effective in making investment policies (Francis et.al 2015). Research conduct in the US shows that women usually invest in a long period of time because on average women live longer than man (Montford and Goldsmith, 2016).

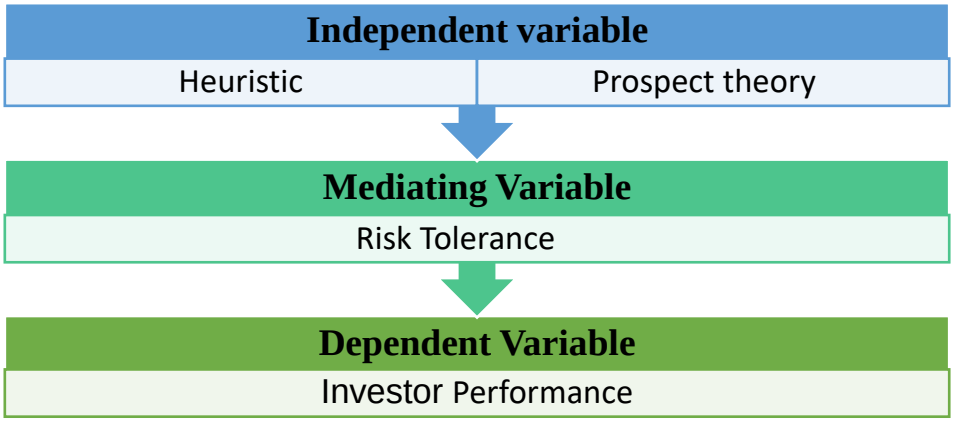

Figure-1. Conceptual Framework

HYPOTHESES OF THE STUDY

This study tests the following Null hypotheses:

H1: There is a no relationship between the heuristics behavior of investors and investment performance.

H2: There is no significant relationship between the prospect theory and investment performance.

H3: There is no significant association between demographic factors(age and occupation) on investment performance

H4: Risk tolerance does not mediate the relationship between behavioural factors and investment performance.

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RESEARCH METHODS

This research study is explanatory in nature. Data were collected through the convenience sampling method from investors in Chennai. The data were collected through online Google forms and the sample size for the study is 189.

ANALYSIS AND INTERPRETATION

a) Reliability Analysis

Table1: Reliability Test

Variables	No of items	Cronbach alpha
Heuristic's factors	10	0.812
Prospect theory	7	0.820
Risk tolerance	7	0.844
Investment performance	5	0.845
Overall	**29**	**0.830**

Interpretation:

Cronbach's alpha is an estimate of the score reliability based on the internal consistency among the [item] scores. All indicator loadings of the reflectively measured constructs are well above the threshold value of 0.708 (Hair, Risher, Sarstedt, & Ringle, 2019), which suggests sufficient levels of indicator reliability. Nunnally (1978, p.245) suggests that Cronbach's alpha should be at least 0.7 to make sure that the measurements are reliable. From the above table, it clearly shows that the alpha values of all variables are more than 0.7. Hence the reliability is the questions are proved.

b) Correlation analysis

Table 1.1

Correlations

		HF v1	HF V2	HF v3	HF 4	HF v5	HF v6	HFV7	HF v8	HF v9	HF v10	tIP
HF v1	Pearson Correlation	1	.569**	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	.959**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
HF V2	Pearson Correlation		1	.569**	.569**	.569**	.569**	.569**	.569**	.569**	.569**	.587**
	Sig. (2-tailed)			.000	.000	.000	.000	.000	.000	.000	.000	.000
HF v3	Pearson Correlation			1	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	.959**
	Sig. (2-tailed)				.000	.000	.000	.000	.000	.000	.000	.000
HF 4	Pearson Correlation				1	1.000**	1.000**	1.000**	1.000**	1.000**	1.000**	.959**
	Sig. (2-tailed)					.000	.000	.000	.000	.000	.000	.000
HF v5	Pearson Correlation					1	1.000**	1.000**	1.000**	1.000**	1.000**	.959**
	Sig. (2-tailed)						.000	.000	.000	.000	.000	.000
HF v6	Pearson Correlation						1	1.000**	1.000**	1.000**	1.000**	.959**
	Sig. (2-tailed)							.000	.000	.000	.000	.000
HFV7	Pearson Correlation							1	1.000**	1.000**	1.000**	.959**
	Sig. (2-tailed)								.000	.000	.000	.000
HF v8	Pearson Correlation								1	1.000**	1.000**	.959**
	Sig. (2-tailed)									.000	.000	.000
HF v9	Pearson Correlation									1	1.000**	.959**
	Sig. (2-tailed)										.000	.000
HF v10	Pearson Correlation										1	.959**
	Sig. (2-tailed)											.000
tIP	Pearson Correlation											1
	Sig. (2-tailed)											

**. Correlation is significant at the 0.01 level (2-tailed).

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http://eelet.org.uk

Interpretations

At the bottom of the „Correlations" table (Table 1) is displayed "**Correlation is significant at the 0.01 level (2-tailed)". This implies that the Pearson's correlation coefficient for all heuristics factors is above 0.05 with N of 189 which is statistically significant at 0.01 level (p = 0.000), which of course is also significant at 0.05 level. Thus, the null hypothesis rejected. In other words, There is a significant relationship between the heuristics behavior of investors and investment performance.

Table 1.2

Correlations

		PT v1	PT v2	PT v3	PT v4	PT v5	PT v6	PT v7	tIP
PT v1	Pearson Correlation	1	.282**	.339**	.419**	.290**	.248**	.053	.219**
	Sig. (2-tailed)		.000	.000	.000	.000	.001	.467	.002
PT v2	Pearson Correlation		1	.478**	.537**	.671**	.597**	-.012	.479**
	Sig. (2-tailed)			.000	.000	.000	.000	.869	.000
PT v3	Pearson Correlation			1	.622**	.654**	.527**	-.040	.507**
	Sig. (2-tailed)				.000	.000	.000	.582	.000
PT v4	Pearson Correlation				1	.732**	.472**	-.034	.550**
	Sig. (2-tailed)					.000	.000	.647	.000
PT v5	Pearson Correlation					1	.657**	-.050	.601**
	Sig. (2-tailed)						.000	.491	.000
PT v6	Pearson Correlation						1	-.036	.505**
	Sig. (2-tailed)							.626	.000
PT v7	Pearson Correlation							1	-.141
	Sig. (2-tailed)								.054
tIP	Pearson Correlation								1

**. Correlation is significant at the 0.01 level (2-tailed).

Interpretations

At the bottom of the „Correlations" table (Table 2) is displayed "**Correlation is significant at the 0.01 level (2-tailed)". This implies that the Pearson's correlation coefficient for all prospect theory factors is above 0.05 with N of 189 which is statistically significant at 0.01 level (p = 0.000) and PT 6 (I ignore the connection between different investment possibilities.) and PT 7 (I save a part of my income for investing in the share market) shows a negative correlation. Thus,

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http://eelet.org.uk

the null hypothesis is rejected. In other words, There is a significant relationship between the prospect theory of investors and investment performance.

c) Independent Sample Test

Table 1.3

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
IP v1	Equal variances assumed	2.034	.156	-2.065	144	.041	-.482	.233	-.943	-.021
	Equal variances not assumed			-2.031	86.851	.045	-.482	.237	-.954	-.010
IP v2	Equal variances assumed	.044	.834	-.737	144	.462	-.142	.193	-.523	.239
	Equal variances not assumed			-.762	98.402	.448	-.142	.186	-.512	.228
IP v3	Equal variances assumed	.470	.494	-2.110	144	.037	-.483	.229	-.936	-.031
	Equal variances not assumed			-2.190	99.489	.031	-.483	.221	-.921	-.045
IP v4	Equal variances assumed	2.034	.156	-2.065	144	.041	-.482	.233	-.943	-.021
	Equal variances not assumed			-2.031	86.851	.045	-.482	.237	-.954	-.010
IP v5	Equal variances assumed	2.202	.140	-2.028	144	.044	-.472	.233	-.932	-.012
	Equal variances not assumed			-1.992	86.493	.050	-.472	.237	-.943	-.001

Levene's test statistic follows a standard statistical distribution called an F distribution. Higher values of the F-statistic are associated with a lower likelihood that the sample did indeed come from a population in which the null hypothesis is true. In this case the F statistic has for IP v1, v4, v5 is 2.034 and v3 is 0.470 SPSS calculates the corresponding p-value for this statistic which is .045 and .031. This p-value is less than 0.05 gives us enough evidence to reject the null hypothesis and to assume that the two groups have different variances. By the significant value, it shows that there is a significant association between gender and investor performance.

Dependent Variable	**(I) 2.Age**	**(J) 2.Age**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**
IP v1	20-30	31-40	-.979*	.307	.009
		41-50	-1.038*	.312	.006
		above 50	-.439	.491	.808
	31-40	20-30	.979*	.307	.009
		41-50	-.059	.192	.990
		above 50	.540	.425	.582
	41-50	20-30	1.038*	.312	.006

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		31-40	.059	.192	.990
		above 50	.599	.428	.501
	above 50	20-30	.439	.491	.808
		31-40	-.540	.425	.582
		41-50	-.599	.428	.501
IP v2	20-30	31-40	-.258	.252	.736
		41-50	-.491	.256	.224
		above 50	.018	.403	1.000
	31-40	20-30	.258	.252	.736
		41-50	-.233	.158	.452
		above 50	.276	.349	.858
	41-50	20-30	.491	.256	.224
		31-40	.233	.158	.452
		above 50	.509	.352	.471
	above 50	20-30	-.018	.403	1.000
		31-40	-.276	.349	.858
		41-50	-.509	.352	.471
IP v3	20-30	31-40	-.811*	.308	.045
		41-50	-1.174*	.312	.001
		above 50	-.497	.492	.743
	31-40	20-30	.811*	.308	.045
		41-50	-.363	.192	.236
		above 50	.314	.425	.881
	41-50	20-30	1.174*	.312	.001
		31-40	.363	.192	.236
		above 50	.677	.429	.393
	above 50	20-30	.497	.492	.743
		31-40	-.314	.425	.881
		41-50	-.677	.429	.393
IP v4	20-30	31-40	-.979*	.307	.009
		41-50	-1.038*	.312	.006
		above 50	-.439	.491	.808
	31-40	20-30	.979*	.307	.009
		41-50	-.059	.192	.990
		above 50	.540	.425	.582
	41-50	20-30	1.038*	.312	.006
		31-40	.059	.192	.990
		above 50	.599	.428	.501
	above 50	20-30	.439	.491	.808
		31-40	-.540	.425	.582
		41-50	-.599	.428	.501
IP v5	20-30	31-40	-.979*	.306	.009
		41-50	-1.024*	.311	.007
		above 50	-.439	.490	.807
	31-40	20-30	.979*	.306	.009
		41-50	-.045	.191	.995
		above 50	.540	.424	.580
	41-50	20-30	1.024*	.311	.007
		31-40	.045	.191	.995

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		above 50	.586	.427	.519
	above 50	20-30	.439	.490	.807
		31-40	-.540	.424	.580
		41-50	-.586	.427	.519

Interpretation

The table shows that there is no siginificant influence of age on investment performance (N=189). Investor perfomance includes 5 groups (IP v1 to IP v5)

The ANOVA was not significant because value is higher than 0.05 so we accept null hypotheis which shows that there is no significant difference between Age and Investor Performance

Table 1.5

Multiple Comparisons				
Dependent Variable: tIP Tukey HSD				
(I) 6.Occupation	(J) 6.Occupation	Mean Difference (I-J)	Std. Error	Sig.
Private Organization	Govt. Employee	-.11400	.25956	.992
	Business	-.34000	.27949	.742
	Professional	-1.08103*	.20719	**.000**
	Students	-1.47381*	.22357	**.000**
Govt. Employee	Private Organization	.11400	.25956	.992
	Business	-.22600	.31091	.950
	Professional	-.96703*	.24795	**.001**
	Students	-1.35981*	.26179	**.000**
Business	Private Organization	.34000	.27949	.742
	Govt. Employee	.22600	.31091	.950
	Professional	-.74103*	.26874	**.050**
	Students	-1.13381*	.28156	**.001**
Professional	Private Organization	1.08103*	.20719	**.000**
	Govt. Employee	.96703*	.24795	**.001**
	Business	.74103*	.26874	**.050**
	Students	-.39278	.20998	.337
Students	Private Organization	1.47381*	.22357	**.000**
	Govt. Employee	1.35981*	.26179	**.000**
	Business	1.13381*	.28156	**.001**
	Professional	.39278	.20998	.337

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Interpretation

The table shows that there is siginificant influence of occupation on investment performance (N=189). Occupation includes 5 groups (Private Organization, Govt. Employee, Business, Professional, Students)

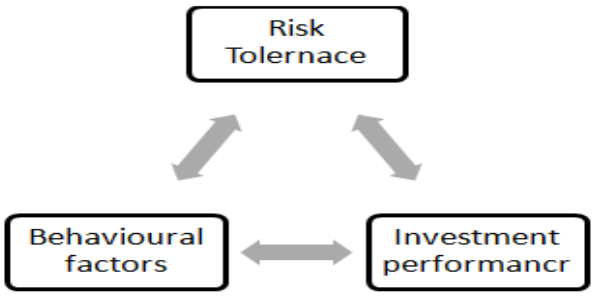
The ANOVA was significant at F where the value falls below 0.05 so we reject null hypotheis. It is concluded that there is significant difference between occupation and investor performance

Mediation Analysis

In order to explore the mediating effects of the risk tolerance in the relationship between behavioural factors and investment performance, the path analysis is conducted Mediation Results of Risk Tolerance Hypothesis Relationship Direct Effect Indirect Effect Total Effect Mediation Result Decision

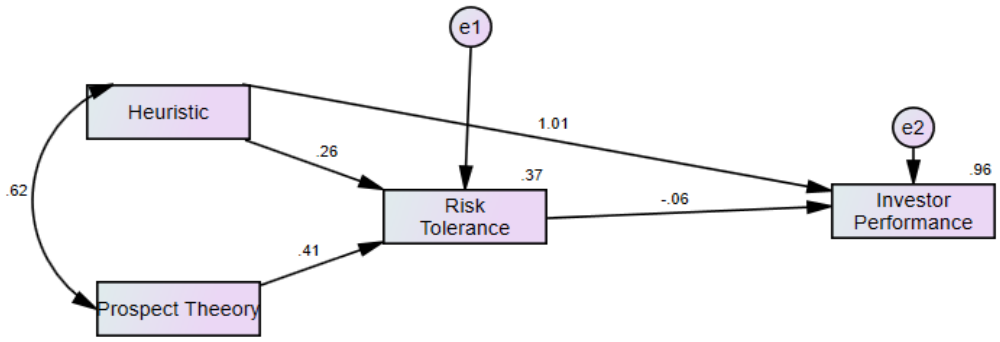
Hypothesis	Relationship	Direct Effect	Indirect Effect	Total Effect	Mediation	Result Decision
H4	Behavioural factors → Risk Tolerance →Investment Performance	0.66*	0.12*	0.78*	Partial	Supported

Note: * denotes p < 0.01



It is inferred from Table, that the direct effect is 0.66, the indirect effect is 0.12 and the total effect is 0.78. 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 Behavioural factors (i,e) heuristics behaviour and prospect theory 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.

STRUCTURAL EQUATION MODEL



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The measurement model is specified in a way that the four factors namely the Heuristics factor, Prospect theory, Risk tolerance and Investor performance correlate with each other. All the four factors are showing association with their respective items. The three factors are positively correlated with each other with a maximum correlation of 1.01 and there is a negative correlation between risk tolerances an investment performance.

Table 4.3.11 Model fit summary of Structural Equation Model

Indices	Value	Suggested value
Chi-square value	0.936	P>0.05
DF	1	
P value	0.326	> 0.05 (Hair et al., 1998)
CMI/DF	0.936	< 5.00 (Hair et al., 1998)
GFI	0.997	> 0.90 (Hu and Bentler, 1999)
AGFI	0.975	> 0.90 (Hair et al. 2006)
NFI	0.999	> 0.90 (Hu and Bentler, 1999)
CFI	1.000	> 0.90 (Daire et al., 2008)
RMR	0.002	< 0.08 (Hair et al. 2006)
RMSEA	0.000	< 0.08 (Hair et al. 2006)

From the above table it is found that the calculated P value is 0.326 which is greater than 0.05 which indicates perfectly fit. Here Goodness of Fit Index (GFI) value (0.997) and Adjusted Goodness of Fit Index (AGFI) value (0.975) is greater than 0.9 which represent it is a good fit. The calculated Normed Fit Index (NFI) value (0.999) and Comparative Fit Index (CFI) value (1.000) indicates that it is a perfectly fit and also it is found that Root Mean square Residuals (RMR) and Root Mean Square Error of Approximation (RMSEA) value is 0.002 which is less than 0.08 which indicated it is perfectly fit.

CONCLUSION

This research work appears to be the first study to explore the mediating role of risk tolerance in the relationship between behavioural factors 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. 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. 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.

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