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A Study on Risk taking Behaviour of Individuals in North Karnataka region

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Abstract

The experimental study was undertaken to investigate the risk taking behavior of the individuals in North Karnatakaregion.The study emphasizes on the experimental design based on the Cumulative Prospect Theory (Tversky and Kahneman, 1992). The study focuses on 12 tasks broadly classified to understand the behaviour of individual in domains of gains and losses, the over weighting of low probabilities and the loss aversion and the study also incorporates the various demographic factors like age, gender, income level which has an effect on the risk taking ability of the individual. The results of the study indicates that the individuals in North Karnataka behave in tandem with assumptions of the Cumulative Prospect Theory except a few exceptions which are due to the various demographic factors and are discussed in detail in this paper.

Keywords: *-Value function, probability weighting function, loss aversion, and cumulative prospect theory*

INTRODUCTION

Investment is the time, matter and energy disbursed for attainment of benefits in future. The history of investments dates back to the 1700 BC in the Code of Hammurabi which provides a legal

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framework for investment (Staheli 2013). In the early 1900s the term speculators was coined to represent those people who invested money in securities, bonds, etc. 1950s, was an era when the term investment was used; while at present the investment is a general term used for any kind of cash outflows done for generating future benefits whereas the term speculations is used more specifically for high risk ventures.

Investment has become an integral part of individual's life and every individual is looking out for various avenues for investment, individuals seek guidance for brokers, financial advisors other investors and experts for investment decisions, but ultimately the decision on where to invest? When to invest? How much to invest? Depends on the individuals behaviour which is dominated by factors like loss and risk aversion, risk seeking and neutral, which shows that the individual will invest based on his risk appetite and his expectation for returns.

PROSPECT THEORY (PT) AND CUMULATIVE PROSPECT THEORY (CPT)

In the Behavioral Finance Paradigm CPT (Kahneman and Tversky, 1992) is regarded as one of the most imperative theories, the CPT has provided support for behavioural researchers to understand individual decision-making process under the conditions of uncertainty.

The CPT is the second version of PT (Kahneman and Tversky, 1979). Together PT and CPT are regarded asthe best theories to explain individual behaviour under risk. There are many theories like Expected Value, Expected Utility theory which has contributed a lot to the decision process under uncertainty. Expected value (EV) is calculated by finding the product between the payoff and its probability. EV model fails in predicting the final choice as it is also dependent on other psychological factors. During the course of his experiments, Bernoulli identifies that the value a person attaches to an outcome can be influenced by such factors as the likelihood of winning, or probability, etc.

In 1979, Kahneman and Tversky provided an alternative, empirically supported theory of choice, so-called Prospect Theory, one that accurately describes how people actually go about making their decision. In short, the theory predicts that individuals tend to be risk averse in a domain of gains and relatively risk-seeking in a domain of losses. However, there are some theoretical problems in PT. The main

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problem is that the functional form of PT violates "stochastic dominance" (Kahneman and Tversky, 1979). Stochastic dominance requires that a shift of probability mass from bad outcomes to better outcomes leading to an improved prospect. The theoretical problems have recently been resolved in a new version of PT, called Cumulative Prospect Theory (CPT) that was introduced by Tversky and Kahneman (1992); in particular, CPT satisfies stochastic dominance.

This study focusses on studying behaviour of the individuals in North Karnataka when faced with conditions of Risk and Uncertainty.

RESEARCH DESIGN

The research is designed in the way to suit the purpose of the study, by considering the most appropriate and feasible sample size and tools and techniques for analyzing the data collected through an experimental design which is discussed in the next part of the report.

Sample size:The Sample size choose for study is 100 individuals from North Karnatakaregion.The samples chosen for the study comprises of individuals who have a minimum of 1 year experience in investment, proportional samples of male and female population are collected for making proper inferences. The sample chosen for the study are individual investors who invest for themselves.

Hypothesis

To understand the behaviour of individuals and its consistency with the assumptions of CPT we are assuming the following Hypothesis. These are tested based on the results and discussed in the further sections

Hypothesis are based onvalue function, probability weighting function, loss aversion discuss these then frame hypothesis

The following hypothesis are proposed to be tested in the course of the research, these hypothesis are not extensive and a few more hypothesis may be added as the research progresses and need arises.

H1: Age, Gender and Income level do not impact shape of value function

H2: Age, Gender and Income level do not impact probability weighting function

H3: Age, Gender and Income level do not impact loss aversion

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H4: Age, Gender and Income level do not impact the overall elements of CPT (Value function, probability weighting function and loss aversion)

The Experimental tasks are adopted from working paper titled, "Stochastic Dominance and Cumulative Prospect Theory" (ManelBeucellsAlibés and Franz H. Heukamp, 2007) which consist of 12 tasks divided as per the hypothesis mentioned above, Task 1-3 for testing H1, Task 4-5 for H2, Task 6-8 for H3, and Task 9-12 for H4. Along with these 12 tasks, 3 questions relating to the moderating variables (Age, Gender and Income Level) have being considered in the questionnaire.

RESULTS AND DISCUSSION

As per the experiments conducted, table 3.1 shows the analysis of the responses provided by the subjects under study for task 1-3 which intends to study the shape of the value function.

Results of Task I – III

Table 1 Shape of the value function (H1) (Task I to Task III)

	X		Y		Choice		
	Gain / Loss	**Probability**	**Gain / Loss**	**Probability**	**N**	**X[%]**	**Y[%]**
ASK I	**0** **000** **000** **000**	**10%** **40%** **40%** **10%**	**3000**	**50%** **50%**	**100**	**78**	**22**
	X		**Y**		**Choice**		
	Gain / Loss	**Probability**	**Gain / Loss**	**Probability**	**N**	**X[%]**	**Y[%]**
ASK II	**-3000**	**50%** **50%**	**-3000** **-2000** **-1000**	**10%** **40%** **40%** **10%**	**100**	**42**	**58**
	X		**Y**		**Choice**		
	Gain / Loss	**Probability**	**Gain / Loss**	**Probability**	**N**	**X[%]**	**Y[%]**
ASK III	**-6000** **3000** **4500**	**1/3** **1/2** **1/6**	**-6000** **-3000** **4500**	**1/6** **1/3** **1/2**	**100**	**75**	**25**

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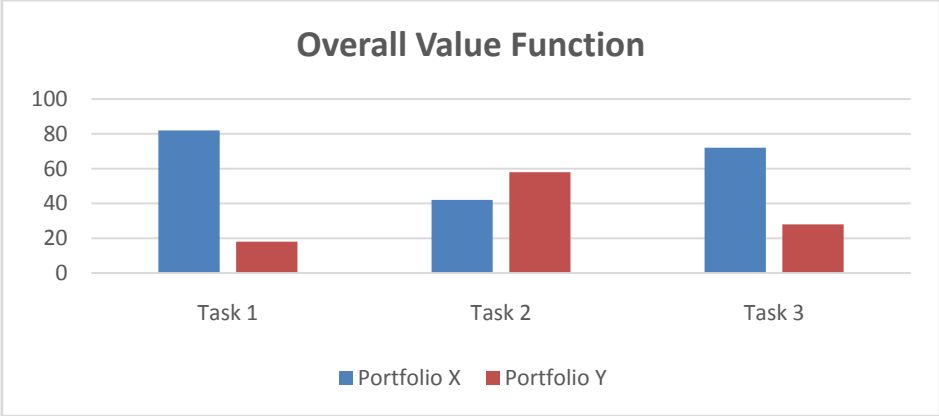


Fig 1: Graphical representation of the responses towards task 1-3 for shape of value function

The results of task I –III are depicted in the rightmost column of table 1 in Task I portfolio X is preferred over Y which indicates that the value function is not convex for gains, in Task II Y is preferred over X by a very small margin, which indicates that value function is concave for losses, and in Task III portfolio X is preferred, which shows that the value function is concave between lower probabilities.

Results of Task IV– V

Similar study has been carried to build Table 2 which includes Tasks 4 & 5 and is intended to analysis the responses towards the shape of probability weighting function.

Table 2 Shape of the Probability Weighting Function(H2) (Task IV and Task V)

	X		**Y**		**Choice**		
TASK IV	**Gain / Loss**	**Probability**	**Gain / Loss**	**Probability**	**N**	**X[%]**	**Y[%]**
	-6000	**6%**	**6000**	**2%**	**100**	**63**	**37**
	3000	**2%**	**3000**	**48%**			
	4500	**%**	**500**	**50%**			
	X		**Y**		**Choice**		
TASK V	**Gain / Loss**	**Probability**	**Gain / Loss**	**Probability**	**N**	**X[%]**	**Y[%]**
	-6000	**1/4**	**-3000**	**1/2**	**100**	**28**	**72**
	3000	**3/4**	**4500**	**1/2**			

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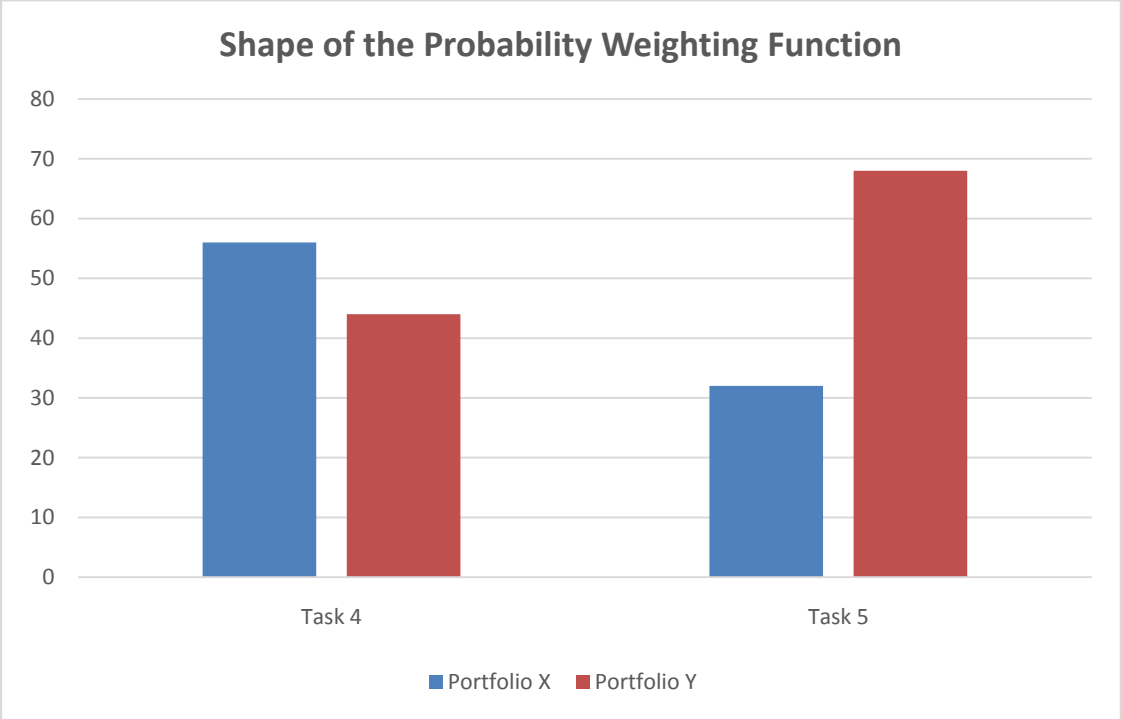


Fig 2: graphical representation of the responses towards task 4-5 for shape of value function

The results of task IV –V are illustrated in therightmost column of table 2 in Task IV portfolio X is preferred over Y which shows that the probability weighting function is convex from for higher probabilities, in Task V portfolio Y is preferred over X which indicates that the probability weighting function is convex near the origin the is at lower probabilities.

Results of Task VI– VIII

Loss aversion is another element which is studied through these experiments, table 3.3 includes task 6-8 which analysis the responses of the subjects towards loss aversion.

The results of task VI –VIII are illustrated in the rightmost column of table 3.3 in Task VI and VIIportfolio Y is preferred over X which shows that the value function does not incorporate loss aversion, in Task VIII portfolio X is preferred which shows that value function incorporates loss aversion as the stake increases.

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Table 3 Loss aversion (H3) (Task VI and Task VIII)

	X		Y		Choice		
TASK VI	**Gain / Loss**	**Probability**	**Gain / Loss**	**Probability**	**N**	**X[%]**	**Y[%]**
	-1000	**10%**	**-1000**	**50%**	**100**	**45**	**55**
		80%					
	1000	**10%**	**1000**	**50%**			
	X		**Y**		**Choice**		
TASK VII	**Gain / Loss**	**Probability**	**Gain / Loss**	**Probability**	**N**	**X[%]**	**Y[%]**
	-3000	**0%**	**-3000**	**50%**	**100**	**45**	**55**
		0%					
	000	**0%**	**3000**	**50%**			
	X		**Y**		**Choice**		
	Gain / Loss	**Probability**	**Gain / Loss**	**Probability**	**N**	**X[%]**	**Y[%]**
	-3000	**20%**	**-3000**	**50%**	**100**	**55**	**45**
	-1000	**30%**					
	1000	**0%**					
ASK VIII	**3000**	**0%**	**3000**	**50%**			

Results of Task IX– XII

Similarly, table 4 comprises of task 9-12 which indicates the analysis of the responses towards overall elements of CPT (Value function, probability weighting function and loss aversion)

Table 4 Overall CPT (H_4) (Task IX and Task XII)

	X		Y		Choice		
TASK IX	**Gain / Loss**	**Probability**	**Gain / Loss**	**Probability**	**N**	**X[%]**	**Y[%]**
	-500	**10%**	**-500**	**30%**	**100**	**38**	**62**
	0	**40%**	**500**	**20%**			
	1500	**40%**	**000**	**20%**			
	2000	**10%**	**2000**	**30%**			
	X		**Y**		**Choice**		
	Gain / Loss		**Gain / Loss**		**N**		

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TASK X	Probability		Probability		X[%]	Y[%]	
	-2000	30%	-2000	10%	100	56	44
			-1000	60%			
	0	60%					
	1000	10%	1000	30%			
		X		Y			Choice
TASK XI	Gain / Loss	Probability	Gain / Loss	Probability	N	X[%]	Y[%]
	-5000	15%	-5000	5%	100	59	41
	-3000	30%	-1000	0%			
	0	20%					
	3000	20%					
	5000	15%	000	35%			
		X		Y			Choice
TASK XII	Gain / Loss	Probability	Gain / Loss	Probability	N	X[%]	Y[%]
	-1500	20%	-1500	50%	100	63	37
	1500	30%					
	4500	30%	500	50%			

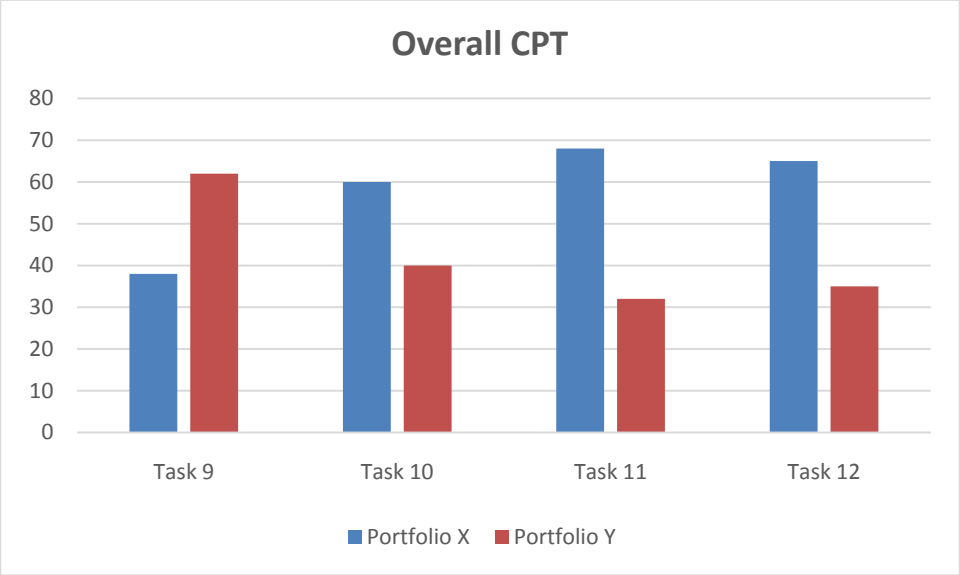


Fig 3: graphical representation of the responses towards task 9-12 for shape of value function

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The results of task IX –XII are illustrated in the rightmost column of table 5 in Task IX portfolio Y is preferred which suggests that the subjects are not in line with the predictions of CPT this may be because the subjects with low income have chosen portfolio Y which are a maximum percentage of the total subjects, but in task X, XI and XII portfolio X is preferred over Y which confirms that the predictions of CPT hold good on the subjects.

The results of this study can be summarized using the following table 5

Table 5 Overall summary of the study

Task	Hypothesis	Result	Conclusion
I	Value function is convex for Losses and Concave for gains	Accepted	Consistent with the shape of value function as per CPT
II	Value function is convex for Losses and Concave for gains	Rejected /Mixed	Not consistent with the shape of value function as per CPT
III	Value function is convex for Losses and Concave for gains	Accepted	Consistent with the shape of value function as per CPT
IV	Probability weighting function is concave near origin and convex far from origin	Accepted	Consistent with CPT, overestimating of lower probabilities
V	Probability weighting function is concave near origin and convex far from origin	Rejected	Not consistent with CPT, overestimating of lower probabilities
VI	Individuals are loss aversive	Rejected	Loss aversion fails
VII	Individuals are loss aversive	Rejected	Loss aversion fails
VIII	Individuals are loss aversive	Accepted	Consistent with loss aversion
IX	Overall CPT	Rejected	CPT Fails
X	Overall CPT	Accepted	Consistent with CPT
XI	Overall CPT	Accepted	Consistent with CPT
XII	Overall CPT	Accepted	Consistent with CPT

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Correlation Analysis

The correlation analysis provides an insight into the relation between the moderating variables and the elements of CPT. Table 3.6 indicates the relationship between the various moderating variables (Age, Gender, and Annual Income) with the dependent variables (value function, probability weighting function and loss aversion).

Table 6 shows the correlation between the various variables under study, it is found that age and annual income of the individuals are positively correlated to the elements of CPT, whereas gender is negatively correlated with the elements of CPT.

Regression

Regression analysis is used to understand the strength of relationship between the moderating variables (Age, Gender, and Annual Income) with the dependent variables (value function, probability weighting function and loss aversion). Table 7 to 10 specifies the strength of relation between the variables as mentioned above and also shows the p-values in order to accept or reject the hypothesis as framed in 2.2.

Table 6 correlation analysis

	Age (Years)	**Gender**	**Annual Income**	**Overall Value Function**	**Overall Probability Weighting Function**	**Overall Loss aversion**	**Overall CPT**
Age (Years)	1						
Gender	-0.21	1					
Annual Income	0.22	-0.01	1				
Overall Value Function	0.25	-0.25	0.05	1			
Overall Probability Weighting Function	0.08	-0.11	0.14	0.03	1		
Overall Loss aversion	0.14	-0.10	0.26	-0.09	0.02	1	
Overall CPT	0.13	-0.23	0.21	0.06	0.30	0.10	1

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Hypothesis testing

H1: Age, Gender and Income level do not impact shape of value function

Table 7 regression analysis for H_1

Variables	**P- value**
Age (Years)	0.06711531
Gender	0.04445638
Annual Income	0.90954378

In table 7, considering the significant value of 0.05, the P-value for Gender 0.04 is less than the significant value, gender has asignificant impact on the value function whereas the P-value for age is 0.06 and annual income is 0.909 are less than the significant value,they do not have an impact on the value function. This indicates that male and female individuals react to the situations of losses and gain differently. Whereas irrespective of the age and annual income the individuals behave in the same manner when faced with situation of gain and losses.

H2: Age, Gender and Income level do not impact probability weighting function

Table 8 regression analysis for H2

Variables	**P- value**
Age (Years)	0.71326113
Gender	0.32515722
Annual Income	0.25110799

In table 8, since the P-value for Age is 0.713, Gender is 0.325 and Annual income is 0.251, is greater than significant value 0.05, it shows that age, gender and annual income do not have an impact on the probability weighting function. This indicates that irrespective of the age, gender and annual income the individuals behave in the same manner as per the assumptions of CPT.

H_3: Age, Gender and Income level do not impact Loss aversion

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Table 9 regression analysis for H_3

Variables	P- value
Age (Years)	0.76498254
Gender	0.43420256
Annual Income	0.00909044

In table 9,considering the P-value for Age is 0.765 and Gender is 0.434, is greater than significant value 0.05, it shows that age, gender do not have an impact on the loss aversion. Whereas the P-value for annual income is 0.0091 which is less than the significant value indicates that annual income has an impact on the loss aversion. This shows that age, gender do not impact the behaviour of individuals towards loss aversion but loss aversion element will vary with the varying levels of annual income.

H_4: Age, Gender and Income level do not impact the overall elements of CPT

Table 10 regression analysis for H_4

Variables	P- value
Age (Years)	0.584829247
Gender	0.024864392
Annual Income	0.080380919

In table 10,the P-value for Age is 0.585 and annual income is 0.0804 is greater than significant value 0.05, it shows that age and annual income do not have an impact on the overall elements of CPT. Whereas the P-value for gender is 0.025 which is less than the significant value indicates that gender has an impact on the overall elements of CPT. This shows that age, annual incomehave no impact on the behaviour of the individuals and are in tandem with the assumptions of CPT but gender will impact the behaviour of the individuals when faced with situation of losses and risk.

CONCLUSION

The study suggests that most of the subjects chosen for the study are in line with the predictions of CPT but there are certain situations where the predictions of the CPT model are rejected,viz. Value function is convex for Losses and Concave for gains, Probability weighting function is concave near origin and convex far from origin, Individuals are loss aversive this is due to the various other demographic factors that have affected the responses of the subjects considered for the study.

The correlation analysis shows that age and annual income are positively related to the elements of CPT whereas gender is negatively related to the elements of CPT.

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According to the regression analysis gender has a significant impact on the shape of the value function and over all elements of CPT and annual income has a significant impact in the loss aversion element of CPT in all other cases the age, gender and annual income have no significant impact on the elements of CPT. The results presented in this paper are purely based on the sample responses for the experimental studyand need to be verified with larger sample size.

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