



Impact of Demographic Variables and Risk Tolerance on Investment Decisions: An Empirical Analysis

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ABSTRACT

This empirical study explores the investment pattern and financial decision making of individuals and their risk tolerance. The study has adopted financial risk tolerance scale proposed by Grable and Lytton to measure the different dimensions of financial risk. Kendall's W test is used to ascertain the preferred source of investment of individuals. Chi-square test is used to determine the demographic variables and their relationship with investment pattern. The study reveals that gender has an impact on the investment pattern and decision making of respondents.

Keywords: Risk Tolerance, Demographics, Investment Pattern, Investment Decision

JEL Classifications: GO2, G32

1. INTRODUCTION

The study is about exploring into the role of demographics in financial investment decisions by individuals and their financial risk tolerance. There are various factors which effect the financial decision making of an individual of which demographic variables like age, gender and occupation and personal financial risk tolerance are the most important one. Risk tolerance is a crucial factor that influences a wide range of financial decisions (Roszkowski and Snelbecker, 1990). Risk tolerance is defined as individuals willingness to engage in a financial activity whose outcome is uncertain (Duda et al., 2010). Risk tolerance is the willingness to engage in behaviour where there is a desirable goal but attainment of goal is uncertain and accompanied by probability of loss (Kogan and Michael, 1964). The study has adopted the financial risk tolerance scale proposed by Grable and Lytton (1999). The objective of any financial investment is to get good returns. In reality it is observed that many a times there is a gap between individual's perceived return and actual return. The mistake lies in the decision making process which is influenced by the risk tolerance of an individual. Research indicates that people tend to overestimate their actual level of risk tolerance because of the desire to appear socially acceptable. Moreschi (2005) concluded in his study that only 4% of the respondents

were able to accurately evaluate their own tolerance for risk. 73% underestimated their risk tolerance, while 23% of them have overestimated it. The investor ends up making irrational decisions as a result of this. The area of research that examines the issues related to investor psychology and people making irrational decisions is behavioural finance.

There is a little research done to examine the impact of demographics like age, gender occupation on investment pattern and decision making process and the role of risk tolerance.

2. REVIEW OF LITERATURE

Heena (2015) examined the relationship between demographic variables and personality traits on investors' attitude towards risk. The author ascertained that there is a positive relationship between income and risk tolerance level. Education and personality types were found to be irrelevant and did not have any impact in determining investor's attitude towards risk.

Raza Ahmed et al. (2013) conducted a study in Pakistan to understand the relationship and impact of demographic variables on investment decisions. The findings of their study were men and youngsters are risk takers compared to woman and the older

generation. Another interesting aspect of their findings are though men and youngsters invest in risky investments but they do it with lot of reluctance because of the scarcity of financial resources.

Abhijeet and Dinesh (2010) examine the psychological biases influencing the investors' behaviour. The psychological factors considered while dealing with investment related issues are over confidence bias, sensitivity to rumours, conservatism bias and representativeness bias. The study concludes that increase in the information diffusion frequencies and greater transparency will be helpful to the investor.

Kabra et al. (2010) examines the factors that influence behaviour and investment risk tolerance and decision making process. The target customers are the investors who invest regularly. These respondents were classified based on the factors like age, gender, profession and annual income. Individual investors investment according to their risk preference. Risk-averse investors consider multiple factors and seek diversified information before executing investment transaction. This study concludes that the investors' age and gender predominantly influences the risk taking capacity of the investors.

Gilliam and Grable (2010) analysed how well married men and women were able to estimate their financial risk tolerance. The author examines gender based estimation bias which relates to household decisions that involves financial risk. The author identifies that older respondents were more likely to underestimate their financial risk tolerance because of past experience. Respondents who were educated were more likely to overestimate their tolerance for taking financial risks might be because of wisdom and financial decision-making expertise. Grable and Joo (2000) identified that single individuals who are not married are more risk tolerant than married individuals. Their study clarify that married individuals have greater risk taking tendencies because shared more income and double human capital of married individuals may possibly encourage them to invest in riskier assets. Lewellen et al. (1977) examined portfolio decision process of the individual equity investor using the data obtained from a questionnaire survey. Multiple regression tests are run on the selected variables of interest. Cross classification of the demographics of the individuals and their portfolio goals and other investment patterns were analysed. An overview of full set of demographic relationships portrayed reveals strong indications of systematic changes in investment objectives and risk preferences across age brackets. The study examines the relationship between the demographic variables and investment patterns.

Bajtelsmit and Bernasek (1996) examined the existing literature regarding gender differences in investment. As per the study, women allocate their portfolios differently than men and may differ in their attitudes towards risk taking. Gender differences in investing and risk taking can be attributed to differences in individual preferences. These factors influence risk aversion directly or through outcomes such as gender differences in wealth, income and employment.

3. RESEARCH STATEMENT

The study shows insights into the investors' psyche which influence their investment patterns and decision making. This study captures the relationship between demographic variables and investment decisions. This study also measures the extent of risk tolerance of individual investors.

Risk tolerance is the amount of risk that an investor is comfortable in taking, or the degree of uncertainty that an investor is able to handle. Risk tolerance often varies with age, gender and occupation. It can be determined by questionnaire designed to reveal risk tolerance.

The objectives of the study are:

- To identify the deterministic factors influencing the individuals' investment patterns.
- To find out the relationship between different demographic variables and the investment patterns and financial decision making.
- To identify the investors risk tolerance using various dimensions proposed by Grable and Lytton.

Developing the hypotheses: The following hypotheses are formulated for the study:

Hypothesis 1 (H₀): There is no significant relationship between gender and investment pattern.

Hypothesis 2 (H₀): There is no significant relationship between occupation and investment pattern.

Hypothesis 3 (H₀): There is no significant relationship between age and investment pattern.

Hypothesis 4 (H₀): There is no significant relationship between occupation and their risk tolerance and acceptance.

Hypothesis 5 (H₀): There is no significant relationship between age and their tolerance and acceptance.

Hypothesis 6 (H₀): There is no significant relationship between occupation and their perception about risk.

4. METHODOLOGY

The study adopts the descriptive and cross sectional research design. Non-probabilistic convenient sampling technique is used and the sample respondents are regular investors. Responses are gathered using a structured questionnaire. Questionnaire is administered in Bangalore, India. Questionnaire is administered to 257 respondents but only 101 responses are qualified for the study because of partial or incomplete forms. Data collections are carried out through Survey method. The responses are collected on a 5 point Likert scale. Data analysis is carried out using SPSS and factor analysis, Chi-square test, Kendall rank correlation tests are adopted to analyse the data. Risk Tolerance Scale developed by Grable and Lytton is adopted for this study. The dimensions

measured in the questionnaire related to financial risk tolerance are (1) guaranteed versus probable gambles, (2) general risk choice, (3) choice between sure loss and sure gain, (4) risk as related to experience and knowledge, (5) risk as a level of comfort, (6) speculative risk, (7) prospect theory and (8) investment risk.

5. DATA ANALYSIS AND FINDINGS

Data analysis is done in two parts. The first part looks at the demographic variables and investment decisions and testing of hypotheses. The second part looks at investor risk tolerance. Factor analysis is adopted to find out the factors which influence investors' decisions. Based on literature review and pilot study nine variables are identified which relates to investors decision making. Table 1 shows the factors comprising of nine variables taken from literature available.

Table 2 exhibits the rotated component matrix. Principal component analysis is used and varimax rotation method is adopted. The variables with the highest factor loadings (at least above >0.05) under the respective factors or components are derived from the rotated component matrix. Investor security which has three variables like family needs, safety and security and investing in risk free assets are highly loaded and are the factors influencing investment decision.

Table 1: Factors influencing investment decision

Components or factors of investment decision	Variables of investment decision
Investor security	1. I invest to live a safe and secure life 2. I invest only in those assets that are risk free 3. I invest to meet my family needs in future
Risk coverage	1. I invest to take advantage of tax benefits 2. Risk coverage is reason for investment 3. I invest to save for my retirement
Future planning	1. I prefer long term investments over short term investments 2. I save to meet future social obligations

Table 2: Factor analysis to understand the factors influencing investment pattern

Rotated component matrix ^a				
Factors influencing investment pattern	Component			
	1	2	3	
I invest to meet my family needs in future	0.783	0.203	0.018	
I invest to live a safe and secure life	0.770	0.281	0.212	
I invest only in those assets that are risk free	0.721	-0.204	0.121	
I invest to save for my retirement	0.458	0.513	0.126	
I save to meet future social obligations	0.381	0.272	0.620	
I prefer long term investments over short term investments	0.237	0.259	0.760	
I invest to receive returns like interest and dividend	0.120	0.396	-0.685	
I invest to take advantage of tax benefits	0.071	0.803	-0.111	
Risk coverage is reason for investment	0.038	0.783	0.257	
Extraction method: Principal component analysis. Rotation Method: Varimax with Kaiser Normalization				

^aRotation converged in 5 iterations

The sampling adequacy is tested through KMO value (0.738) and Bartlett's test shows the statistical significance of the factor analysis. The total percentage of variance is 63.634% which is higher than the acceptable range (above 60%).

In Table 3 Kendall's W Test is used to test the preferred influencing source for the investor. The respondents have ranked the influencing factors on a ranking of 1-5. The major influence in Indian scenario for an investor related to investments is family and friends with the least score of 2.27. The next preferred source is broker or agent. So we can say that the individuals believe in personal sources before investing rather than impersonal sources. The least preferred source is the use of internet. Its mean rank is the highest that is 3.30.

Table 4 reveals that majority of the respondents preferred investing in gold as it is considered as they perceive it as the safest investment option over the years. Insurance is the next preferred option as investing in insurance is risk free and there is no fear of losing their invested money and the corporate bonds are the least preferred option of investment. This significant finding supports the previous research findings on why Indians love to invest in gold including recent study conducted by the Associated Chambers of Commerce and Industry of India. Indian Prime Minister Mr. Narendra Modi unveiled three schemes in November 2015, that seek to dampen physical demand for gold and tap into an estimated 20,000 tonnes of the precious metal lying idle with Indian households. India has surpassed China as the world's largest gold consumer, buying 562 tonnes of yellow metal so far in 2015, compared to China's 548 tonnes.

Chi-square test is carried out to determine the relationship between the investment patterns of the investors and their demographic variables like age, gender and occupation.

Hypothesis 1 (H₀): There is no significant relationship between gender and investment pattern.

In this study 22.1% of the respondents who are male chose insurance as the most preferred investment option whereas gold is

Table 3: Kendall's W test to identify the influencers for investment decision

Influencers for investment decision	Mean rank
Family and friends	2.27
Financial newspapers	3.15
Business news channels	3.19
My broker/agent	3.09
I use internet	3.30

Table 4: The most preferred investment option

Investment options	Frequency	Percentage	Valid percentage	Cumulative percentage
Gold	35	34.7	34.7	34.7
Shares	19	18.8	18.8	53.5
Mutual funds	10	9.9	9.9	63.4
Govt. bonds	5	5.0	5.0	68.3
Corporate bonds	4	4.0	4.0	72.3
Insurance	28	27.7	27.7	100.0
Total	101	100.0	100.0	

the most preferred option among female respondents. Bajtelsmit and Bernasek (1996) in their study found that men tend to be more risk tolerant than woman. Table 5 Chi-square test is performed between gender and investment pattern.

The Chi-square value is 0.028, which is <0.05. So, we reject the null hypothesis. Hence we can conclude that there is a significant relationship between the gender and the investment pattern.

Hypothesis 2 (H0): There is no significant relationship between occupation and investment pattern.

Table 6 Chi-square test is performed between occupation and investment pattern and test the hypothesis.

The Chi-square value is 0.279, which is more than 0.05. So, we accept the null hypothesis. Hence we conclude that there is no significant relationship between occupation and the most preferred investment option.

Hypothesis 3 (H0): There is no significant relationship between age and investment pattern.

In Table 7 Chi-square test is performed between age and investment pattern and test the hypothesis.

The Chi-square value is 0.206 which is more than 0.05. So we accept the null hypothesis. Hence we conclude that there is no significant relationship between age and the most preferred investment option.

Table 5: Chi-square test to see the relationship between gender and investment pattern

Gender and investment pattern	Value	df	Asymp significant (2-sided)
Pearson Chi-square	12.523 ^a	5	0.028
Likelihood ratio	13.653	5	0.018
Linear-by-linear association	6.785	1	0.009
Number of valid cases	101		

^a5 cells (41.7%) have expected count <5. The minimum expected count is 1.35

Table 6: Chi-square test to see the relationship between occupation and investment pattern

Occupation and investment pattern	Value	df	Asymp. significant (2-sided)
Pearson Chi-square	17.689 ^a	15	0.279
Likelihood ratio	19.243	15	0.203
Linear-by-linear association	1.999	1	0.157
Number of valid cases	101		

^a20 cells (83.3%) have expected count <5. The minimum expected count is 0.24

Table 7: Chi-square test to see the relationship between age and investment pattern

Age and investment pattern	Value	df	Asymp. significant (2-sided)
Pearson Chi-square	24.885 ^a	20	0.206
Likelihood ratio	27.190	20	0.130
Linear-by-linear association	0.210	1	0.647
Number of valid cases	101		

^a25 cells (83.3%) have expected count <5. The minimum expected count is 0.20

Hypothesis 4 (H0): There is no significant relationship between occupation and their risk tolerance.

In the study majority of the respondents are cautious and have moderate risk tolerance across occupations. In the sample 42% of the respondents working in private companies are willing to accept risk. The study indicates that 67% of the house wives are risk avoiders. Gender also plays an important role here. Businessmen are equally balanced lot with equal percentage of respondents as gamblers, willing to take risk and percentage of avoiders. To prove the above hypothesis, Chi-square test is performed between occupation and risk tolerance in Table 8.

The Chi-square value is 0.000, which is <0.05. So we reject the null hypothesis. Hence we conclude that there is a significant relationship between occupation and their risk taking abilities and willingness.

Hypothesis 5 (H0): There is no significant relationship between Age and their Risk tolerance.

In the age group of 21-30 years, 43.5% of the respondents are risk tolerant and 3% are real gamblers who are willing to take lots of risk. Only 13% of the respondents are real risk avoiders. In 31-40, 41-50 and 51-60 age groups majority of them are cautious. Above 60 years majority of investors are risk avoiders. It is evident that age is inversely related to risk tolerance of the investor. Chi-square test is conducted between age of the respondents and risk tolerance in Table 9.

The Chi-square value is 0.041. This is <0.05. So we reject the null hypothesis. Hence we conclude that there is a significant relationship between age and risk tolerance.

Hypothesis 6 (H0): There is no significant relationship between Occupation and their perception about risk.

60% of the respondents believe that risk refers to an uncertain situation or loss. This trend is observed across all occupations

Table 8: Chi-square test to test the relationship between occupation and risk tolerance

Occupation and risk tolerance	Value	df	Asymp. significant (2-sided)
Pearson Chi-square	38.760 ^a	9	0.000
Likelihood ratio	25.253	9	0.003
Linear-by-linear association	4.441	1	0.035
Number of valid cases	101		

^a12 cells (75.0%) have expected count <5. The minimum expected count is 0.12

Table 9: Chi-square test to test the relationship between age and risk tolerance

Age and risk tolerance	Value	df	Asymp. significant (2-sided)
Pearson Chi-square	21.698 ^a	12	0.041
Likelihood ratio	21.600	12	0.042
Linear-by-linear association	14.333	1	0.000
Number of valid cases	101		

^a14 cells (70.0%) have expected count <5. The minimum expected count is 0.10

like public sector, private sector employees and also housewives. Only business men perceive risk as thrill as they are more tolerant to risk compared to other professions.

Table 10 Chi-square test is performed between occupation of the respondent and their perception about risk. The Chi-square value is 0.000, which is <0.05 . So we reject the null hypothesis. Hence we conclude that there is a significant relationship between occupation and their perception about risk.

5.1. Dimensions of Risk Assessed by Each Item in the Risk Tolerance Questionnaire

The second part of data analysis focuses on the risk tolerance of the respondents. The questions in the questionnaire are based on the risk tolerance scale proposed by Grable and Lytton. The first dimension of financial risk tolerance is prospect theory. Prospect theory is a behavioural finance theory propounded by Kahneman and Tversky (1979). It is also called as "loss aversion theory." It is the way people make decisions that involves risk. This theory explains how people perceive gains and losses differently. Prospect theory states that investors evaluate their choice in terms of potential gains and losses relative to some reference point Shefrin and Statman (1993).

Table 11 explains prospect theory in terms of gains. 55.4% of the respondents have preferred a sure gain of Rs. 5000 while 44.6% of them are ready to take some risk if Rs. 10000 was given to them freely. According to prospect theory, people prefer a sure gain rather than a little uncertain option though the uncertain option might prove to be profitable to them which are evident from the responses of the respondents.

Table 10: Chi-square test to test the relationship between occupation and their perception about risk

Occupation and Perception about risk	Value	df	Asymp. significant (2-sided)
Pearson Chi-square	44.015 ^a	9	0.000
Likelihood ratio	27.321	9	0.001
Linear-by-linear association	0.741	1	0.389
Number of valid cases	101		

^a12 cells (75.0%) have expected count <5 . The minimum expected count is 0.18

Table 11: Prospect theory - in terms of gains

Assume you have been given Rs. 10000 freely to keep. You are now asked to choose between:				
Choices	Frequency	Percentage	Valid percentage	Cumulative percentage
A sure gain of Rs. 5,000	56	55.4	55.4	55.4
A 50% chance to gain Rs. 10,000 and a 50% chance to gain nothing	45	44.6	44.6	100
Total	101	100	100	

Table 12: Prospect theory - in terms of losses

In addition to whatever you own, you have been given Rs. 2000. You are asked to choose between:				
Choices	Frequency	Percentage	Valid percentage	Cumulative percentage
A sure loss of Rs. 500	40	39.6	39.6	39.6
50% chance to lose Rs. 1,000 and 50% chance to lose nothing	61	60.4	60.4	100
Total	101	100	100	

Table 12 explains the Prospects Theory in terms of losses. If an additional amount of Rs. 2000 was given to the individuals, 60.4% of the respondents have taken some risk in going for 50% chance to lose Rs. 1000 and 50% chance to lose nothing and 39.6% would have gone for sure loss of Rs. 500. According to prospect theory, people prefer larger losses which are uncertain rather than smaller losses which are certain because people by nature are averse towards sure loss. People in general avoid loss that is the reason why only 39.6% of the respondents opted for a sure loss of Rs.500.

From the responses of Tables 11 and 12 we can conclude that the certainty effect leads to a risk-averse preference for a sure gain, rather than one which may be larger but be probable. But people exhibit risk-loving preferences for larger losses which are probable, rather than smaller certain ones.

Table 13 looks into risk as a level of comfort. 49.5% of the respondents are risk averse, prefer investing 60% in low risk, 30% in medium risk and 10% in high risk investments. 36.6% would prefer investing 30% in low risk, 40% in medium and 30% in high risk investments. 13.9% of the population would prefer investing in 10% low, 40% medium and 50% high investments. The respondents discomfort from suffering a loss is in absolute terms higher than receiving an equally high gain. This is the effect of loss aversion bias (Kahneman and Traversky, 1979).

Tables 14 and 15 below would measure the dimensions of risk tolerance - risk as experience and knowledge and Investment risk. These combine the attributes of knowledge of the investor and his outlook in assessment of risk tolerance and dealing with risk. Investment risk can be defined as the probability or likelihood of occurrence of losses relative to the expected return on any particular investment.

Table 14 shows that 41.6% of the respondents invest in bonds or bond mutual funds which are safe. 40.6% of them invest in a bank or would have opened money market or an insured certificate of deposit. It is evident that most of them are risk averse and are expecting guaranteed returns for their investments. Only 17.8% of the investors are risk tolerant and are willing to invest in stocks. Respondents perceive after understanding the market that there

is a lot of risk in investing in stocks probably from their past experience.

From Table 15 we can infer that most of the respondents are cautious. They form 45% of the total sample. Most of the Indians generally are risk averse. 34% of the sample are willing to take risk after doing some basic research. Only 2% of them are real gamblers and risk takers and consider risk as thrill. 19% of them are risk avoiders and do not want to take risk in any case. Respondents who perceive themselves as experienced and knowledgeable generally are risk tolerant than others. 33.7% believe that they can take risk after taking adequate research because experience and knowledge are positively correlated with risk tolerance.

Table 16 measures the speculative risk of the respondent. Speculation is an important dimension for risk tolerance. Speculative risk is the force that signifies an individual's tendency towards risk taking behaviour (Lampenius and Zickar, 2005). Respondents who have tendency to speculate are more risk tolerant in terms of their money. 25.7% of the respondents are totally risk averse so they prefer Rs. 1000 in cash directly

45.5% of the respondents would consider taking 50% chance in winning Rs. 5000 and are moderately risk tolerant. Only 7% of the respondents are tolerant and ready to speculate for winning Rs. 100000 for which there is only 5% chance.

Respondents who perceive risk synonymous to loss and uncertainty are risk averse than those who perceive risk as opportunity and thrill (Bernstein, 1993). 60.4% of the respondents perceive risk as uncertain and 15.8% perceive it as loss (Figure 1). 20.8% of the respondents feel that it is an opportunity and 3% believe that risk is thrill and enjoy taking risk. 76% of the respondents perceive risk as a sure loss and 24% of the respondents perceive risk as gain.

6. DISCUSSION AND CONCLUSION

Understanding investment patterns and financial decision making has always been of great interest to researchers and financial service providers and planners. Investment pattern of individuals and investment decisions are influenced by demographic variables and risk tolerance. The study explores into these aspects and measures risk tolerance by using Grable and Lytton scale. The significant

Table 13: Prospect theory as a dimension of risk

If you had to invest Rs. 20000 which of the following investment choices would you find most appealing?				
Choices	Frequency	Percentage	Valid percentage	Cumulative percentage
60% in low risk investments, 30% in medium risk investments and 10% in high risk investments	50	49.5	49.5	49.5
30% in low risk investments, 40% in medium risk investments and 30% in high risk investments	37	36.6	36.6	86.1
10% in low risk investments, 40% in medium risk investments and 50% in high risk investments	14	13.9	13.9	100
Total	101	100	100	

Table 14: Experience and knowledge and perception of investment risk as a dimension of risk

If you unexpectedly receive Rs. 2000 to invest, what would you do?				
Options	Frequency	Percentage	Valid percentage	Cumulative percentage
Deposit it in bank account, money market account or an insured CD	41	40.6	40.6	40.6
Invest it in safe high quality bonds or bond mutual funds	42	41.6	41.6	82.2
Invest it in stock or stock mutual funds	18	17.8	17.8	100
Total	101	100	100	

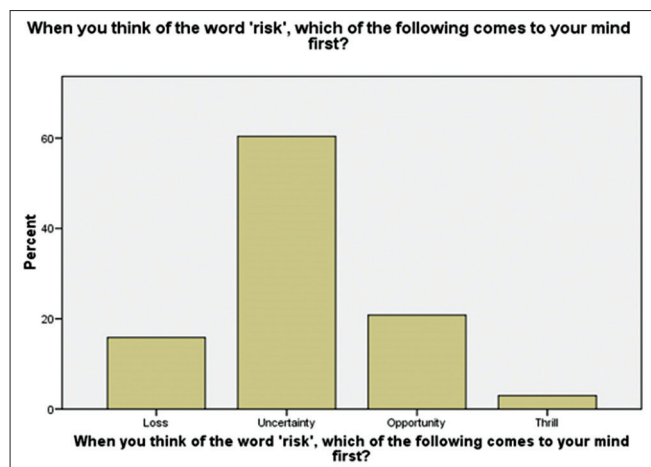
Table 15: Experience and knowledge and perception of investment risk as a dimension of risk

Dimensions of risk	Frequency	Percent	Valid percentage	Cumulative percentage
A real gambler	2	2.0	2.0	2.0
Willing to take risks after completing adequate research	34	33.7	33.7	35.6
Cautious	46	45.5	45.5	81.2
A real risk avoider	19	18.8	18.8	100
Total	101	100	100	

Table 16: Risk speculation as a dimension of risk tolerance

You are on a TV game show and can choose one of the following. Which one would you choose?				
Choices	Frequency	Percentage	Valid percentage	Cumulative percentage
Rs. 1000 in cash	26	25.7	25.7	25.7
50% chance in winning Rs. 5000	46	45.5	45.5	71.3
25% chance in winning Rs. 10000	22	21.8	21.8	93.1
5% chance in winning Rs. 100000	7	6.9	6.9	100.0
Total	101	100.0	100.0	

Figure 1: Choice between sure loss and sure gain as a dimension of risk tolerance



finding of the study is gender is the only demographic variable which has an impact on investment patterns. Chi-square test proves that age and occupation of the respondent has an impact on the risk tolerance and respondents perception of risk. Lewellen et al. (1977) found that investors' age, gender, income and education effect their investment inclinations. Factor Analysis is adopted and the analysis reveals that the investor invests mostly for his security followed by risk coverage and future planning. Family and friends has a lot of influence on investment decisions. Using questionnaire the study looked into various dimensions of risk tolerance. 55.4% of the respondents preferred a sure gain rather than an uncertain option and 60.4% of the respondents preferred larger losses which are uncertain rather than smaller losses which are certain. Finally approximately 42% of the respondents are risk averse, avoid any type of risk and perceive risk as uncertain and loss. 40% of the respondents are cautious and are willing to take risk after adequate research and 18% are willing to take risk out of which 2% are real gamblers. They have adequate knowledge and experience in investing and are ready to take risk as they perceive risk as thrill.

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