

Impact of Risk Tolerance and Demographic Factors on Financial Investment Decision

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Abstract

Risk tolerance is popularly used in the personal financial planning industry to understand an investor's attitude towards risk. In the twenty-first century, it is very important for the various investment firms, fund managers, financial planners to understand financial investment decisions of an investor for developing a strategy for the sale of their investment products in market. However, financial decisions of an individual not only depend on financial risk-tolerance level, but also upon different demographic factors. Thus, this study is undertaken to develop a model that helps in understanding impact of risk tolerance and demographic factors jointly on investment decision; especially, a decision related to level of investment. Also, investor may be having higher risk tolerance for the calculative investment but may be having lower risk tolerance in speculative investment. So, based on extensive literature support, this research has tried to propose a model for understanding the impact of investment risk tolerance, capital risk tolerance, speculative risk tolerance, and six important demographic variables jointly on investment decision. Thus, this study would be helpful to investment firms in understanding impact of risk tolerances and demographic variables jointly on level of investment of investors, which can be used for designing a strategy or investment product to offer to the investors with different levels of financial risk tolerance and different demographic profiles.

Keywords: Demographic Factors, Investment Decision, Investment Firm, Investors, Risk Tolerance

Introduction

How a person manages his finance has become a raising issue in today's world. It is no longer about managing their short-term financial affairs like how much to save and how much to spend on a holiday, etc.; however, it's about long-term prospects such as: how to maintain the same standard of living after retirement, how the higher

education of the children will be funded, how much return their investment should yield to nullify the effect of inflation, how the contingencies in life, including medical emergencies, will be taken care of, and many more. It was found that investment decisions of an individual are influenced by many factors like his ability to take risk and also on demographic factors among many others.

Risk tolerance is a term widely used in the personal financial planning industry to refer to an investor's attitude towards risk. The definition of risk tolerance can be mentioned as the amount of uncertainty or investment return volatility that an investor is willing to accept when making a financial decision (Grable, 2000; Grable and Lytton, 1999) or the extent to which an individual is prepared to risk experiencing a less attractive outcome in the pursuit of a more attractive outcome (Davey, 2000). Even though it is not getting enough due until very recently, risk tolerance is beginning to get consideration as an extremely important topic in financial planning. Dalton & Dalton (2004) have defined financial risk tolerance as: "the level of risk exposure with which an individual is comfortable; an estimate of the level of risk an investor is willing to accept in his or her investment portfolio."

According to Grable (2000), financial risk tolerance investigations should not only include psychological factors, but should also incorporate demographic, socioeconomic, and attitudinal factors, because considerations such as gender, age, marital status, income, and occupation may influence a person's level of risk taking in everyday money matters.

In this above-mentioned context, purpose of this study is to propose and develop a model for understanding the impact of financial risk tolerance and also six important demographic variables on the level of investment

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decisions of an individual. The findings of this research study would have significant implications for the fund managers, mutual fund managers, bank professionals, portfolio managers, financial planners, and academicians who are interested in pursuing farther investigation in this specific field.

Review of Related Literature

Financial risk tolerance has been attracting attention of many researchers in various disciplines including behavioural economists (e.g., Roszkowski and Snelbecker 1990); consumer research (e.g., Grable and Joo 1999); cognitive psychologists (e.g., Holtgrave and Weber 1993; Kahneman and Tversky 1984; Liverant and Scodel 1960); social psychologists (e.g., Carducci and Wong, 1998; Wong and Carducci, 1991; Zuckerman, 1983), as well as financial analysts and financial planners (e.g., Riley and Chow, 1992; Quattlebaum, 1988).

In broader term, risk tolerance, as research did not emerge as a subject of importance until the 1900s. Bernoulli's logic for the basis of risk taking propensity was accepted by the all economist until two notable studies prior to the 1950s were undertaken first by Keynes (1921) and second by Knight (1921). Wallach and Kogan (1959; 1961) had contributed a major advancement in the study of choice in risky situations. These researchers developed the widely-used Choice Dilemmas Questionnaire to measure risk tolerance in everyday life situations.

However, financial risk tolerance (FRT) has engrossed the curiosity of researchers in various disciplines, such as cognitive psychologists like Liverant and Scodel (1960), Kahneman and Tversky (1984), and Holtgrave and Weber (1993); social psychologists like Zuckerman (1983), Wong and Carducci (1991), and Carducci and Wong (1998); as well as consumer research like Garble and Joo (1999); they have shown important of FRT.

Roszkowski and Snelbecker (1990) have studied and established the importance of FRT and its impact on investment decision in their study. Quattlebaum (1988) and Riley and Chow (1992) have investigated the important of FRT in financial analysis and financial planning and emphasised that the level of FRT of an individual helps the investment firms to design tailor-made investment products for the target clients and also define strategies to sell their investment products. To study

FRT further in more detailed manner, it was categorised in three categories such as Capital Risk Tolerance (CRT), Investment Risk Tolerance (IRT), and Speculative Risk tolerance (SRT) (Gilliam, Chatterjee, and Garble, 2010). To understand the impact of the above-mentioned FRTs on the level of investment, the following hypotheses were formed:

H_{1 (1)}: There is a significant impact of IRT on investment decisions of an individual.

H_{1 (2)}: There is a significant impact SRT on investment decisions of an individual.

H_{1 (3)}: There is a significant impact CRT on investment decisions of an individual.

On the other side, it can be noted that the empirical study of investor's risk tolerance in relation to demographics is limited. Bajtelsmit and Bernasek (1996) stated that major studies commissioned by a major national brokerage firm found that age is most powerful determinant of investment followed by income and gender. Wallach and Kogan (1961) are considered to be the first researchers to study the relationship between risk tolerance and age. In addition to that, it is commonly observed that gender can be used effectively to classify individuals into different risk tolerance categories. However, no concrete study has been conducted to prove this point so far; especially, in the Indian context. Not only gender, but the current study also investigates how marital status of an individual influences investment decisions. Even though numerous researches were undertaken on the topic of risk tolerance, only a few were directed towards the relationship between marital status and investment decisions (Sung & Hanna, 1998; Elder & Rudolph, 2003; Roszkowski, Delaney, & Cordell, 2004; Yao & Hanna, 2005; Hanna & Lindamood, 2005).

Baker and Haslem (1974), Haliassos and Bertaut (1995), and Sung and Hanna (1996) added significant contributions towards the study of the impact of level of education for FRT and also the impact of FRT on investment decisions of an individual. However, none of the researches showed direct impact of education level on investment decision process. As per Roszkowski et al. (1993), different profession or occupation has an impact on investment decisions of individual. Similarly, Friedman (1974), Cohn et al. (1975), Blume (1978), Riley and Chow (1992), Grable and Lytton (1999), Schooley and Worden (1996),

and Shaw (1996) found that investment decisions and income uniformly supported a positive relationship.

Roszkowski et al. (1993) had identified 12 demographics that were used to differentiate among levels of investor risk tolerance and their impact on investment decisions. However, some of them were empirically weak in Indian context (birth order, the assumption that business executives tend to take less risks with their own money than with their firm's funds, self-employment, occupation, and race). Thus, the present study considered six demographic variables as independent variables to examine their impact on investment decisions which is the dependent variable and the following hypotheses were formed:

H₁₍₄₎: There is a significant impact of investors' age on investment decisions.

H₁₍₅₎: There is a significant impact of gender of the investors on investment decisions.

H₁₍₆₎: There is a significant impact of marital status of the investors on investment decisions.

H₁₍₇₎: There is a significant impact of education level of the investors on investment decisions.

H₁₍₈₎: There is a significant impact of profession of the investors on investment decisions.

H₁₍₉₎: There is a significant impact of income of the investors on investment decisions.

Thus, based on review of literature, the following model was proposed:

Annexure II: TABLES AND FIGURES

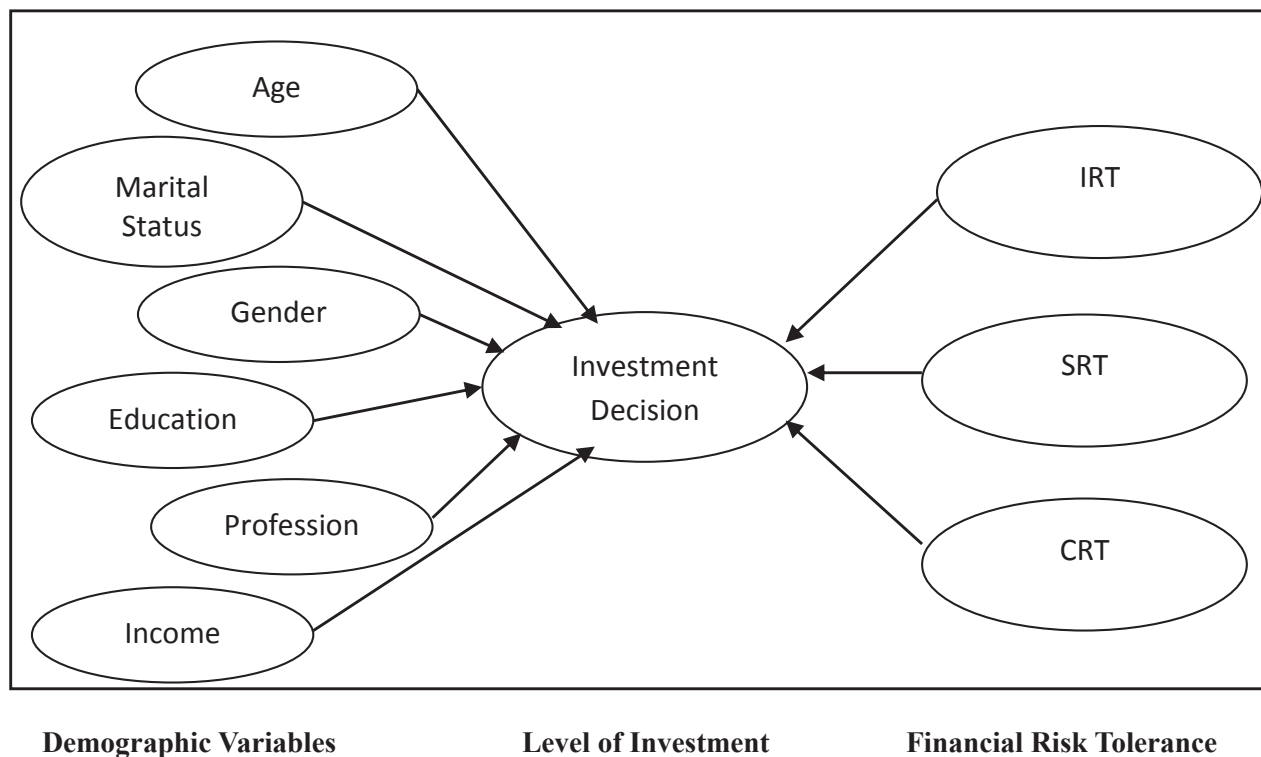


Fig. 1: Proposed Model

In the next part research methodology to be undertaken for getting the direction for further research is discussed. Based on the literature review, six demographic variables and eight statements of risk tolerance measure were included in the study.

Research Methodology

This study aims to consider those investors who are residing in the state of Gujarat, aiming to invest in any of the various investment avenues, and must be an adult

(able to make his/her own decisions and have enough purchasing power). Sampling units were households in the major cities of Gujarat consisting investors recruited through convenience sampling. The research design used was “quantitative, descriptive, and non-experimental.”

Respondents were recruited through non-probability convenience sampling method. A structured questionnaire was administered for data collection. Data were collected through personal-contact approach. The questionnaire (Annexure I) was then circulated among 320 respondents; this was completed in 3 months.

In the current study, researchers have taken 95% level of confidence for determine the sample size at 5% tolerance error as the population was unknown. It was assumed that there were no strong feelings about the proportion of the population. With this, the data collected from 320 respondents, are higher than threshold, i.e., 318. Convenience sampling was used to obtain a sample element. A structured questionnaire containing three parts was put to use. Through the use of bivariate and multivariate item analyses, the final set was reduced to 18 questions in two pages. In Part A, basic information related to respondents' demographic profile were collected.

In Part B, financial risk tolerance was measured. There were three dimensions of financial risk measured by these eight items, which included probable versus guaranteed choice, risk choice in general, sure gain versus sure loss selection, risk as understanding and experience, level of comfort, speculative risk, theory of prospect, and investment-related risks. First two statements were used to measure CRT, next four statements were used to measure IRT, and last two statements measured the SRT (Gilliam, Chatterjee and Garble, 2010). The Part C was used to collect the percent range of investment from salary. Here, even though investment can be measured as continuous variable, the purpose of taking it in four categories is to get better response from the respondents, as it can be seen that exact percentage of investment of the income is difficult to be measured by the respondents and many were not ready to part with the exact amount. Hence, a range was adopted in this study to get the overall idea about the level of investment of an investor.

The data had been analysed by using SPSS (Software Package for Social Science) 20.0 trial version for windows. Here, multinomial logistic regression had been performed keeping in mind the nature of data, hypotheses

of the study, and research objectives. Most of the data had been analysed at 5 or 10% level of significance.

In order to test hypotheses, the summated score was calculated for all three factors of FRT. The dependent variables were predicted through independent variables either by discriminant analysis or logistic regression. Logistical regression is regularly used rather than discriminant analysis when there are only two categories of the dependent variable. Logistic regression is also preferred than discriminant analysis when there is a mixture of numerical and categorical IV's, because it includes procedures for generating the necessary dummy variables automatically, requires fewer assumptions, and is more statistically robust (Hair et al. 1999).

Discriminant analysis strictly requires the continuous independent variables (though dummy variables can be used as in multiple regressions). Thus, in instances where the independent variables are categorical or a mix of continuous and categorical, and the dependent variable is categorical having more than two categories, multinomial logistic regression is necessary.

Data Analysis and Interpretations

Here, the dependent variable had four categories wherein 41.1% respondents ($n=130$) invested 20-30%, 32.3% respondents invested less than 20% ($n=102$), 17.4% respondents invested 30-50%, and rest invested more than 50% depicted in Annexure II: Table 1. Of these, the last category is considered the reference category. So, three comparisons were made as shown in Annexure II: Table 2.

In multinomial logistic regression, the independent variables used were depicted in Annexure II: Table 3, with their codes to find the impact on investment decisions of investors. It clearly showed that explanatory variables comprised both categorical (non-metric measurement) and continuous (metric measurement). In logistic, the metric variables are treated as “covariates” and non-metric or categorical variables are treated as “factors.” All independent variables were fed simultaneously in SPSS.

Logistic regression employs maximum likelihood procedure through iterations to find out the most-likely estimates for the coefficients. Instead of minimising the sum of the squared deviations (or least squares differences in ordinary least square method) in multiple regressions,

logistic regression maximises the likelihood that an event will occur.

This likelihood value is used for assessing the measure of overall model fit. Logistic regression measures the model estimation fit with the value of -2 times the log of the likelihood values, referred to as $-2LL$ or -2 log likelihood. Value showed that the model was significant ($\chi^2=95.038$, $p<0.001$; Annexure II: Table 4).

After assessing the model fit, it is needed to check the strength of relationship between the IV-DV. Although multinomial logistic regression does compute correlation measures to estimate the strength of the relationship (Pseudo R square measures, such as Nagelkerke's R^2), these correlations measures do not really tell us much about the accuracy or errors associated with the model. Moreover, Nagelkerke's R^2 is widely used measure of Pseudo R square measures among the others such as Cox and Snell. It was found that Nagelkerke's R^2 value was 0.283, indicating moderate level of percentage variance explained by the independent variables (Annexure II: Table 5).

After that, it is important to know which independent variable has the significant relationship with the dependent variable. This is found from the likelihood ratio tests values as shown in Annexure II: Table 6. From this table, it was found that independent variables such as IRT ($\chi^2=12.725$, $p=0.005$), SRT ($\chi^2=10.475$, $p=0.015$), CRT ($\chi^2=14.166$, $p=0.003$), and income ($\chi^2=19.656$, $p=0.020$) were significantly related to investment. And age, gender, marital status, education, and profession were found to be nonsignificant predictor of investment decision. Thus, null hypotheses $H_{0(1)}$, $H_{0(2)}$, $H_{0(3)}$, and $H_{0(9)}$ were rejected; whereas, null hypotheses $H_{0(4)}$, $H_{0(5)}$, $H_{0(6)}$, $H_{0(7)}$, and $H_{0(8)}$ were not rejected.

After the overall relationship between independent variable and dependent variable, the Wald test is used to evaluate whether or not the independent variable is statistically significant in differentiating between the two groups in each of the embedded binary logistic comparisons. Finally, all three models were estimated and reported in Annexure II: Tables 7, 8, and 9.

Considering less than 20% group and more than 50% group, results were depicted in Annexure II: Table 7.

Variables IRT, SRT, CRT, AGE 1, AGE 2, EDUCATION 2, PROFESSION 3, INCOME 1, and INCOME 2 were found to be significantly related to investment. The coefficient of IRT was negative and also negative relationship was displayed from other measure, i.e., value of exponential coefficient (0.413) was less than 1. This indicated that at the lower value of IRT, predicted probability of investing up to less than 20% would likely decrease. Similarly, for SRT and CRT, lower the risk investor perceived, more he/she likely to invest or the probability of invest more would increase or the probability of investing more than 50% would increase. Similarly, INCOME 1 and INCOME 2 were indicating lower the income range predicted probability of investing more than 50% would likely to be increased.

In order to compare investment of 20–30% group and more than 50% group, binary logistic regression results were depicted in Annexure I: Table 8. Variables IRT, SRT, CRT, AGE 2, GENDER 1, EDUCATION 2, and PROFESSION 3 were found to be significantly related to investment. The coefficient of IRT was negative and also negative relationship was displayed from other measure, i.e., value of exponential coefficient (0.488) was less than 1. This indicated that at the lower value of IRT, predicted probability of investing 20–30% would likely decrease. Similarly, for SRT and CRT, lower the risk investor perceived, more he/she would be likely to invest or the probability of invest more would increase or the probability of investing more than 50% would increase.

In order to compare investment of 30–50% group and more than 50% group, binary logistic regression results were depicted in Annexure I: Table 9. Variables IRT, SRT, CRT, EDUCATION 2, and PROFESSION 3 are found to be significantly related to investment. The coefficient of IRT was negative and also negative relationship was displayed from other measure, i.e., value of exponential coefficient (0.464) is less than 1. This indicates that at the lower value of IRT, predicted probability of investing 30–50% would likely decrease. Similarly, for SRT and CRT, lower the risk investor perceived, more he/she was likely to invest, i.e., the probability of investing more would increase or the probability of investing more than 50% would increase.

The classification accurate is found to be 52.2% (Annexure II: Table 10), which is higher than proportional

by chance accuracy criteria of 39.875%. The criterion for classification is satisfied.

Findings, Implications, and Limitations

It was found that independent variables such as The IRT, SRT, CRT, and income were significantly related to investment. And age, gender, marital status, education, and profession were found to be non-significant predictors of investment decision. The investment company can use these results to find out potential investors by analysing their risk profile or level of income, and, hence, may understand possible investment levels of different investors.

It was observed in all three investment groups that the three financial risk tolerance factors namely IRT, SRT, and CRT were significantly related to investment. It is indicated from the study that lower the value for any of three factors, predicted probability of level of higher investment would likely to decrease. So, a conservative or risk adverse person may not get easily converted for investment and that would eventually harm the overall economy as well as his/her own wealth. Thus, a financial planner can design an investment strategy after consulting the financial risk profile of an investor and suggest some safer investments if the client has lower risk tolerance and vice versa.

In general, undergraduates are more likely to prefer heavy investments (more than 50% of saving) than the postgraduates. This finding was applicable to all investment groups. This study indicated that in all investment groups the probability of investing 30–50% for self-employed was higher than the homemakers considering the fact that they were self-employed and their businesses needed money to satisfy the routine, operational expenses for a smooth run. In fact, result confirms that lower range of income has higher probability of investing more than 50% of their salary. This effect of demographic profile on level

of investment decision helps in making proper strategy for selling investment product by investment firms.

Limitations of the Study

This study is an attempt to study the impact of risk tolerance on investment decisions. Care and attention had been taken to ensure that the research was designed and optimised to achieve the objectives of the study. However, sometimes it is very difficult to conduct the study with complete perfection due to personal resource constraints in terms of time, manpower, and money.

There are different methods to measure the risk tolerance and investment decisions and different assessment and measurement techniques have been developed for the same. In this regards, views of experts may differ from one another. The study used the non-probability convenience sampling method. So, the limitations of this method are applicable to findings of the study also.

Accuracy of the analysis and interpretation is dependent upon the accuracy and profitability of the sources of the data collected. The target population for this study is the investors across Gujarat. Therefore, the generalisation of the findings of this study to investors other than Gujarat might be limited.

Conclusion

All three factors of financial risk tolerance namely IRT, SRT, and CRT are showing significant impact on investment decision taken by investor. Out of six demographic factors used for prediction of investment category, only income was showing significant impact. The three models derived in this study can help the investment firms, financial planners, fund managers, and portfolio managers to assist their investors in planning their investments based on their IRT, SRT, and CRT so that the investors can earn maximum return for their investment and attain sustainable wealth.

Annexure I

Questionnaire

Dear Sir/Madam,

Thanking you for agreeing to participate in this survey. This study is meant to understand the impact of financial risk tolerance on investment decision in the Indian context. The information provided by you will be used only for academic purpose and kept strictly confidential. Your cooperation is solicited.

Kindest regards,

Prof. Mitali Baruah

Dr. Abhishek Parikh (f13abhishek.parikh@iimahd.ernet.in)

PART A: Basic Information

1. Age group: less than 25 26 to 35 36 to 45 above 45
2. Gender: Male Female
3. Marital status: Married Unmarried
4. Education (highest degree): Up to HSC Under graduate Graduate
 Post graduate and higher
5. Profession: full time part time self-employed homemaker
6. Monthly Income: less than 10,000 10,001–30,000 30,001–50,000
 More than 50,000

PART B: Financial Risk Tolerance

1. You are on a TV game show and can choose one of the following. Which one would you take?
 - a. Rs.20,000 in cash
 - b. A 50% chance at winning Rs. 1,00,000
 - c. A 25% chance at winning Rs. 2,00,000
 - d. A 5% chance at winning Rs. 20,00,000
2. You have just finished saving for an “once-in-a-lifetime” vacation. Three weeks before you plan to leave, you lose your job. You would:
 - a. Cancel the vacation
 - b. Take a much more modest vacation
 - c. Go as scheduled, reasoning that you need the time to prepare for a job search
 - d. Extend your vacation, because this might be your last chance to go first-class
3. In terms of experience, how comfortable are you in investing in stocks or stock mutual funds?
 - a. Not at all comfortable
 - b. Somewhat comfortable
 - c. Very comfortable
4. When you think of the word “risk,” which of the following words comes to mind first?
 - a. Loss
 - b. Uncertainty
 - c. Opportunity
 - d. Thrill

5. If you unexpectedly received Rs. 2,20,000 to invest, what would you do?
 - a. Deposit it in a bank account, money market account, or an insured CD
 - b. Invest it in safe high-quality bonds or bond mutual funds
 - c. Invest it in stocks or stock mutual funds
6. Suppose a relative left you an inheritance of Rs.10,00,000, stipulating in the will that you invest ALL the money in ONE of the following choices. Which one would you select?
 - a. A savings account or money market mutual fund
 - b. A mutual fund that owns stocks and bonds
 - c. A portfolio of 15 common stocks
 - d. Commodities like gold, silver, and oil
7. If you had to invest \$20,000, which of the following investment choices would you find most appealing?
 - a. 60% in low-risk investments, 30% in medium-risk investments, 10% in high-risk investments
 - b. 30% in low-risk investments, 40% in medium-risk investments, 30% in high-risk investments
 - c. 10% in low-risk investments, 40% in medium-risk investments, 50% in high-risk investments
- 8(A). In addition to whatever you own, you have been given Rs. 12,000. You are now asked to choose between:
 - a. A sure loss of Rs. 3,000
 - b. A 50% chance to lose Rs. 6,000 and a 50% chance to lose nothing
- 8(B). In addition to whatever you own, you have been given Rs. 20,000. You are now asked to choose between:
 - a. A sure gain of Rs. 10,000
 - b. A 50% chance to gain Rs. 20,000 and a 50% chance to gain nothing

PART C Investment Decision

1. How much you invest from your salary?
 - a. Less than 20%
 - b. Between 20% and 30%
 - c. Between 30% and 50%
 - d. Greater than 50%

Table 1: Descriptive Results: Investment Decisions

<i>Variable</i>	<i>Categories</i>	<i>Frequency</i>	<i>Percentage</i>
Investment decisions	Less than 20%	102	32.3%
	20-30%	130	41.1%
	30-50%	55	17.4%
	More than 50%	29	9.2%

Table 2: Multiple Comparisons in Dependent Variable

<i>Model 1 "low investing"</i>	Less than 20% group (coded as "1") is compared to more than 50% (coded as "0")
<i>Model 2 "medium investing"</i>	20-30% group (coded as "1") is compared to more than 50% (coded as "0")
<i>Model 3 "high investing"</i>	30-50% group (coded as "1") is compared to more than 50% (coded as "0")

Table 3: Study Variables: Dependent and Independent (Explanatory)

Variable	
Dependent variable (DV)	
Investment decision	Ordered choice variable; "1" if respondent invests less than 20%, "2" for 20–30%, "3" for 30–50%, "4" for more than 50%
Explanatory variables (IVs)	
Investment risk tolerance (IRT)	Continuous variable (metric)
Speculative risk tolerance (SRT)	Continuous variable (metric)
Capital risk tolerance (CRT)	Continuous variable (metric)
AGE	Multinomial variable with the value of "1" for less than 25; "2" for 26–35; "3" for 36–45; and "4" for 45+
GENDER	Dichotomous variable, "1" for male; "2" for female
MARITAL STATUS	Dichotomous variable, "1" for married; "2" for unmarried
EDUCATION	Multinomial variable with the value of "1" for up to HSC; "2" for UG; "3" for Graduate; "4" for PG and higher
PROFESSION	Multinomial variable with the value of "1" for full time; "2" for part time; "3" for self-employed and "4" for homemaker
INCOME	Multinomial variable with the value of "1" for less than Rs. 10,000; "2" for Rs. 10,001–30,000; "3" for Rs. 30,001–50,000; and "4" for more than Rs. 50,000

Table 4: Model Fitting Information: Likelihood Ratio Tests

Model	-2 Log Likelihood	Chi-square	Df	Sig.
Intercept Only	791.080			
Final	696.042	95.038	51	0.000*

* Significant at 0.05 levels

Table 5: Strength of the Relationship of Model

	Measures	Value
Pseudo R square measures	Nagelkerke's R ²	0.283
	Cox and Snell R ²	0.260
	McFadden R ²	0.120

Table 6: Test of Significance for Relationship between Independent and Dependent Variables

Effect	-2 Log Likelihood	Chi-square	Df	Sig.
Intercept	696.0			
IRT	708.766	12.725	3	0.005*
SRT	706.517	10.475	3	0.015*
CRT	710.208	14.166	3	0.003*
Age	709.581	13.539	9	0.140
Gender	701.115	5.074	3	0.166
Marital Status	699.827	3.785	3	0.286
Education	705.995	9.953	9	0.354
Profession	704.577	8.535	9	0.481
Income	715.698	19.656	9	0.020*

* Significant at 0.05 levels

Table 7: Parameter Estimates: Model 1

<i>Effect</i>	<i>B</i>	<i>Wald Statistic</i>	<i>df</i>	<i>Exp (B)</i>	<i>Sig.</i>
IRT	-0.884	11.001	1	0.413	0.001*
SRT	-0.492	3.958	1	0.611	0.047*
CRT	-0.855	10.679	1	0.425	0.001*
AGE 1	-2.131	3.436	1	0.119	0.064**
AGE 2	-1.962	3.927	1	0.141	0.048*
AGE 3	0.482	0.124	1	1.619	0.725
AGE 4 ^b	--	--	--	--	--
GENDER 1	0.773	1.55	1	2.166	0.213
GENDER 2 ^b	--	--	--	--	--
MARITAL STATUS 1	-0.045	0.006	1	0.956	0.937
MARITAL STATUS 2 ^b	--	--	--	--	--
EDUCATION 1	-0.629	0.249	1	0.533	0.618
EDUCATION 2	-2.410	4.450	1	0.090	0.035*
EDUCATION 3	0.208	0.105	1	1.231	0.745
EDUCATION 4 ^b	--	--	--	--	--
PROFESSION 1	0.981	0.598	1	2.666	0.439
PROFESSION 2	0.909	0.362	1	2.482	0.547
PROFESSION 3	21.484	234.92	1	2.14E9	0.000*
PROFESSION 4 ^b	--	--	--	--	--
INCOME 1	1.927	3.122	1	6.870	0.077**
INCOME 2	1.883	5.495	1	6.575	0.019*
INCOME 3	0.585	0.721	1	1.795	0.396
INCOME 4 ^b	--	--	--	--	--

Note: ^b reference category, * $p < 0.05$, ** $p < 0.1$

Table 8: Parameter Estimates: Model 2

<i>Effect</i>	<i>B</i>	<i>Wald Statistic</i>	<i>df</i>	<i>Exp (B)</i>	<i>Sig.</i>
IRT	-0.718	7.621	1	0.488	0.006*
SRT	-0.631	6.749	1	0.532	0.009*
CRT	-0.755	8.785	1	0.470	0.003*
AGE 1	-1.400	1.564	1	0.246	0.211
AGE 2	-1.623	2.834	1	0.197	0.092**
AGE 3	0.839	.387	1	2.315	0.534
AGE 4 ^b	--	--	--	--	--
GENDER 1	1.034	2.892	1	2.812	0.089**
GENDER 2 ^b	--	--	--	--	--
MARITAL STATUS 1	0.640	1.337	1	1.897	0.248
MARITAL STATUS 2 ^b	--	--	--	--	--
EDUCATION 1	-1.041	0.676	1	0.353	0.411
EDUCATION 2	-3.280	7.851	1	0.038	0.005*
EDUCATION 3	-0.117	0.034	1	0.890	0.853
EDUCATION 4 ^b	--	--	--	--	--
PROFESSION 1	1.207	0.905	1	3.344	0.341
PROFESSION 2	1.462	0.926	1	4.315	0.336

<i>Effect</i>	<i>B</i>	<i>Wald Statistic</i>	<i>df</i>	<i>Exp (B)</i>	<i>Sig.</i>
PROFESSION 3	22.083	243.839	1	3.895E9	0.000*
PROFESSION 4 ^b	--	--	--	--	--
INCOME 1	0.911	0.729	1	2.488	0.393
INCOME 2	0.808	1.100	1	2.243	0.294
INCOME 3	0.355	0.316	1	1.427	0.574
INCOME 4 ^b	--	--	--	--	--

Note: ^b reference category, * $p < 0.05$, ** $p < 0.1$

Table 9: Parameter Estimates: Model 3

<i>Effect</i>	<i>B</i>	<i>Wald Statistic</i>	<i>Df</i>	<i>Exp (B)</i>	<i>Sig.</i>
IRT	-0.767	7.378	1	0.464	0.007*
SRT	-0.208	0.651	1	0.812	0.420
CRT	-0.454	2.842	1	0.635	0.092**
AGE 1	-1.922	2.495	1	0.146	0.114
AGE 2	-1.039	1.072	1	0.354	0.300
AGE 3	1.068	0.595	1	2.909	0.441
AGE 4 ^b	--	--	--	--	--
GENDER 1	0.193	0.086	1	1.213	0.769
GENDER 2 ^b	--	--	--	--	--
MARITAL STATUS 1	0.221	0.135	1	1.247	0.713
MARITAL STATUS 2 ^b	--	--	--	--	--
EDUCATION 1	-0.152	0.013	1	0.859	0.908
EDUCATION 2	-2.562	4.163	1	0.077	0.041*
EDUCATION 3	0.257	0.147	1	1.293	0.701
EDUCATION 4 ^b	--	--	--	--	--
PROFESSION 1	0.747	0.283	1	2.112	0.595
PROFESSION 2	1.556	0.919	1	4.739	0.338
PROFESSION 3	20.601	--	1	8.853E8	0.000*
PROFESSION 4 ^b	--	--	--	--	--
INCOME 1	-0.665	0.308	1	0.515	0.579
INCOME 2	0.176	0.047	1	1.192	0.828
INCOME 3	-0.710	1.090	1	0.492	0.296
INCOME 4 ^b	--	--	--	--	--

Note: ^b reference category, * $p < 0.05$, ** $p < 0.1$

Table 10: Classification: Accuracy Rate of the Model

<i>Observed</i>	<i>Predicted</i>				<i>Percent Correct</i>
	<i>Less than 20%</i>	<i>20–30%</i>	<i>30–50%</i>	<i>More than 50%</i>	
Less than 20%	54	42	3	3	52.9%
20–30%	32	90	5	3	69.2%
30–50%	11	30	11	3	20.0%
More than 50%	5	13	1	10	34.5%
Overall Percentage	32.3%	55.4%	6.3%	6.0%	52.2%

References

- Bajtelsmit, V., & Bernasek, A. (1996). Why do women invest differently than men? *Financial Counseling and Investing*, 7, 1-10.
- Baker, H. K., & Haslem, J. A. (1974). The impact of investor socioeconomic characteristics on risk and return preferences. *Journal of Business Research*, 2, 469-476
- Barskey, R., Kimball, M., & Shapiro, M. (July 1996). Preference parameters and behavioral homogeneity: An experimental approach in health and retirement survey. National Bureau of Economic Research, Working Paper Series No. 5667.
- Bernheim, B. D., Skinner, J., & Weinberg, S. (2001). What Accounts for the Variation in Retirement Wealth among US Households. *American Economic Review*, 91, 832-857.
- Bernstein, P. L. (1996). *Against the gods: The remarkable story of risk*. New York: Wiley
- Blume, M. (1978). *The changing role of the individual investor*. New York: John Wiley & Sons, Inc
- Bruce, A., & Johnson, J. (1994). Male and female betting behavior: New perspectives. *Journal of Gambling Studies*, 10, 183-198.
- Carducci, B., & Wong, A. (1998). Type A and risk taking in everyday money matters. *Journal of Business and Psychology*, 12(3), 355-359.
- Cohn, R. A., Lewellen, W. G., Lease, R. C., & Schlarbaum, G. G. (1975). Individual investor risk aversion and investment portfolio composition. *Journal of Finance*, 30, 605-662
- Cordell, D. M. (2001). RiskPACK: How to evaluate risk tolerance. *Journal of Financial Planning*, 14, 36-40.
- Davey, G. (2000). Risk tolerance, risk profiling and the financial planning process. *Econometrica*, 47, 263-291.
- Elder, H. W., & Rudolph, P. M. (2003). Who makes financial decisions in the household of older Americans? *Financial Services Review*, 12(4), 293-308.
- Friedman, B. (1974). "Risk aversion and the consumer choice of health insurance option. *The Review of Economics and Statistics*, 56, 209-214.
- Grable, J. E., & Joo, S. (1999). Factors related to risk tolerance: A further examination. *Consumer Interests Annual*, 45, 53-58.
- Grable, J., & Joo, S. (2000). A cross-disciplinary examination of financial risk tolerance. *Consumer Interests Annual*, 46, 151-157.
- Grable, J. E. (2000). Financial risk tolerance and additional factors that affect risk taking in everyday money matters. *Journal of Business and Psychology*, 14, 625-630.
- Grable, J. E., & Lytton, R. H. (1999). Assessing financial risk tolerance: Do demographic, socioeconomic and attitudinal factors work? *Family Relations and Human Development/Family Economics and Resource*, Management Biennial, 80-88.
- Grable, J. E., & Lytton, R. H. (1999). Financial risk tolerance revisited: The development of a risk assessment instrument. *Financial Services Review*, 8 (3), 163-181.
- Gilliam, J., Chatterjee, S., & Grable, J. (2010). Measuring the perception of financial risk tolerance: A tale of two measures. *Journal of Financial Counseling and Planning*, 21(2), 30-43
- Haliassos, M., & Bertaut, C. C. (1995). Why do so few hold stocks? *The Economic Journal*, 105, 1110-1129.
- Hanna, S. D., & Lindamood, S. (2005). Risk tolerance of married couples. Paper presented at the 2005 Academy of Financial Services
- Hanna, S. D., & Lindamood, S. (2004). An improved measure of risk aversion. *Financial Counseling and Planning*, 15(2), 27-38.
- Holtgrave, D., & Weber, E. (1993). Dimensions of risk perception for financial and health risks. *Risk Analysis*, 13(5), 553-559.
- Jianakopolis, N., & Bernasek, A. (1998). Are women more risk averse?. *Economic Inquiry*, 36(4), 620-630.
- Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American psychologist*, 39, 341-350.
- Keynes, J. M. (1921). *A treatise on probability*. London: Macmillan.
- Keynes, J. M. (1937). *The general theory of employment, interest and money*. New York: Harcourt, Brace.
- Knight, F. H. (1921). *Risk, uncertainty and profit*. New York: Century Press.
- Leimberg, S. R., Satinsky, M. J., LeClair, R. T., & Doyle, Jr. R. J. (eds.), *The tools and techniques of financial planning* (4th ed.), pp. 213-225, Cincinnati, OH: National Underwriter
- Levin, I. P., Johnson, R. D., Deldin, P. J., Carstens; L. M., Cressy, L. J., & Davis, C. R. (1986). Framing effects in decisions with completely and incompletely described alternatives. *Organizational Behavior and Human Decision Processes*, 38, 48-64.
- Liverant, S., & Scodel, A. (1960). Internal and external control as determinants of decision making under conditions of risk. *Psychological Reports*, 7, 59-67.

- MacCrimmon, K. R., & Wehrung, D. A. (1986). *Taking risks*. New York: The Free Press, p. 34
- Quattlebaum, O. (1988). Loss aversion: The key to determining individual risk. *The journal of financial planning*, 1(1), 66-68.
- Riley, W. B., & Chow, K. V. (1992). Asset allocation and individual risk aversion. *Financial Analysts Journal*, 48, 32-37.
- Roszkowski, M. (1996). Risk tolerance in financial decisions. In: Cordell, D. M. (ed.) *Fundamentals of Financial Planning* (3rd ed.), pp. 143-201
- Roszkowski, M., & Snelbecker, G. (1990). Effects of "framing" on measures of risk tolerance: Financial planners are not immune. *The Journal of Behavioral Economics*, 19(3), 237-246.
- Roszkowski, M. J., Delaney, M. M., & Cordell, D. M. (2004). The comparability of husbands and wives on financial risk tolerance. *Journal of Personal Finance*, 3(3), 129-144.
- Schooley, D. K., & Worden, D. D. (1996). Risk aversion measures: Comparing attitudes and asset allocation. *Financial Services Review*, 5, 87-99.
- Shaw, K. L. (1996). An empirical analysis of risk aversion and income growth. *Journal of Labor Economics*, 14, 626-653.
- Sitkin, S. B., & Pablo, A. L. (1992). Reconceptualizing the Determinants of Risk Behaviour. *Academy of Management Review*, 17, 9-38.
- Sulloway, F. J. (1997). *Born to rebel: Birth order, family dynamics, and creative lives*. Revised paperback edition, New York: Vintage
- Sung, J., & Hanna, S. (1996). Factors related to risk-tolerance. *Financial Counseling and Planning*, 7, 11-20.
- Sung, J., & Hanna, S. (1998). The spouse effect on participation and investment decisions for retirement funds. *Financial Counseling and Planning*, 9(2), 47-58.
- Sung, J., & Hanna, S. (1996). Factors related to household risk-tolerance: An ordered probit analysis. *Consumer Interests Annual*, 42, 227-228.
- Wallach, M. A., & Kogan, N. (1959). Sex differences and judgment processes. *Journal of Personality*, 27, 555-564.
- Wallach, M. A., & Kogan, N. (1961). Aspects of judgment and decision making: Interrelationships and changes with age. *Behavioral Science*, 6, 23-26.
- Wong, A., & Carducci, B. (1991). Sensation seeking and financial risk taking in everyday money matters. *Journal of Business and Psychology*, (5), 525-580.
- Yao, R., & Hanna, S. D. (2005). The effect of gender and marital status on financial risk tolerance. *Journal of Personal Finance*, 4(1), 66-85.
- Zuckerman, M. (1983). *Biological biases of sensation seeking, impulsivity, and anxiety*. Hillsdale, NJ: Lawrence Erlbaum Associates