



# Retail investors' financial risk tolerance and their risk-taking behaviour: The role of demographics as differentiating and classifying factors



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Received 16 April 2013; revised 27 March 2014; accepted 16 June 2015; available online 3 July 2015

## KEYWORDS

Financial risk tolerance;  
Retail investors;  
Demographic factors;  
Financial risk behaviour

**Abstract** This paper empirically examines whether demographic factors namely gender, age, marital status, income, occupation, and education could be used individually or in combination to differentiate among retail investors in terms of financial risk tolerance (FRT) and risk taking behaviour (FRB), and classify retail investors into FRT and FRB categories. A single cross sectional survey was conducted among 778 retail investors with various levels of investment experience, through a structured questionnaire covering a variety of demographic factors. Four of the six demographic factors were found to be useful in differentiating between levels of investors' FRT and FRB as well as classifying individuals into different FRT and FRB categories.

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## Introduction

One of the most debated questions in the field of personal finance literature is whether there is any set of factors that differentiates among retail investors and classifies them into different categories in terms of financial risk tolerance (FRT) and financial risk behaviour (FRB). There is no consensus within

extant literature and among practitioners on an answer to this. In addition, most financial advisors and/or individuals often mistakenly equate financial risk tolerance (FRT) with risk behaviour of an individual (Davey, 2006). Behaviour has been described as any denotable overt action that an individual performs (Jaccard & Blanton, 2005). Jaccard and Blanton (2005) also opined that every action has a denotable beginning and ending, which is usually performed in an environmental context. As human behaviour varies, actions lead to positive as well as negative outcomes. Within the personal finance domain (i.e. financial management in general and money management in particular), behaviour could be defined as goal oriented or volitional (Grable et al., 2008). The way in which an individual handles his/her financial situation provides a

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Peer-review under responsibility of Indian Institute of Management Bangalore.

mechanism for achieving a stated goal with goal influencing actions. Such behaviour is called goal oriented behaviour. On the other hand, money management behaviour is the result of an individual's behavioural intentions. Further, this behaviour could be influenced by external factors, which are beyond their control. For example, financial emergency or loss of job could lead to behaviour that may result in negative outcomes (Jaccard & Blanton, 2005).

Behaviour could be approached from the determinant perspective or the consequences/outcome perspective. For example, a person's weight loss is not overt behaviour; rather it is a result of previous action taken by that person such as diet or exercise (Jaccard & Blanton, 2005). Similarly, it is always important to understand the consequences of money management rather than the overt behaviour of money management. It is because the overt behaviour of money management is to be reasoned, deliberate, and conscious or non-conscious, unplanned and impulsive (Fazio & Towles-Schwen, 1999). An individual's behaviour i.e. the way in which he/she handles his/her financial situation affects his/her social, and personal, significance (Jaccard & Blanton, 2005). Further, mismanagement of money increases the probability of experiencing financial stress. Understanding the consequences of financial stress plays an important role in shaping policy and in the development of tools and techniques that can be used to cater to the investors more effectively (Grable et al., 2008). This study focusses on the outcome of money management behaviour.

The objective of managing money is to make profits and to increase wealth. The saying that there is no reward without risk is well known; further, risk is inherently associated with every economic decision. Risk is defined as "the unexpected variability (negative) of returns than those expected from investments" (Kannadhasan, 2006; Kannadhasan & Nandagopal, 2010). Financial risk tolerance refers to an individual's willingness to accept the negative changes in the value of investment or an adverse outcome that is different from the expected one (Grable & Lytton, 1999a, 1999b). It is believed that a willingness to take risks i.e. higher FRT, is a prerequisite for accumulating wealth (Yao et al., 2005). However, there is a possibility that wealth may decrease if an individual mismanages her/his financial environment (Grable et al., 2008). Shrinkage of wealth may lead to an individual receiving overdue notices from creditors, and or filing for bankruptcy, which is an outcome of mismanagement or financial risk behaviour. Therefore, understanding and assessing FRT and FRB is significant among the various steps essential in making optimal decisions in terms of risk-reward trade-offs (Moreschi, 2004). Financial risk tolerance plays a crucial part in individual choices about wealth accumulation, retirement, portfolio allocation, insurance, and all other investment and finance related decisions that are dependent on this behaviour (Hanna et al., 2001). Understanding and assessing FRT would help the financial advisor develop a single optimal portfolio that maximises the return at the given level of risk by pooling together investors with different levels of FRT (Schirripa & Tecotzky, 2000). An inability to accurately assess risk tolerance may lead to sub-optimal investment decisions. For example, by overestimating individual risk tolerance an investor/financial advisor may select a portfolio that turns out to be too aggressive, by keeping all other factors such as gender, income, and education constant. Choosing a portfolio which is inconsistent with one's financial risk tol-

erance may result in investor disappointment (Droms, 1987) and may increase the financial stress of an individual, which in turn, affects his/her financial risk behaviour.

Considering the importance of FRT and FRB in investment decisions, previous studies (Grable, 1997; Grable & Lytton, 1999a, 1999b; Coleman, 2003; Grable & Joo, 2004; Hallahan et al., 2004; and others) have investigated a number of factors namely, demographic, social, environmental, and psychological factors across countries over a period of time. Findings of these studies would help to place the investors into a specific risk tolerance category. However, it is imperative to assess the impact of these factors periodically as FRT varies from one person to another, from one period to another, and one country to another. Further, the risk tolerance of an individual changes over time as it is influenced by life experiences (Van de Venter et al., 2012). Furthermore, FRT is a multidimensional attitude. It is an elusive concept that appears to be influenced by a number of predisposing factors such as environmental and psychosocial factors (Trone et al., 1996). Secondly, owing to the sub-prime mortgage crisis in 2008 and Greece crisis in 2010, the value of assets (equity, for example) decreased, and inflation increased, weakening the currency value (of India more than other countries), and increasing unemployment or salary cuts. This increased the financial vulnerability of investors (Bricker et al., 2011; Yao et al., 2011). Such a scenario changes the level of FRT and emphasises the importance of a periodic assessment of FRT (Yao et al., 2011). Moreover these crises have emphasised the need for a periodic review of the risk tolerance that helps in choosing/changing the investors' investment options in accordance with market conditions and thereby their risk behaviour. No study has so far been conducted to understand the role of demographic factors in differentiating the level of FRT among retail investors as well as classifying them into different FRT categories, a factor that motivates this study. This study also intends to examine the role of demographics as a differentiating and classifying factor of retail investors' FRB as FRT is positively associated with risk taking behaviour (Bailey & Kinerson, 2005; Coleman, 2003).

## Review of literature and hypothesis development

Financial risk tolerance and FRB are among the important phenomena in the field of economics, psychology, finance and management science (Roszkowski et al., 1993). Understanding the financial risk behaviour of an individual would be useful for service providers and policy makers who are interested in bringing out new financial products. Financial risk tolerance is one among the factors that determine the risky behaviours of an individual. Financial risk tolerance increases the investors' vulnerability to choosing a risky investment (Irwin, 1993). The choice of a risky investment is likely to increase the investor's wealth, while the opposite is also true (Hanna & Chen, 1998; Yao et al., 2005). An individual who is willing to take risks tends to exhibit high risk taking behaviour i.e. FRB is positively associated with FRT (Bailey & Kinerson, 2005; Chang et al., 2004; Coleman, 2003; Grable et al., 2008). Therefore, understanding FRT is becoming increasingly important for investors and financial industry service providers. From the retail investor's perspective, it helps to make better financial decisions and

avoid frustration, and improves faith in one's decision making as well. From the service providers' perspective, it helps to increase the retail investors' wealth by providing suitable investment options and avoiding a disconnection in their relationship with their clients. For instance, in October 2008, Spectrum Groups conducted focus group interviews with affluent individuals (affluent individuals are those who have a net-worth of at least \$1 million) in order to know the impact of the economic crises on them. The outcome of the study was that 36% of the affluent individuals felt that their advisors performed well during the economic downturn. The remaining 64% were unhappy with their advisors' performance because their wealth had reduced to the extent of 30%, and hence they severed their relationship with their advisors (Holzhauer & McLeod, 2009). Thus, FRT has been the focus of many studies (Coleman, 2003; Delpechitre & DeVaney, 2006; Finke & Huston, 2003; Grable, 2000; Grable et al., 2008; Grable & Joo, 2004; Grable & Lytton, 1999a, 1999b; Grable & Roszkowski, 2008; Hanna & Chen, 1998; Morin & Suarez, 1983; Roszkowski & Grable, 2005; Schooley & Worden, 1996; Van de Venter, 2006; Wang & Hanna, 1998; Yip, 2000).

Financial risk tolerance of an individual is one of the inputs required to develop a financial and investment plan, the other inputs being objectives or goals, time horizon, and financial stability or constraints (Garman & Fogue, 2011). Grable (1997) pointed out that unlike the other inputs FRT tends to be subjective rather than objective, and difficult to measure as well. However, an individual's emotional ability to accept the possible loss from her/his investments is important to achieve the investment objectives (Trone et al., 1996). Whether an individual makes a decision for himself or on behalf of others as a financial advisor, measuring FRT is the key to the success of investment decisions. Thus, understanding the consequences of money mismanagement would help investors in making wise decisions according to market conditions. All financial advisors or investors understand their responsibility in considering FRT and the consequences of previous money mismanagement while matching investment options and strategies (Garman & Fogue, 2011). There is a consensus among practitioners that demographic factors could be used to differentiate and classify retail investors. Further they also believe that this classification could help them to develop a better financial strategy for their clients (Chang et al., 2004). However, Grable and Lytton (1999a, 1999b) pointed out that this consensus is alarming, because there is a possibility of incorrect classification, which could lead to inappropriate asset allocation, or selling the existing assets at a loss or buying wrong assets. In either case, the objective of retail investors cannot be achieved (Pålsson, 1996; Trone et al., 1996). On the contrary Train (1995) reported in his study that lack of tools, models, and heuristics made service providers rely on demographic factors for differentiating and classifying the retail investors into categories (Elvekrog, 1996). Consequently, investors or financial advisors are unable to choose the right investment option that suits the requirement of a particular FRT category. The consequences are quite serious (Pålsson, 1996). It emerges from the literature that relying primarily on demographic factors fails to achieve the investors' objectives as it has limited efficacy (Grable & Lytton, 1999a, 1999b). The purpose of this study is to find out the extent to which demographic factors are dependable in differentiating and classifying investors in terms of FRT and FRB in the Indian context.

## Gender

Studies have revealed that women are more conservative than men, and this difference is attributed to a personality trait in men referred to as "thrill seeker or sensation seeker" (Roszkowski et al., 1993). The prevailing belief of cultures across countries is that men should, and do take greater risks than women (Slovic, 1966) and this has been borne out by financial advisors (Bajtelsmit & Bernasek, 1997). Financial advisors used gender as an effective differentiating and classifying factor of FRT and FRB. This has been consistently supported by numerous researchers such as Sung and Hanna (1996); Bajtelsmit and Bernasek (1997); Grable and Lytton, (1999a, 1999b); Schubert et al. (1999); Grable (2000); Hallahan et al. (2004); Moreschi (2004); Yao et al. (2005); Al-Ajmi (2008); Gilliam et al. (2010); Neelakantan (2010); and Dohmen et al. (2011). However, another group of researchers has found an insignificant relationship between gender and risk tolerance (Grable & Joo, 1999). Though the extant literature has no consensus, this study goes with the former belief. Therefore, it is expected that:

H1. Men are more risk tolerant than women.

## Age

Age is the most investigated demographic factor among all. It is largely accepted that the risk behaviour of an individual depends on his/her age. Older individuals tend to be less risk tolerant than younger individuals, probably because older individuals have less time to meet their goals and objectives (Grable & Lytton, 1999a, 1999b). However, the relationship may not necessarily be linear (Bajtelsmit & VanDerhei, 1997). Previous research found that FRT decreases with age (Al-Ajmi, 2008; Bajtelsmit & VanDerhei, 1997; Dohmen et al., 2011; Grable, 2000; Grable et al., 2011; Hallahan et al., 2004; Hariharan et al., 2000; Hawley & Fujii, 1993; Sultana, 2010; Sung & Hanna, 1996), and this view has been largely acknowledged by practitioners. Contrary to this, some studies find a positive relationship or fail to find a relationship with FRT (Grable, 1997; Grable & Joo, 1997; Wang & Hanna, 1998). It is reasonable to assume that age has an inverse relationship with risk tolerance for two reasons: younger individuals have more time as well as the ability to recover financial losses. Similarly, younger individuals have more time to accumulate as well as protect their wealth. Therefore, in this study, it is expected that:

H2. The level of risk tolerance decreases as age increases.

## Marital status

As is generally believed and as supported by research, marital status affects FRT as married couples tend to have more responsibilities than a single person (Lee & Hanna, 1991; Roszkowski et al., 1993). Furthermore, it is believed that they are averse to high financial risk because they have more financial commitments and a larger number of dependents; they are also at considerable social risk. Therefore, they are less risk tolerant than single persons. However, the findings on

this aspect are mixed. For instance, [Sung and Hanna \(1996\)](#); [Hallahan et al. \(2004\)](#); [Yao and Hanna \(2005\)](#) found that single persons are more risk tolerant than married individuals. Contrary to this, [Grable \(2000\)](#) found that married couples were more risk tolerant than single persons. However, a few studies found that there is no significant relationship between marital status and risk tolerance ([Grable & Joo, 1997](#)). In this study it is expected that:

**H3.** Married individuals are less risk tolerant than unmarried individuals.

### Education

It is generally assumed that people with professional education have a better ability to assess risk and return of an investment than others. [Maccrimmon and Wehrung \(1986\)](#) contend that higher education encourages an individual to assume higher level financial risk. Similarly, other studies found that the increased levels of education are associated with an increased level of FRT ([Al-Ajmi, 2008](#); [Grable, 2000](#); [Grable & Lytton, 1999a, 1999b](#); [Hallahan et al., 2004](#); [Lee & Hanna, 1991](#); [Maccrimmon & Wehrung, 1986](#); [Sung & Hanna, 1996](#)). This leads us to the following hypothesis:

**H4.** Individuals who have professional education tend to have a higher level of risk tolerance.

### Occupation

Occupation refers to the principal activity which someone engages in to meet requirements for their livelihood ([Grable & Lytton, 1999a, 1999b](#)). An investor may be working in the private sector or the public sector or be self-employed. Other things such as gender, education, and marital status being equal, those who are self-employed tend to be high risk takers, choosing riskier investments and accepting volatility when compared to a salaried persons who work for others ([Maccrimmon & Wehrung, 1986](#)). Among salaried individuals, those who work in the private sector are perceived to be high risk takers compared to the individuals working in the public sector ([Grable & Lytton, 1999a, 1999b](#); [Sung & Hanna, 1996](#)). There is a consensus among practitioners that self-employed individuals are more likely to have a higher level of FRT than salaried individuals ([Haliassos & Bertaut, 1995](#)). Therefore, it is expected that:

**H5.** Self-employed individuals tend to have a higher level of risk tolerance than salaried individuals.

### Income

Individuals generally try to allocate some portion of their income for investment in order to increase their wealth. Those who have higher income tend to have a higher level of risk tolerance than individuals with lower income ([Maccrimmon & Wehrung, 1986](#)). Higher income individuals have enough resources to meet essential commitments. Since they invest surplus money they have a greater capacity to incur risk

([O'Neill, 1996](#)). Therefore, there is a positive relationship between income and the level of risk tolerance. Many researchers have found that this positive relationship to be significant ([Grable, 2000](#); [Grable & Lytton, 1999a, 1999b](#); [Hallahan et al., 2004](#)). Therefore, it can be said:

**H6.** The level of risk tolerance increases with the level of income.

### Demographic factors associated with FRB

As discussed earlier, researchers have attempted to understand the relationship between demographic factors and risk taking behaviour. While studying the relationship, researchers have used the expected utility theory as the basis of their analysis. This is a normative approach ([Hanna & Chen, 1998](#)). They pointed out that economic utility theory describes how individuals ought to act in a given situation rather than how actually they behave in the situation. The study of risky behaviour requires the researcher to go beyond the assumption that a person would attempt to "maximise expected utility, with a utility function of wealth ([Hanna & Chen, 1998](#))". Although the utility function is characterised in terms of relative risk aversion ([Grossman & Shiller, 1981](#)), risk aversion is typically determined by an individual's risk-taking preference which is shaped by many factors such as demographic factors, socio economic factors, and psychological and cognitive factors. [Grable and Roszkowski \(2008\)](#) note that research so far has not incorporated the many other factors as a component of expected utility analyses while assessing risk-taking behaviour. As an alternative framework, researchers have attempted to explain FRB by using observed variables such as gender, marital status, age, education, occupation, and income as a part of the bounded rationality approach. These variables are used by service providers to classify individuals into different risk-taking categories ([Nairn, 2005](#)). [Grable et al. \(2008\)](#), with the same approach, examined the relationship between age, gender and income and risk taking behaviour. They found that there was a significant negative relationship between them. Therefore it is expected that:

**H7a.** Men are most generally associated with increased risk taking behaviour than women.

**H7b.** Risk taking behaviour decreases as age increases.

**H7c.** Married individuals have less risk taking behaviour than unmarried individuals.

**H7d.** Individuals who have professional education tend to have higher risk taking behaviour.

**H7e.** Self-employed individuals tend to have more risk taking behaviour than salaried individuals.

**H7f.** Risk taking behaviour increases with income.

### Methodology

#### Data and sample

The study employs single cross sectional survey design. Data were collected from retail investors from Raipur, Chhattisgarh, India, by using a structured questionnaire. The study was

conducted in January and February 2013 with 794 retail investors, covering a variety of demographic factors with various levels of investment experience. A pilot study was conducted initially. In addition, discussions were held with financial advisors before the final survey was conducted. The objective was to ensure the appropriateness and validity of the scales. Convenient/purposive sampling method was employed to ensure the representativeness of the target population. Since the survey instrument was in English, the researcher requested the respondents to seek clarification if they had problems in understanding the questions. In order to minimise the limitations of sampling method, the study increased the sample size. Out of the total responses, 12 responses that were from divorced individuals were discarded since the study wants to concentrate on a major segment that includes unmarried and married individuals. Further, it was observed that four responses were incomplete or unusable and were discarded. Finally, the study used 778 responses for analysis.

## Variables

This study covers six independent variables namely gender, age, marital status, occupation, education, and income, and two dependent variables—the level of financial risk tolerance and financial risk behaviour of retail investors. Age and income are measured on ratio scales. Gender, education, occupation and marital status are measured on a nominal scale. FRT and FRB are dependent variables which are measured by using a 5-item and 4-item scale developed by Grable and Joo (2004) and Grable et al. (2008) respectively (see Tables 4 and 5). Respondents were requested to choose the responses that best describe their risk tolerance level on a 4-point scale. This study has used the common reliability test namely Cronbach's alpha coefficient for assessing reliability of the FRT scale. The alpha value of the FRT scale was 0.762. As described earlier, FRB was measured using four money mismanagement outcomes namely wage garnishments, bankruptcy, overdue notices from creditors, and vehicle re-possession. As part of the survey, respondents were asked to indicate if they engaged in or experienced certain negative and harmful financial activities during the past years. Each factor was dichotomously coded (if they indicated yes, coded as 1, 0 otherwise). A summated score was generated for each subject as an indicator of money management action i.e. outcome behaviour, called risky financial behaviour. The reliability of the scale was 0.649. The reliability of these variables is above 0.60 which is above the minimum threshold level for a variable (Nunnally, 1978). Names and definitions of variables used in the analysis are given in Table 1. FRT and FRB categories were identified using cluster analysis. The researcher labelled the clusters as above and below average FRT and higher and lower FRB based on the total summed mean score sequence (refer to Tables 5 and 6).

## Data analysis tools

To classify retail investors into different risk tolerance categories, the study used cluster analysis. To classify the retail investors into risk tolerance categories using demographic

**Table 1** Names and definition of variables used in the analysis.

Variable	Coding
Gender	Male - 1 Female - 0
Marital status	Married - 0 Single - 1
Education	Professional - 1 Non-professional - 0
Age	Actuals (in years)
Occupation	Salaried - 0 Self-employed - 1
Annual household income	Actuals (in lacs)
Financial risk tolerance (FRT)	Above average FRT - 1 Below average FRT - 0
Financial risk behaviour (FRB)	High FRB - 1 Low FRB - 0

factors, the study used binary logistic regression. Further, this study employed independent samples t-test with descriptive statistics to examine the difference between the groups with respect to the variable tested. Bivariate correlation was used to verify the relationship between continuous independent and dependent variables.

## Results

This section is divided into two parts, namely hypotheses testing using independent samples "t" test, and correlation and multivariate analysis. To test the hypotheses 1-7 i.e., whether demographic factors differentiate retail investors into FRT and FRB categories or not, this study employed univariate analysis. Further, to understand whether the demographic factors could be used to classify individuals into different categories accurately or not, this study used multivariate analysis.

### Univariate analysis

To understand the relationship between FRT and FRB, this study employed simple regression. Understanding this relationship would support the researcher's expectation as well as justify the use of demographic factors as differentiating and classifying individuals' FRB. The results are given in Table 2, which show that there is a positive relationship between FRT and FRB. However, the predictability of this model is 7%. This result supports our expectations that factors that are used to differentiate and classify the investors into FRT categories could be used with respect to FRB as well.

In order to verify hypotheses 1-7, this study employed independent samples' test and bivariate correlation analysis. The results indicate that men, younger individuals, single individuals, professionally qualified people, and self-employed individuals are more risk tolerant (refer to Table 3). However, the results reveal that the level of risk tolerance does not vary with income.

Table 4 shows the results of independent samples' test and bivariate correlation analysis about the association of demographic factors with FRB. The results indicate that men, younger individuals, single individuals, professionally qualified people, and self-employed individuals exhibit more risk-taking behaviour (refer to Table 4). However, the results reveal that the level of risk-taking behaviour does not vary with income.

## Multivariate analysis

### Classifying results

This paper aims to examine whether demographic factors are useful in classifying and differentiating retail investors into different FRT as well as FRB categories. To achieve this, this study used cluster analysis to identify the number of FRT categories and classify retail investors into different groups. The

hierarchical cluster analysis with Ward method produced two clusters (see Tables 5 and 6). The researcher labelled the clusters as above and below average FRT and higher and lower FRB based on the total summed mean score sequence (refer to Tables 5 and 6). The F-values of the cluster analysis were statistically significant at 1% level.

### Identification of differentiating factors

After identifying the categories of FRT and FRB categories using cluster analysis, the next logical approach was to use the demographic factors to verify the differentiating capability of demographic factors to classify retail investors into categories. To test the role of demographics as a classifying and differentiating factor, the study used logistic regression which could handle both continuous and categorical variables. Further, independent variables do not necessarily have to be normally distributed, linearly related, or be of equal variances within each group (Tabachnick & Fidell, 1996). Logistic regression (forward: LR) was preferred to discriminant function analysis because this study is interested in evaluating simultaneous effects of four categorical variables (gender, marital status, education, and occupation) and two continuous variables (age and income) as predictors. The overall model was statistically significant at 1% level. Tables 7 and 9 show the comparison between the observed and predicted category of individuals and the degree of their prediction accuracy. They also show the degree of success of the classification of the sample.

**Table 2** Relationship between financial risk tolerance and financial risk behaviour.

	Coefficient	t-Value	Sig.	Results at 1% level
FRT	0.107	7.566	0.000	Significant
R = 0.262; R <sup>2</sup> = 7%; F = 57.24, p < 0.01				
FRT: financial risk tolerance.				

**Table 3** Relationship between demographic factors and financial risk tolerance.

Hypothesis	Classification	N	Mean	SD	t/r Value	Sig.	Results
H <sub>2</sub>	Male	610	11.95	2.39	-11.22	0.000	Significant
	Female	168	09.52	2.79			
H <sub>3</sub>	Age	778	36.25	10.93	-0.144	0.000	Significant
H <sub>4</sub>	Married	285	11.84	2.62	-3.272	0.001	Significant
	Single	493	11.19	2.69			
H <sub>5</sub>	Professional	198	11.95	2.55	3.25	0.001	Significant
	Non-professional	580	11.24	2.70			
H <sub>6</sub>	Salaried	598	11.12	2.63	5.92	0.000	Significant
	Self-employed	180	12.44	2.60			
H <sub>7</sub>	Income	778	6.14	2.55	0.025	0.491	Insignificant

**Table 4** Relationship between demographic factors and financial risk behaviour.

Hypothesis	Classification	N	Mean	SD	t or r-Value	Sig.	Results at 5% level
H <sub>8</sub>	Male	610	1.25	1.08	-3.85	0.000	Significant
	Female	168	0.89	1.06			
	Married	285	1.30	1.12	3.27	0.001	Significant
	Single	493	1.10	1.07			
	Professional	198	1.37	1.13	-2.97	0.003	Significant
	Non-professional	580	1.10	1.07			
	Salaried	598	1.14	1.06	-2.68	0.007	Significant
	Self-employed	180	1.36	1.15			
	Age	778	36.06	10.55	-0.112	0.002	Significant
	Income	778	6.14	2.55	0.063	0.079	Insignificant

**Table 5** Results of cluster analysis of financial risk tolerance (FRT).

Items of the variable of FRT	Cluster 1	Cluster 2	p-Value
	Below average FRT	Above average FRT	
Investing is too difficult to understand	1.61 (0.588)	2.44 (0.722)	0.000
I am more comfortable putting my money in a bank account than in the stock market	1.66 (0.511)	2.46 (0.638)	0.000
When I think of the word "risk" the term "loss" comes to mind immediately	1.69 (0.534)	2.61 (0.647)	0.000
Making money in stocks and bonds is based on luck	1.83 (0.508)	2.90 (0.583)	0.000
In terms of investing, safety is more important than returns	1.82 (0.592)	2.62 (0.647)	0.000
Total summated scores	8.61	13.02	0.000
No of retail investors	282	496	0.000

Scores are mean and standard deviations are given in parenthesis.

**Table 6** Results of cluster analysis of financial risk behaviour (FRB).

Items of the variable of financial risk tolerance (FRT)	Cluster 1	Cluster 2	F value*
	High FRB	Low FRB	
Wage garnishments	0.63 (0.48)	0.34 (0.48)	64.76
Bankruptcy	0.45 (0.49)	0 (0)	381.36
Overdue notices from creditors	0.70 (0.46)	0 (0)	1091.87
Vehicle repossession	0.44 (0.49)	0.13 (0.34)	109.39
Total summated scores	2.22	0.47	
No of retail investors	311	467	

Scores are mean and standard deviations are given in parenthesis.

\*Significant at 1% level.

**Table 7** Classification results—Logistic Regression about financial risk tolerance (FRT).

Observed	Predicted group		Correct percent
	Group classification		
	Below average	Above average	
Classification of retail investors			
Below average	136	146	48.20
Above average	45	451	90.90
<b>Overall percent</b>			<b>75.40</b>

The FRT model was able to correctly classify 48.20% of those who are below average and 90.90% of those who are above average. An overall correct classification observed is 75.40% of original group cases (refer to Table 7). Table 8 shows the logistic regression coefficients, Wald test, and odds ratio (Exp (B)) for each predictor used in the FRT model. Further it shows the Hosmer–Lemeshow goodness of fit test value. It indicates that there is not much difference between observed and predicted values. Gender, age, education, and occupation had the ability to differentiate the level of FRT

categories which was statistically significant. Marital status and income did not contribute in explaining differences in the level of FRT and hence were not shown in the table. While observing standardised residuals, there are no outliers i.e. value outside plus or minus 3. However, 3.5% of cases have absolute values plus or minus 2 which is within the acceptable level.

The FRB model was able to correctly classify 88.70% of those who exhibit low risk-taking behaviour and 25.70% of those who exhibit high risk-taking behaviour. An overall correct classification observed is 63.50% of original group cases (refer to Table 9). While observing standardised residuals, there are no outliers i.e. value outside plus or minus 3, and all the cases have absolute values less than plus or minus 2.

Table 10 shows the logistic regression coefficients, Wald test, and odds-ratio (Exp (B)) for each predictor used in the FRB model. Further it shows the Hosmer–Lemeshow goodness of fit test value. It indicates that there is not much difference between observed and predicted values. Gender, age, occupation, and income had an ability to differentiate the level of FRB which was statistically significant.

Men have a higher level of FRT and FRB than women. This finding is similar to the findings of Sung and Hanna (1996); Bajtelsmit and Bernasek 1997; Grable and Lytton, (1999a, 1999b); Grable (2000); Hallahan et al. (2004); and Al-Ajmi (2008). Education and occupation indicated a significant difference in terms of risk tolerance which is similar to the findings of Sung and Hanna (1996); Grable and Lytton, (1999a, 1999b); Grable (2000); Hallahan et al. (2004); and Al-Ajmi (2008). Another important finding is that the level of risk tolerance increases as age decreases. This finding is similar to those of Hawley and Fujii (1993); Sung and Hanna (1996); Bajtelsmit and VanDerhei (1997); Hallahan et al. (2004); and Al-Ajmi (2008). Although there is a significant difference between married and unmarried individuals in terms of FRT and FRB which is similar to the findings of Sung and Hanna (1996); Hallahan et al. (2004) and in contrast with those of Grable (2000), it was not useful in classifying the respondents into FRT and FRB categories. Marital status and income did not contribute in explaining differences in the level of FRT. Similarly marital status and education did not contribute in explaining differences in the level of FRB. Hence it was not shown in the table.

**Table 8** Parameters estimate table of final model for financial risk tolerance (FRT).

Variables	B	S.E.	Wald	Sig.	Exp(B)	Results
Gender	-2.195	0.211	107.86	0.000	0.111	Significant
Education	-0.708	0.210	11.388	0.001	0.493	Significant
Age	-0.034	0.008	18.824	0.003	0.966	Significant
Occupation	-1.146	0.232	24.395	0.000	0.318	Significant
Constant	3.795	0.415	83.508	0.000	44.460	Significant

R<sup>2</sup>: Cox and Snell - 21.50%; Nagelkerke -29.50%: model - chi-square: 188.42 (4), p < 0.01; Hosmer and Lemeshow test - chi-square: 7.344 (8); p > 0.01.

**Table 9** Classification results—logistic regression about financial risk behaviour (FRB).

Observed Group classification of retail investors	Predicted group		Correct percent
	Group classification Low FRB	High FRB	
Low FRB	414	53	88.70
High FRB	231	80	25.70
<b>Overall percent</b>			<b>63.50</b>

**Table 10** Parameters estimate table of final model for financial risk behaviour (FRB).

Variable	B	S.E.	Wald	Sig.	Exp(B)	Results
Gender	-0.670	0.194	11.85	0.001	1.941	Significant
Age	-0.020	0.007	7.25	0.007	1.015	Significant
Occupation	-0.579	0.176	10.87	0.001	1.790	Significant
Income	0.063	0.031	4.15	0.042	0.940	Significant
Constant	0.486	0.351	1.855	0.173	1.1625	Insignificant

R<sup>2</sup>: Cox and Snell - 5.40%; Nagelkerke -6.80%: model - chi-square: 40.05 (4), p < 0.01; Hosmer and Lemeshow test - chi-square: 3.21 (8); p > 0.01.

## Conclusions, implications, and directions for future research

As mentioned in the first section, the objective of this paper was to examine the role of demographic factors viz. gender, marital status, age, occupation, education, and income either collectively or in combination as a differentiating factor among levels of FRT and FRB of retail investors and classifying them into different categories in the Indian context. This study addressed this objective successfully. Four of the six demographic factors were found to be useful factors in differentiating among the level of FRT and FRB of retail investors, as well as classifying them into different FRT and FRB categories. This result confirms that demographic factors do play a role in differentiating and classifying retail investors and they motivate practitioners to continue to use them in the future as well. These findings support the previous findings and have implications for practice. For instance, the findings on gender in connection with FRT and FRB need attention. Belsky et al. (1993) found that the demographic trends indicate that women have longer life expectancy, exhibit greater responsibility towards their families, and have lower lifetime earnings potential and so on. This emphasises the need

for women to be educated to enable them to use risk prudently in ensuring adequate return to meet their financial needs. As Grable and Lytton (1999a, 1999b) suggested, it is an essential responsibility of financial advisors and educators to educate women about risk-return trade-offs in investing. Similarly they could explain the implications of various investments to those who have less formal education/inadequate knowledge about investments in order to achieve their goals.

Although age is considered to be the most effective differentiating factor of FRT categories, other issues such as time horizon, goals, and financial stability of retail investors should also be kept in mind. Exchange rate fluctuation, market volatility, inflation, political instability, and the impact of global crises on the economy have equally long-term implications for younger investors (see Goodfellow & Schieber, 1997). It is believed that higher income investors can afford to meet their commitments and hence would take a higher level of risk than lower income individuals. However, income was not found to be significant in classifying retail investors into FRT categories. Although retail investors have more disposable income, high level of responsibilities and the presence of dependants lead to a lower level of FRT. Education was found



to be insignificant in classifying retail investors into FRB categories. This could be attributed to retail investors having "non-investment" type of education rather than investment type education (Grable, 2000). Consequently they avoid taking risk. Another possibility has to do with the highly subjective nature of investors. Typically they may be highly competitive persons, using education, among other means, to improve their competitive advantage over others in choosing investment options and thereby avoiding risk taking behaviour. Therefore, planners and advisors are cautioned to note that relying on any one factor or a combination of factors in classifying the retail investors into the FRT category without taking into account other factors such as market conditions, individuals' goals, time horizon, and financial stability may lead to two types of risk namely an incorrect classification of category and incorrect investment decisions. This, in turn, may lead to diminution in wealth and welfare of investors (Pålsson, 1996). In other words, it leads to an incorrect classification of retail investors into a category which leads to wrong investment decisions. As a result of mis-classification, one may sell a good investment or invest in an incorrect portfolio. Both these are not good for financial service providers. It will affect their credibility, reputation, and result in loss of trust and customers (Grable & Lytton, 1999a, 1999b). Finally, this research suggests to the practitioners and advisors or individuals that the two models discussed earlier help classify retail investors satisfactorily. However, use of all the demographic variables for differentiating among the level of FRT and FRB is suggested instead of relying on statistically significant factors alone. This is because a small variation in any of the variables that are considered to estimate the FRT and FRB would be useful in avoiding false classifications and preventing the wrong asset allocation decisions (Train, 1995). This may also help to retain the investors' confidence in an advisor or not to lose confidence in oneself.

At the same time, retail investors cannot be classified into different categories based on demographics alone. Therefore, it is suggested that practitioners consider the retail investors' socio-economic and attitudinal factors while assessing the category. Further, SEBI has started educating people about the capital market through various schemes. Hence retail investors' financial knowledge could also be used to find out the FRT or FRB category. This study could be replicated to other samples in the other parts of India which would help generalise these findings and develop the population model for identifying/predicting the retail investors' category. It is also suggested that while assessing their FRT category, it would be better to use objective as well as subjective measurements. Further research can be done to identify whether other factors such as sensation seeking, personality type, herding, overconfidence, race, expectations, financial knowledge, family background, culture and birth order have an impact on the FRT and FRB. This study can be extended to make comparison between countries—we suggest retaining the factors used in this study and including the factors mentioned earlier which were not considered in the study. Researchers could further make a comparison between retail investors and institutional investors based on the same factors. Finally, though measuring the FRT category is a complicated process in the decision-making domain, an understanding of FRT and FRB would be beneficial to the finance service providers to sustain a rewarding relationship with their clients.

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