

# Demographic Factors Impacting the Financial Risk Tolerance of Retail Investors of Urban West Bengal

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## Abstract

Prior knowledge of willingness or capacity to take financial risks of a retail investor can be very useful in targeting potential clients for investment agencies offering various low, medium, or high risk instruments for investment. Previous research has showed that the financial risk tolerance (FRT) of an individual is influenced by several demographic factors of the individual such as age, gender, marital status, education, profession, income, number of dependents in the family, etc. The capacity also varies from country to country and place to place within a country. Hence, knowledge of the demographic data of the individual can help researchers to understand how each of these factors impact the retail investors residing in a particular place, city, or a state in taking financial risk. In this paper, we collected primary demographic data from 2000 residents of Kolkata, Asansol, and Durgapur, the three major cities of the state of West Bengal in India with an aim to find out the impact of each of these demographic factors of the respondents (the potential retail investors) on their tolerance to financial risk. The primary data were analyzed using logistic regression method which revealed gender and profession as the two demographic factors that had the most significant impact on the FRT of the retail investors ; whereas, income and number of dependents had a negligible impact.

**Keywords :** logistic regression analysis, financial risk tolerance, investor behavior, demographic factors, logistic regression, retail investor

**JEL Classification Codes :** G11, G17, G32

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Financial markets are volatile in nature and hence, the study of risk associated with the market is very important. The interdependence between risk and volatile markets with the investment portfolio of an individual has been a matter of research as it is expected that such studies can help forecast interest rates, bond rates, returns on security market, dividends, etc. For an individual to take an investment decision, it is useful to have necessary information on the financial market. However, prediction of the financial market is a very difficult task as the market changes with time, region, and other factors. In the traditional finance approach, the markets are fully efficient and non - volatile and the investors are considered rational. However, recent research by several researchers suggests that an individual's choice of a specific financial investment may conflict with his/her rational individual behaviour and hence, the need for development of a behavioural finance approach became necessary. Due to the instances of global market crashes in the past few decades, the study of investor behaviour

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has emerged as a topic of huge research interest. The behavioural science approach has gained popularity because it takes into account the psychological aspects of the individual as well.

The foundation for behavioural finance was laid by Tversky and Kahnemann (1974), who stressed on the fact that instead of calculated risk, perceived risk should be analyzed, as according to them, people do not always act rationally ; rather, they act on the basis of certain cognitive shortcuts determined by them. Since then, many researchers have developed the field (Blais & Weber, 2006 ; Bayer, Bernheim, & Scholz, 2009 ; Junkus & Berry, 2010 ; Weber, Weber, & Nosić, 2013). When one examines the literature, it is observed that both social and economic (demographic) factors affect the individual behaviour as the market fluctuations cannot be explained solely through financial implications. It is now widely established that the psychological biasness of every individual influences their risk tolerance at different levels. Thus, the demographics of the individual investors are important aspects in determining the market volatility and performance of a specific instrument of investment in a particular region as it can help us to forecast how a typical investor is likely to react to certain changes in circumstances. According to Chen and Volpe (1998), age, gender, and experience are the determining factors for calculating one's FRT. On the other hand, research by Schooley and Worden (1999) showed that investors with higher level of education held more risky assets in investment. In the Indian context, a recent study by Kannadhasan (2015) showed that as many as six demographic factors including gender, marital status, age, education, occupation, and income could influence the retail investors' financial risk tolerance (FRT), that is, the ability to take financial risks. The author's study focused on the retail investors from Raipur, Chhattisgarh, India. Few other studies have also been reported by Indian researchers in the last few years in which the authors studied the role of behavioural biases (Dangi & Kohli, 2018 ; Isidore & Christie, 2018; Raut & Das, 2015) ; attitudinal factors (Gautam & Matta, 2016) ; and women investors (Paramashivaiah, Puttaswamy, & Ramya, 2014). However, no studies could be found on the risk behaviour of the urban retail investors residing in the three major cities of West Bengal, namely Kolkata, Asansol, and Durgapur.

These three cities are the main industrial belt of the state of West Bengal. In this work, we have made an attempt to forecast the risk behaviour of the retail investors residing in these cities based on their six main demographic factors : gender, age, income, education, profession, and number of dependents. The justification for selection of these demographic factors are detailed below :

**(1) Gender :** As of the differences in the emotional responses between male and female, gender forms one of the important criteria for estimating the risk taking ability of the investors. After analyzing 150 studies from 1967 to 1997, Byrnes, Miller, and Schafer (1999) concluded that the female respondents were more risk averse than their male counterparts. A study conducted on American professional mutual fund managers revealed that the female managers showed less inclination towards higher risk profiles (Niessen & Ruenzi, 2007). In general, women are considered more risk averse than men when it comes to taking important financial decisions (Jianakoplos & Bernasek, 1998 ; Sapienza, Zingales, & Maestripieri, 2009).

**(2) Age :** Investor behaviour has been found to vary with age. For example, a study showed that middle - aged adults aged between 40-55 years were more strategic while making investment decisions (D'Zurilla, Maydeu - Olivares, & Kant, 1998). Gardner and Steinberg (2005) suggested that younger adults between the age group of 18 - 22 years were highly influenced by their peers and friends while taking investment decisions. Thus, it may be concluded that the risk taking ability of retail investors is dependent on their age.

**(3) Education :** General feeling of knowledgeable investors is that they can assess the risk scenarios more accurately than their uneducated counterparts, thus suggesting a positive correlation between education and risk taking ability. Due to their capability of using category - based processing, they can process the information at the

**Table 1. Demographic Factors and the Related Hypotheses Used in this Study**

Demographic Variable	Hypothesis
Income ( $X_1$ )	A higher income investor has more FRT than a lower income investor ( $H_1$ ).
Gender ( $X_2$ )	Men have more FRT than women ( $H_2$ ).
Age ( $X_3$ )	Investors with more education have higher FRT ( $H_3$ ).
Education ( $X_4$ )	Younger investors have higher FRT than older investors ( $H_4$ ).
Profession ( $X_5$ )	Salaried individuals have higher FRT than others ( $H_5$ ).
Number of Dependents ( $X_6$ )	An increase in number of dependents decreases FRT ( $H_6$ ).

category level rather than based on individual attributes (Cohen, 1982 ; Chang, 2004). Compared to knowledgeable investors, less knowledgeable investors may not be able to process financial information regarding the security market effortlessly because an initial categorization of financial information is not available.

**(4) Profession :** Profession often determines the level of income and in turn is an indicative factor for determining the level of risk alertness. An investor may be working in the private concern or the public concern or be self-employed. Studies have shown that other parameters such as gender, education, age, etc. being equal, self-employed people tend to be high risk takers, and choose riskier investments and accept volatility when compared to a salaried person who works for others (MacCrimmon & Wehrung, 1986). In the salaried sector, those who work for the private sector are perceived to be high risk takers than the employees of the public sector (Grable & Lytton, 1999).

**(5) Income :** Some researchers considered the level of income as a determinant factor in estimating the investor to be a risk taker, risk averse, or risk neutral. For example, Dohmen, Falk, Huffman, Sunde, Schupp, and Wagner (2011) argued that higher levels of income and wealth may increase the willingness of an investor to take risks because these may cushion the impact of bad realizations.

**(6) Dependents :** The number of dependents determines the amount of savings that an individual can separate for investment purpose from his/her income. Many scholars argue that individuals with lower number of dependents or a small family size are more risk taking than individuals with big families (Hallahan, Faff, & McKenzie, 2003 ; Holt & Laury, 2002). The main reason is increased number of responsibilities with increased number of family size.

The Table 1 summarizes the hypotheses for each of the demographic factors as can be deduced from the above discussion.

## Objective and Research Methodology

The objective of this paper is to apply statistical methods to the data collected from the respondents living in Kolkata, Durgapur, and Asansol cities in order to develop a simplified model for prediction of their risk behaviour based on their demographic data. With the six above - mentioned demographic factors as independent variables, the dependent variable that we want to predict from this study is the risk response, that is, how likely an investor will make investment through risky instruments, namely mutual funds, shares, stocks, etc. Cook and Whittle (2015) defined an individual's risk profile as the extent to which an individual prefers certain rewards compared to

**Table 2. List of Independent Variables and Their Response Codes Used in the Study**

Variable	Coding
Income ( $X_1$ ) in INR	>20,000 = 0; 20,000 - 50,000 = 1; 50,000 - 120,000; > 120,000
Gender ( $X_2$ )	Male = 1; Female = 0
Age ( $X_3$ )	20 - 40 = 2; 40 - 60 = 1; Above 60 = 0
Number of Dependents ( $X_4$ )	0 - 5 (absolute number)
Education ( $X_5$ )	Undergraduate = 0; Graduate = 1; Post graduate = 2; Above = 3
Profession ( $X_6$ )	Salaried = 0; Self-employed = 1

uncertain, yet larger rewards. In general, the individual who favours low probability outcome is a risk taker and an individual who does not favour high probability outcome is risk averse.

In our work, data were collected from 2000 respondents using a structured questionnaire during the period of September - December 2017 from retail investors residing in Kolkata covering diverse demographic factors. The questionnaire was prepared keeping in mind the typical questionnaires used by financial advisors of investment agencies to ensure the appropriateness of the survey. The raw data collected were then subjected to multi-logistic regression analysis to develop a model to forecast the probability of the response based on six independent demographic variables as above. Age, income, and number of dependents were measured on ratio scales ; whereas, gender, education, and profession were measured on a nominal scale. The detailed codes used to categorize the responses received against each of the independent variables are listed in the Table 2.

FRT of an individual investor is the only dependent variable in the analysis and is classified into two categories : risk-takers are coded as 1 and risk-averse are coded as 0. The respondents were requested to choose the responses that best described their financial investments through risky instruments (such as shares, stocks, and mutual funds) in percentage of their total savings in order to classify them into appropriate. Respondents with more than 30% of total investment in shares, stocks, and mutual funds were categorized as risk takers ; whereas, those with less than 30% investment in shares, stocks, and mutual funds were categorized as non - risk takers.

Logistic regression method was used in SPSS to analyze the raw data for its following advantages :

**(i)** Logistic regression does not assume a linear relationship between the dependent (risk) and independent variables (demographic factors). The dependent variable must be dichotomous (two categories) and the independent variables need not be interval, nor normally distributed, nor linearly related, nor of equal variance within each group.

**(ii)** The categories (groups) of the demographic factors must be mutually exclusive and exhaustive ; a case can only be in one group and every case must be a member of one of the groups.

**(iii)** Logistic regression determines the impact of multiple independent variables presented simultaneously to predict membership of one or two dependent variable categories.

## Data Analysis and Results

In order to examine whether the data is normally distributed and since the data under consideration is relatively large (2000 samples), we performed the Kolmogorov - Smirnov test using SPSS, and the results of the same are presented in the Table 3. In general, if the significance value is less than .05 at the 5% confidence level, then the data is said to be normally distributed. The Table 3 shows that the significance is .000 for all demographic variables, which confirms the normality test.

**Table 3. Kolmogorov - Smirnov Tests in SPSS**

Demographic Factors		Income	Gender	Age	Dependents	Education	Profession
Normal Parameters	Mean	1.95	1.37	2.13	2.10	2.05	1.86
	Standard Deviation	.893	.483	.694	1.197	.874	.873
Most Extreme Differences	Absolute	.234	.407	.260	.183	.226	.255
	Positive	.234	.407	.260	.183	.226	.255
	Negative	-.159	-.275	-.241	-.166	-.175	-.162
	Kolmogorov-Smirnov (Z)	10.454	18.221	11.624	8.205	10.129	11.425
Asymp. Sig. (2 tailed)		.000	.000	.000	.000	.000	.000

**Table 4. Classification Table Predictor (SPSS)**

Observed	Predicted		Correct Percentage (%)
	Non - Risk Taker	Risk Taker	
Non - Risk Taker	456	213	68.2
Risk Taker	164	1167	87.7
Overall Percentage			81.2

Logistic regression is used to test the role of demographic factors as a differentiating factor as this can handle both continuous and categorical variables. The overall model is statistically significant at the 5% level. The Table 4 compares the observed and predicted category of individuals, the degree of their prediction accuracy, and success of the classification of the sample. The performance of the model is assessed by cross - tabulating the observed response categories with the predicted response categories which are shown in the classification Table 4. Here, whenever the predicted probability is greater than the cut off value of 0.5, the predicted response category is treated as 1. It can be seen in the Table 4 that the model correctly classifies 68.20% of non - risk takers and 87.70% of those who are risk takers, with an overall prediction of 81.20%.

The Table 5 shows the logistic regression coefficients - Wald tests, odds ratio (Exp (B) for each predictor used in the FRT model. The Table 5 has several important elements. The significance of each predictor is explained by Wald statistics, which has a chi-square distribution. Wald can be explained through the significance level. If the significance is more than .05, then the hypothesis is rejected. However, in our case, all the variables have significance level 0, which indicates that all the hypotheses are accepted and that the logistic regression is statistically significant. This means that all the six demographic factors (income, gender, age, number of dependents, education, and profession) are significant and influence the FRT of the retail investor. The high values

**Table 5. Logistic Regression Parameters of the Model for FRT**

	B	SE	Wald	df	Sig.	Exp (B)
Income ( $X_1$ )	-3.248	.263	152.882	1	.000	.039
Gender ( $X_2$ )	2.509	.293	73.569	1	.000	12.293
Age ( $X_3$ )	1.996	.195	104.757	1	.000	7.357
Dependents ( $X_4$ )	-.953	.175	29.680	1	.000	.386
Education ( $X_5$ )	1.760	.301	34.283	1	.000	5.810
Profession ( $X_6$ )	2.405	.214	34.283	1	.000	11.079
Constant	-5.788	.367	248.428	1	.000	.003

of Exp ( $B$ ) associated with gender and profession (12.290 and 11.079, respectively) in Table 5 indicate the strong dependence of the investors' FRT on these two demographic factors. On the other hand, very small values of Exp ( $B$ ) associated with income and number of dependents indicates negligible dependence of the investors' FRT on these two demographic factors.

To test the goodness of fit, Hosmer- Lemeshow test was conducted as this provides useful information about the model. The significance level for chi - square is found to be .000, which indicates acceptance of the null hypothesis, which states that there is not much difference between the predicted and the observed values. This result shows that the model is fit with chi - square value at 172.875 of this model at the .01 significance level. This indicates that the logistic regression is meaningful, in accordance with the dependent variable related to each specified independent variables.

The findings above are largely in accordance with previous literature. For example, one of the key findings of this study is that the salaried men have much higher level of FRT than un-salaried women. This finding is similar to the findings of Croson and Gneezy (2009), Grable and Lytton (1999), and Grable (2000) who also suggested that men are more risk takers than women. Another important finding of this study is that profession of the investor (whether self - employed or salaried) has a strong influence on the FRT, which is also in good agreement with other studies (Shtudiner, 2019). Also, the finding that the level of FRT decreases with increase in age in this study is consistent with the findings of Kannadhasan (2015).

It is generally believed that investors having higher income can afford to take higher level of risk than their lower income counterparts, but our study does not support this strongly. The reason for this is not well understood but could be associated with a number of other factors such as increased level of responsibilities, dependants, etc. We also do not see much dependence of the FRT on the number of dependents in the family, and the reason for this could be in the perception of the dependents in the minds of the investor. If the dependents are perceived by the investor as family members, irrespective of whether they are also earners, this could easily mislead the data implications.

## **Conclusion and Research Implications**

In this article, we have made an attempt to investigate the influence of six independent demographic factors, which may influence the financial decisions of the individual retail investors residing in the three major cities of the Indian state of West Bengal. The study specifically focuses to forecast the probability of investment (through risky instruments such as stocks, shares, and mutual funds) of a retail investor based on his/her demographic information such as income, gender, age, number of dependents, education, and profession for retail investors residing in the cities of Kolkata, Asansol, and Durgapur. We use the multi-logistic regression analysis to determine the influence of these factors which reveals that gender and profession are the two demographic factors that have the most significant impact on the FRT of the retail investors ; whereas, income and number of dependents have a negligible impact. Also, our multi-logistic regression analysis predicts the number of investors with high FRT (risk takers) with up to 81.2% accuracy.

The findings of this study can be useful to the financial investment agencies/advisors in identifying their potential clients living in the cities of Kolkata, Asansol, and Durgapur who are likely to make investments through risky instruments such as stocks, shares, etc. based on demographic factors such as gender, profession, age, and education. However, for better accuracy of prediction, the study would require inclusion of more demographic details such as information on the number of earners in the family, ethnic origin, marital status, etc.

## **Limitations of the Study and Scope for Further Research**

The study does suffer from certain limitations. From the perspective of data collection, some investors may refuse

to answer certain questions which can cause difficulty in classification and in turn introduce some biasness in the data. Another problem regarding demographic variables is the fact that certain groups are overall more risk seeking or risk averse, but this does not necessarily mean that the questioned individual always acts in coherence with this group. Men, for example, are considered more risk tolerant than women, but there are definitely other women as well who are more risk tolerant than the average man. So, the problems of certain exceptions always pertain. According to Jianakoplos and Bernasek (1998), there is even a difference between actual risk tolerance and stated risk tolerance as they found that many men who verbally claimed to be more risk tolerant were actually non risk takers when measured by their actual investments. Market volatility and political instability may also have a strong impact on the financial risk decisions of an informed retail investor, and thus, is a limitation of the current research.

It is worth noting that demographics alone may not be sufficient to classify the retail investors into different categories since the socioeconomic and attitudinal factors may also influence the financial risk decisions of an investor (Grable & Joo, 2004). Financial education of the investor is another parameter that may be included in future studies. More sampling from a larger number of respondents with information on additional demographic factors such as marital status, number of earners in the family, financial education, ethnicity, family background, personality, etc. would establish a more generalized model for predicting the retail investors' risk category. In fact, such studies may be extended to retail investors residing in other parts of India and can also be compared with institutional investors based on the same demographic factors.

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