

Multinomial Logistic Analysis of Income Level of Salaried Class on Financial Risk Tolerance

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Abstract

Financial Risk tolerance of investors affects Investment and saving behavior of individuals. This research studies the relationship between income of salaried class and financial risk tolerance using multinomial logistic regression. It is found that income is significantly correlated to the financial Risk tolerance. A sample covered salaried class of D.I.Khan district of 269 respondents, Khyber Pakhtunkhwa, Pakistan. This study found that low income class are risk averse as compared to high income class.

Keywords: Financial Risk Tolerance, Income, Multinomial Logistic Regression.

Introduction

Investment is associated with saving & consumption. In business management and finance, investment is associated with households, governments & firms. Investment & savings are used interchangeably. Savings include reducing expenditures, such as everyday costs. Saving in terms of personal finance indicates low-risk protection of money, like in a bank account. In investment, risk taking decision is a main way to generate wealth. It facilitates the investor to select a suitable investment avenue according to their needs & they can avoid repeating the past errors (Tseng & Yang, 2011).

People respond in a different ways to risk, some accept risk other reject risk. Risk averse is apparently the reverse of risk tolerance i.e. when risk tolerance increases, risk averse decreases. Risk tolerance is measured to evaluate the performance of respondents based on a combination of subjective questions related to investment decision. “Financial risk tolerance is a person’s readiness to accept the risk of an adverse result for the opportunity of get a good result”. Risk tolerance is

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studied by different researchers by different aspects such as personality, demographics, birth order, socio-economic status & attitudes about money (Grable & Joo, 1999; Grable & Joo, 2000; Wong & Carducci, 1991; Roszkowski, 1996; Carducci & Wong, 1998). This research study attempts to examine the effect of income level on individual financial risk tolerance.

Literature Review

Sung & Hanna (1996) did study on factors related to risk tolerance. They found that income has an indirect influence on risk tolerance with decrease in income risk tolerance decreased. A substantial difference was found between Caucasians and the Blacks risk tolerance. The study discovered a major variation among men and women risk tolerance. In their analysis they used education levels to found influence on risk tolerance, with higher education higher was the risk tolerance related to investments. They also evaluated different professions with the risk tolerance. Profession included technical personnel/salesmen/administrators, management, service-related occupations, productive professions in agriculture, high technology- related occupations, or fishing. Result shows no relationship of the capacity to accept financial risk with these professions. Other demographic factors such as family size, retirement years, showed to be unrelated.

Murtaza et al., (2013) developed a socio-demographic behavior based model. They study the outcome of social-demographic factors on investment choices through risk perception. Investors who invest their money in those companies which support human rights, consumers' rights & environmental laws are socially responsible investors. They also do not like to invest in the such businesses, whose is involve in making weapons, alcohol, tobacco & gambling. In Muslim countries it is an emerging concept. Their main dependent variable was the socially responsible investor choices in Muslim countries & independent variables were demographic and social factors. Risk perception was taken as a mediating variable.

Keller et al (2006) did study on individual investor's attitudes toward money such as stock investing, financial security, perceived immorality of the stock market, interest in financial matters, attitude toward gambling, obsession with money & saving. They used cluster analysis of data. Data was collected through mail questionnaire. Survey was conducted on individual investors in Switzerland segmented into four categories such as safe players, open books, money dummies & risk-seekers. Investor behavior value was forecast by this typology: Each category was different on the basis of different investment

portfolios, risk tolerance, selling & buying securities, readiness to make socially responsible investments & reaction to price fluctuations.

Caglayan and Abdieva(2014) conduct study on risk tolerance of individual investors in Kyrgyzstan& find out the reason influencing investor types. They used multinomial logit model to get the result. They make three categories of risk tolerance (dependent variable) as risk-lover, risk-neutral & risk averse. They found that factors affect the preference choice of investor were gender, age, non-wage income, investment rate and domestic investment. They concluded that in Kyrgyzstan women take less risk than men. They also found that with the increase in age & income investor become less risk lower & high risk taker respectively. Their findings show that income has an optimistic outcome on the risk taking behavior.

Hawley and Fujii (1993) did study to find the correlation in risk tolerance & demographic factors. Their study sample was American working people aged from 25 to 62. They concluded that the level of income, education & the debt degree were unconditionally related with investor's risk tolerance.

Anbar and Eker (2010) conduct study to examine the association of socio-demographic factor such as age, number of children, gender, marital status, total net assets & income with financial risk tolerance level. They investigate the cause that influences the individual investors financial risk perception. They used t-test, ANOVA & logistic regression analysis. Data was collected from 1100 university students of the Uludağ University of Turkey at Faculty of Economic and Administrative Sciences. They found that gender, working in a job, department, monthly income were important in differentiating individuals into risk tolerance levels through the outcome of t-test and ANOVA analysis whereas age, marital status & number of children had no effect on financial risk tolerance.

Lewellen *et al.*, (1977) found that income and age are positively correlated & marital status is negatively correlated with risky asset portion of the portfolio. They found that as income rises risk tolerance also increases. They found that investors show a conservative investment attitude with a lot of dependents. Larger the size of family size less will be the disposable income for investment & the low will be the risk bearing capacity.

Sulaiman (2012) conducted research to assess the financial risk tolerance & to study the relationship between demographic factors & risk tolerance of individual investors. He said that financial risk tolerance is the level of risk that an investor has confidence in to accept. He used statistical tools such as chi-square test and Correlation analysis. He

collected primary data through questionnaire from employees of two universities of India such as university of Kerala, and mahatma gandhi university. Employees were randomly chosen from a list of selected universities faculties and staff. He used questionnaire for risk-tolerance assessment of finametrica developed by an Australian company. The finametrica questionnaire consists of 24 questions. In his study he used independent variables such as education, gender, age, marital status, number of dependents & annual income. Risk tolerance was the dependent variable. He made seven risk groups on the basis risk score into three risk tolerance group. These groups were low risk group (0-34), medium risk group (35-54) & high risk group (55-100). He concluded that gender & financial risk tolerance are independent of each other. Whereas, there was positive correlation of age & income with financial risk tolerance. He found that marital status & educational level is associated with financial risk tolerance of individual investors.

Research Method

In this study primary data was collected through questionnaire developed by Grable & Layton (1999). Multinomial Logistic Regression model is used. The population of this study consists of salaried class of D.I.Khan, Khyber Pakhtunkhwa, Pakistan. A sample of 400 respondent was selected through random sampling from D.I.Khan city. Questionnaires were printed and distributed among the salaried class of D.I.Khan city. The reason of this model selection is because it is important & useful for analyzing categorical data & dependent variable has more than two options/aspects.

Financial risk tolerance is dependent variable. It has three aspects.

1= below average risk tolerance (score from 1-19)

2= average risk tolerance (score 20-28)

3= above average risk tolerance (score 29-45)

Income (monthly) is used as independent variable. Four aspects of monthly income are used.

1= below 15 thousand, 2= 15-25 thousand, 3= 26-40 thousand, 4= above 40 thousand

In logistic regression analysis, the outcome is coded as 0 or 1, where 1 identifies that the outcome of interest exist, and 0 identifies the absent.

The multiple logistic regression model can be written as follows:

$$\hat{p} = \frac{\exp(b_0 + b_1 X_1 + b_2 X_2 + \dots + b_p X_p)}{1 + \exp(b_0 + b_1 X_1 + b_2 X_2 + \dots + b_p X_p)}$$

$\hat{P}$ is the expected probability that the outcome exist, X_1 through X_p are distinct independent variables; and b_0 through b_p are the regression coefficients

Data Analysis & Interpretation

Table 1 shows case processing shows number of observations & marginal percentage in each category of the income & risk tolerance outcome.

Table 1 Case Processing Summary

		N	Marginal %
Risk Tolerance	below average risk tolerance	30	11.2%
	average risk tolerance	188	69.9%
	above average risk tolerance	51	19.0%
Monthly income	below 15 thousand	46	17.1%
	15-25 thousand	84	31.2%
	26-40 thousand	103	38.3%
	above 40 thousand	36	13.4%
Valid		269	100.0%
Total		269	

Table 2 Cronbach's Alpha

Reliability Statistics	
Cronbach's Alpha	N of Items
.709	13

Reliability test is achieved by means of Cronbach's alpha. Cronbach's alpha calculates internal consistency is used to check reliability of questions, tools & variables used in a survey instrument. According to Nunnally (1978), 0.7 value is the suitable value and value greater than 0.7 specify the items are measuring the same construct.

Table 3 Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	73.439			
Final	29.014	44.425	6	.000

It is evaluated from the table 3 that the chi-square of 44.425 having p-value < 0.000, which shows that model fits significantly as a whole. The relationship between dependent & independent variable is supported.

Table 4 Parameter Estimates

Risk Tolerance ^a		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
below average risk tolerance	Intercept	-	.641	5.241	1	.022			
		1.466							
	[income=1.00]	-	1.207	1.708	1	.191	.206	.019	2.200
		1.578							
	[income=2.00]	2.383	.872	7.467	1	.005	10.833	1.961	59.834
average risk tolerance	[income=3.00]	1.674	.741	5.098	1	.024	5.333	1.247	22.808
	[income=4.00]	0 ^b	.	.	0	.	.	.	.
	Intercept	.431	.356	1.462	1	.227			
	[income=1.00]	-.297	.465	.409	1	.523	.743	.299	1.848
	[income=2.00]	2.431	.625	15.112	1	.000	11.375	3.339	38.757
	[income=3.00]	1.308	.466	7.875	1	.005	3.700	1.484	9.227
	[income=4.00]	0 ^b	.	.	0	.	.	.	.

a. The reference category is: above average risk tolerance.

b. This parameter is set to zero because it is redundant.

Income of above 40 thousand (income-4) is set zero. The result for first equation of multinomial logistic regression shows that if income-1 score is increased by one point, the multinomial log-odds would be expected to decrease by 1.57 units. The Wald statistic (1.708) for the survey respondents of income-1 has level of sig of .191. It is concluded that the difference between income-1 and income-4 has not found statistically different for preferring Risk 1 over Risk 3. The value of Exp (B) is .206 which implies that the odds decreased by 79%. Respondents with income-1 are 79 % less likely prefer Risk 1 rather than to prefer Risk 3. The only statistically significant difference in Risk Tolerance in first equation is between income-2 and income-4.

Income-2 is nearly 98 times more likely to prefer below average Risk Tolerance than income-4. The 95% confidence interval for the odds ratio comparing income-2 against income-4, those who prefer below average Risk Tolerance is very wide (1.961 to 59.839). This is due to the fact that there are a small number of outcome of income-2. Thus, this relationship should be interpreted with caution. In second equation of model, the statistically significant difference is found for income-1 and income-2 with income-4.

Conclusion and Limitations of the Study

Risk tolerance is an important aspect in the investment process. The economic theory discovered that the wealth of investors is not the only reason that is important in explaining moves in terms of risk tolerance. Income is significant contributors in explaining differences in risk tolerance. To collect data throughout Pakistan it was difficult that's why

sample was taken only of D.I.Khan district of Khyber Pakhtunkhwa, Pakistan. The individual investment behavior may differ with the city depending on variety of demographic factors. Besides income, there are numerous factors that must be viewed in this respect: gender, education, age, social status, job status, religion, occupation etc.

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