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HOW IS THE RISK TOLERANCE OF INDIVIDUAL INVESTORS IN KYRGYZSTAN?*

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ABSTRACT

Investment and saving behaviour of individuals are important issues in the economies. Risk tolerance of investors affects the investment decisions. In Kyrgyzstan, a transition economy, while the investment resources are high, savings of individuals in financial organizations are low. This study analyses the risk tolerance of individual investors in Kyrgyzstan and determines the factors influencing investor types. In the study multinomial logit model is used to determine these factors. The findings of the study show that men take more risk than women in Kyrgyzstan. When the age increases people become less risk lover. Having non-wage income increases taking risk and increases in the rate of investment. The findings also indicate that income has a positive effect on the risk loving sense.

Keywords: Investment, Investor, Risk tolerance, Multinomial logit.

Jel Codes: GO2, G11, E21.

1. INTRODUCTION

Deviations from rational behaviour are observed when individuals are investing, particularly deciding at risk. The main reason for this is that some of individual's biases have an impact on investment decisions. These biases that can be influencing on investment decisions are loss aversion, mental accounting, regret aversion, overconfidence, over-optimism, self-control, anchoring, framing, cognitive dissonance, representativeness, conservatism, social interaction. Including these biases, willingness to live under good conditions in future and to earn more income

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is also forces individuals to invest. In general, willingness of individuals to invest is influenced by such personal factors as information about investment, age, health status, income, value judgements, and also such financial factors as to achieve the growth of assets and to gain permanent income and at last such environmental factors as social and cultural circumstances and family.

When individual investors are investing, they remain face to face with different investment instruments, depending on the country where they are located. In this case, investors are trying to gain income by investing a certain part of their current revenues in various investment instruments. Each selected investment has certain advantages and weaknesses in terms of security, risk, return and liquidity. Investment instruments that widely used by individuals can be listed as cash, currency, bank deposits, gold, real estate, land and securities. When individual investors are taking a decision on investment instruments they must take different risks. According to their risk tolerance, investors are divided into three types: risk lover, risk-neutral investor and risk-averse investor.

Political and economic conditions in Kyrgyzstan in the beginning of transition process are negatively affected investors' confidence in financial institutions. Because of low confidence in financial institutions and financial illiteracy the most popular investment instruments among Kyrgyz people are currency, real estate and deposits. Transformation of free money at the hands of the people into financial investment instruments of stock exchange, force credit interests down, activate the economy and at the result it will increase people's welfare.

The aim of this study is to see how the risk tolerance of individual investors in Kyrgyzstan. For this aim we analyse the influencing factors on investor types (risk-lover, risk-neutral and risk averse) of Kyrgyz people who makes investment, by taking on individuals living in the capital city of the Kyrgyzstan, in Bishkek, using the multinomial logit model. We prepared a questionnaire which can reveal the biases and factors affecting to the investment decisions of investors. There were carried out statistical and econometric analyses using the data obtained from this questionnaire. The most important feature of this study, as we know, is in its implementing for the first time the econometric analyse of investor behaviours in Kyrgyzstan.

The rest of the paper is organized as follows: The following section is including introduction. Section 2 introduces financial situation in Kyrgyzstan after 1991 for the purpose of understand the behaviour of investors. Section 3 presents multinomial logit model which used to estimate the factors that influence the type of investors. Section 4 and 5 present sampling, data and descriptive statistics, respectively. Findings of the model for investor types are summarised in Section 6. The final section provides conclusions.

2. FINANCIAL SITUATION IN KYRGYZSTAN

Kyrgyzstan is transition economy which gained independence in 1991 after the crash of The Union of Soviet Socialist Republics (USSR). Kyrgyzstan is counted as one of the transition economies where economic and social crisis was very deep. In the recession of the transition period

decrease of the production was 50%. The reasons for such deep crisis is can be counted the great dependence of the Kyrgyz economy on the USSR economy, subvention from the government budget of the USSR to the budget of former Kyrgyz Soviet Republic was 8-14% to GDP, rapture of commercial links between members of former Soviet Union countries.

Institutional structure of financial system of Kyrgyzstan consist of 22 commercial banks, 337 microcredit company, 91 microcredit agency, 5 financial company, "Financial Company of Credit Unions" Corporation, 189 credit unions, 270 exchange bureau, 14 insurance company, 8 investment fund, 1 stock exchange and 2 pension fund (NBKR-National Bank of Kyrgyz Republic, 2012).

Commercial banks play a central role in financial intermediation in Kyrgyzstan in institutional terms and outperform other financial intermediaries on economic potential (NBKR-National Bank of Kyrgyz Republic, 2012). Kyrgyz Stock Exchange was organized in 1994. In 2011, two companies that offer stock service "Kyrgyz Stock Exchange' and 'Securities Trading System" are merged and made an agreement for the establishment of a single trade field. In December 1, 2011 in the stock exchange market 77 professional companies were carrying out professional activities. 77. 108 licenses were granted to these people. 24 of them were brokers, 23 were dealers and 29 of them were carried out asset management activity. In July 10, 2012 trade volume on this stock exchange had exceeded 2.2 million coms. Total size of 2 deals reached 2.2457 million com (Mazikina, 2012).

One of the major factors that hinder the development of the stock exchange in Kyrgyzstan is the lack of information about the market, in other words, the lack of reliable and complete information about the companies. This led to the less demand for the securities issued by the firms. Lack of information and transparency reduces the confidence of the people in this investment instruments. One of the main reasons for being passive the issue of securities in stock exchange is not understanding the advantages of stock exchange completely and lack of information. Such situation is the result of state's fulfilment only the regulatory role, not undertaking inform the people and activate the stock market adequately. As a result, today, the public are not confident in the capital market (Luneva, 2011).

3. MULTINOMIAL LOGIT MODEL

Multinomial Logit model is based on utility function. Thereby, according to this model properties of choices and/or person can be taken into account. Multinomial logit model is generalized form of binary logit model. In this model dependent variable is taking more M value instead of two. According to multinomial logit model, choice probability of *m* alternative of *M* alternatives for *i*. individual is calculated as:

$$P(Y_i = m|X_i) = \frac{e^{X_i\beta_m}}{\sum_{j=1}^{M} e^{X_j\beta_j}}$$

Multinomial logit model is estimated by maximum likelihood method (Long, 1997; Borooah, 2002). Marjinal effects of probability are founded as below (Green, 1997; Borooah, 2002).

$$\frac{\partial P(Y_i = m)}{\partial X_i} = \frac{\partial \widehat{P}_m}{\partial X_i} = \widehat{P}_m\left(\widehat{\beta}_m - \overline{\beta}\right)$$

The estimated coefficients of the multinomial models are not interpreted directly. Thus, marginal effects can be used to interpret the coefficients (Hardin and Hilbe, 2001).

In multinomial logit models independence between alternatives should be analysed in order to identify if determination of model is correspond with the data or not. The hypothesis which analyse this independence is called Independence of Irrelevant Alternatives (IIA) hypothesis. This hypothesis is based on that residuals are with independent and stable variance. Hausman and McFadden (1984.) Test can be used to analyse the variance of IIA. Statistics of the test is estimates as below:

$$\chi^2_{HM} = (\beta_R - \beta_{UR})'[V_R - V_{UR}]^{-1}(\beta_R - \beta_{UR})$$

Where β_R shows parameter of restricted model estimated by taking out one or more choices of dependent variable and V_R is covariance matrix of the restricted model. β_{UR} are the parameters of unrestricted model where all choices of dependent variable are placed and V_{UR} is covariance matrix of unrestricted model. Obtained statistics of the test is compared with the chi-square values. In this test zero hypotheses is created as there is independence between choices (Cramer, 1991; Green, 1997).

4. DATA AND VARIABLES

We aim to determine the investment behaviour of individuals, target audience is the individuals who have invested at least once time. The survey was conducted in the capital city of Kyrgyzstan in Bishkek to 384 individual on average. The reason for choosing this city for conducting this survey is being the capital city of Kyrgyzstan; Bishkek is also historical and touristic city and preferred city for education and developed business and commercial centre as well. In addition, in Bishkek settled people from different regions of the country with different socio-economic and socio-cultural characteristics and with different economic purposes. Therefore this city has strong representative power in revealing different financial behaviour of Kyrgyz people.

The population of Bishkek in 2012 was 1,420,783 persons[†]. There are more than 90 nations are living in this city (Ivasenko, 2008). According to the data published by the National Statistic Committee of the Kyrgyz Republic, in 2010 the number of migrants from other parts of Kyrgyzstan to Bishkek city was 9469 people. For example from Talas region immigrated 582 person and from Osh region 1 678 person to Bishkek in 2010[‡].

[†](http://www.kg.spinform.ru/capital.html (10.10.2012))

[‡]National statistic committee of Kyrgyz Republic (2006-2010).

There are different ways are using when sample size is determines (Yamane, 2010). In this study confidence interval for population ratio (P) is estimated with this formula: $P \pm Z_{\frac{\alpha}{2}}\sigma_p$. Optimum size of population ratio is determined the formula as follows:

$$n = \frac{Z_{\frac{\alpha}{2}}^2 P(1-P)}{d^2}$$

Where, $Z_{\frac{\alpha}{2}}$ is confidence coefficient, d is margin of error and P is ratio of population. There was made control according to n/N ratio after the calculation of the formula. Sample size calculated according to the significance level 0.05. As the share of the people who investing in total population of Bishkek is not known, for the Bishkek city, where the population in 2008 according to the official reports of the Statistics Committee of Kyrgyz Republic[§] was 819 900 person, different ratios were determined for the size of sample. According to $\pm$ 0.05 margin of error for P=0,5; P=0,4 and P=0,3 sample size is calculated as n_1=384, n_2=368, n_3=323 respectively. Maximum questionnaire number that will conducted in this study was determined as 384. Even in the case of the population size is 1.000.000 person this size of sample can represent the population.

5. DESCRIPTIVE STATISTICS

In this research only individuals who have financial behaviour were analysed. Their answers to the questionnaire show factors that they pay attention when they are investing. Thus, there were analysed attitudes and behaviour of individuals when they are choosing an investment instrument. The questionnaire includes 25 questions and 13 of them are related to the investment behaviour of individuals.

Analysis of the age ranges of the participants of the survey shows that, 41% of them (163 person) are 29 years old and under, 43.7 % (174 person) are between the ages of 30-45, 12.3% (12 person) between the ages of 46 - 55 and 3 % (12 person) were 55 years and older. As we saw, 84% (337 person) of the participants' ages are 45 years and under. 52.3% (208 person) of the participants are male, 47.7% (190) are female and 70.1% (279 person) are married, 24.4% are (97 person) single, 1.3% are (5 person) divorced, and 4% are (17 person) widow.

Considering the level of education of the respondents 16.3% (65 person) are secondary school graduates, 11.6% (46 person) are vocational high school graduates, 58% (231 person) are university graduates, 8.5% (34 person) has master degree and 5.5 % (22 person) had graduated other doctoral (Ph.D.) and upper degrees. It shows that in our survey had participated people with all level of education.

The average monthly personal income of individuals participating in the survey shows that 28,6% (114 person) of the participants' the average monthly personal income is less than 10 000 com, 37.7 % (150 person) the average monthly personal income is between 10 001-20 000 coms, 13.6% (54 person) the average monthly personal income is between 20001 – 30000 coms, 6.5%

[§] http://www.kg.spinform.ru/capital.html(10.10.2012)

(26 person) is between 30 001 - 40,000 coms, 6.3% (25 person) between 40,001 - 50,000 coms, 7.3% (29 person) the average monthly personal income is 50001 com and more. In addition, 43.7% (174 people) of the participants has non-wage income, 56.3% (224 people) has not such kind of income.

6. THE RESULTS OF THE MODEL FOR INVESTOR TYPES

In finance literature investor, according to the types, generally divided into three groups: risk averse, risk-neutral and risk lover. Risk averse investor do not like to take a risk, therefore between two different investment instrument with certain yields, he prefer less risky instrument. While creating a portfolio risk averse investor is trying to minimize the risk and maximize yields by diversification. So he will be in an effort to optimize the portfolio. In other words, this type of investor will prefer a higher average income on the same level of risk.

For the risk-neutral investor is not important which investment instrument is chosen, because such type of investors are not interested in risk. Therefore, these investors are indifferent between risk and yield. As a result, they take investment decisions mostly based on return expectations. For the risk lover investors risk premium is always at zero or below zero. This type of investors can take risks even just for fun.

These three investor types can be identified by looking at the behaviour of investors after changes in their wealth. While investor's wealth is increasing his investment to the risky assets increases too, then it can be said that this investor loves risk. If investor's wealth increases but the amount of his investment in risky assets does not change, it can be argued that investor maintains the current status in the point of risk averse. Finally when the investor's wealth increases, the investment into risky assets decreases, then it can be concluded that this investor is avoids risk. There are many factors that effect on investors' risk perception and the process of developing the behaviour besides wealth. On the average, men are known to have more tendencies to take a risk than female. Moreover, information, experience and age of investor too are closely associated with the degree of risk aversion. On the other hand the share of investment amount invested for the investment instrument in the total wealth of investor too is one of the important factors affecting the preference.

The categories of dependent variable (INV) used in current study have been formed as:

INV=1, if investor is risk-lover
INV=2, if investor is risk-neutral
INV=3, if investor is risk averse

Explanatory variables used in the estimates are described in Table 1.

Table-1. Definition of Explanatory Variables

Variable	Definition
Age	Year
Gender	1 if the person is male 0 if the person is female
Education	1 if the person is graduate secondary school; if not 0 1 if the person is graduate vocational high school; if not 0 1 if the person is graduate university; if not 0 1 if the person is graduate master degree; if not 0 1 if the person has a higher degree of education; if not 0
Rate of investment	%
Income	Average monthly personal income (com)
Non-wage income	1 if the person has non-wage income; if not 0
Place of residence	1 if the person is lives in his own home; if not 0 1 if the person is lives with parents; if not 0 1 if the person is living in rent house; if not 0 1 if the person is living in other place; if not 0
Types of investment	1 if the person invest in currency; or not 0 1 if the person invest in gold; or not 0 1 if the person invest in com; or not 0 1 if the person invest in land; or not 0 1 if the person invest in bank; or not 0 1 if the person invest in real estate; or not 0 1 if the person invest in stock exchange; or not 0 1 if the person invest in other asset; or not 0
Consultant	1 if the person following the investment professionals advice; or not 0
Number of staff	Person

Estimated model in our study summarized in two tables. In the first table the coefficients estimated from the multinomial logit model and the results of Hausman test are given. Moreover, at the last column of the table the results of limited model of the Hausman test are given and examined whether the independence assumption of the irrelevant alternatives is valid. In our study, Hausman test was applied to all alternatives of the dependent variable in turn, but at the tables the results for only one alternative are given. The results of other alternatives can be obtained from the authors.

On the second table within the estimated coefficients of the multinomial logit model the relative risk ratios (RRR) are given. As it is known coefficients of such models could not be interpret directly, therefore interpretation of coefficient will be made according to relative risk ratios. There are seven important factors that effects to investment type according to LR test results: age, gender, non-wage income, place of residence, rate of investment, domestic investment and income.

The results of multinomial logit model which analyses the factors on investor types are given in Table 2. In this table first choice refers to risk-lover investor, second choice to risk-neutral investor. Risk averse investor was taken as a comparison group.

Table-2. The Results of the Model

	Variable	Coefficients	Hausman coefficients
Risk-Lover	Age	-0,0292**	-0,0305**
		(0,0143)	(0,0149)
	Female	0,4303*	0,4290*
		(0,2497)	(0,2537)
	Non-wage income	0,8490***	0,8427***
		(0,2674)	(0,2692)
	Living own house	0,3900	0,4125
		(0,9658)	(0,9672)
	Living with parent's home	0,3844	0,4089
		(0,9942)	(0,9965)
	Living in Rental house	0,7934	0,7749
		(0,9865)	(0,9871)
	Rate of investment	0,0205***	0,0213***
		(0,0049)	(0,0050)
	Domestic investment	0,7618**	0,7502**
		(0,3385)	(0,3413)
	Income	4,63e-06*	4,46e-06*
		(2,53e-06)	(2,49e-06)
	Constant	-2,1834**	-2,1667**
		(1,1182)	(1,1297)
Risk Neutral	Age	-0,0240	
		(0,0161)	
	Female	0,2964	
		(0,2822)	
	Non-wage income	0,7341***	
		(0,3006)	
	Living own house	17,7978***	
		(0,7724)	
	Living with parent's home	17,4444***	
		(0,6835)	
	Living in Rental house	18,2260***	
		(0,7072)	
	Rate of investment	0,0041	
		(0,0057)	
	Domestic investment	0,6524*	
		(0,3883)	
	Income	-2,99e-06	
		(5,42e-06)	
	Constant	-19,0661	
LR Test	Chi2(18)= 66,71	prob>chi2=0,0000	
Pseudo R^2	0,0821		
Log-likelihood	-372,6854		
Hausman Test	Chi2(9)=0,66	prob>chi2=0,9999	
Number of observations	397		

Notes: (i) Comparision Group:Risk Averse

(ii) *,**,*** indicate significance at the level 10%, 5% and 1%, respectively

(iii) Numbers in parentheses are standard errors.

The Hausman test was examined to identify the independence assumption between investor types. According to Hausman test statistic assumption of independence among the choices are provided. Also, according to the results of this test multinomial logit model can be used. In order to interpret coefficients of the model relative risk ratios are estimated and these results are given in Table 3.

Table-3. Relative Risk Ratios

	Variables	**Coefficients**	**RRR**
Risk Lover	Age	-0,0292**	0,9712***
	Female	0,4303*	1,5377*
	Non-wage income	0,8490***	2,3374***
	Living own house	0,3900	1,4777
	Living with parent's home	0,3844	1,4688
	Living in Rental house	0,7934	2,2109
	Rate of investment	0,0205***	1,0207***
	Domestic investment	0,7618**	2,1421**
	Income	4,63e-06*	1,0000*
	Constant	-2,1834**	
Risk-Neutral	Age	-0,0240	0,9762
	Female	0,2964	1,3451
	Non-wage income	0,7341***	2,0837*
	Living own house	17,7978***	5,36***
	Living with parent's home	17,4444***	3,77***
	Living in Rental house	18,2260***	8,23***
	Rate of investment	0,0041	1,0041
	Domestic investment	0,6524*	1,9202*
	Income	-2,99e-06	0,9999
	Constant	-19,0661	
LR Test	Chi2(18)= 66,71	prob>chi2=0,0000	
Pseudo R^2	0,0821		
Log-likelihood	-372,6854		
Number of observations	397		

Notes: (i) Comparision Group: Risk Averse

(ii) *,**,*** indicate significance at the level 10%, 5% and 1%, respectively

(iii) Numbers in parentheses are standard errors.

Table 3 shows that first choice refers to risk-lover investor. The factors affecting the choice of this preference such as age, gender, non-wage income, investment rate and domestic investment determined as significant. As age increases the probability to be risk-lover investor is reduces comparatively to risk averse investors. Men risk lover 1.53 times greater than women. Especially, having non-wage income increases the love to risk 2.33 times. Increase in the rate of investment

and income has a positive effect on the risk loving sense, too. Investing in the country is affects risk-lover investors 2.14 times more than risk-averse investors. In our study, while income and non-wage income are increases, also being a men increasing the probability to love risk, age increase (if we see it as the rise of knowledge and experience) decreases the probability to love risk comparatively to not to love risk.

When the choice of being risk-neutral investor is analysed, it is obvious that non-wage income, place of residence and domestic investment have significant effect. Place of residence increases the probability to be risk-neutral investor comparatively to risk-averse investors. Growth of non-wage income increases the probability to be risk-neutral 2.08 times. Specially to invest in the country increases the probability to be risk-neutral 1.92 times. Demographic factors as age and gender have not a significant effect on the probability of being risk-neutral investors.

7. CONCLUSION

Nowadays, Kyrgyz investors mostly prefer different kind of investment instruments which are cash, currency, land, real estate and bank deposits. While investors with lower income generally invest in cash and currency, investors with higher income invests in gold, land and real estate. People prefer keep in hand most of their savings. The most significant reason for this situation is low confidence in financial institutions and also lack of reliable information. Out of distrust to the financial institutions as banks and stock exchange and low accessibility to the information's about investment instruments and firms, investment instruments such as security and shares are not popular among the people. This problem might be particularly analysed. Even the holding the savings at hands is not be seen as a problem as the individual behaviour, when we will take whole economy, in the economy where there is shortage of financial resources, this evidence would be the reason of many problems.

In this study we analyse the influencing factors on investor types (risk-lover, risk-neutral and risk averse) of Kyrgyz investors using the multinomial logit model is to see how the risk tolerance of them. When investor types are analysed, the findings indicate that the ratios of risk lovers are increases with the increase of the share of income invested. The ratio of risk-averse are decreases with the increase of the share of income invested. But, the level of investors who do not love risk at all is same in each group. Generally, it is evident that while the one's sense to take risk is increases the share of income invested is increases too. Particularly, we must to know that, the individuals who invest the large share of their income, within the loving the risk at same time they are thinking and knowing about the risk.

In order individuals can invest their savings in stock exchange, government must in the first stage give broad and systematic information about stock exchange, investment instruments of the stock exchange, advantages and benefits of this instruments etc. Serious educational and informative program should be prepared and executed relating this issue. Such programs are implements in many developing countries as USA, England and Korea. For example, at the result

of implementation such program in Kazakhstan the activity of stock exchange increased to 60 % in 2009.

To increase the confidence of people in stock exchanges, legislation and legal basis must developed, also transparency and accessibility of the information about the stock exchange and firms listed in it must be provided. At the same time, the general situation of the country's economy is very important for investors. Political and economic crisis that had been held in recent years would be the reason further reduction investors' confidence. Therefore, the state should take care of the stability of country's economy in general.

Thus, individuals' investment behaviour and preferences is very important for the country's economy and for the government. In Kyrgyzstan in the first stage investors' savings should be mobilized to the most beneficial for the economy sphere, to the capital market. In the second stage, government through its regulatory role should prevent abnormalities and crises in the financial markets and protect investors.

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