

DETERMINANTS OF RISK TOLERANCE: EMPIRICAL EVIDENCE FROM KYRGYZSTAN

K. Karymshakov, Assistant professor, Finance and Banking Department

<kamalbek.karymshakov@manas.edu.kg>

R. Abdieva, Assistant professor, Economics Department <abdievaraziya@gmail.com>

B. B. Sulaimanova, Research Assistant, Economics Department

<burulcha.sulaymanova@manas.edu.kg>

Kyrgyzstan-Turkey Manas University

ДЕТЕРМИНАНТЫ ВОСПРИЯТИЯ РИСКА: НА ПРИМЕРЕ КЫРГЫЗСКОЙ РЕСПУБЛИКИ

К. Карымшаков, и. о. доц., PhD <kamalbek.karymshakov@manas.edu.kg>

Р. Абдиева, и. о. доц., PhD <abdievaraziya@gmail.com>

Б. Б. Сулайманова, младший научный сотрудник, аспирант

<burulcha.sulaymanova@manas.edu.kg>

Кыргызско-Турецкий университет «Манас»

Abstract

This study analyses the determinants of the risk tolerance in Kyrgyzstan, by using nationally representative “Life in Kyrgyzstan” survey for 2011. The results of multinomial probit models show that men more willing to take risk and that as the age increases individuals become risk-averse. Increasing income and education level has a positive effect on the risk taking decision of the individual. The regional distribution of risk tolerance of individuals shows that individuals living in rural areas and in south region are more likely to be in risk-averse category.

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Key words: risk tolerance, multinomial probit, Kyrgyzstan.

Jel Codes: G11

Аннотация

Данное исследование анализирует факторы, влияющие на толерантность населения к риску в Кыргызстане. Для эконометрических расчетов были использованы данные опроса «Жизнь в Кыргызстане» за 2011 г. Результаты мультиномиальных пробит-моделей показывают, что мужчины готовы взять на себя риск в большей степени, чем женщины, и что с увеличением возраста люди становятся менее склонны к риску. Уровень дохода и образования оказывает положительное влияние на склонность к риску. Региональное распределение толерантности к риску показывает, что люди, живущие в сельской местности и в южном регионе страны, менее склонны к риску.

Первая версия этой статьи была представлена на ежегодной конференции «Жизнь в Кыргызстане» в Бишкеке 1-2 октября 2015 года.

Ключевые слова: толерантность к риску, мультиномиальная пробит-модель, Кыргызстан.

Introduction

A crucial determinant of almost any decision in life is an individual's risk tolerance (Leuermann, 2012). The degree of risk-aversion is a pivotal parameter for answering a range of normative and positive questions in many fields such as macroeconomics, public finance, or labor economics (Findeisen, 2013). Also, risk attitude of individuals affect their portfolio decisions.

Results of several studies showed that risk tolerance negatively correlated with age (Grable and Lytton, 1998; Morin and Suarez, 1983; Yao et al., 2011). Morin and Suarez (1983) analyzed household demand for risky assets. They used Canadian Survey of Consumer Finances dataset on 1970. The results of the study showed that risk tolerance decreased uniformly with age. Yao et al. (2004) using 1983–2001 Survey of Consumer Finances (SCF) found that age negatively related to risk tolerance. Yao et al. (2011) study too showed that age affect risk tolerance negatively. Each additional year of age decreased the likelihood of reporting any level of risk tolerance by 2%.

But at the same time some studies found positive relationship between age and risk tolerance. Wang and Hanna (1997) found that age effect risk tolerance positively. They used ratio of risky assets to total wealth in the 1983–1989 SCF panel to examine the effect of age on risk tolerance. Bertaut (1998) also using the 1983–1989 SCF panel data revealed that age have a positive relationship with risky behavior.

A person's gender too influences the willingness to take risks. Bruce and Johnson (1994) find that in the United States women's financial risk tolerance is lower than men. Byrnes et al. (1999) analyze of 150 studies showed that on average, women take less risk than men. Al-Ajmi (2011) using 1500 respondents in Bahrein found that men are more risk lover than women. But according to the results of Feng and Seasholes (2007) there was no any difference in investment behavior between Chinese men and women.

Most studies showed that education level positively affect person's attitude to risk (Haliassos and Bertaut, 1995; and Guiso et al., 2003; Al-Ajmi, 2011). People's propensity to risks can be influenced by the level of income or wealth. The study of Grable and Lytton (1999) showed that there is a positive relationship between risk tolerance and wealth. Wealthy investors are likely to hold a higher proportion of their portfolios in risky assets. Analyze of individual investors in Bahrein by Al-Ajmi (2011) revealed that wealthy investors are more risk tolerant than the less-wealthy investors.

Çağlayan and Abdieva (2014) analyzed risk tolerance of individual investors' in Kyrgyzstan. Using the survey that conducted in the capital city of Kyrgyzstan in Bishkek and Multinomial Logit Model they found that men love risk more than women, people become less risk lover with the increase of age. Having non-wage income increases the love to risk and increase in the rate of investment and income has a positive effect on the risk loving sense, too.

This study uses nationally representative household survey data and examines importance of such factors as the ratio of children in household, rural or urban residence, education level and marital status.

Data and Descriptive Statistics

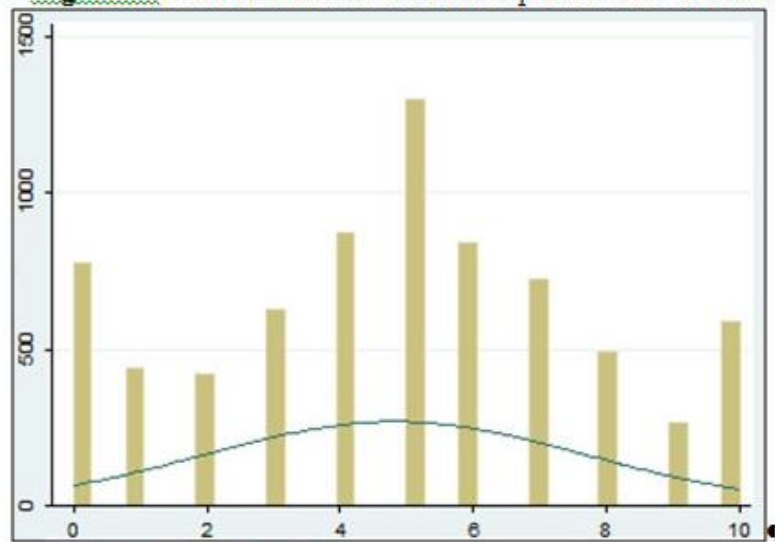
This study is based on the "Life in Kyrgyz Republic" survey data for 2011. This survey includes sample of 3000 households, 8066 individuals and representative at the national level as well as for urban, rural areas and oblasts regions of the country. This survey conducted by DIW Berlin in collaboration of Humboldt University of Berlin, the Center for Social and Economic Research (CASE-Kyrgyz Republic), and the American University of Central Asia (AUCA). 2011 data is the second wave data and was collected in September-November 2011.

The survey includes wide range of data including information on individual (education, health, labor market participation, movements etc.) and household characteristics (composition, education, child education, health etc.). Along with this the survey contains special section on subjective well-being of individual, where individual is asked particular question on how they asses their self, as person who is fully willing to take risks or a person avoiding taking risks. The answer for this question is taken as variable of interest, as dependent variable. This variable has qualitative peculiarity of whether individual is prone to be in one of the ten categories (from 0 to 10) in assessing their risk tolerance.

Following the literature, these categories has been reduced up to three categories, these are risk-averse (from 0 to 3), risk-neutral (from 4 to 6) or risk-lover (from 7 to 10) categories. Thus, risk tolerance is generally divided into three groups: risk averse, risk-neutral and risk lover. Risk-averse

individuals don't like to take a risk, and mostly prefer a higher average income on the same level of risk. While the risk-neutral individuals are not interested in taking or not taking risks, and therefore, these types of individuals are indifferent between risk and other alternatives. For instance, these types of individuals take investment decisions mostly based on return expectations. For the risk-loving individuals it can be noted that they would take risks disregarding the alternative choices it will have.

.....**Figure 1.** Distribution of the self-reported risk tolerance



Source: LIK data, 2011.

The table 1 describes the main individual and household characteristics, such as age, gender, marital status, education level of individual aged between 16-65 years and residential and compositional specification of the households within risk attitudes groups. The number of observation is 7 340 individuals.

Table 1 – Basic characteristics of individual by risk tolerance groups

	Total	Risk averse		Risk neutral		Risk lover	
		Amount	%	Amount	%	Amount	%
Individual characteristics:							
Age (mean)	40.0634	38.63	-	38.12	-	35.37	-
Gender							
- Male	3474	818	23.55	1401	40.33	1255	36.13
- Female	3864	1444	37.37	1609	41.64	811	20.99
Marital status							
- Married	5912	1885	31.88	2512	42.49	1515	25.63
- Single, divorced, widowed	1426	377	26.44	498	34.92	551	38.64
Education level:							
- Secondary, basic	4751	1517	31.93	1966	41.38	1268	26.69
- Technical	1299	369	28.41	549	42.26	381	29.33
- Tertiary education	1251	354	28.27	486	38.82	412	32.91
Household characteristics:							
- Household size (mean)	5.36	5.64	-	5.38	-	5.02	-
- Child ratio, 0-5 years	0.1119	0.1104	-	0.1151	-	0.1090	-
Residence							
- Urban	2745	885	32.24	1034	37.67	826	30.09
- Rural	4593	1377	29.98	1979	43.02	1240	27.00
Household total expenditure per capita (mean, in soms)	38 363	35 517	-	36 334	-	44 420	-

Source: LIK data, 2011.

Generally there is negative correlation between age of individual and their attitude as risk-lover. Also there is gender differences exist. Men are more likely to be in risk-lover groups, while women are prone to be in the risk-averse group. Married individuals are more likely to be in risk-neutral group.

The individuals with more higher education level are more likely to be in risk – lover group. There is a significant impact of household composition on individual attitude towards the risk. While risk lovers are more likely to be from smaller household, the increase of the ratio of children with respect to household size determines the individuals as more like as risk-neutral people.

While there is an impact of residence on risk attitude of individuals, it is seem to be that urban residents more likely to take risk-lover group rather than rural residents.

Expenditure per capita in risk lover individuals' households are in average more than in other types of risk attitudes, showing that risk lovers comes from more wealthy households.

Methodology

For estimation of determinants of risk tolerance categories, the multinomial probit model is used. This model is based on utility function, which shows that individual chooses one of the alternatives which maximize its utility. This is represented with the following equation (Cameron and Trivedi, 2005):

$$v_{ij'} = \eta_{ij'} - \eta_{ik} = \mathbf{Z}_i \gamma_{j'} + \varepsilon_{ij'}, \quad (1)$$

where risk category alternatives is $j = 1, 2, 3$, $i = \dots, n$ and $\varepsilon_{ij} \sim$ i.i.d. $N(0,1)$ and we are observing alternative k for the i th individual if $\eta_{ik} > \eta_{ij'}$ for $j \neq k$. The probability that individual i chooses outcome k is:

$$\Pr(y_i = k) = \Pr(v_{i1} \leq 0, \dots, v_{ij-1} \leq 0) \quad (2)$$

where $\mathbf{Z}_i = (x_{1i}, x_{2i})$ and γ is a vector of structural parameters. y_i is the multinomial dependent variable indicating risk status of individual. x_{1i} is the vector of variables at individual level, which includes individual's age, gender, marital status and educational attainment; while x_{2i} is the vector of household levels variables, which includes household composition, expenditure level, regional characteristics (see Table 2).

Table 2 – Definition of Explanatory Variables

Dependent variable :	
Risk Tolerance	1 = individual is risk-averse 2 = individual is risk-neutral 3 = individual is risk-lover
Explanatory variables	
<i>Individual characteristics:</i>	
Gender	1= male; 0 = female.
Age	Age (years).
Marital status	1= individual is married; 0 = otherwise
Educational category	
- Basic, secondary education	1= individual has basic and secondary education; 0 = otherwise.
- Technical education	1= individual has technical education; 0 = otherwise.
- Tertiary education	1= individual has tertiary education; 0 = otherwise.
<i>Household characteristics:</i>	
Household size	The total number of household members.
Child ratio	The ratio of children in household, aged between 0-5 years.
Total expenditure per capita	The total expenditure per capita of the household receives (in logarithm).
Residence	1= the household resides in rural area; 0 = otherwise.
Regional dummies	
- North	1= the household resides in Issyk-Kul, Naryn or Talas oblasts, 0 =otherwise.
- South	1= the household resides in Jalal-Abad, Batken, Osh oblasts or Osh city, 0 =otherwise.
- Central	1= the household resides in Bishkek city or Chui oblast, 0 =otherwise.

Results

Estimation results given in Table 3 show that, all variables have statistically significant and expected signs. Results show that significant gender differences exist among those who willing to take risk and not.

Table 3 – Estimation results

	Variable	Coefficients	Marginal effects
Risk-Averse	Individual characteristics:		
	Gender (1=male)	-0.3540*** (0.0461)	-0.1430***
	Age	0.0048** (0.0020)	0.0024***
	Marital status (1= married)	-0.0131 (0.0711)	0.0273
	Educational category (reference: Secondary and basic education)		
	- Technical education	-0.1702** (0.0641)	-0.0495***
	- Tertiary education	-0.1511** (0.0654)	-0.0574***
	Household characteristics:		
	Household size	0.0436** (0.0135)	0.0067**
	Child ratio	-0.5491** (0.1782)	-0.1380***
	Total expenditure per capita (log)	-0.2674*** (0.0507)	-0.1032***
	Residence (1=rural)	-0.1744*** (0.0524)	-0.0468***
	Regional dummies (reference: Central region)		
	- North	-1.0245*** (0.0813)	-0.2494***
	- South	-0.6446*** (0.0597)	-0.1259***
	Constant	2.9370*** (0.5890)	-
Risk-Lover	Individual characteristics:		
	Gender (1=male)	0.4377*** (0.0466)	0.1520***
	Age	-0.0095*** (0.0022)	-0.0030***
	Marital status (1= married)	-0.2654*** (0.0702)	-0.0692***
	Educational category (reference: Secondary and basic education)		
	- Technical education	0.0420 (0.0641)	0.0298*
	- Tertiary education	0.1588** (0.0650)	0.0591***
	Household characteristics:		
	Household size	0.0450** (0.0142)	0.0067**
	Child ratio	-0.0921 (0.1778)	0.0379
	Total expenditure per capita (log)	0.2763*** (0.0514)	0.1011***
	Residence (1=rural)	-0.0062 (0.0537)	0.0181
	Regional dummies (reference: Central region)		
	- North	0.2696*** (0.0752)	0.1721***
	- South	-0.4213*** (0.0621)	-0.0359**
	Constant	-2.9193*** (0.6022)	-

Number of obs.	7338	Log likelihood	-7487.2781
		Wald chi2	875.84***
*,** and *** show statistical significance at the 10, 5 and 1% level, respectively. Standard errors presented in parentheses. Reference group for dependent variable: Risk-Neutral			

Thus men are more likely to take risk, rather than women, with the 43.77 % probability of being in the risk-lovers category. This result supports literature (Bruce and Johnson, 1994; Byrnes et al., 1999; Al-Ajmi ,2011)

With increase of age the probability of individuals to be in risk-averse category increases, indicating that getting older is positively associated with not taking risks. Results of mostly studies showed too that people will be more risk averse with age (Grable and Lytton, 1998; Morin and Suarez, 1983; Yao et al., 2011).

Interesting finding is that marital status of individuals in both categories has negative impact, meaning that those married individuals are more likely to be in risk-neutral categories rather than in risk-averse or risk-lover categories. But many studies had found that married persons are more risk averse than singles (J.E.Grable & Roszkowski, 2007; J.Grable & Joo, 2004; Faff et al., 2011).

More educated individuals are likely to be in risk-lovers category. A completed university degree raises the probability of individuals to take risk for 15.88 % more that of individuals with technical, secondary education or less. This result too supports literature (Haliassos and Bertaut, 1995; and Guiso et al., 2003; Al-Ajmi, 2011).

The composition of household appears to significantly influence individual decision to take risk. The increase in child ratio to household size significantly reduces the probability of individual to be in risk-averse category, thus it reduces its probability for 54.91 % percentage points. While bigger households are similarly could be both in risk-averse or risk-lovers categories, rather than in risk-neutral.

The total expenditure per capita of the household affects all risk categories, showing that increase in expenditure per capita in household reduces probability of individual to be in risk-averse category and increase its probability to be in risk-lovers category for 27.63 %.

Next variables related with location characteristics of households point out that individual residing in rural areas more likely to be in risk-neutral category rather than risk-lover or risk-averse category. While individuals from south region are more likely to be in risk-neutral category and the individuals from north region are more likely to be in risk-lover category with probability of 26.96%.

Some interesting findings in this study can be said that married persons are more likely to be in risk-neutral categories, and people residing in urban are more risk-lovers than people residing in rural.

Conclusion

In this paper we analyzed risk tolerance of Kyrgyz people using the data “Life in Kyrgyzstan” on 2011. This survey includes sample of 3000 households, 8066 individuals and representative at the national level as well as for urban, rural areas and oblasts regions of the country.

We investigated effect of age, sex, education, marital status, residence in rural or urban areas, ratio of children in household and income. The results of multinomial probit model showed that in Kyrgyzstan men’s risk tolerance higher than women and age is negatively correlated with risk tolerance, education on the contrary is positively correlated with risk tolerance; increase in expenditure per capita in household increases the probability to be in risk-lovers category. These results mostly support literature and earlier empirical researches. But some findings as the people residing in rural and married people are more likely to be in risk-neutral groups are not common in literature and should be further investigated deeply. Also increase in child ratio to household size significantly reduces the probability of individual to be in risk-averse category.

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