CHOICE UNDER UNCERTAINTY: RISK ATTITUDES AND GENDER IN UKRAINE

by

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Abstract

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The importance of studying choice under uncertainty cannot be overestimated. Each individual, that is, an economic agent, makes decisions about the allocation of his scarce resources, which should be used efficiently. This paper examines risk preferences of Ukrainian students when they face uncertain outcomes. A risky environment is generated by a set of lotteries. The process of elicitation is designed on the basis of the two-stage approach introduced by Becker et al. (1964) and the Random-Lottery Incentive system, the so-called "certainty-equivalent technique". The results of our experiment show that students are on average inclined to be more risk seeking when the probability of winning is small, and near risk neutral when the winning probability is high. Also we find that students are less risk seeking preferences of the higher prizes than of the lower ones. The pattern of risk attitudes resembles those found by Kachelmeier and Shehata (1992) in China and Belianin (1998) in Russia. Thus, there is no cross country difference in the risk attitudes. Furthermore, we found that, *ceteris paribus*, female students exhibit more risk seeking than do male students. Disposable income of students as well as the income of their total household also appears to influence their risk attitudes.

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GLOSSARY

Certainty equivalent. The amount of money that leaves an agent indifferent between playing the lottery and obtaining that amount for sure.

Dominant strategy. The strategy which gives maximum possible payoff no matter what other agents do. Player chooses that strategy in any game.

Elicitation mechanism. An experimental mechanism that is designed to reveal true preferences of an individual over a certain lottery.

Expected value of the lottery. The weighted average of payoffs of the lottery with weights being probabilities of outcomes.

Hypothetical payoff. The payoff that does not imply real cash payment.

Lottery. The set of all possible outcomes and probabilities associated with them.

Maximum purchase price. The maximum amount an individual is willing to pay for the proposed lottery.

Minimum selling price. The minimum amount an individual is willing to accept in exchange for the proposed lottery.

Risk neutral utility. An individual is indifferent between playing a lottery and obtaining expected value of that game for sure.

Risk averse utility. An individual prefers obtaining expected value of a lottery for sure to playing a game.

Risk seeking utility. An individual prefers playing a lottery to obtaining expected value of that game for sure.

Risky environment. The situation in which subjects face choice under uncertainty generated by set of lotteries.

Wealth effect. Wealth effect is associated with change in preferences due to the change in wealth.

Chapter 1

THEORETICAL MOTIVATION

The importance of studying choice under uncertainty cannot be overestimated. Each individual, that is, an economic agent, makes decisions about the allocation of his scarce resources, which should be used efficiently. And on the aggregate these individuals comprise the whole economy. Thus, the understanding of the decision making process of these individuals would help to explain and predict the behavior of the agents. Usually outcomes of the allocation of available resources involve a certain degree of risk, making impossible to predict them. The theory of choice under uncertainty tries to explain the decision-making process of individuals in such situations. Risk attitudes, which are the particular features of individuals, show the degree to which these individuals are willing to take risk. This means that the understanding of risk attitudes of economic subjects allows explaining and predicting of the certain results of economic activity of these agents because the degree of risk is always accompanied by certain level of profits.

In Ukraine, which is on its way to the economic transformation, the uncertainty of the future is tremendous. And the process of reallocation of all resources available in our economy from less efficient to more efficient involves the decision making of individuals: people are making choices among different risky alternatives. On the aggregate we have the outcome which is produced by the whole population. Therefore, looking at a micro level of the economy, we may expect to find the explanations of the reasons that drive people to do exactly what they do. In this paper we do not aim to cover the decision making process of the Ukrainian individuals, but rather this paper a try to examine the risk

preferences of the sample drawn from Ukrainian population and compare them with the risk preferences of people from other countries, namely China, USA, Canada and Russia.

Experimental economics provides a useful approach for testing whether economic theory is true or false. Studying different deviations from the theory in this way motivates for further development of appropriate theory. While many fields of economics have not been much experimentally investigated, such topics as public goods, co-ordination problems, bargaining, a host of market institutions, and individual decision making have drawn a lot of attention of the economists (Kagel and Roth 1995). Our experimental investigation mainly deals with the decision making process of the individuals when they face choice with uncertain outcomes.

The economic theory of the choice under uncertainty is based on the expected-utility hypothesis that has been summarized by John von Neumann and Oskar Morgenstern in their book, *Theory of Games and Economic Behavior* (1947). "The hypothesis that individuals choose among alternatives involving risk as if they were seeking to maximize the expected value of some quantity, which has been called utility, is intended to be a scientific hypothesis enabling correct predictions to be made about individual behavior"(Friedman and Savage 1952). This hypothesis suggests that the individual behaves as if (a) he has a consistent set of preferences; (b) these preferences can be completely described by a function that attaches the utility to the alternatives; (c) his objective is to make his expected utility as large as possible. Thus, the individual will choose the lottery that produces the highest possible expected utility to him:

$$\mathrm{E}[U(X)] = \sum u(x_i)p_i \rightarrow \max,$$

where the x_i is a vector of all possible outcomes and p_i is an attached probability of each x_i, and $\sum p_i = 1$. This utility $u(x)$ defines both the utility of the outcome and the attitude towards risk: if u is linear then the individual is said to be risk-neutral, if u is convex, then the individual is said to be risk seeking, and if u is concave then the individual has a risk averse attitude towards risk (Machina 1987).

In economic theory, risk aversion is generally accepted as a typical individual attitude toward risk. However, in real life, the same people buy insurance, showing risk aversion, and at the same time participate in gambles and take investment risk, exhibiting risk-seeking behavior. Although in theory the risk aversion assumption is dominant in risky choices made by people, however, the degree and presence of risk aversion must be empirically determined. A number of studies try to measure risk attitudes of the students in the People Republic of China, USA, Canada and Russia (Kachelmeier and Shehata 1992; Belianin 1998). We will look at these studies more closely later in this chapter, as our research is in the same vein.

In our study we want to measure the risk attitudes of the Ukrainian individuals when they are faced with the risky choices. Our contribution to that research is two-fold: (1) this is the first study of the risk preferences of the Ukrainian people; (2) we use a different methodology to elicit risk attitudes than previous studies do. We try to assess how individual risk preferences change as the monetary payoffs increase and the possibility of gaining these payoffs increase. We also try to control for other possible characteristics that influence individual choice under uncertainty: gender, disposable income of the subject, her household income as well as the educational background. Finally, there is really a lack of findings on actual cross-cultural differences of decision making. So we will try to compare our findings about risk preferences with those found previously in different countries:

China, USA, Canada and Russia (Kachelmeier and Shehata 1992; Belianin 1998) looking for some cross-cultural differences in risk attitudes.

The economic psychology of risk-bearing stresses that people pay more than the expected value of the lotteries showing that the individual expected utility is greater than the expected value of the lottery. Otherwise, all those institutions that arrange lotteries would never be profitable. The individual subjective utility also includes an emotional aspect that includes dreaming about winning a high prize for the relatively low price of the lottery, even though the probability to win is very low (Wärneryd 1996).

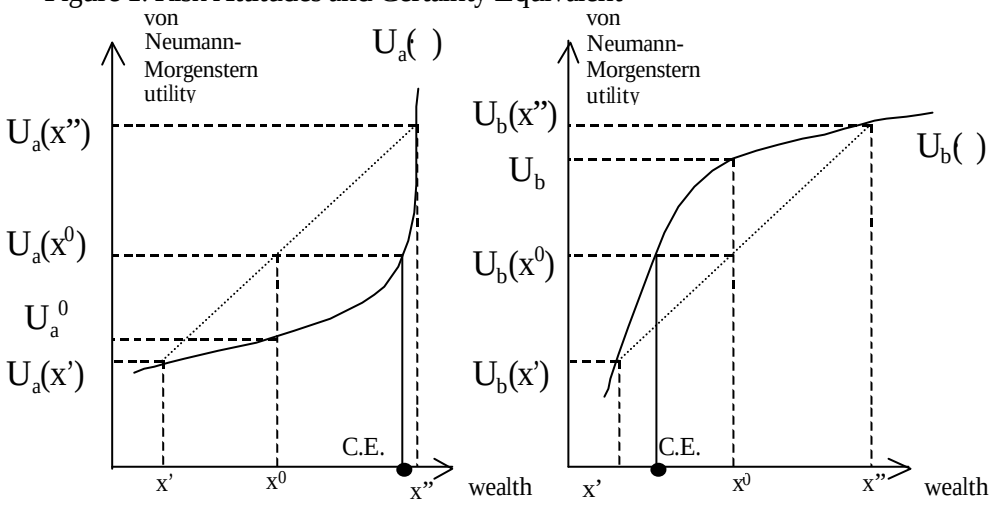
According to economic theory, people are risk averse for gains with high probability and for losses with low probabilities, but they become risk seeking in a case when the winning probability and loss probability are high ("probability bias"). The pattern of the risk behavior also changes when the prize level increases, that perhaps explains why people prefer a higher prize with lower winning probability to the lower prize however, with higher winning probability (Wärneryd 1996).

Several experimental studies have been performed recently to explore attitudes towards risk. One study by Binswanger (1981) involved farmers of rural India. They were suggested to select lotteries of varying risk for high and low payoffs. The author found that farmers were more risk-averse in the choice among lotteries with high payoffs then with low payoffs.

Kachelmeier and Shehata (1992) proposed another type of evaluating risk attitudes. In their study, these authors examine how students behave when they have to make a choice under uncertainty. The economic theory of choice under uncertainty states that individual choice over uncertain outcomes is driven by many factors. Among them it distinguishes the amount of a prize and the actual possibility to win that prize ("*probability bias*"). In their research they tried to test

how these two issues influenced risk attitudes. They conducted several experimental sessions involving students of economics departments in China, Canada and the USA in order to elicit certainty equivalents for a sequence of lotteries involving real monetary outcomes. Control groups consisted of volunteer Chinese undergraduate students at Beijing University in the People's Republic of China. In order to detect any cultural differences similar experiments were conducted with students in the USA and Canada. The design of the experiment induced students to state their true certainty equivalents for proposed lotteries with high and low prize levels (the so-called "certainty-equivalent technique").

Figure 1. Risk Attitudes and Certainty Equivalent



(a) risk loving person (b) risk averse person

Let us consider Figure 1. There are two types of utilities: of a risk seeking person (a) and of risk averse person (b). Suppose there is a lottery with *p* of probability of winning *x*' and with *1-p* of winning *x*". Then $x^0=px'+(1-p)x''$ is the expected value of this lottery. According to the Expected Utility Theory in risky choices an individual maximizes his or her expected utility rather than simply utility. Therefore, the certainty equivalent of a lottery is the amount of money that leaves

a subject indifferent between getting this amount for sure and playing the lottery. Then if the individual's *certainty equivalent* for this lottery will be an amount of money x that

$$u(x)=pu(x_1)+(1-p)u(x_2).$$

This amount is presented by point C.E. on the Figure 1. It is also evident that for risk lover this amount of certainty equivalent is higher than the expected value of the lottery, but for risk averter it is lower than the expected value of the lottery. Thus the natural measure of the risk attitudes is a lottery's certainty equivalent to expected value ratio.

Kachelmeier and Shehata (1992) used the Becker, DeGroot and Marschak (1964) two-stage approach for elicitation of true preferences over lotteries (or BDM mechanism). During the first stage students were asked to write down their minimum selling price for the proposed lottery, that is, the amount they were willing to accept in the exchange for that lottery. Then the price was compared to some random number, and depending on the outcome students either received an amount equal to the random number or played the lottery, which constituted a second stage of the BDM approach.

Results of the experiment indicated a statistically significant impact of the level of monetary incentives on revealed risk preferences (Kachelmeier and Shehata 1992). They found preferences risk-neutral on average, but with significant risk-seeking preferences for low-probability gain prospects. The individuals exhibited more risk seeking in the case of low monetary payoff of the lottery, while they turned out to be more risk averse (or less risk seeking) if a higher outcome was at stake. The authors also detected no differences in responses towards low monetary payoffs and no payoffs at all as well as there were no difference between high and low level prizes' responses if these payoffs were hypothetical.

Similar research was conducted recently in Russia to discover the pattern of risk attitudes under uncertainty of people who live in the transitional period (Belianin, 1998). This experimental study also involved undergraduate economics students as the participants. Risk attitudes were estimated in two ways. The first one was through direct statements of preferences on each pair of lotteries with the same expected values but with different levels of variances (the choice method). The second method required revealing minimum selling or maximum buying prices for various lotteries (the certainty equivalent method). Results turned out to be quite similar to those established by Kachelmeier and Shehata in their experiment mentioned above: students showed significant risk seeking preferences when the winning probability of the lotteries was low (5-25%) and sharply became risk neutral when the probability of winning increased up to 95%.

In our research we want to test using statistical model several theoretical hypotheses: 1) whether the Ukrainian subjects also exhibit risk seeking behavior when the winning probability is low; 2) whether the Ukrainian subjects are less risk seeking over higher prize than lower prize with low win possibility. We may expect to receive a significant support to those hypotheses, that is, the Ukrainian students almost comply with the economic theory of the choice under uncertainty and their risk preferences will be quite similar to those found in other studies (Kachelmeier and Shehata 1992; Belianin 1998).

In our experiment, we try to follow the scheme of the experimental study of Kachelmeier and Shehata (1992). However, due to financial constraints we apply the Random-Lottery Incentive System approach along with the BDM eliciting mechanism. The Random-Lottery Incentive approach suggests that during the experiment subjects be asked to perform some tasks, each of which requires a choice among lotteries with real monetary payoffs. At the end of the experiment one of the tasks is selected randomly and the subject plays the lottery she has

chosen in this task (Starmer and Sugden 1991). This approach is rather attractive because it is relatively low-cost and it allows collecting a great amount of data and avoiding the wealth effect associated with change in preferences due to the change in wealth.

In our research, we also try to incorporate the empirical evidence that gender differences in attitudes towards risk may exist. Men and women may behave differently in risk bearing, although it is not obvious from the theoretical point of view. Several studies show that gender does matter in the cooperative decisions: male students tend to behave less cooperatively in the experimental games (Frank, Gilovich and Regan 1993); as well as in financial decision making processes (Jianakoplos and Bernasek 1998; Schubert, Brown, Gysler and Brachinger 1999; Sunden and Surette 1998). The authors found that single women exhibit relatively more risk aversion in financial decision making than single men do. They assert that the proportion of wealth held in risky assets increases more slowly for women than for men when the wealth increases by the same amount. That is women are more risk averse than men are in the allocation of financial resources (Jianakoplos and Bernasek 1998; Sunden and Surette 1998). However, there is also evidence that men are more risk prone towards gains, whenever, women are more risk prone in the case of losses. When the identical decisions are presented as insurance and investment schemes no gender difference is found (Schubert, Brown, Gysler and Brachinger 1999).

In the next chapter we will describe the design and methodology of our experiment. The statistical model as well as the results of the empirical investigation will be discussed in chapter 3. The last chapter will summarize the evidence and give possible directions for further research.

Chapter 2

DESIGN AND METHODOLOGY

In the recent economic literature, there are five methods of eliciting the risk attitudes: (1) a choice between a certain alternative and probable alternative; (2) a choice between two probable alternatives that have the same or unequal expected values; (3) a request for a certain value that is equivalent to the probable value (certainty-equivalent method); (4) a request for a probability value that leaves the subject indifferent between two alternatives one of which is certain (lottery-equivalent method); (5) a request for a probability value that leaves the subject indifferent between two alternatives one of which has a known probability.[1]

The main hypotheses of our research are the following:

Hypothesis 1: *There are no systematic differences in the risk attitudes towards high and low prize level*

Hypothesis 2: *The winning percentage change has no impact on the risky preferences of the individuals*

In order to test them we use the certainty-equivalent technique of eliciting risk preferences, which is described below.

We conducted two sessions of the experiment involving 128 students of the National University of "Kyiv-Mohyla Academy" in December 1999. We recruited them during their tutorial hours and asked to participate on a voluntary basis. All

[1] Summarized by Wärneryd (1996).

of them were undergraduates with different academic backgrounds (see Table 1 for the composition of the groups).

Table 1. Composition of the experimental groups.

Department of Economics		Social Science Department		Natural Science Department		Total	
34		40		35		109*	
Female	Male	Female	Male	Female	Male	Female	Male
12	22	32	8	20	15	64	45

*-Either questionnaire or one of the reporting tables were missing for a subject, as well as the observations from the subjects who put their certainty equivalents in the reversed to expected value order were tossed out, thus, we do not include such subjects into our analysis.

In our experiment, we mainly followed the experimental methodology used by Kachelmeier and Shehata (1992). We used a set of instructions similar to that used by the authors. We also distributed questionnaires (see appendix 3) to collect relevant information about our subjects. However, due to the limited financial budget we use the Random-Lottery Incentive system that also induced subjects to reveal their true preferences over proposed lotteries (Starmer, Sugden 1992). We also have two different prize levels: high (10UAH) and low (0,20UAH).

We partially pattern the approach suggested by Becker, DeGroot and Marshak (1964), or BDM mechanism. This is a two-stage mechanism, which implies real monetary payments at the end of the procedure. First we present the individual with the lottery which consists of a certain probability *p%* to win a prize *x* and a probability of *(1-p)%* of winning nothing. For example, a typical lottery may be (10%, 10UAH; 90%, 0UAH). The individual is asked to give a minimum selling prize (or her certainty equivalent)[2], the least amount of money she would accept for selling the right to play this lottery. The first stage of the mechanism consists of the comparison of an individual's minimum selling price with some random price of the proposed lottery. Random price of the lottery is generated through

[2] Further, we will use "minimum selling price" and "certainty equivalent" of the lottery interchangeably

the following random device: there is a deck of numbered cards, and one card is drawn randomly out. The number on a card is a random price. If this random price is greater or equal to the individual's minimum selling price then the individual receives this greater random price as her payoff; that is, the individual sells her chance to win maximum prize. Otherwise, the individual will keep the lottery and continue the second stage of the eliciting mechanism: playing a lottery. A random device creates the risky condition of the lottery. In our case we use 100 deck cards numbered 1 through 100. Each card represents some random percent of winning the lottery. The proposed lottery has a certain percentage of winning and losing. Thus, some random winning percentage is drawn out of 100 cards and is compared to the certain winning percentage of the lottery. If the random winning percentage is less or equal to the winning percentage of the lottery then the individual wins and receives the maximum winning prize, otherwise she loses and receives nothing. Therefore, there are three possible outcomes of applying this mechanism. The individual receives either the random price for the proposed lottery, or maximum winning prize of the lottery, or nothing. This constitutes a one trial of the experiment. The next trial begins with a lottery with a different probability of winning *p%*. To see that the dominant strategy for the subjects is to reveal their true certainty equivalent we may use the following reasoning: if a subject's stated minimum selling price is higher than her true minimum selling price for some lottery, then if the random price is falling between the true and overvalued price of this lottery, this subject will be playing it instead of the getting this amount of a random price that is greater than her true minimum selling price. By analogy, if a subject asks lower than her true minimum selling price of the lottery, its random price may be higher then a subject's ask but lower than her true evaluation. Thus, this subject loses in terms of the forgone possibility to receive his higher true price. Therefore, the only dominant strategy for a subject is to state her true certainty equivalent for that lottery.

The combination of BDM mechanism and the Random-Lottery Incentive System implies that during BDM mechanism only one or more but not all of the lotteries will be played. The individuals state their certainty equivalents for all proposed lotteries but only several randomly chosen lotteries will be participating in the BDM two-stage system. The uncertainty about which exactly lotteries will be chosen and be played with real monetary payoffs makes the individuals state their true preferences for all of the proposed lotteries. The process of selection of the lotteries that will be played is the following: all lotteries are numbered through 1 to 21. There is also a deck of cards numbered 1 through 21. The instructor draws one of the cards randomly. The number on a card determines what lottery will be played in BMD mechanism. In such a way, we also avoid the *wealth effect problem* that would arise if the subjects can play all the lotteries. As the result, in our experiment only one lottery is chosen randomly and played by each individual with real monetary payments.

In the beginning of the experiment, each subject was assigned a study number. Each subject used his/her study number while making choices over lotteries during the whole experiment. There were two reasons for this decision: 1) we wanted to collect private information about our participants through the questionnaire and keep it in the confidence, 2) we needed to be able to match subjects choices to the questionnaire.

As the second step, we distributed the questionnaires and asked subjects to put their study numbers on them and to complete them. After all students finished their questionnaires we collected them and distributed the instructions for a low prize level of 0.2 UAH. Such a start allowed us to avoid any discrepancy that could arise if some students did not understand correctly the process of the experiment. Another reason for this was to avoid wealth effect that could influence their decision on the low prize level if we were to start playing a high-

level prize lottery. Twenty kopecks (0.2UAH) is a rather small amount of money, and may be definitely considered as the low prize level, while the prize of 10 UAH is a relatively high prize for the Ukrainian students as their income on average is about 50-75UAH per month.

During each experimental session, students received the Ukrainian version of the instructions (see Appendix 2) and questionnaire (Appendix 3). First, we wrote the set of instructions and questionnaires in English, and later we translated them into Ukrainian.

During the session, we ensured that the students were comfortable with the task they were supposed to do, by answering all questions regarding the design and methodology of the experiment. The notion of a minimum selling price or willingness to accept a certain amount instead of playing a lottery was carefully explained. Students were told that there would be two types of prizes: low and high. We began with the low prize level of 0,20UAH then the procedure was repeated for the high prize level of 10UAH. Each set of instructions consisted of a questionnaire, written instructions, Table 1 that listed 21 lotteries with increasing winning percentage starting from zero chance of winning up to 100% of winning the lottery with the incremental increase of 5% per lottery, and Table 2, which was identical to Table 1 (see Appendices 1, 2 and 3). The students were also told that one of the lotteries among 21 would be chosen randomly and played for real monetary payoff.

After students wrote down their minimum selling prices in Table 1 they were asked to replicate their results into Table 2 along with their personal study number. They were warned that the real payments would be based on the results written in Table 2, which would be collected after they copied their minimum selling prices into it. This was an attempt to prevent subjects from cheating on their minimum selling price when it would be compared to some random price of

that lottery. Then we collected all Tables 2. The next step was to choose which lottery would be played. We used a deck of 21 cards numbered from 1 to 21 and shuffled publicly. Then an instructor drew a card out of the deck. The number was announced and each subject wrote down the number of the lottery into Table 3 along with his/her minimum selling price for this lottery.

After that procedure, we started the first stage of the BDM mechanism for the chosen lottery. In the case of 20 kopecks as the random device we used a deck of cards numbered from 1 to 20, each standing for 1 kopek (0.01UAH) random price (the indivisible particle). For 10UAH we used 100 cards numbered from 0.10UAH to 10 UAH with an incremental increase of 10 kopecks. Each deck was publicly examined and shuffled by students. After that, one person chose a random price. All students put that random price into Table 3 and compared with their certainty equivalents for the proposed lottery. We asked students to say if their price was less or equal to that random price. Those students, whose certainty equivalents for that lottery were less than the random price, received this random price. All others participated in the second stage of BDM mechanism.

The second stage involved the choice of a random winning percentage for a given lottery. There was another deck of 100 cards numbered from 1 to 100 that was also publicly examined and shuffled. One hundred stated for sure (100%) winning of the prize. Then a card was drawn and the random percentage was announced. If the random winning percentage turned out to be less than or equal to the given lottery winning percentage, then the student won, otherwise he/she lost. These outcomes were also written down into Table 3, and the final payoff was determined.

Nevertheless, as a sign of our appreciation for the subject's participation we guaranteed at least 1UAH as a compensation for those who lost. Afterwards, all

participants received their payoffs according to Table 2. Appendix 4 summarizes the outcomes of our two experimental sessions.

Chapter 3

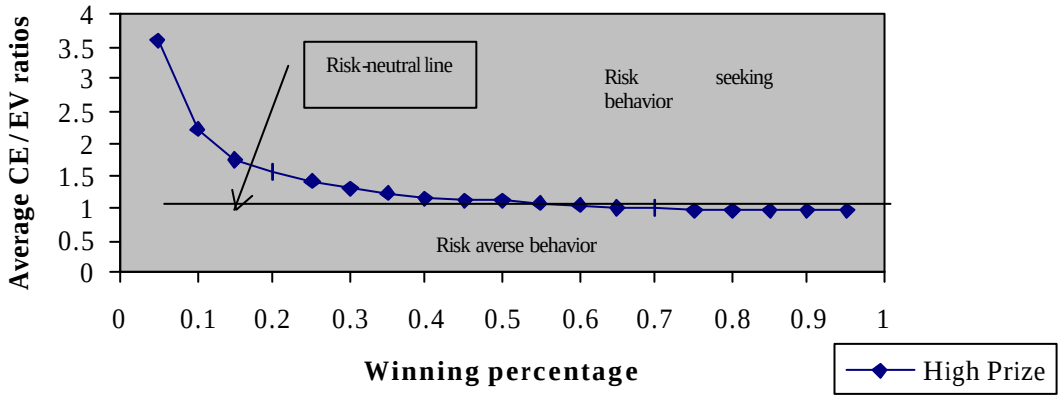
DISCUSSION OF THE EXPERIMENTAL RESULTS

As the measure of risk we use the ratio of the individual minimum selling price (certainty equivalent) of a given lottery to the expected value of that lottery. For example, if the subject is willing to sell a given lottery (0.45,10UAH; 0.55,0UAH) for the price of 4UAH then this subject produces a ratio of a certainty equivalent to an expected value (CE/EV) of 1.125. The prizes of 10UAH and 0.20UAH constitute high and low prize level, respectively.

3.1. Discussion of the descriptive results

Figure 2 depicts the relationship between the average certainty equivalent to expected value ratios and winning percentage for the high level prize of 10UAH. The line *CE/EV=1* means risk neutrality on the graph. Any average measure above that line means risk seeking behavior and conversely, any measure below the line is risk averse behavior. We can see that, on average, subjects behave in a

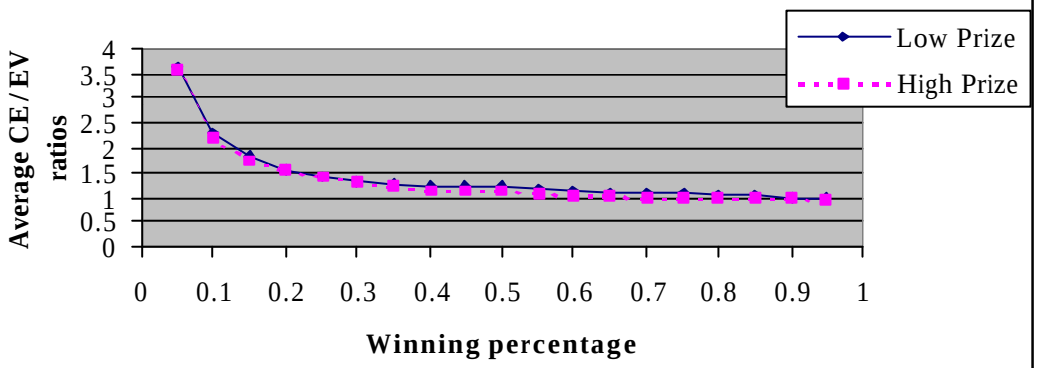
Figure 2. Average CE/EV ratios for the High (10UAH) Prize Level



risk seeking fashion for low probabilities of winning, however, as the chance of winning increases they exhibit less and less seeking attitude, which becomes near risk neutral after 0.5 probability of winning. This result is quite similar to that found in previous works (Kachelmeier and Shehata 1992; Belianin 1998): the subjects are risk seekers for low winning probabilities and become nearly risk neutral after 55%.

In order to trace the impact of the prize level on the risk attitudes we plotted average CE/EV ratios for both high and low prize levels. From Figure 3 we can see that, on average, for the high prize level subjects are less risk seeking than for the low prize level. Although the visual discrepancies are not very large we will use statistical evidence to support this graphical analysis.

Figure 3. Average CE/EV ratios for the High (10UAH) and Low (0.20UAH) Prize Level



During the analysis of the experimental results we find that there is a difference in the risk preferences of men and women. From Figures 4a and 4b we see that, on average, for both prize levels the Ukrainian female students are more risk seeking than male students when the probability of winning is low. This is quite an opposite result to the studies of the financial risk aversion that find that women are more risk averse than men (Jianakoplos and Bernasek 1998; Schubert, Brown, Gysler and Brachinger 1999; Sunden and Surette 1998). The possible explanation

of this finding may be in the composition of our sample and issue of the disposable income of our participants. Students who have come to study in Kiev from other cities have to rely mainly on themselves. They usually live in the dormitories and have higher expenses which are relatively independent from family income than those students who live in Kiev with their parents. If we assumed that nearly all students who come from other cities to Kiev live in the

Figure 4a. Average CE/EV ratios for the High Prize Level, Males vs. Females

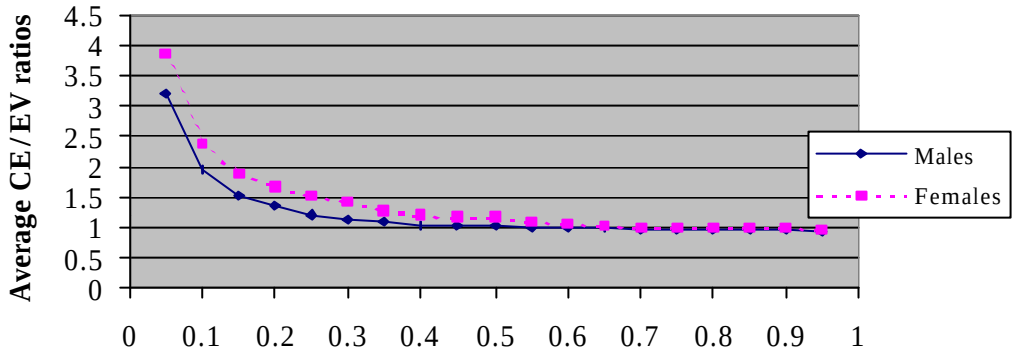
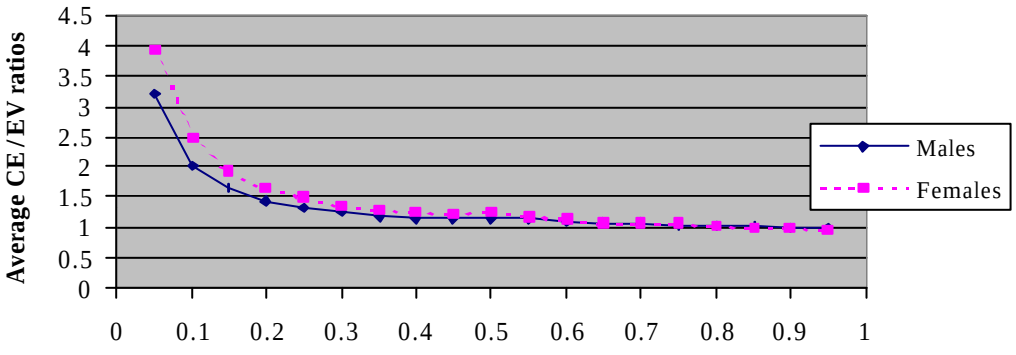


Figure 4b. Average CE/EV ratios for the Low Prize Level, Males vs. Females



dormitories (this is a valid assumption: undergraduate students in Ukraine usually live in the dormitories of the universities they are studying at as all other options are quite expensive and not common), then we may expect that those who lives in the dormitories are more careful in their expenditures, as their monthly income is the main source of their living expenditures, than are those who live with their parents and more rely upon the income of the family. Although this is just a hypothesis and we do not have enough information to test it, but some evidence in support of the hypothesis is found. Nearly 65% (29 people) of our male subjects came from other cities to Kiev, while only 46% (30 people) of female subjects came from other regions than Kiev. Furthermore, if male students are more likely to go to study away from home (meaning that they are willing to take the risk associated with this decision more often then females) they now should be more considerable in their expenses, and thus less risk seeking than female students from our sample. This finding may call for a more careful investigation of female-male differences in risk behavior.

To support the evidence that female students more risk seeking than male students we have also conducted a non-parametric Kruskal-Wallis test for certainty equivalents of the lowest winning probability lotteries (5 %) for the both prize levels. The null hypothesis is that multiple population distribution functions (corresponding to multiple samples) are identical against the alternative hypothesis that they differ by location. We have two couple of groups: Male-Female High Prize, Male-Female Low Prize. We assume that certainty equivalents for both groups are independent and identically distributed. The samples are independent of each other. The results of this test are presented in Table 2.

Table 2. Kruskal-Wallis Non-Parametric Test (χ^2)

	Male-Female High Prize	Male-Female Low Prize
Kruskal-Wallis statistics	2,25515	1,71852
p-value	0,13317	0,18988

The results suggest that the difference in locations of average certainty equivalents for male and female students in the case of high prize level is more significant than in the low prize case. Although the statistical significance is quite low it is still acceptable to stress that female students have higher risk seeking preferences than male students.

3.2. Discussion of the statistical results

For the purpose of our statistical analysis we followed the model used by Kachelmeier and Shehata (1993):

$$CE/EV = \alpha + \beta_1 \mathrm{Prize} + \sum_{i=1}^{19} \beta_{2i} Percent_i + \sum_{j=1}^{n-1} \beta_{3i} Subject_j + \varepsilon , \qquad (1)$$

where CE/EV = ratio of certainty equivalent to lottery expected value;

α = the regression intercept;

$Prize$ = 1 for high prize level

= 0 for low prize level;

$Percent_i$ = 1 if the observation is at the *i*'s winning percentage

= 0 otherwise, using 95-percent as a base category;

$Subject_j$ = 1 if the observation is from the *j*th subject,

= -1 if the observation is from the *n*th subject,

= 0 otherwise;

ε = the regression residual

n = number of subjects

For our research we slightly modified this model, including several other characteristics that we believe may influence the individual decision process under uncertainty:

$$CE / EV = a + b_1 \,\mathrm{Prize} + \sum_{i=1}^{19} b_{2i} Percent_i + \sum_{j=1}^{n-2} b_{3i} Subject_j + b_4 Gender + e \quad (2)$$

The first three characteristics are similar to the previous model. The rational for inclusion of the last variable, *Gender*, is that some studies (Jianakoplos and Bernasek 1998; Schubert, Brown, Gysler and Brachinger 1999; Sunden and Surette 1998) suggest that there is gender difference in the perception of risk, that is, in the risk preferences. We code *Gender* as follows: 1 for the male subject and 0 for the female subject. In our statistical analysis we will use Test-of-Significance Approach to examine what factors influences risky choices of the Ukrainian subjects.

Hypothesis 1: *There are no systematic differences in the risk attitudes towards high and low prize levels*

$$H_0: \; b_1 = 0 \text{ against } H_1: b_1 \neq 0$$

The alternative hypothesis is built on the ground of the economic theory of choice under uncertainty: the risk-aversion increases when the prize at stake increases.

Hypothesis 2: *The winning percentage change has no impact on the risk preferences of the individuals*

$$H_0: \; b_{2i} = 0 \text{ against } H_1: b_{2i} \neq 0$$

The alternative hypothesis to the above null hypothesis is that the winning percentage negatively contributes to the certainty equivalents and thus to the risk behavior. The higher the probability of winning the less risk seeking an individual becomes.

Hypothesis 3: *There is no significant difference in the risk behavior of men and women*

$$H_0: \beta_4 = 0 \text{ against } H_1: \beta_4 \neq 0.$$

The alternative hypothesis in this case is that gender has an impact on risk attitudes; however, it is not still obvious who is more risk averse: men or women (Schubert, Brown, Gysler and Brachinger 1999).

The variable *Subject* is included in order to avoid correlated errors, which are induced by the systematic differences in the individuals' risk preferences in the ordinary linear regression: it is assigned 1 for *i*'s subject, -1 for the last *n*th subject and 0 otherwise. Such a scheme allows us to trace the value of each individual's deviation from the average risk attitudes measured by the overall intercept (Kachelmeier and Shehata 1993). In the case of the regression model (2) we had to run the regression on *n-2* subjects: we dropped two observations from female and male subjects in order to avoid multicollinearity between *Subject* and *Gender.*

The results of these regressions are summarized in Table 2. We also ran the regression with natural-logarithmic transformation of the certainty equivalent ratios in order to get proportionate effects of the changes in the repressors.

The statistical results for model (1) both for CE/EV and log-transformation of that dependent variable show that the higher prize level is negatively correlated with a risk taking. Thus we may reject the null hypothesis of Hypothesis 1 that there is no influence of prize level on the risk behavior at 5% level of

confidence. It is also evident that low winning percentages induce subjects to be more risk seeking, as the coefficients are highly significant even at 1% level of confidence.

Table 3. The results of the regression models (1) and (2).

	$CE/EV = \alpha + b_1 \text{Prize} + \sum_{i=1}^{19} b_{2i} Percent_i + \sum_{j=1}^{n-1} b_{3j} Subject_j + \varepsilon$				$CE/EV = a + b_1 \text{Prize} + \sum_{i=1}^{19} b_{2i} Percent_i + \sum_{j=1}^{n-2} b_{3j} Subject_j + b_4 Gender + e$			
Variable	CE/EV		Log(CE/EV)		CE/EV		Log(CE/EV)	
	Coefficient	*t* statistics	Coefficient	*t* statistics	Coefficient	*t* statistics	Coefficient	*t* statistics
Intercept	0.799	4.42	-0.063	-0.81	1.182	6.54	0.064	0.83
Prize	-0.062	-1.86*	-0.114	-7.99*	-0.062	-1.86*	-0.114	-7.99*
Percent (5)	2.634	29.04‡	0.924	23.33‡	2.634	29.04‡	0.924	23.33‡
Percent (10)	1.285	14.17‡	0.598	15.21‡	1.285	14.17‡	0.598	15.21‡
Percent (15)	0.811	8.94‡	0.448	11.40‡	0.811	8.94‡	0.448	11.40‡
Percent (20)	0.584	6.44‡	0.370	9.45‡	0.584	6.44‡	0.370	9.45‡
Percent (25)	0.437	4.82‡	0.300	7.68‡	0.437	4.82‡	0.300	7.68‡
Percent (30)	0.342	3.77‡	0.251	6.42‡	0.342	3.77‡	0.251	6.42‡
Percent (35)	0.253	2.79‡	0.201	5.12‡	0.253	2.79‡	0.201	5.12‡
Percent (40)	0.205	2.27**	0.173	4.42‡	0.206	2.27**	0.173	4.42‡
Percent (45)	0.180	1.99**	0.165	4.23‡	0.181	1.99**	0.165	4.23‡
Percent (50)	0.191	2.11**	0.178	4.55‡	0.191	2.11**	0.178	4.55‡
Percent (55)	0.143	1.58	0.142	3.64‡	0.143	1.58	0.142	3.64‡
Percent (60)	0.111	1.23	0.115	2.95‡	0.111	1.23	0.115	2.95‡
Percent (65)	0.076	0.83	0.082	2.09**	0.076	0.83	0.082	2.09**
Percent (70)	0.061	0.67	0.070	1.79	0.061	0.67	0.070	1.79
Percent (75)	0.040	0.44	0.046	1.18	0.040	0.44	0.046	1.18
Percent (80)	0.025	0.28	0.036	0.92	0.025	0.28	0.036	0.92
Percent (85)	0.019	0.21	0.032	0.82	0.019	0.21	0.032	0.82
Percent (90)	0.015	0.16	0.025	0.64	0.015	0.16	0.025	0.64
Gender					-0.383	-1.57	-0.128	-1.21
F test of the regression(incl. all $Subject_j$)	F=18.09‡		F=29.61‡		F=18.09‡		F=29.62‡	
R square of the regression	R^2=0.35		R^2=0.47		R^2=0.35		R^2=0.47	

* - p<0.05 (one-tailed test); **- p<0.05(two-tailed test); ‡ - p<0.01(two-tailed test).

Thus up to 35% winning percentage we may also reject the hypothesis that there is no influence of the winning percentage on the individual choices against the alternative hypothesis. The *F* test also shows that these regressions are significant overall. These findings are similar to those found by Kachelmeier and Shehata (1993) and Belianin (1998), however prize level was much more significant in the Chinese experiment. This may be explained that our subjects viewed these lotteries as entertainment rather than the possibility to earn income.

However, as the prize level or winning percentage increased they became more concerned with the earning of that prize, thus exhibiting less risk seeking behavior (Belianin, 1998).

The results of the regression model (2) show similar evidence to the model (1). Although *Gender* is not significant even at 10% level of confidence (its *p* value is 0.117), we still suspect that there are female-male differences in the perception of risk such that female students are more risk seeking than male students for low winning percentages. The insignificance of the coefficient of the *Gender* can be explained by our statistical model itself: each individual is represented by the *Subject* effect in our model, and as the gender is also a specific attribute of each subject we may conclude that the effect of gender is hidden in our model. The graphical analysis also confirms our finding. Therefore, in order to shed more light on the risk behavior of men and women we have separated our subjects into two groups by gender and investigated what factors might have been influencing their performance.

The results from Table 3 show that prize level appears to be statistically insignificant for female students, while this variable is statistically significant for male students. There is also evidence that because of the insignificance of the prize level for female they do exhibit more risk seeking behavior than do male students for low winning probability: the winning percentage up to 40% is

significant for females compared to 20% of winning possibility for male students. Thus, the difference in the performance of the female and male students can be explained by different attitude toward these prize levels. However, this finding should not be considered as robust, because there are still many factors that may influence risk behavior of males and females, but anyway, this may be one of the possible explanations of our findings.

Table 4. The results of the regression model (1) estimated separately for male and female students

Variable	$CE/EV = \alpha + \beta_1 \text{Prize} + \sum_{i=1}^{19} \beta_{2i} Percent_i + \sum_{j=1}^{n-1} \beta_{3i} Subject_j + \varepsilon$			
	Male		*Female*	
	Coefficient	*t* statistics	Coefficient	*t* statistics
Intercept	0.898	4.83	1.112	5.88
Prize	-0.095	-1.90*	-0.038	-0.86
Percent (5)	2.233	16.27‡	2.916	24.22‡
Percent (10)	1.025	7.47‡	1.468	12.19‡
Percent (15)	0.624	4.54‡	0.942	7.83‡
Percent (20)	0.429	3.13‡	0.693	5.76‡
Percent (25)	0.298	2.18**	0.534	4.44‡
Percent (30)	0.225	1.64	0.424	3.52‡
Percent (35)	0.177	1.29	0.307	2.55**
Percent (40)	0.134	0.98	0.257	2.13**
Percent (45)	0.122	0.89	0.221	1.84
Percent (50)	0.116	0.85	0.244	2.02**
Percent (55)	0.105	0.76	0.170	1.41
Percent (60)	0.087	0.64	0.128	1.07
Percent (65)	0.063	0.46	0.085	0.70
Percent (70)	0.048	0.35	0.070	0.58
Percent (75)	0.032	0.23	0.046	0.38
Percent (80)	0.026	0.19	0.025	0.21
Percent (85)	0.016	0.12	0.022	0.18
Percent (90)	0.011	0.08	0.017	0.14
F test	13.86‡		17.45‡	
R^2	0.33		0.37	

* - $p<0.05$ (one-tailed test); ** - $p<0.05$(two-tailed test) ‡ - $p<0.01$(two-tailed test).

We also found some spike of the female risk seeking attitude when the winning percentage is exactly 50%. Perhaps, female students considered this lottery to be the last of the list of the low winning probability, when they may exhibit risk seeking behavior. All other lotteries with the winning percentage higher than 50% were considered as safe as their certainty equivalents become closer to the expected value of the lottery (risk-neutral attitude). The overall regressions are also significant if tested by the F statistics, and this suggest that subjects' effects are also present in our data.

We ran also several other regressions that include different characteristics that are subject specific for both female and male students, such as the disposable income of the students, the income of their household, educational background and the information whether the subjects participate in the national lotteries or a similar kind of activity. We coded the variables in the following manner: Disposable income and household income are the averages of the ranges stated in personal questionnaires; Economics is equal 1 for economics students and 0 for all other groups, Natural Science is equal 1 for natural science student and 0 otherwise; Lottery is equal 1 for a student that plays National Lottery, and 0 otherwise. The results are reported in Table 4.

The results from Table 4 support the idea that the prize level was not so significant as a factor of influence on the risk behavior of females as it was for males. We also found that the average disposable monthly income of the student is a significant factor for females but not significant for males. However, the income of the household from where a student come is significant for both female and male students. These results suggest that the higher the income of a student, both disposable and household, the less risk seeking a subject behaves. However, this result should be taken with caution because some of our subjects have come to the National University of "Kyiv-Mohyla Academy" from other

cities, thus they rely only upon themselves and are more careful in their expenditures, and as the result, more risk averse. Thus, this result may be somewhat ambiguous.

Table 5. The results of the regression estimated separately for female and male subjects.

Variable	$CE/EV = a + b_1 \mathrm{Prize} + \sum_{i=1}^{19} b_{2i} Percent_i + b_3 I_{disp} + b_4 I_{fam} + b_5 Econ + b_6 Natural + b_7 Lottery + e$			
	Male		*Female*	
	Coefficient	*t* statistics	Coefficient	*t* statistics
Intercept	1.188	10.18‡	1.083	11.09‡
Prize	-0.095	-1.75	-0.037	-0.78
Percent (5)	2.233	14.94‡	2.917	22.55‡
Percent (10)	1.025	6.86‡	1.469	11.36‡
Percent (15)	0.624	4.17‡	0.943	7.29‡
Percent (20)	0.429	2.87‡	0.695	5.37‡
Percent (25)	0.298	2.00**	0.535	4.12‡
Percent (30)	0.225	1.51	0.425	3.29‡
Percent (35)	0.177	1.18	0.309	2.39‡
Percent (40)	0.134	0.90	0.258	1.99**
Percent (45)	0.122	0.82	0.221	1.71
Percent (50)	0.116	0.78	0.244	1.88‡
Percent (55)	0.105	0.70	0.170	1.31
Percent (60)	0.087	0.58	0.128	0.99
Percent (65)	0.062	0.42	0.085	0.66
Percent (70)	0.048	0.32	0.069	0.54
Percent (75)	0.032	0.21	0.046	0.36
Percent (80)	0.026	0.17	0.025	0.19
Percent (85)	0.016	0.11	0.022	0.17
Percent (90)	0.011	0.07	0.017	0.13
Income Disposable	-0.00028	-0.75	-0.00086	-2.35
Income Family	-0.00012	-2.08	0.00015	2.37
Economics	-0.057	-0.73	-0.250	-3.82
Natural Science	-0.297	-3.64	-0.135	-2.41
Lottery	0.479	6.29	0.139	1.01
F test	17.66‡		35.50‡	
R^2	0.19		0.25	

* - $p<0.05$ (one-tailed test); **- $p<0.05$(two-tailed test); ‡ - $p<0.01$(two-tailed test)

The motivation for looking at the educational background is that probably students are gaining some certain perceptions of risk during their education process. We divided our subjects into three groups: economics, social sciences and natural sciences. As the base category we use social science group. The statistical results show that the natural and economic sciences are less risk seeking than the social science students. However, this result is also subjected to biases as

our economics group consists mainly of the first year students, who may not have gained any specific knowledge yet. As for other groups they were mainly third and fourth year students. Therefore, the validity of our inference is somewhat doubtful and requires further experimental investigation.

We also found that those who play lotteries have higher certainty equivalents showing more risk seeking behavior. It seems reasonable that those who are rather careful in their expenditures are less likely to spend money on any chance decision (Wärneryd 1996). Thus, those who play lottery are expected to have higher certainty equivalents for the same lotteries. Our findings support this hypothesis. The results show that this factor is highly significant for male students than for female students. However, here we also have certain bias in the sample: the group of students who often participate in lotteries was predominantly consisted of male students. We may suggest that, at least, in our sample, mainly male students engage themselves into gambles of that kind. Nevertheless, careful investigation is also required on this subject.

CONCLUSIONS

The purpose of this experimental study was to investigate whether the Ukrainian subjects have similar pattern of risk preferences to those found in other researches (Kachelmeier and Shehata 1992; Belianin 1998). In general, the pattern of risk attitudes produced by the Ukrainian subjects is similar to those found in other studies: Ukrainian students exhibit higher risk seeking when the chance of winning is small (5%-25%) but become less and less risk seeking as the percentage of winning increases. Our findings are closer to the results established in the study with Chinese students (Kachelmeier and Shehata 1992): the range of average certainty equivalents ratios for the initial probabilities lies between 3 and 4 while for Russian students it was lower: between 2 and 3. However, for the higher probabilities the risk attitudes become, on average, near risk neutral. Nevertheless, our results show the same particular features that are present in the study in Russia: no highly statistically significant difference between the preferences over high and low prize levels. Now we may say that risk attitudes are not influenced by some specific social and institutional framework. Subjects from different countries exhibited the same pattern of risk preferences. So, on aggregate, there is no cross-cultural difference in risk attitudes of individuals: people have the same pattern of behavior at least in risk attitudes in any of the countries where this research was performed. As the result under the similar social and institutional framework we may expect that decision making process of these individuals will end up in the same welfare outcome. Then why some countries are doing well while other doing not so well? The answer for this question may lie not in the individual behavior but rather in the nature of the social and economic institutions. But we should admit that this inference is very

straightforward and it true only for the samples that were drawn in each country. The problem is that all studies examined only undergraduate students, but not all other social subjects (like businessmen or retired people). Thus, the result may not be the same.

In our experiment the application of Random Lottery Incentive System along with the BDM preference eliciting mechanism proves to give the results similar to those found under other eliciting mechanisms: BDM (Kachelmeier and Shehata 1992); market approach (Belianin 1998). This gives an additional support of the applicability of this method in eliciting individual's true preferences, although to which degree it is true still require more investigation.

One of the important findings suggests that there are systematic differences in the risk preferences of female and male students. We found that female students are more risk seeking than male students are all everything being equal. This holds for both prize levels. We explain this by the fact that 10 UAH is statistically insignificant for female subjects, while it was significant for male students leading to the conclusion that there may be difference in the perception of monetary payoffs by female and male subjects. However, this finding should be more careful investigated.

We also find that for female students higher winning probabilities (30- 60%) are still statistically significant, that is, female subjects anchor their certainty equivalents to the probability of winning to higher degree than male students do.

Other practical results demonstrate other factors that influence individual certainty equivalents. We find that certainty equivalents are partially determined by the disposable and household incomes. The higher the income the less risk seeking behavior is observed. We also try to detect whether there is any systematic differences in risk attitudes of the students with different backgrounds.

Although we find that the educational background matters for risk choices, this result should be taken with a caution. The distribution of years of studies as well as gender breakdown between different majors is quite uneven: economics students are predominantly males and first-year students, while social science students are mainly females and third and fourth year students. Another finding support the fact that those who participate in lotteries have higher certainty equivalents, thus higher risk seeking preferences.

This study calls for further research of the female-male differences in risk behavior because we find that the stereotype of women being more risk averse (less risk seeking) agents than men is not supported. In our study of certainty equivalents as the measure of risk attitudes we come with the quite opposite result: female subjects are more risk seeking than male subjects for the low possibilities of gains are. Other elicitation methods should be used to verify or refute our evidence.

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Appendix 1. **The instructions (English version)**

Study Number____

Instructions

During this experiment you have several possibilities to earn a certain amount of money.

How does the game work?

Attached is a list of lotteries. Maximum amount of the prize is 0.20UAH. Each lottery presents some chance *p*% to win the amount of money and *(100-p)%* chance to lose the prize and get nothing. Please, write down your minimum selling price for each lottery. **Minimum selling price of the proposed lottery is the price that you are willing to accept instead of playing this lottery and winning or losing win-prize.** Note, the percentage of winning is different for each lottery. When you do all the lotteries, two (three) lotteries will be chosen randomly. Then, from the shuffled deck of 20 cards {numbers from 1 to 20} you will pull out any card. If the amount on the card is equal or greater than your minimum selling price for this lottery then you receive the amount shown on the card. Otherwise, you play the lottery in the following way:
From the second deck of cards (numbered from 1 to 100) you draw any card; if the number on the card is less or equal to the winning percentage of the lottery, then you win! If it is greater then you lose.
Example: Suppose your minimum selling price for some lottery is 7 kop, and you have drawn a card with the amount of 15 kop., then you will get 15 kop. If instead, your minimum selling price is 17 kop., then you will play this lottery with some percentage of winning.

Therefore, it is in your best interest to state your minimum selling price as accurate as possible; because, if your estimate is undervalued or overvalued, you may lose your chance to win some part of the payoff. For example, your true assessment is 10 kop., but you have declared only 5 kop.; then, if random price is between 5 and 10 kop., you will not be able to play the lottery with the winning amount of 20 kop. Instead, you will get only the amount of this random price, that is, something between 5-10 kop. By contrast, if you have declared 15 kop. as your minimum selling price then, if random price is between 10 and 15 kop., you will have to play the lottery even if you prefer the amount of random price drawn from the deck. Lotteries will be chosen randomly after all of you write down your minimum selling price for each lottery.

Remember: Two (three) lotteries will be chosen randomly and you will get either their win-prize or amount from the card or nothing...
Disclaimer: Remember! The payoffs will be paid based on the information provided in Table 2. Any intention to misrepresent the true results from Table 2 will be considered as the event of losing all the payoffs. If you wish to stop your participation then all the payoffs will be retained from you.

Table 1. The list of lotteries for the prize level of 0.20 UAH

[1]	**Lotteries**	**Minimum Selling Price**
1b.	Winning percentage 0; Loss percentage 100	
2b.	Winning percentage 5; Loss percentage 95	
3b.	Winning percentage 10; Loss percentage 90	
4b.	Winning percentage 15; Loss percentage 85	
5b.	Winning percentage 20; Loss percentage 80	
6b.	Winning percentage 25; Loss percentage 75	
7b.	Winning percentage 30; Loss percentage 70	
8b.	Winning percentage 35; Loss percentage 65	
9b.	Winning percentage 40; Loss percentage 60	
10b.	Winning percentage 45; Loss percentage 55	
11b.	Winning percentage 50; Loss percentage 50	
12b.	Winning percentage 55; Loss percentage 45	
13b. 14b.	Winning percentage 60; Loss percentage 40 Winning percentage 65; Loss percentage 35	
15b.	Winning percentage 70; Loss percentage 30	
16b	Winning percentage 75;	

.	Loss percentage	25	
17b.	Winning percentage Loss percentage	80; 20	
18b.	Winning percentage Loss percentage	85; 15	
19b.	Winning percentage Loss percentage	90; 10	
20b.	Winning percentage Loss percentage	95; 5	
21b.	Winning percentage Loss percentage	100; 0	

Table 2. The list of lotteries for the prize level of 0.20 UAH

[1]	**Lotteries**		**Minimum Selling Price**
1b.	Winning percentage Loss percentage	0; 100	
2b.	Winning percentage Loss percentage	5; 95	
3b.	Winning percentage Loss percentage	10; 90	
4b.	Winning percentage Loss percentage	15; 85	
5b.	Winning percentage Loss percentage	20; 80	
6b.	Winning percentage Loss percentage	25; 75	
7b.	Winning percentage Loss percentage	30; 70	
8b.	Winning percentage Loss percentage	35; 65	
9b.	Winning percentage Loss percentage	40; 60	
10b.	Winning percentage Loss percentage	45; 55	
11b.	Winning percentage Loss percentage	50; 50	
12b.	Winning percentage Loss percentage	55; 45	

13b.	Winning percentage 60; Loss percentage 40	
14b.	Winning percentage 65; Loss percentage 35	
15b.	Winning percentage 70; Loss percentage 30	
16b.	Winning percentage 75; Loss percentage 25	
17b.	Winning percentage 80; Loss percentage 20	
18b.	Winning percentage 85; Loss percentage 15	
19b.	Winning percentage 90; Loss percentage 10	
20b.	Winning percentage 95; Loss percentage 5	
21b.	Winning percentage 100; Loss percentage 0	

Table 3.

Lotteries that have been chosen random

[1]	**Minimum selling price**	**"Random" price**	**Winning percentage**	**"Random" Winning percentage**	**Payoff**

Thank you for your time and willingness to participate in this experiment.

***Appendix 2*. The experimental instruction (Ukrainian version)**

[1] ó÷àñíèêà_____

[2]íñòðóêö³ÿ.

Ï³ä ÷àñ öüîãî åêñïåðèìåíòó ó Âàñ º äâê³ëüêà ìîæëèâîñòåé çàðîáèòè ïåâíó ñóìó ãðîøåé.

ßê ïðîõîäèòü ãðà?

Íà ñòîð³íö³ 2 Âè áà÷èòå ïåðåë³ê ëîòåðåé. Ìàêñèìàëüíèé âèãðàø ñêëàäàº 10 ãðí. Êîæíà ëîòåðåÿ äàº øàíñ ð
âèãðàòè 10 ãðí, àáî øàíñ *(100-ð)*
íå âèãðàòè öþ ñóìó. Áóäü ëàñêà, íàâïðîòè êîæíî¿ ëîòåðå¿ âïèø³òü Âàøó ì³í³ìàëüíó ö³íó ïðîäàæó. **Ì³í³ìàëüíà ö³íà ïðîäàæó çàïðîïîíîâàíî¿ ëîòåðå¿ – öå ö³íà, ÿêó Âè áè õîò³ëè îòðèìàòè çàì³íöü ãðè â ëîòåðåþ, òîáòî â³äìîâèòèñü â³ä øàíñó âèãðàòè 10 ãðí. Ìàêñèìàëüíà ö³íà ïðîäàæó çà ÿêó Âè áè ïðîäàëè öå øàíñ âèãðàòè 10 ãðí.** Çâåðí³òü óâàãó, ùî êîæíà ëîòåðåÿ äàº *ð³çíèé* ïðîöåíò âèãðàøó.
Ï³ñëÿ òîãî, ÿê Âè çàïîâíèòå âñþ òàáëèöþ, ïåðåíåñ³òü Âàø³ çàïèñè ó òàáëèöþ 2. Òàáëèöÿ 1 ³ òàáëèöÿ 2 îäíàêîâ³. Çâåðòà òàáëèöþ 2 ³íñòðóêö³þ.
Ï³ñëÿ öüîãî ïàíà ëîòåðåÿ áóäå âèáðàíà âèïàäêîâî: ç êîëüêè ç 21 ïðîíóìåðîâàíîãî êàðòî÷îê ³íñòðóêö³ÿ âèÿâèòüñÿ áóäü-ÿêó êàðòî÷êó. Öèôðà íà êàðòî÷ö³ â³äïîâ³äàº íîìåðó ëîòåðå¿. **Öÿ ëîòåðåÿ áóäå ðîç³ãðàíà**.
Òåïåð Âàøà ö³íà çà **öþ ëîòåðåþ** áóäå ïîð³âíþâàòèñÿ ç “âèïàäêîâîþ” ì³í³ìàëüíîþ ö³íîþ. Äëÿ öüîãî, ç ³íøî¿ ïåðåì³øàíî¿ êîëüêè ç³ 100 êàðòî÷îê, ïðîíóìåðîâàíèõ â³ä 0.10 ãðí. äî 10 ãðí (0.10, 0.20,..,10) ³íñòðóêö³ÿ âèÿâëÿòüñÿ áóäü-ÿêó êàðòî÷êó. ßêùî ÷èñëî íà êàðòî÷ö³ äîð³âíþº àáî ïåðåâèùóº Âàøó ì³í³ìàëüíó ö³íó äëÿ ö³º¿ êîðòåñ¿, òî Âè îòðèìóºòå ñóìó ãðîøåé ó ðîçì³ð³, ÿêèé âêàçàíèé íà êàðòî÷ö³. ßêùî ÷èñëî íà êàðòî÷ö³ º ìåíøèì çà Âàøó ì³í³ìàëüíó ö³íó, òî Âè ðîç³ãðóºòå ëîòåðåþ.
Ïðèêëàä: Íåõàé Âàøà ì³í³ìàëüíà ö³íà ïðîäàæó çà öþ ëîòåðåþ º 7.45 ãðí., ³ ³íñòðóêöèîí âèÿã êàðòî÷êó ç ÷èñëîì 9.5 ãðí, òîä³ Âè îòðèìóºòå 9.5 ãðí; äëÿ ÿêùî ÷èñëî íà êàðòî÷ö³ äîð³âíþº 3.6 ãðí, òî Âè ðîç³ãðóºòå ëîòåðåþ.
Ðîç³ãðàø ëîòåðåé ïðîâîäèòüñÿ íàñòóïíèì ÷èíîì:
Ç ³íøî¿ êîëüîä êàðòî÷îê (ïðîíóìåðîâàíèõ â³ä 1 äî 100) ³íñòðóêöîíð âèÿãóº áóäü-ÿêó êàðòî÷êó; ÿêùî ÷èñëî íà êàðòî÷ö³ º ìåíøå àáî ð³âíå ïðîöåíòó âèãðàøó, òî âè âèãðàëè! ßêùî æ öå ÷èñëî º á³ëüøå í³æ ïðîöåíò âèãðàøó, òî âè ïðîãðàëè.

Î÷åâèäíî, ùî öå ó Âàøèõ ³íòåðåñàõ îö³íèòè Âàøó ö³íó ïðîäàæó ÿêîìîãà òî÷í³øå. ßêùî Âè íåäîö³íèëè àáî ïåðåö³íèëè Âàøó ö³íó, òî Âè ìîæåòå

âòðàòèòè øàíñ âèãðàòè ìàêñèìàëüíèé âèãðàø ó ðîçì³ð³ 10 ãðí. Íàïðèêëàä, Âàøà ñïðàâæíÿ îö³íêà ñêëàäàº *7.45* êîï., àëå Âè çàïèñàëè 5 ãðí., òî ÿêùî “âèïàäêîâà” ö³íà áóäå ì³æ 5 ³ 7.45 ãðí, Âè îòðèìàºòå ëèøå ñòíó ãðîøåé, ùî â³äïîâ³äàº ö³é “âèïàäêîâ³é” ö³í³, òîáòî ñóìó ìåíøó çà 7.45 ãðí.³ Âè âòðàòèòå ñâ³é øàíñ âèãðàòè 10 ãðí.; ³ íàâïàêè, ÿêùî Âè çàïèñàëè 9 ãðí, ÿê Âàøó ì³í³ìàëüíó ö³íó, (à íå 7.45), òîä³ ÿêùî “âèïàäêîâà” ö³íà âèÿâèëèñÿ ó ìåæàõ 7.45-9 ãðí., Âàì äîâåäåòüñÿ ðîç³ãðóâàòè ëîòåðåþ, íàâ³òü ÿêùî Âè áè õîò³ëè îòðèìàòè ñóìó ó ðîçì³ð³ “âèïàäêîâî¿” ö³íè, à íå ãðàòè ó ëîòåðåþ ³ ìîæëèâî ïðîãðàòè. Ëîòåðåÿ áóäå âèáðàíà âèïàäêîâî ï³ñëÿ òîãî, ÿê óñ³ ç âàñ çàïèøóòü ñâî¿ ì³í³ìàëüí³ ö³íè ó òàáëè³ 1 ³ 2 íà ñòîð³íö³ 2.

Ïîïåðåäæåííÿ: Ðîçðàõóíîê âèãðàø³â áóäå çä³éñþâàòèñÿ ïî òàáëè³ 2, ÿêó ç³áðàâ ³íòðóêòîð. Ñòóäåíòè, ÿê³ íàâìèñíå âèðàâëÿòèóòü ñâî¿ çàïèñè â òàáëè³ 1 íå îòðèìàþòü âèãðàø³ íåçàëåæíî â³ä ¿õ ðîçì³ðó. ßêùî Âè âèð³øèëè ïðèïèíèòè ó÷àñòü ï³ä ÷àñ åêñïåðèìåíòó, òî Âè âòðàòèòå âñ³ âèãðàø³, ÿê³ îòðèìàëè äî öüîãî. Âèëàòà âèãðàø³â áóäå çä³éñíþâàòèñÿ ï³ñëÿ ïðîâåäåííÿ ëîòåðåþ.
Ïàìÿòàéòå: Ää³ ëîòåðåþ áóäóòü âèáðàí³ âèïàäêîâî ³ Âè îòðèìàºòå àáî ñóìó ç êàðòî÷êè, àáî ìàêñèìàëüíèé âèãðàø ëîòåðåþ, àáî í³÷îãî...

Òàáëèöÿ 1. Ñïèñîê ëîòåðåé ç ìàêñèìàëüíèì âèãðàøîì <u>10 ãðèâåíü</u>.

1	Ëîòåðåþ	Ì³í³ìàëüíà ö³íà ïðîäàæó
1b.	Ïðîöåíò âèãðàøó 0; Ïðîöåíò ïðîãðàøó 100	
2b.	Ïðîöåíò âèãðàøó 5; Ïðîöåíò ïðîãðàøó 95	
3b.	Ïðîöåíò âèãðàøó 10; Ïðîöåíò ïðîãðàøó 90	
4b.	Ïðîöåíò âèãðàøó 15; Ïðîöåíò ïðîãðàøó 85	
5b.	Ïðîöåíò âèãðàøó 20; Ïðîöåíò ïðîãðàøó 80	
6b.	Ïðîöåíò âèãðàøó 25; Ïðîöåíò ïðîãðàøó 75	
7b.	Ïðîöåíò âèãðàøó 30; Ïðîöåíò ïðîãðàøó 70	
8b.	Ïðîöåíò âèãðàøó 35; Ïðîöåíò ïðîãðàøó 65	

9b.	Ïðîöåíò âèãðàøó 40; Ïðîöåíò ïðîãðàøó 60	
10b.	Ïðîöåíò âèãðàøó 45; Ïðîöåíò ïðîãðàøó 55	
11b.	Ïðîöåíò âèãðàøó 50; Ïðîöåíò ïðîãðàøó 50	
12b.	Ïðîöåíò âèãðàøó 55; Ïðîöåíò ïðîãðàøó 45	
13b.	Ïðîöåíò âèãðàøó 60; Ïðîöåíò ïðîãðàøó 40	
14b.	Ïðîöåíò âèãðàøó 65; Ïðîöåíò ïðîãðàøó 35	
15b.	Ïðîöåíò âèãðàøó 70; Ïðîöåíò ïðîãðàøó 30	
16b.	Ï ðîöåíò âèãðàøó 75; Ïðîöåíò ïðîãðàøó 25	
17b.	Ïðîöåíò âèãðàøó 80; Ïðîöåíò ïðîãðàøó 20	
18b.	Ïðîöåíò âèãðàøó 85; Ïðîöåíò ïðîãðàøó 15	
19b. 20b.	Ïðîöåíò âèãðàøó 90; Ïðîöåíò ïðîãðàøó 10 Ïðîöåíò âèãðàøó 95; Ïðîöåíò ïðîãðàøó 5	
21b.	Ïðîöåíò âèãðàøó 100; Ïðîöåíò ïðîãðàøó 0	

Òàáëèöÿ 1. Ñïèñîê ëîòåðåé ç ìàêñèìàëüíèì âèãðàøîì <u>10 ãðèâåíü</u>.

1	**Ëîòåðå¿**	**Ì³í³ìàëüíà ö³íà ïðîäàæó**
1b.	Ïðîöåíò âèãðàøó 0; Ï ðîöåíò ïðîãðàøó 100	
2b.	Ïðîöåíò âèãðàøó 5; Ïðîöåíò ïðîãðàøó 95	
3b.	Ïðîöåíò âèãðàøó 10; Ïðîöåíò ïðîãðàøó 90	
4b.	Ïðîöåíò âèãðàøó 15; Ïðîöåíò ïðîãðàøó 85	
5b.	Ïðîöåíò âèãðàøó 20; Ïðîöåíò ïðîãðàøó 80	
6b.	Ïðîöåíò âèãðàøó 25;	

	Ïðîöåíò ïðîãðàøó 75	
7b.	Ïðîöåíò âèãðàøó 30; Ïðîöåíò ïðîãðàøó 70	
8b.	Ïðîöåíò âèãðàøó 35; Ïðîöåíò ïðîãðàøó 65	
9b.	Ïðîöåíò âèãðàøó 40; Ïðîöåíò ïðîãðàøó 60	
10b.	Ïðîöåíò âèãðàøó 45; Ïðîöåíò ïðîãðàøó 55	
11b.	Ïðîöåíò âèãðàøó 50; Ïðîöåíò ïðîãðàøó 50	
12b.	Ïðîöåíò âèãðàøó 55; Ïðîöåíò ïðîãðàøó 45	
13b.	Ïðîöåíò âèãðàøó 60; Ïðîöåíò ïðîãðàøó 40	
14b.	Ïðîöåíò âèãðàøó 65; Ïðîöåíò ïðîãðàøó 35	
15b.	Ïðîöåíò âèãðàøó 70; Ïðîöåíò ïðîãðàøó 30	
16b.	Ïðîöåíò âèãðàøó 75; Ïðîöåíò ïðîãðàøó 25	
17b.	Ïðîöåíò âèãðàøó 80; Ïðîöåíò ïðîãðàøó 20	
18b.	Ïðîöåíò âèãðàøó 85; Ïðîöåíò ïðîãðàøó 15	
19b.	Ïðîöåíò âèãðàøó 90; Ïðîöåíò ïðîãðàøó 10	
20b.	Ïðîöåíò âèãðàøó 95; Ïðîöåíò ïðîãðàøó 5	
21b.	Ïðîöåíò âèãðàøó 100; Ïðîöåíò ïðîãðàøó 0	

Òàáëèöÿ 3. Ëîòåðå¿, ÿê³ âèïàäêîâî âèãðàí³.

1	Ì³í³ìàëüíà ö³íà ïðîäàæó	“Âèïàäêîâà” ö³íà	Ïðîöåíò âèãðàøó	“Âèïàäêîâèé” ïðîöåíò âèãðàøó	Äî âèïëàòè

Äÿêóºìî çà Âàø ÷àñ ³ áàæàííÿ ïðèéíÿòè ó÷àñòü ó öüîìó åêñïåðèìåíò³!

Appenix 3. **The questionnaire.**

Study Number_____

Questionnaire

You are participating in the research conducted by Economics Education and Research Consortium. As a small token of our appreciation for your participation, we guarantee a minimum payment of 1Hr. During the experiment you may earn at most 10Hr or at least 1Hr. You will however be given the opportunity to earn various sums of money.

YOU HAVE BEEN ASSIGNED A STUDY NUMBER. PLEASE, USE THIS NUMBER TO IDENTIFY ALL YOUR CHOICES. ALL ANSWERS WILL BE KEPT IN STRICTEST OF CONFIDENCE.

Please, answer the following questions:

1. What is your native language?
☐ Ukrainian
☐ Russian
☐ Others

What other languages do you speak fluently?
☐ Ukrainian
☐ Russian
☐ English
☐ German
☐
Others_____

What is your Hometown? Please Specify_____

What is your undergraduate major? Please Specify_____

5. How far along are you in your studies?
☐ first year
☐ second year
☐ third year
☐ fourth year
☐ fifth year

☐ sixth year and more

6. How many economic courses have you had in your studies (including this course)?

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6 or more

7. Gender:

☐ male
☐ female

8. Marital status:

☐ single
☐ married

9. Age: _____

10. Do you have any children?

☐ none
☐ one
☐ two
☐ more

11. Do you have a job?

☐ yes, part time
☐ yes, full time
☐ no job

12. What is your average individual income per month (including allowances given by parents)?

☐ less than 25 Hr.
☐ 25-50 Hr.
☐ 50-75 Hr.
☐ 75-100 Hr.
☐ 100-150 Hr.
☐ 150-250 Hr.
☐ more than 250 Hr.

13. What is the average combined income of your parents per month?

- ☐ less than 250 Hr.
- ☐ 250-500 Hr.
- ☐ 500-750 Hr.
- ☐ 750-1000 Hr.
- ☐ 1000-1500 Hr.
- ☐ more than 1500 Hr.

14. Do you play National Lottery?

- ☐ no
- ☐ yes

If yes, how many times per month?_____

All winnings will be paid in Ukrainian hr. at the end of the experiment. On receipt of your payment you will be asked to sign a receipt indicating that payment has been made.

Thank you for taking the time to answer our questionnaire. The information you have provided will be valuable to our research. Your participation is very much appreciated.

***Appendix 4*. The summary of the payoffs paid during the experiment[3].**

	Row #	**Session 1 (12/06/99)**	**Session 2 (12/07/99)**
Winning percentage of the randomly chosen lottery	1	75	65
Random price of the lottery	2	5.70 UAH	9.20 UAH
Number of people who received random price for that lottery	3	6	75
Sum of the payoffs to the random price (2*3)	4	35 UAH	690 UAH
Number of people who played the lottery	5	34	7
Random winning percentage	6	82	70
Sum of the payoffs to the lottery	7	0	0
Sum of the participation premiums	8	34 UAH	7 UAH
Total sum of the payments (4+7+8)	9	69 UAH	697 UAH
Total	10	766 UAH (151USD*)	

*- exchange rate on 12/07/99 (National Bank of Ukraine)

[3] We paid monetary payoffs only for 10UAH prize level because low prize trials were considered as the practice