

4-30-2017

## Comparing a Risky Choice in the Field and Across Lab Procedures

Zuzana Brokesova

*University of Economics in Bratislava*

Cary Deck

*Chapman University, deck@chapman.edu*

Jana Peliova

*University of Economics in Bratislava*

Follow this and additional works at: [https://digitalcommons.chapman.edu/esi\\_pubs](https://digitalcommons.chapman.edu/esi_pubs)



Part of the [Economic Theory Commons](#), and the [Other Economics Commons](#)

### Recommended Citation

Brokesova, Z., Deck, C., & Peliova, J. (2017). Comparing a risky choice in the field and across lab procedures. *Journal of Economic Psychology*, 61, 203–212. <https://doi.org/10.1016/j.joep.2017.04.008>

This Article is brought to you for free and open access by the Economic Science Institute at Chapman University Digital Commons. It has been accepted for inclusion in ESI Publications by an authorized administrator of Chapman University Digital Commons. For more information, please contact [laughtin@chapman.edu](mailto:laughtin@chapman.edu).

---

## Comparing a Risky Choice in the Field and Across Lab Procedures

### Comments

NOTICE: this is the author's version of a work that was accepted for publication in *Journal of Economic Psychology*. Changes resulting from the publishing process, such as peer review, editing, corrections, structural formatting, and other quality control mechanisms may not be reflected in this document. Changes may have been made to this work since it was submitted for publication. A definitive version was subsequently published in *Journal of Economic Psychology*, volume 61, in 2017. DOI: [10.1016/j.joep.2017.04.008](https://doi.org/10.1016/j.joep.2017.04.008)

The Creative Commons license below applies only to this version of the article.

### Creative Commons License



This work is licensed under a [Creative Commons Attribution-Noncommercial-No Derivative Works 4.0 License](https://creativecommons.org/licenses/by-nc-nd/4.0/).

## Accepted Manuscript

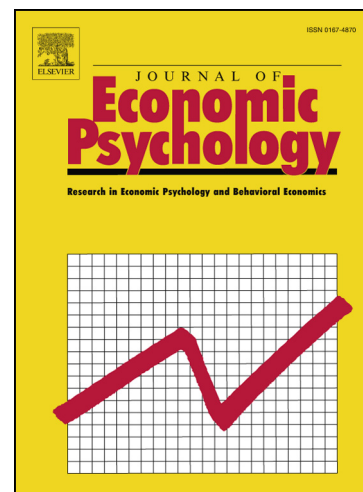
Comparing a Risky Choice in the Field and across Lab Procedures

Zuzana Brokesova, Cary Deck, Jana Peliova

PII: S0167-4870(16)30708-5  
DOI: <http://dx.doi.org/10.1016/j.joep.2017.04.008>  
Reference: JOEP 2008

To appear in: *Journal of Economic Psychology*

Received Date: 28 November 2016  
Revised Date: 11 April 2017  
Accepted Date: 18 April 2017



Please cite this article as: Brokesova, Z., Deck, C., Peliova, J., Comparing a Risky Choice in the Field and across Lab Procedures, *Journal of Economic Psychology* (2017), doi: <http://dx.doi.org/10.1016/j.joep.2017.04.008>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Comparing Risky Choice: in the Field and across Lab Procedures

Zuzana BROKESOVA<sup>a</sup>, Cary DECK<sup>b</sup>, Jana PELIOVA<sup>c</sup>

<sup>a</sup> Corresponding author, Faculty of National Economy, University of Economics in Bratislava, Dolnozemska cesta 1, 852 35 Bratislava, Slovak Republic, zuzana.brokesova@euba.sk, +421 2 672 91 562

<sup>b</sup> College of Business and Public Policy University of Alaska Anchorage, 3211 Providence Drive, Anchorage, AK 99508, United States; Sam M. Walton College of Business, University of Arkansas, Fayetteville, AR 72701, United States; & Economic Science Institute Chapman University, One University Drive, Orange, CA 92866, United States, cdeck@walton.uark.edu

<sup>c</sup> Faculty of National Economy, University of Economics in Bratislava, Dolnozemska cesta 1, 852 35 Bratislava, Slovak Republic, jana.peliova@euba.sk

## Comparing a Risky Choice in the Field and across Lab Procedures

**Abstract**

Controlled laboratory experiments have become a generally accepted method for studying economic behavior, but there are two issues regarding the reliability of such work. The first pertains to the ability to generalize experimental results outside the laboratory. The second pertains to the impact the payment procedure has on observed behavior. This paper adds empirical insight into both issues. Using data from the promotional campaign of a bank and a laboratory experiment that closely mimics the same decision, we find similar levels of risk taking controlling for gender and age. We also compare behavior on this same risky choice across three distinct experimental payoff procedures: a single salient choice as in the field, multiple responses for similar choices with one selected at random for payment, and a single salient choice that has only a small probability of being implemented. We find nearly identical behavior across these three payment procedures.

Keywords: Risk Attitudes; Field Data; Laboratory Experiment; Payment Procedures

PsycINFO Classification code: 2260 Research Methods & Experimental Design; 3920 Consumer Attitudes & Behavior

JEL codes: C91, C99, D81

ACCEPTED MANUSCRIPT

## 1. Introduction

Since almost every economic decision involves risk, it is unsurprising that numerous researchers have attempted to measure risk attitudes of individuals. Unfortunately, empirical work is often plagued by important parameters, such as the probability of an outcome or its associated payoff to the decision maker, being unobservable. For this reason, much risk measurement work has been conducted in the lab. This raises two interrelated questions. First, to what degree do choices made in the lab reflect choices that are made outside of the lab? Second, how do specific payoff procedures used in the lab affect risk taking behavior? This paper uses data from the field and three separate lab treatments to provide further empirical evidence for answering these two questions.

Specifically, we exploit a promotional campaign conducted by a bank that offered potential customers a chance to receive up to 1,000 € to gauge risk attitudes in the field. We then design an experiment that closely mimics the bank promotion to compare individual's risk taking decisions between the two settings.

One drawback to the bank data is the coarseness of information that it provides. This is due to the structure of the choice that decision makers faced in the field: a single binary choice between a certain payment and a risky lottery. Hence, one can only draw inferences that a person is more or less risk averse than a given threshold. This contrasts with the approach of most laboratory experiments, where the objective is to capture a more precise degree of risk aversion. By presenting a subject with several choices, a finer partitioning of a respondent's risk attitude is

possible. However, having a respondent make multiple decisions necessitates a design choice by the researcher. If multiple choices are used to determine payment then potential wealth effects are introduced under the assumptions of expected utility theory. For this reason, researchers instead frequently select one task at random for payment, as in the popular multiple price list approach in Holt and Laury (2002). While some researchers have provided evidence to suggest that this random payment procedure does not alter behavior (e.g. Cubitt et al. 1998 and Starmer and Sugden 1991), Holt (1986) and Cox et al. (2015) argue that this technique is not incentive compatible if the independence axiom does not hold and can affect behavior. To provide further empirical evidence on the degree to which presenting subjects multiple tasks, one of which is selected at random for payment, impacts risk taking behavior, we introduce a second laboratory treatment. Here a subject faces the same choice as faced by the bank customers plus four other choices using a similar structure, but with only one choice randomly selected for payment.

Finally, we include a third experimental treatment that examines how another common payment technique impacts risk taking behavior. Rather than paying each participant, some researchers randomly select a subset of respondents to actually receive payment (e.g. Tversky and Kahneman 1981, Langer and Weber 2008). Such procedures are typically accompanied by a statement reminding the participant that her choices might determine her payment and therefore it is in her best interest to respond as if they will. This approach allows a researcher to collect more observations or increases the nominal stakes for the same expected cost.

Ultimately, we find that the laboratory subjects in all three treatments make nearly identical decisions. Further, the observed behavior is similar between the lab and the field controlling for



the age and gender of the decision maker. These findings suggest that, at least in this case, lab experiments provide a reasonable degree of external validity and that behavior is robust to the payoff procedures.

## 2. Risk Data from the Field

A private bank in the Slovak Republic conducted a marketing promotion to attract new clients. Individuals, who had a minimum of 1,000 € could open a savings account to which the bank would add either a fixed amount of 20 € or a randomly determined amount. To make the decision to take the safe or risky payment, a person went to the bank's website where the official rules were available and logged in into her account. Each customer would click a button associated with her preferred choice. If the person chose to "Roll the Die," an image of a die rolled across the screen with each face displaying one of the six possible prize amounts. The award amount was instantly reflected in the account balance, but to receive the money a person had to keep a minimum balance of 1,000 € excluding the award in the new account for 3 months. The critical feature of this campaign is that the distribution for the risky payment was available to the decision makers. This distribution, shown in Table 1, is far more skewed than is typical in lab experiments and has an expected value of 27.5 €. If one assumes that an individual's utility function is characterized by constant relative risk aversion (CRRA), then an individual with a risk parameter of  $r = 0.38$  would be indifferent between the two options and a risk neutral ( $r = 0$ ) person would choose to "Roll the Die."

[Insert Table 1]

A total of 3,917 people participated in the promotion. Of the participants, 69.9% were male and the average age was 36.92. In aggregate 75.64% of the customers opted for the lottery payment. Several studies have examined the effect of gender on risk taking and typically report that women are more risk averse than men (e.g. Powell and Ansic 1997, Eckel and Grossman 2002, 2008, Fehr-Duda et al. 2006, Agnew 2008, Borghans et al. 2009, Charness and Gneezy 2010, Dohmen et al. 2011). Fewer studies have examined the effect of age on risk taking, but the typical finding is that older people are not more risk averse (e.g. Harbaugh et al. 2002, Mather 2006, Peters et al. 2007, Harrison et al. 2007, Dohmen et al. 2011, Tymula et al. 2013). Figure 1 plots the percentage of males and females who opted for the risky payment by age. The size of the marker indicates the proportion of the data accounted for by a particular age and gender combination. Based on Figure 1, it appears that there is no gender difference in the behavior of the bank customers, but behavior does appear to vary with age, as older people are less willing to take the risky option.

[Insert Figure 1]

These demographic conclusions are supported econometrically in Table 2, which reports the results of estimating a probit model controlling for gender, age, and an interaction between the two. The dependent variable takes a value of 1 if the person opted to “Roll the Die” and accept the risky payment. Otherwise, it is 0. The coefficient on age is negative and significant while the coefficient on gender is not statistically significant.

[Insert Table 2]

### 3. Risk Data from the Lab

#### 3.1 Experimental Design

Data were collected from 162 people in three between-subject treatments. The first, which is referred to as the Baseline, was designed to match the bank promotion as closely as possible. The other two treatments are designed to evaluate the effect of two common payment procedures used in laboratory experiments. Referred to as “Pay Random Task” and “Pay Random Subject”, these treatments are explained in detail below.

The experiments were conducted in the Economic Laboratory at the University of Economics in Bratislava. Participants were primarily students (62%), but some were university staff (mainly administrative staff) and others were from the general public.<sup>1</sup> Because participants in the bank promotion had to open an account with a 1,000 € balance, before the experiment potential subjects completed a short questionnaire by email that included questions about their current wealth and their ability to open such an account. Only those who would have been able to open an account were invited to participate in the experiment, but the questionnaire also contained other distraction questions and the respondents were not aware of this selection criteria.

Recruitment for the lab experiment was done in a similar fashion to that done in the bank’s marketing campaign: leaflets, mass email and a Facebook advertisement.

---

<sup>1</sup> The post experiment survey did not differentiate between university employees and other non-students.

In the Baseline, subjects read “rules” that mirrored those of the bank promotion (English translations of the bank promotion rules and the experimental instructions are included in the appendix while copies in the original Slovak are available upon request). The choice problem was the same in terms of stakes and probabilities. The visual presentation of the task and the manner of providing information regarding the distribution for the risky payment were virtually identical. The one difference is that subjects in the laboratory were not required to actually open an account and wait three months for the payment. Instead, they were paid in cash at the conclusion of the experiment.

The Pay Random Task treatment differed from the Baseline in that subjects made five different choices including the one in Table 1. The five choices were presented in a randomly determined order and only one of these choices was used to determine the subjects’ payment. For the first task, subjects observed the full set of rules, but on subsequent tasks, only the changes (i.e. the relevant distribution) were presented.

The Pay Random Subject treatment differed from the Baseline in that each participant was informed that only one person in the session would actually be paid based upon her choice. Each of the other participants in the session received a flat payment of 3 € for their time as there was no show-up payment for paid decision makers to be consistent with the bank’s procedure. For all treatments, a session consisted of 16-18 people in the lab at the same time.

Experimental sessions lasted approximately 30 minutes and the average salient earnings were 19.03 €. For comparison, the average hourly wage in the Slovak Republic is 5.02 € and therefore the top possible prize of 1,000 € represents a substantial payment.<sup>2</sup> After completing the experiment, subjects in each treatment completed a brief survey which included demographic information as well as the three-item Cognitive Reflection Task (CRT) introduced by Frederick (2005) and a hypothetical investment question similar to Barsky et al. (1997).<sup>3</sup> Ultimately, neither CRT score nor responses to the hypothetical investment question were found to significantly correlate with risk taking behavior.<sup>4</sup>

### *3.2 Experimental Results*

Table 3 provides summary statistics for each of the three experimental conditions as well as the field data. Clearly, the laboratory subjects tended to be younger than the respondents in the field and a slightly higher percentage of lab participants were female.

[Insert Table 3]

First, we compare behavior across the three experimental treatments by probit regression controlling for age and gender. We conclude that in this case behavior was the same in the one shot baseline as in the Pay Random Task treatment and the Pay One Subject treatment (see Model 1 in Table 4). This is formalized in Finding 1. We further note that we do not find any gender or age differences between the treatments.

---

<sup>2</sup> By chance, no subject actually earned 1,000 €.

<sup>3</sup> The specific version we use is the same as Dohmen et al. (2005), which is taken from the German Socio-Economic Panel.

<sup>4</sup> These data are available upon request.

**Finding 1.** *Subjects make similar choices under the Baseline, Pay Random Task, and Pay Random Subject protocols.*

[Insert Table 4]

Table 4 also reports probit regressions comparing the decision to “Roll the Die” across the two data sources: lab and field. The explanatory variable *Lab* takes the value 1 if the decision was made in the lab and is 0 otherwise. For lab and field comparison, we tested three models. In Model 2, only data from the Baseline is included in the analysis to provide the most direct comparison of the lab and the field. As we have not found any effect of the payment procedure on risk taking (Finding 1), Model 3 includes the combined data from all three lab conditions. The statistical analysis reveals that, controlling for gender and age, behavior is similar in the lab and field.<sup>5</sup> This is the basis for the second finding.

**Finding 2.** *People in the laboratory and people in the field make similar risk taking choices.*

#### 4. Conclusions

Exploiting a bank promotion that presented people with a risky choice, we develop a laboratory experiment designed to match the field choice as closely as possible. Almost four thousand people responded to the bank’s promotional campaign, revealing a clear age effect on risk attitude. Controlling for the demographic differences between the bank customers and the laboratory subjects, behavior in the lab and the field are quite similar suggesting that lab

---

<sup>5</sup> A similar result is found if one allows for separate indicator variables for each of the three laboratory treatments.

experiments provide insight into risk taking outside of the lab, similar to the results of Von Gaudecker et al. (2012).

The second contribution of this paper regards the behavioral consequences of commonly used procedures in risk elicitation experiments. Having subjects complete several tasks and randomly selecting one for payment did not impact behavior, which is in line with previous research on risky choices in binary lotteries by Camerer (1989) and Hey and Lee (2005). Randomly selecting some people to actually receive payment for their choices also was not found to impact observed behaviour consistent with Cubitt et al. (1998), Laury (2005), Harrison et al. (2007) and March et al. (2015), Charness et al. (2016).

Our work connects to a recent book by Friedman et al. (2014), which has generated considerable attention from researchers working to understand how people make decisions under uncertainty (see reviews with a variety of opinions by Harrison 2015, Eckel 2016, and Trautmann 2016). The argument made in the book is that researchers have not made much real progress in this arena and that expected utility theory and other common parametric models do a poor job of explaining observed behavior. In support of this view, Trautmann (2016, p. 178) notes that he is “not aware of any robustly replicated effects of risk attitude measures on risky behaviors outside the lab”. Our paper cannot speak to the success of expected utility theory vis-a-vis other models or to the consistency of a person’s behavior across tasks or domains. However, our work does suggest that aggregate level behavior is robust, at least on this particular task, across payment techniques in the lab and between the lab and the field.

## 5. Acknowledgements

This paper is part of a research project No. 2015 - 3-02/6 entitled 'Support for the internationalization of scientific research in economic sciences' supported by the Foundation VUB (Nadácia VÚB) and research grants VEGA No. 1/0849/15 and No. 1/0964/15 supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic. We would like to thank Stefan Trautmann for his valuable comments and suggestions, and we also acknowledge Mr. Marek Marcinka for help in design of experimental software.

ACCEPTED MANUSCRIPT



## References

1. Agnew, J. R., Anderson, L. R., Gerlach, J. R. & Szykman, L. R. (2008). Who chooses annuities? an experimental investigation of the role of gender, framing, and defaults. *The American Economic Review*, 98(2), 418-422.
2. Barsky, R. B., Juster, F. T., Kimball, M. S., & Shapiro, M. D. (1997). Preference parameters and behavioral heterogeneity: An experimental approach in the health and retirement study. *The Quarterly Journal of Economics*, 112(2), 537-579.
3. Borghans, L., Heckman, J. J., Golsteyn, B. H. & Meijers, H. (2009). Gender differences in risk aversion and ambiguity aversion. *Journal of the European Economic Association*, 7(2-3), 649-658.
4. Camerer, C.F. (1989). An experimental test of several generalized utility theories. *Journal of Risk and Uncertainty*, 2 (1), 61–104.
5. Charness, G. and Gneezy, U. (2010). Portfolio choice and risk attitudes: An experiment. *Economic Inquiry*, 48(1), 133-146.
6. Charness, G., Gneezy, U. & Halladay, B. (2016). Experimental methods: Pay one or pay all. *Journal of Economic Behavior & Organization*, 131, 141-150.
7. Cox, J. C., Sadiraj, V. & Schmidt, U. (2015). Paradoxes and mechanisms for choice under risk. *Experimental Economics*, 18(2), 215-250.
8. Cubitt, R. P., Starmer, C. & Sugden, R. (1998). On the validity of the random lottery incentive system. *Experimental Economics*, 1(2), 115-131.

9. Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2005). Individual Risk Attitudes: New Evidence from a Large, Representative, Experimentally-Validated Survey.
10. Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J. & Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association*, 9(3), 522-550.
11. Eckel, C. C. (2016). Risky Curves: On the empirical failure of expected utility theory, Daniel Friedman, R. Mark Isaac, Duncan James and Shyam Sunder. Routledge, 2014, xiii+137 pages. *Economics and Philosophy*, 32(03), 540-548.
12. Eckel, C. C. & Grossman, P. J. (2002). Sex differences and statistical stereotyping in attitudes toward financial risk. *Evolution and Human Behavior*, 23(4), 281-295.
13. Fehr-Duda, H., De Gennaro, M. & Schubert, R. (2006). Gender, financial risk, and probability weights. *Theory and Decision*, 60(2-3), 283-313.
14. Frederick, S. (2005). Cognitive reflection and decision making. *Journal of Economic Perspectives*, 19(4), 25-42.
15. Friedman, D., Isaac, R. M., James, D., & Sunder, S. (2014). *Risky curves: On the empirical failure of expected utility*. Routledge.
16. Harbaugh, W. T., Krause, K. & Vesterlund, L. (2002). Risk attitudes of children and adults: Choices over small and large probability gains and losses. *Experimental Economics*, 5(1), 53-84.
17. Harrison, G. W. (2015). Risky Curves: On the Empirical Failure of Expected Utility, Friedman Daniel, Isaac R. Mark, James Duncan, Sunder Shyam. Routledge, New York

- (2014). xii+137 pp., \$107.41, hbk, ISBN: 978-0-415-6310-0., *Journal of Economic Psychology*, 48 (June 2015), 121-125.
18. Harrison, G. W., Lau, M. I. & Rutström, E. E. (2007). Estimating risk attitudes in Denmark: A field experiment. *The Scandinavian Journal of Economics*, 109(2), 341-368.
  19. Hey, J. D. & Lee, J. (2005). Do subjects separate (or are they sophisticated)? *Experimental Economics*, 8(3), 233–265.
  20. Holt, C. & Laury, S. (2002). Risk Aversion and Incentive Effects. *American Economic Review*, 92(5), 1644-1655.
  21. Holt, C. A. (1986). Preference reversals and the independence axiom. *American Economic Review*, 76(3), 508-515.
  22. Langer, T. & Weber, M. (2008). Does commitment or feedback influence myopic loss aversion? An experimental analysis. *Journal of Economic Behavior and Organization*, 67(3), 810–819.
  23. Laury, S. (2005). Pay one or pay all: Random selection of one choice for payment. *Andrew Young School of Policy Studies Research Paper Series*, No. 06-13.
  24. March, C., Ziegelmeyer, A., Greiner, B. & Cyranek, R. (2015). Monetary Incentives in Large-Scale Experiments: A Case Study of Risk Aversion, working paper.
  25. Mather, M. (2006). A review of decision-making processes: Weighing the risks and benefits of aging. In: Carstensen L. L., Hartel C. R. (eds.). *When I'm 64*. Washington, DC: The National Academies Press, 2006, 145–173.
  26. Peters, E., Hess, T. M., Västfjäll, D. & Auman, C. (2007). Adult age differences in dual information processes: Implications for the role of affective and deliberative processes in older adults' decision making. *Perspectives on Psychological Science*, 2(1), 1-23.

27. Powell, M. & Ansic, D. (1997). Gender differences in risk behaviour in financial decision-making: An experimental analysis. *Journal of Economic Psychology*, 18(6), 605-628.
28. Starmer, C. & Sugden, R. (1991). Does the random-lottery incentive system elicit true preferences? An experimental investigation. *American Economic Review*, 81(4), 971-978.
29. Trautmann, S. (2016). Risky Curves: On the empirical failure of expected utility, Daniel Friedman, R. Mark Isaac, Duncan James, Shyam Sunder (Eds.). Routledge, New York (2014). xiii+137 pp., \$145.00 (hc), ISBN: 978-0415-636100, *Journal of Economic Psychology*, 53 (April 2016), 178-179.
30. Tversky, A. & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(30), 453-458.
31. Tymula, A., Belmaker, L. A. R., Ruderman, L., Glimcher, P. W. & Levy, I. (2013). Like cognitive function, decision making across the life span shows profound age-related changes. *Proceedings of the National Academy of Sciences*, 110(42), 17143-17148.
32. Von Gaudecker, H. M., van Soest, A., & Wengström, E. (2012). Experts in experiments: How selection matters for estimated distributions of risk preferences. *Journal of Risk and Uncertainty*, 45(02), 159-190.

**Appendix A. Subject Directions (translated from Slovak)**

[Text in brackets was not observed by the subjects.]

**[Experimental Instructions]**

Welcome to the economic experiment.

Please read the instruction on the screen carefully, do not communicate with the other participants and follow the instructions. Once you are ready, please press the Start button.

**[TREATMENT 1]**

You can participate in a game and receive up winning to 1 000 EUR. In the game, you can choose either sure alternative of 20 EUR or you can roll a die where you can win from 10 EUR up to 1 000 EUR.

You can read the rules for the game [HERE](#).

Which alternative do you choose?

**[TREATMENT 2]**

You can participate in series of games and receive winning up to 1 000 EUR. In every game, you can choose either sure alternative of 20 EUR or you can roll a die where you can win from 10 EUR up to 1 000 EUR. Amount of the winnings will be determined by random selection of one of all your winnings.

You can read the rules for the game No. XX [HERE](#).

Which alternative do you choose?

[TREATMENT 3]

You can participate a game and receive winning up to 1 000 EUR. In the game, you can choose either sure alternative of 20 EUR or you can roll a die where you can win from 10 EUR up to 1 000 EUR. It will be selected at random one participant of all who are currently participating in the experiment and will be paid her winnings. Other participants of the experiment will receive 3 EUR for their participation.

You can read the rules of the game [HERE](#).

Which alternative do you choose?

[END TREATMENTS]

[Survey]

1. Your gender is:
2. Your date of birth is:
3. Your hometown is:
4. The ZIP code of your home town is:
5. Your nationality is:
6. Your major is:
7. Are your savings at least 1 000 EUR?
8. There was a probability 5% of winning 30 EUR. How many times out of 100 rolls would you expect to win 30 EUR?

9. Suppose that you earned 100 000 EUR in lottery winnings. How much of the 100 000 EUR would you be willing to invest in an asset to either HALVE or DOUBLE in two years time with equal probability?

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100

10. A bat and a ball cost 1.10 EUR in total. The bat costs 1.00 EUR more than the ball. How much does the ball cost?

11. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

12. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

**Appendix B. Rules of the game (translated from Slovak)**

[Text in brackets was not observed by the subjects.]

**COMPETITION**

[TREATMENT 1 & 3]

**The experimenter hereby declares that every participant of the experiment who meets the Conditions referred to in paragraph 1.1 of these competitive conditions will win the amount referred in paragraph 2 of these competition conditions (Competition), while avoiding any termination of claim of winning under paragraph 3.**

[TREATMENT 2]

**The experimenter hereby declares that every participant of the experiment who meets the Conditions referred to in paragraph 1.1 of these competitive conditions will win the amount referred in paragraph 2 of these competition conditions (Competition), while avoiding any termination of claim of winning under paragraph 3, if the winnings are random selected.**

[END TREATMENTS]

The experimenter therefore makes the following conditions of competition. Just to make sure that we are speaking the same language: words beginning with capital letters have the meaning which we assigned to them in these competition conditions.



## 1. OCCURRENCE OF WINNING CLAIM

1.1 The claim for winning in the competition (**Claim**) occurs to anybody who meets all

following conditions:

- a) the participant is person with full legal capacity;
- b) the participant is at least 18 (in words: eighteen) years of age at the time of the participation in the competition;
- c) a Winning Claim under the Paragraph 2 has not been made by another person living under the same household defined by paragraph 115 of the Act No. 40/1964 Coll. Civil Code, as amended, before the participation;
- d) the participant has permanent residence in the Slovak Republic;
- e) the participant participates in the economic experiment and he/she chose (a) sure win worth 20 EUR (in words: twenty euro) (**Sure twenty**) or (b) winning from 10 EUR (in words: ten euro) up to 1 000 (in words: one thousand euro) according to the result of the virtual die roll (**Roll a Die**);
- f) the participant is participating in the Competition for the first time;
- g) the participant completes the Survey that is a part of the experiment.

### (Conditions)

1.2 If the participant fails to fulfil even one Condition, his/her Claim is invalid.

1.3 For the avoidance of any doubts, someone who previously participated in a different economic experiment has the right to participate in the Competition.

[TREATMENT 1]

## 2 WINNING

2.1 The experimenter will provide the winning amount according to the paragraph 2.2 or 2.3 (**Winnings**) to the participant of the experiment who satisfies the Conditions (**Winner**) immediately and without delay after the experiment.

2.2 If the Winner chose the sure win alternative, his/her Winnings in Competition will be 20 EUR.

2.3 If the Winner chose the possibility to win amount from 10 EUR (in words: ten euro) up to 1 000 EUR (in words: one thousand euro) according to the result of the virtual rolling of the die, his/her Winnings in the Competition will be:

- a) 10 EUR with the probability of 50%
- b) 20 EUR with the probability of 39%
- c) 30 EUR with the probability of 5%
- d) 50 EUR with the probability of 3%
- e) 100 EUR with the probability of 2%
- f) 1 000 EUR with a probability of 1%.

[TREATMENT 2]

## 2 WINNINGS

2.1 The experimenter will provide the winning amount according to the paragraph 2.2 or 2.3 (**Winnings**) to the person who satisfies the Conditions (**Winner**) immediately and without delay after the experiment.

2.2 If the Winner chose the sure win alternative, his/her Winnings in Competition will be 20 EUR.

## [GAME A]

2.3 If the Winner chose the possibility to win amount from 10 EUR (in words: ten euro) up to 1 000 EUR (in words: one thousand euro) according to the result of the virtual rolling of the die, his/her Winnings in the Competition will be:

- a) 10 EUR with the probability of 24%
- b) 20 EUR with the probability of 55%
- c) 30 EUR with the probability of 15%
- d) 50 EUR with the probability of 3%
- e) 100 EUR with the probability of 2%
- f) 1 000 EUR with a probability of 1%.

## [GAME B]

2.3 If the Winner chose the possibility to win amount from 10 EUR (in words: ten euro) up to 1 000 EUR (in words: one thousand euro) according to the result of the virtual rolling of the die, his/her Winnings in the Competition will be:

- a) 10 EUR with the probability of 34%
- b) 20 EUR with the probability of 49%
- c) 30 EUR with the probability of 12%
- d) 50 EUR with the probability of 3%
- e) 100 EUR with the probability of 2%
- f) 1 000 EUR with a probability of 1%.

## [GAME C]

2.3 If the Winner chose the possibility to win amount from 10 EUR (in words: ten euro) up to

1 000 EUR (in words: one thousand euro) according to the result of the virtual rolling of the die, his/her Winnings in the Competition will be:

- a) 10 EUR with the probability of 50%
- b) 20 EUR with the probability of 39%
- c) 30 EUR with the probability of 5%
- d) 50 EUR with the probability of 3%
- e) 100 EUR with the probability of 2%
- f) 1 000 EUR with a probability of 1%.

## [GAME D]

2.3 If the Winner chose the possibility to win amount from 10 EUR (in words: ten euro) up to

1 000 EUR (in words: one thousand euro) according to the result of the virtual rolling of the die, his/her Winnings in the Competition will be:

- a) 10 EUR with the probability of 85%
- b) 20 EUR with the probability of 5%
- c) 30 EUR with the probability of 4%
- d) 50 EUR with the probability of 3%
- e) 100 EUR with the probability of 2%
- f) 1 000 EUR with a probability of 1%.

## [GAME E]

2.3 If the Winner chose the possibility to win amount from 10 EUR (in words: ten euro) up to 1 000 EUR (in words: one thousand euro) according to the result of the virtual rolling of the die, his/her Winnings in the Competition will be:

- a) 10 EUR with the probability of 99%
- b) 20 EUR with the probability of 0%
- c) 30 EUR with the probability of 0%
- d) 50 EUR with the probability of 0%
- e) 100 EUR with the probability of 0%
- f) 1 000 EUR with a probability of 1%.

[TREATMENT 3]

## 2 WINNINGS

2.1 The experimenter will provide the winning amount according to the paragraph 2.2 or 2.3 (**Winnings**) to the one randomly chosen participant of the experiment who satisfies the Conditions (**Winner**) immediately and without delay after the experiment.

2.2 If the Winner chose the sure win alternative, his/her Winnings in Competition will be 20 EUR.

2.3 If the Winner chose the possibility to win amount from 10 EUR (in words: ten euro) up to 1 000 EUR (in words: one thousand euro) according to the result of the virtual rolling of the die, his/her Winnings in the Competition will be:

- a) 10 EUR with the probability of 50%
- b) 20 EUR with the probability of 39%

- c) 30 EUR with the probability of 5%
- d) 50 EUR with the probability of 3%
- e) 100 EUR with the probability of 2%
- f) 1 000 EUR with a probability of 1%.

[END TREATMENTS]

2.4 The Winnings is an income from capital funds and therefore it is a subject to 19% income tax withholding. Tax liability is the responsibility of the Winner.

### **3 TERMINATION OF WINNING CLAIM**

3.1 If it is found than even one of the Conditions is not fulfilled, the Winner's claim under the paragraph 2.1 will be terminated.

3.2 If the Winner's claim of Winning is terminated under the paragraph 3.1, he/she cannot participate in the Competition again.

### **4 DURATION OF COMPETITION, CHANGE OF THE CONDITIONS AND**

#### **DISMISSAL OF COMPETITION**

4.1 Conditions of this Competition can be met only on the day of the conduction of economic experiment (**Validity of the competition**).

### **5 FINAL PROVISIONS**

- 5.1 The conditions of this competition are specific to it and subject to change. Therefore, if you participate in the Competition, they apply to you as amended.
- 5.2 If any provision of these competitive conditions become invalid, ineffective or disputed due to changes in legal regulations of the University of Economics in Bratislava, the closest legal regulation of the University of Economics in Bratislava in its character and purpose will be applied.
- 5.3 For the purpose of the Competition and competitive conditions, the application of any legal regulations of the University of Economics in Bratislava is precluded, except those which are strictly mandatory in nature, in so far as their use might change the meaning or purpose of any provisions of the Competition and/or competitive conditions.
- 5.4 If these competitive conditions refer to those generally binding legal regulation, they are understood as the valid and effective legal regulations of the University of Economics in Bratislava.
- 5.5 All disputes arising from or connecting to the Competition, including disputes concerning its validity, existence, interpretation or termination will be solved by the dean of the Faculty of National Economy at the of the University of Economics in Bratislava under legal regulations of the University of Economics in Bratislava, if there is no agreement between the parties.
- 5.6 These conditions of competition go into force and effect from 1st October 2015.

In Bratislava, 1st October 2015

**Tables and figures**

Table 1. Distribution of Random Payment by Bank

<b>Payoff</b>	<b>Likelihood</b>
10 €	50%
20 €	39%
30 €	5%
50 €	3%
100 €	2%
1,000 €	1%



Table 2. Probit Analysis of Field Data

Dependent Variable	“Roll the Die”	
Independent Variables	(1)	(2)
Female	.0291 (.0481)	.0359 (.1555)
Age	-.0125 ** (.0019)	-.0124** (.0025)
Female × Age		-.0002 (.0039)
Constant	1.1531** (.0753)	1.1504** (.0952)
Observations	3,917	3,917
<p>Dependent variable is binary and equals to 1 if the person opted to “Roll the Die” and accept the risky payment. Otherwise, it is 0. Standard errors are in parentheses. *, ** denote significance at the 5% and 1% level, respectively.</p>		

Table 3. Summary Statistics

	Field Data	Laboratory Data			
		Combined	Baseline	Pay Random	Pay Random
				Task <sup>A</sup>	Subject
Observations	3,917	162	56	55	51
% Safe	24.36	14.81	12.50	16.36	15.69
% Male	66.90	55.56	57.14	54.55	54.90
Age					
Average	36.92	26.07	25.45	26.09	26.61
Range	18-85	18-70	19-65	18-66	19-70
Average CRT Score <sup>B</sup>	-	1.32	1.48	1.24	1.22
Average hypothetical investment <sup>C</sup>	-	.40	.39	.39	.43

<sup>A</sup> Behavior reported here is based on the choice shown in Table 1, which is the same choice as in the other treatments.

<sup>B</sup> Average CRT Score is the average number of correctly answered CRT questions.

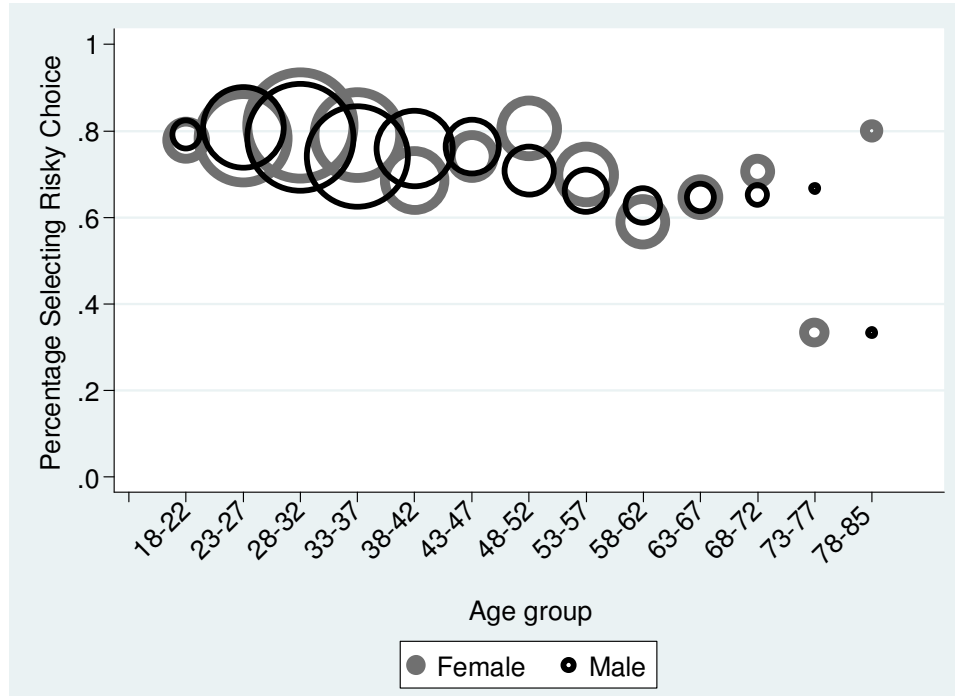
<sup>C</sup> Average investment is measured with the hypothetical risky investment question from the SOEP.

Table 4. Probit Analysis of Payoff Procedures

Dependent Variable	“Roll the Die”		
	(1)	(2)	(3)
Lab (Baseline)		.3025 (.2165)	
Lab (Combined)			.2085 (.1247)
Pay Random Task	-.1840 (.2969)		
Pay Random Subject	-.1585 (.3034)		
Female	.1412 (.2530)	.0290 (.0478)	.0362 (.0473)
Age	.0103 (.0146)	-.0123** (.0019)	-.0120** (.0019)
Constant	.8376* (.4088)	1.1457** (.0751)	1.1328** (.0744)
Observations	162	3,973	4,079

Dependent variable is binary and equals to 1 if the person opted to “Roll the Die” and accept the risky payment. Otherwise, it is 0. Standard errors are in parentheses. \* and \*\* denote significance at the 5% and 1% level, respectively. We conducted a prior hypothesis power analysis for testing the difference between independent samples using GPower 3.1 Software. Given our sample sizes, our empirical approach has a power of at least 80% for identifying a treatment effect of 0.15 in the difference between proportions of risk taking in comparisons between data sets.

Figure 1. Risk Taking Data from the Field



**Highlights**

- Experiments examining similarity in risk taking in and out of the lab.
- Testing the impact of the payment procedure on observed risk taking behavior.
- Behavior in the lab and the field are similar.
- No differences in risk taking across different payment procedures.

ACCEPTED MANUSCRIPT