FAIRNESS IN RISKY ENVIRONMENTS: THEORY AND EVIDENCE

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Fairness in Risky Environments: Theory and Evidence[1]

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Abstrakt

Teorie férovosti obvykle používaly předpoklad ex-ante znalosti velikosti koláče. Velikost koláče je ale jen vzácně známa předem. Za použití tří jednoduchých alokačních problémů obecně známých jako hry typu diktátor, ultimátní hra a hra důvěry zkoumáme vliv ex-ante neznámé velikosti koláče měnícího se stupně rizika na chování jednotlivců. Odvozujeme teoretické predikce pro dvě z těchto her za použití užitkové funkce, která zachycuje aditivně separovatelnou konstantní relativní risk averzi a averzi k nerovnosti.

Experimentálně testujeme teoretické predikce na dvou rozdílných druzích objektů: studenti ČVUT a zaměstnanci pražského magistrátu. Vztah k riziku našich testovacích subjektů kontrolujeme pomocí Holt-Lauryho instrumentu. Nacházíme statisticky významné rozdíly v chování dávat jako funkce stupně rizika a stupně averze k riziku napříč jedinci. Rovněž nacházíme rozdíly napříč dvěma skupinami subjektů, ale jakmile kontrolujeme různé socio-demografické a kognitivní charakteristiky, tyto rozdíly zmizí.

Diskutujeme doporučení a metodologické implikace výsledků našeho experimentu v terénu, stejně jako implikace pro teorie férovosti reciprocity a jejich experimentální testy.

Keywords: Fairness, Risk Aversion, Subject Pool Effects, Economics Experiments
JEL Classification: C90, C91, C92, D81.

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Abstract

Theories of fairness have typically used the assumption of ex-ante known pie size. Pie size, however, is rarely known ex ante. Using three simple allocation problems generally known as dictator, ultimatum and trust games, we explore the influence of ex-ante unknown pie size of varying degrees of risk on individual behavior. We derive theoretical predictions for two of these games using utility functions that capture additively separable constant relative risk aversion and inequity aversion.

We test the theoretical predictions experimentally on two different subject pools: students of Czech Technical University and employees of Prague City Hall. We control for the risk attitude of our subjects through a variant of the Holt-Laury assessment instrument. We find statistically significant differences in giving behavior as a function of the degree of risk, and the degree of risk aversion, across individuals. We also find differences across the two subject pools but show that, once we control for various socio-demographic and cognitive characteristics, these differences evaporate.

We discuss the policy and methodological implications of the results of our artefactual field experiment, as well as the implications for theories of fairness of reciprocity and their experimental test.

1. Introduction

Theories of fairness and reciprocity have received significant play in the literature (e.g., Fehr & Schmidt, 1999, Bolton & Ockenfels, 2000, Charness & Rabin, 2002). Most authors have tried to explain the results of pie distribution experiments which suggest that many subjects do not behave in the purely selfish manner postulated by standard economic theory. For example, the game-theoretic prediction in Dictator and Ultimatum games suggests zero giving under the standard assumption of selfish preferences. Experimental studies, however, have provided evidence of positive giving for both games; the transfer to the recipient amounts to about twenty percent of the pie size for the Dictator game (but see Cherry et al., 2002[5]) and more than twice that for the Ultimatum game (Camerer, 2003).

The models of Bolton & Ockenfels (2000) and Fehr & Schmidt (1999) incorporate other-regarding behavior in the form of inequity aversion as the key explanatory component. Engelmann & Strobel (2004, 2006) presented an experimental test of the Bolton-Ockenfels and Fehr-Schmidt models which suggests that people, following Rawls' Theory of Justice, want to maximize the welfare of the person who is the worst off (a form of other-regarding behavior); these authors (see also Engelmann & Strobel 2007a, b for a balanced review of the literature) identify the importance of efficiency concerns as an explanatory variable.[6] In their theory section, Charness & Rabin (2002) use a social welfare criterion which is defined as a weighted combination of minimal payoff (again, a form of other-regarding behavior) and the sum of all payoffs in the game. Cox & Sadiraj (forthcoming) provide a non-linear generalization of that model.

All the above-mentioned models were constructed under the assumption of pie sizes that are known ex ante. The world, however, is rarely fully known ex ante.
Below we study the allocation problem commonly known as the Dictator game, when the dictator knows what the range of possible outcomes is but does not know the exact

[5] Cherry et al. (2002) have demonstrated persuasively that the experimental results reported in the literature are dependent on both the degree of asset legitimacy and social distance. When the pie was not provided by the experimenter but had to be earned by their student dictators first (“asset legitimacy”), and when the game was furthermore played under double anonymity (maximal “social distance”; see Hoffman, McCabe, & Smith, 1996), giving was as predicted by standard economic theory. Bekkers (2007) provides similar and intriguing evidence through a field experiment. Smith (2010) argues that asset legitimacy is an important challenge that experimental economists need to address.

realization of the size of the pie. Formally, let S be the size of the pie to be allocated, where S is a random variable. In the Dictator scenario, we assume that the decision maker decides the percentage *p* of an ex ante unknown realization of S which is to be transferred to the recipient.[7]

As a related scenario, we study the one-shot Ultimatum game. Again, we assume an environment characterized by risk. Formally, a pie of size S is to be distributed, where S is a random variable. The first mover (proposer) offers a percentage *p* of S to the second mover (responder). Rather than being a passive recipient, the responder will accept any *p* above some threshold, and reject each offer below it. Rejection leads to a zero payoff for both proposer and responder.

We also study the ramifications of risk for a simple Trust game in which a first mover (proposer) decides how much of a fixed endowment he or she will send to a second mover (responder). The responder in a Trust scenario faces, structurally, a decision problem similar to the dictator, a useful check for internal consistency during the experiment (see e.g. Binmore et al., 2002) although Cox (2004) provides evidence that intentions, as reflected in initial investments, trigger reciprocity. The responder in our Trust scenario decides on a precise amount; risk is introduced through an unknown random factor X by which the amount sent to the responder is multiplied. The unknown random factor X makes it impossible for the responder to infer precisely the proposer's allocation decision.

We assume (based on the key behavioral assumption of most models of reciprocity and fairness) that agents have a preference for relative rather than for "absolute" giving, and we investigate how the variance of possible pie sizes, i.e. the risk associated with a given distribution, will affect agents' choices. We also explore, in a within-subject

[6] Efficiency is defined as the sum of all payoffs in the game.

[7] In principle, the share to be transferred to the recipient could be determined also in absolute terms. There are three reasons working against such a procedure. First, theories of fairness and reciprocity are formulated in relative terms rather than absolute ones. Second, an ex-ante allocation in absolute terms could result in a negative outcome for the decision maker (when the realized pie would be small), thus bringing in loss aversion as a confound. Third, in the present paper we are not interested in optimal contract design (that could solve the preceding problem but would also complicate our design beyond what seems feasible to implement.)

design, how these choices are related to risk attitudes of the decision makers. Since all scenario realizations are different from each other, we ignore the effect of learning.[8]

The game-theoretic predictions of standard deductive game theory for non-risky environments are zero giving on the part of the dictator as well as the proposer in the Ultimatum and Trust scenarios. We derive for the Dictator scenario a decision prediction and formulate conjectures about the other scenarios.

To test the theoretical predictions experimentally we chose to employ two different subject pools: students of the Czech Technical University and employees of Prague City Hall. The choice of the second subject pool was motivated by our interest in the widespread corruption with which Central European institutions, and in particular Prague City Hall, are allegedly afflicted (Ortmann, 2004). Our informal working hypothesis was that people in such an institution — if indeed they were more prone to corruptibility (i.e., if indeed they would have less other-regarding concerns) — would tend to take more self-regarding actions than the standard student subjects in the three allocation problems that we studied and that have been key vehicles with which other-regarding preferences have been studied in the experimental economics literature.

Because the two subject pools were so different, and also motivated by the role that our theoretical analysis attributed to characteristics such as risk attitude, we controlled for various cognitive and demographic measures including the risk attitude of our subjects. We find statistically and economically significant differences in giving behavior as a function of the degree of risk, and the degree of risk aversion, across individuals. We also find differences across the two subject pools but show that, once we control for the socio-demographic and cognitive characteristics that we elicited, these differences evaporate.

Predictions for environments that are risky will be explicated in the section that follows. In Section 3, we present our experimental design and implementation. In Section 4 we summarize all data and results. In Section 5 we discuss our findings and enumerate questions regarding our study. In the Appendix we provide a copy of the (translated) instructions and the precise sequencing of the scenarios used in the experiment.

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[8] We are aware that learning might happen without repetition of a particular situation, and even without feedback (see Weber, 2003). But these effects seem relatively minor.

2. Theoretical predictions for fairness in risky environments

To analyze the effect of risk on behavior in the three games described, we take as our point of departure the theory of ERC[9] (Bolton & Ockenfels, 2000). Let the motivation function be additively separable: $v(y) = u(y) - k \cdot f(\sigma)$ where y is the absolute payoff of the player we are interested in and σ is her relative payoff (i.e. the ratio of her absolute payoff to the sum of all payoffs in that interaction). To fulfill the assumptions of ERC theory, let u be a continuously increasing concave function (i.e. the marginal utility of her own payoff is decreasing), f be a continuous strictly convex function attaining its minimum equal to 0 at $\sigma = 0.5$ (i.e. the disutility which the player experiences from her relative position in the game is minimized when her payoff equals that of the other player), and $k > 0$ be a constant (the coefficient k quantifies how much she cares about her relative payoff, i.e. sets the degree of individual fairness attitude). As k approaches 0, she cares less and less about her relative standing in society and becomes, in the limit, a selfish decision maker with utility function u postulated by standard economic theory.

Let us focus on the Dictator scenario as the simplest possible "interaction" between two economic subjects. For simplicity, let us assume for now that agents are expected utility maximizers.[10]

Following Babicky (2004) we get the first order condition for optimal dictator giving p as the equation $\frac{dEU[(1-p)S]}{dp} + kf'[1-p] = 0$ and using utility functions in the constant relative risk aversion form[11] $U[x] = Sign[x]x^r$ for $r \neq 0$, $U[x] = \mathrm{LN}[x]$ for $r=0$. The resulting condition is $(1-p)^{1-r} f'[1-p] = \frac{r}{k} \cdot Sign[r] \cdot E[S^r]$. Similarly, with constant relative inequity aversion $f[\sigma] = (\sigma - \frac{1}{2})^S$, the corresponding equation is

$$(1-p)^{1-r}(1-2p)^{S-1} = \frac{r}{k} \cdot Sign[r] \cdot E[S^r] \qquad (1)$$

[9] This can easily be reformulated in terms of Fehr & Schmidt (2000); see Babicky (2004)

[10] We are aware that this assumption is the subject of ongoing disputes on which we remain agnostic. Our interest is, within the framework of previous studies, to analyze the ramifications of decision making under risk. This allows us to ignore these disputes.

[11] For standard stakes (such as the ones in our experiment) the constant relative risk aversion form of the utility function can be rationalized experimentally by the results in Holt & Laury (2002), which suggest that

with some constant *k*. The relative risk aversion is then given by 1-*r*, with 1-*r* >(<) 0 indicating risk-averse (risk-loving) preferences.

We formulate two types of hypotheses that are paired: The first reflects our interest in the effects on behavior of degrees of risk in the environment, and the second (identified by a prime) reflects our interest in the effects of risk attitudes on behavior in risky environments. Our last hypothesis refers to subject pool differences.

Our assumptions on the form of the utility function and the form of inequity aversion allows us to derive the following hypotheses from formula (1):

- Hypothesis 1: In the Dictator scenario, the degree of risk in the environment matters for subjects' giving behavior: giving under low risk is higher than under high risk.
- Hypothesis 1': In the Dictator scenario, subjects' risk attitude matters for giving behavior: more risk-averse subjects give less the riskier the pie size is.

A similar analysis applies also to the behavior of responders in the Trust scenario. In fact, the situation for the responder is almost equivalent to that of a dictator in a standard Dictator scenario. However, as mentioned earlier, the responder in the Trust scenario cannot infer precisely the proposer's initial decision (because the amount sent to the responder is multiplied by an unknown random factor X). We formulate:

- Hypotheses 2,2': In the Trust scenario, neither degree of risk in the environment nor a responder's risk attitude influences her behavior.

The response in the Trust scenario can be viewed as an action reciprocal to that of the proposer (e.g. Dufwenberg & Kirchsteiger, 2004). Reciprocity will, however, be affected by the fact that the responder cannot exactly infer the proposer's choice (although the common knowledge of the range of factor X allows her some vague inference about the proposer's choice). If our hypothesis were to be rejected, it would indicate that risk in the earlier stages of the game may affect the responder in her choice.

Further theoretical analysis of the proposer's choice in the Trust and Ultimatum scenarios is beyond the scope of this paper since these two decisions depend heavily on a

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it works as a "good approximation" of human behavior. This approximation simplifies our theoretical arguments considerably.

proposer's beliefs about the responder's behavior which, given the circumstances, would have been difficult to control during the experiment.

We will test the following:

- Hypotheses 3, 3': In the Ultimatum scenario, neither degree of risk in the environment nor a proposer's risk attitude influences her offer.
- Hypotheses 4,4': In the Trust scenario, neither degree of risk in the environment nor a proposer's risk attitude influences her offer.

Lastly, we analyze the responder's behavior in the Ultimatum scenario. In this scenario, she evaluates an offer of percentage *p* from the random pie S. According to the theory, the responder rejects any time when her expected utility is lower than the utility of destroying the whole pie. Using the same type of motivation function as above, $Sign[r] \cdot p^r \cdot E[S^r] - f[p] < 0$. Note that the responder's acceptance threshold *p** then satisfies the equation $Sign[r] \cdot p^{*r} \cdot E[S^r] - f[p^*] = 0$. As above, we conclude that $Sign[r] \cdot E[S^r] = \frac{f[p^*]}{p^{*r}}$ and, since the left-hand side of the equation represents the risk associated with the random variable *S* as above while the right-hand side determines the responder's acceptance threshold in the Ultimatum scenario depending on her risk attitude, we formulate (recalling our assumptions on *f* and the shape of the right-hand side function):

- Hypothesis 5: In the Ultimatum scenario, higher risk in the environment (as reflected in the distribution of pie size) prompts subjects to set a higher acceptance threshold.
- Hypothesis 5': In the Ultimatum scenario, subjects' risk attitude matters for setting an acceptance threshold in the Ultimatum scenario: more risk-averse subjects set a higher threshold the riskier the pie size is.

Table 1 summarizes our hypotheses.

Table 1 Hypothesized effects of risk on amount proposed or returned

	Dictator	Ultimatum	Trust
Proposing	LOWER (Hypotheses H1,H1')	NONE (Hypotheses H3,H3')	NONE (Hypotheses H4,4')
Threshold/ Returning	-	HIGHER (Hypotheses H5,H5')	NONE (Hypotheses H2,2')

Our last prediction concerns subject pool effects.

- Hypothesis 6: All phenomena observed in the experiment are independent of the two subject pools we draw on.

To repeat: This hypothesis is motivated by the other purpose of the present experiment: To understand through an "artefactual field experiment" (Harrison & List, 2004) whether municipal employees of the City of Prague behave differently — more selfishly — than do standard student subjects in the experimental workhorses that we described above. If they do not, then the problem with corruption in City Hall seems more likely to be one of incentive-incompatible and ineffective anti-corruption measures than that of corrupt, and corruptible, employees *per se*.

3. Experimental Design and Implementation

The experiment was conducted at CERGE-EI on a portable experimental laboratory with students of Czech Technical University (CTU) and with municipal employees of the City of Prague. In total, the subject pool consisted of 44 employees of Prague City Hall (denoted by CH), and 116 CTU students.[12]

We conducted 12 experimental sessions, each session with an even number of participants, constrained by the maximum lab capacity of 16 people. Table 2 summarizes:

[12] We also ran two control sessions with an additional 32 CTU student subjects. The subjects in the control group read the same instructions but were given a different ordering of decisions: all low risk treatments were switched to high risk treatments and vice versa. This control group was run to control for order effects. The results for the control group suggest that order effects may affect our data. Unfortunately, the control group differs significantly from the CTU group in at least three respects (average session size, gender composition, and – most troubling – the measure of cognitive ability that we will discuss below), indicating that we might have exhausted that subject pool temporarily. While determining the extent of the estimated treatment effects attributable to decision-order effects would be desirable, we decided not to include these data in our analysis.

Table 2 Overview of experimental sessions

Session	1	2	3	4	5	6	7	8	9	10	11	12
Type of subjects	CTU	CTU	CTU	CTU	CTU	CTU	CTU	CTU	CH	CH	CH	CH
Number of subjects	14	12	16	14	12	16	16	16	10	8	16	10

We attempted to have at least 12 participants in each session but scheduling the four CH sessions turned out to be difficult.

The experiment was programmed in z-Tree (Fischbacher, 1999). The experimental instructions were in Czech. Following standard experimental methodology in economics, all scenarios were framed in abstract terms (see the English translation of the instructions in the Appendix). The experimenter – the first author in all sessions – first read descriptions of the four scenarios reproduced in English in the Appendix. Then all subjects had to answer correctly two questions on payoff calculations before they could proceed to the 17 choices that constituted the experiment proper.

Five choices (constituting one of the four scenarios) concerned the measurement of risk aversion (see Holt & Laury, 2002); we will return to these choices in more detail below. The program randomly selected ex post one of these to be paid; the twelve remaining choices were paid in full. The fully paid choices were the offer and acceptance threshold of the Ultimatum scenario (under no-risk, low-risk and high-risk realizations of the pie size), as well as dictator giving in the Dictator scenario and investment and return decisions in the Trust scenario (all under low-risk and high-risk realizations of the pie size). The Appendix spells out the order in which these treatments were sequenced: The order of choices was such that no scenario realization was followed by another realization of the same scenario. No realization of a scenario was repeated during any session.

Outcomes were determined by random re-matching for each round. Subjects were informed about the outcomes of their decisions only at the end of a session. The exchange rate was 1 CZK per 20 ECUs (experimental currency units); the payoffs per person ranged from 190 CZK to 620 CZK (payoffs were rounded to the upper closest ten), with the average being slightly below 400 CZK.[13] Because they had to commute to and from

[13] The exchange rate was about 23 CZK/1 USD when the experimental sessions were conducted, implying that our subjects – not counting appearance fees – earned on average 17 – 18 USD. The local purchasing

CERGE-EI and because sessions with CH employees lasted longer (the experiment proper started only after all participants within the session answered the questionnaire correctly, which on average took longer in the CH sessions)[14], City Hall employees were paid an additional participation bonus of 150 or 200 CZK. At the end of each session, we asked all subjects to identify their age and gender, and to report their disposable income.

Since the model's predictions identify risk aversion as an important determinant of individual decision making, we categorized — as mentioned — all subjects according to their risk aversion through an additional scenario (see Scenario Four in the Instructions): Following a procedure suggested by Holt & Laury (2002), subjects had to choose between a series of safer and riskier options. In the first choice, the safer option had a higher expected value (EV) than the corresponding riskier one; in the following choice the riskier option had a higher expected value than the corresponding safer one. With every choice, the EV of the riskier choice grew faster than the EV of the corresponding safer option (see Table 3 below).[15]

Table 3 Elicitation of risk aversion

		Safer option					**EV**			**Riskier option**					**EV**
Choice 1:	1000	if n>	40	,	1250	otherwise	1100		60	if n>	40	,	2400	otherwise	996
Choice 2:	1000	if n>	50	,	1250	otherwise	1125		60	if n>	50	,	2400	otherwise	1230
Choice 3:	1000	if n>	60	,	1250	otherwise	1150		60	if n>	60	,	2400	otherwise	1464
Choice 4:	1000	if n>	70	,	1250	otherwise	1175		60	if n>	70	,	2400	otherwise	1698
Choice 5:	1000	if n>	80	,	1250	otherwise	1200		60	if n>	80	,	2400	otherwise	1932

Standard theory predicts that any agent will make at most one switch, if any, across the five choices. Because we wanted somewhat independent decisions, we did not prompt our subjects to make their choices in a back-to-back manner but interspersed them, as questions 2, 6, 10, 12, and 16 respectively, with the other Scenario questions. Table 4

power of these payoffs is about twice as much. Thus, it seems fair to say that the stakes were considerable for both students and City Hall employees. Since City Hall employees (and students) were told ex ante what average earning they could expect, we have reason to believe that only those subjects signed up for the experiment who thought that money was worth their time.

[14] Sessions lasted from 60 to 100 minutes with student sessions typically being in the lower half and the CH sessions in the upper half of the interval.

[15] As in Holt & Laury (2002), subjects were not told the expected value of the options they were given.

shows the risk aversion interval and classification implied by the number of safe options the subject chooses before switching over to choosing risky options.

Table 4 Implied ranges of risk aversion *r*

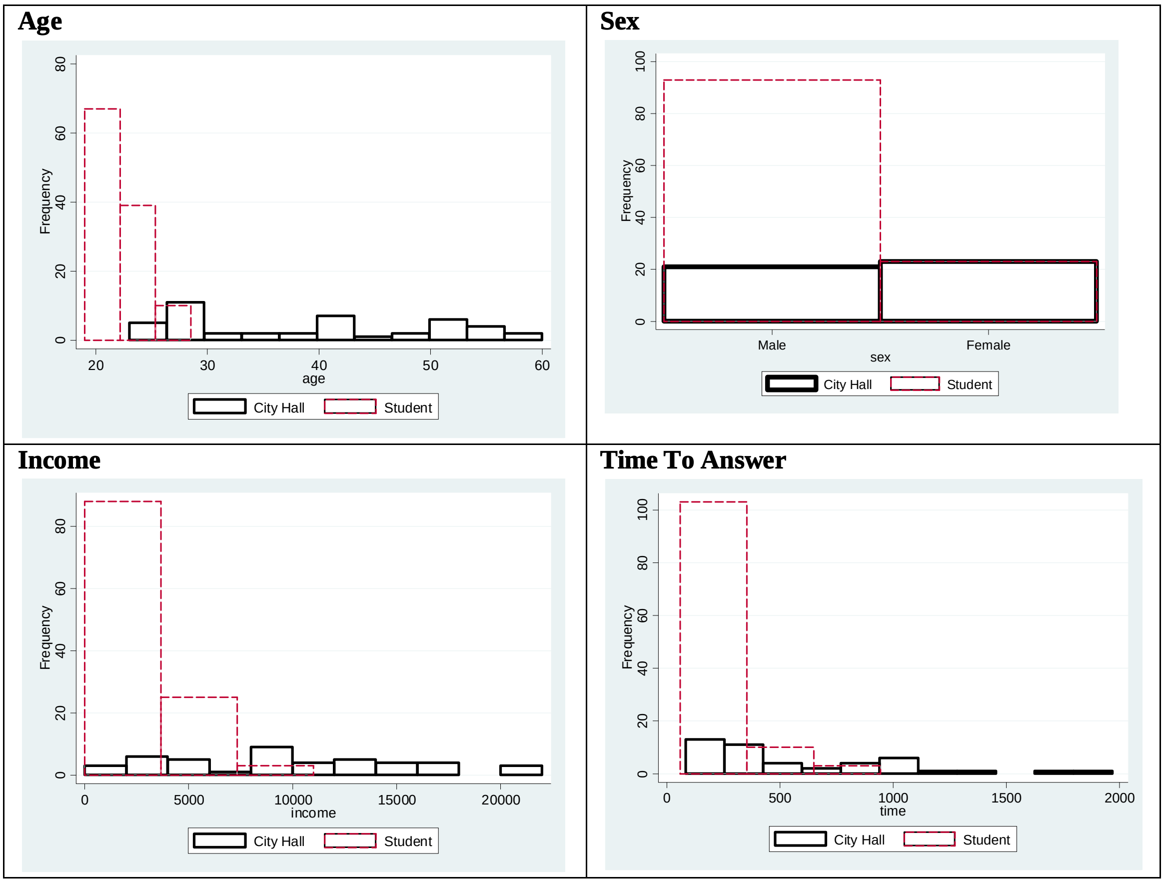
	Range of Relative Risk Aversion 1-*r* for $U(x) = Sign(r)x^r$		Risk Preference Classification
0	-∞	-0.148	Risk Loving
1	-0.148	0.140	Risk Neutral
2	0.140	0.405	Somewhat Risk Averse
3	0.405	0.669	Risk Averse
4	0.669	0.961	Very Risk Averse
5	0.961	∞	Highly Risk Averse

4. Results

Before we analyze our data, we show the distribution of our two subject pools conditional on the socio-demographic variables in Table 5. As can be seen from the histograms, the socio-demographic characteristics differ markedly across the two subject pools but the considerable overlap enables us to make meaningful comparisons. In addition, we run regressions to characterize risk aversion among our subjects. Only slightly more than half of our subjects (52.6% of the CTU group and 54.5% of the CH group, i.e., 61 student subjects and 24 City Hall employees) made consistent choices.[16]

[16] We were aware ex ante (based, for example, on evidence reported in Hey & Orme, 1994, as well as our pilots) that our procedure was likely to induce at least 25% inconsistent choices. Given that we did not give our subjects one menu of five choices and given that we did not give our subjects the EV of their options, with the benefit of hindsight the fairly high percentage of inconsistent choices (not observed in the pilots in which we employed CERGE-EI students) is arguably not that surprising; it might simply reflect (as does also recent evidence on the stability of risk attitude assessment measures; see Dickhaut & Wilcox, 2010) that other forms of elicitation may be confounded by subjects' attempts to be consistent.

Table 5 Socio-demographic characteristics of City Hall employees and students



The lower (upper) bound on 1-*r* cannot be determined for subjects who choose the risky (safe) option for Choice 1 (5). For the other subjects, we use, as suggested by Harrison et al. (2005),[17] wider intervals defined by the first and the last row that the subject switched at. Thus we determine the lower (upper) bound as follows: If the subject chose the risky (safe) option in Choice 1 (5), then the subject is willing to pay for the riskier (safer) lottery. As we present no choices with a higher opportunity cost for the risky (safe) choice, we are not able to measure the lower (upper) bound of the RA. The lower (upper) limit of RA is thus -∞ (+∞).

[17] Harrison et al. (2005, p.14) write: "The problem here is that some subjects switch back and forth as they move down the rows of the MPL [MPL stands for 'Multiple Price List', of which the Holt & Laury (2002) study is the most famous example, *our comment*]. Few of the existing MPL implementations allow subjects to report indifference. It is quite possible that switching behavior is the result of the subject being indifferent between the options. The implication here is that one could simply use a 'fatter' interval to represent this subject, defined by the first row that the subject switched at and the last row that the subject switched at."

If the subject chose the safe (risky) option in Choice 1 (5), the lower (upper) bound on *r* can be determined. Going from the 1st to the 5th choice, if the subject switched to the risky option and did not switch back to a safe option later on, or never made the risky (safe) option at all, then we take the lower bound of the last safe (first risky) choice of the corresponding risk aversion range in Table 4. Going from the 1st to the 5th choice, if the subject switched from a safe (risky) option to a risky (safe) option and then back to a safe (risky) option, then we interpret the switch as a sign of indifference, and we define a wide interval for the risk aversion in the following fashion: The lower (upper) bound we set equal to the lower bound of the last safe (first risky) choice before (after) the occurrence of the first risky (last safe) choice. For all other subjects no interval for their risk aversion can be determined. See Table A1 in the Appendix for all patterns of choice that our subjects showed together with the estimated interval for risk aversion.

We use these intervals in the interval regressions with risk aversion as a dependent variable to characterize risk aversion in our sample. To be able to test for the effects of risk aversion as an independent variable, we define a variable RA_ExactMidpoint as the midpoint of these intervals. If the interval is open, RA_ExactMidpoint is undefined and has a missing value. As this reduces the number of independent observations by 60%, we also define a proxy for risk aversion by the variable RA_Midpoint. This variable is identical to RA_ExactMidpoint except that we substitute for the missing values the upper or lower bound of the interval if that is not missing. This underestimates the risk aversion (loving) of the more risk-averse (risk-loving) subjects, and thus most likely understates the effect of risk aversion in our regressions. We therefore perform robustness tests using different proxies for risk aversion, such as RA_ExactMidpoint and, as in Holt & Laury (2002), the number of safe choices. We also perform robustness tests, excluding for example the inconsistent subjects; see footnote 20.

Table 6 Interval regression of risk aversion on socio-demographic variables

Variables	Effects
Age[18]	**0.026**** **(0.013)**
Female	**0.274*** **(0.16)**
Personal disposable income	**-0.000060**** **(0.000027)**
Time to answer questions	**0.0010*** **(0.0003)**
City Hall employee	-0.201 (0.30)
Constant	**0.663*** **(0.105)**

Table 6 shows the relation between risk aversion and the socio-demographic characteristics of our subjects. Risk aversion from a subject with an average score on the socio-demographic variables is given for students by the constant, 0.66, and for City Hall employees by the constant plus the City Hall Employee dummy which together indicate a risk aversion coefficient of 0.46. Both City Hall employees and students are thus, on average, soundly risk averse.[19] City Hall employees have a lower risk aversion than students, but the difference is not significant (p=0.50).[20] We see that most of the socio-demographic variables have significant effects (p<0.10) of various strengths. Among our subjects, a person is predicted to be significantly more risk averse when the person is female (p=0.09) or older (p=0.04), and when the person earns a lower income (p=0.03). Interestingly, "time to answer (the comprehension) questions", which we interpret as a

[18] The variable is measured as deviations from the sample average.

[19] This result is not out of line with other evidence (e.g. Harrison & Rutström, 2008), which suggests that the vast majority of subjects is risk averse and on average not just slightly so. Given the considerable stakes in our experiment our risk attitude results seem sensible.

[20] We ran various robustness tests that confirm the results of our main test. We ran an interval regression excluding the subjects that made inconsistent choices, which decreases the number of observations to 85. Signs and significance levels are unaffected, except for the effect of time to answer questions, which becomes significant (p=0.08). We also ran ordered logistic regressions with the number of safe choices as the independent variable: Signs are unaffected and the significance levels are about the same except the effect of age is no longer significant (p=0.15). The difference between City Hall employees and students is not significant in any of the robustness tests (all p>0.400, except for the ordered logistic regression including the inconsistent subjects, where p=0.149). We also ran an interval regression including dummies for the sessions: none of these dummies were significant and in this regression signs and significance levels were not affected. We also ran the regression separately for both subject pools, students and City Hall employees, and find that *TimeToAnswer* has the correct sign and is highly significant in both pools (p<0.001). In addition, to show that our results also hold without the cognitive variable *TimeToAnswer*, we ran a regression excluding this variable and including all demographic variables. We find that the variable

measure of cognitive ability, is also significant although only weakly so and the effect is small.

The increased risk aversion for women is in line with results in the literature (see Harrison, 2008, p.65). The increased risk aversion for age is in line with the findings of Holt & Laury (2002); see the analysis of their data in Harrison & Rutström (2008, p.65).

Table 7 Regression of giving on socio-demographic variables in the Dictator scenario

	Model 1	**Model 2**	**Model 3**	**Model 4**
CityHallEmployees	**7.43** (3.52)**	0.96 (5.51)	-1.20 (3.59)	0.96 (5.51)
HighTaskRisk	**-6.12*** (1.56)**	**-5.62*****	**-6.12*** (1.56)**	
RiskAversion		-3.72 (3.60)		
LowTaskRisk*Risk Aversion				-0.258 (3.80)
HighTaskRisk*Risk Aversion				**-7.19* (3.80)**
Income		-0.0006 (0.00043)		-0.0006 (0.00044)
TimeToAnswer		**0.028*** (0.0046)**	**0.027*** (0.0046)**	**.028*** (.0046)**
Age		0.0098 (0.26)		0.0098 (0.26)
Sex		1.12 (3.24)		1.12 (3.24)
Constant	**25.09*** (1.97)**	**6.09*** (6.10)**	**18.80*** (2.27)**	**18.36*** (5.93)**
Number of observations (Independent clusters)	N=320 (160)	N=264 (132)	N=320 (160)	N=264 (132)

Table 7 shows the four models we tested to explain the amounts that were given in the Dictator game. The models provide support for hypotheses H1 and H1': A higher task risk decreases giving. The decrease is stronger for risk-averse subjects. In Model 1 we use as independent variables a dummy for the high task-risk condition and a dummy to indicate that the subject was a City Hall employee. In Model 2 we also include variables on the socio-economic characteristics and risk aversion. Model 1 and Model 2 show that, when the task is riskier, subjects offer less, and this effect is highly significant (p=0.002), thus confirming Hypothesis H1.

CityHallEmployees is still insignificant (p<0.16), and there is no multicollinearity problem (the variance inflation factor [vif] <3.1).

A striking result of Model 1, certainly in light of our priors, is that City Hall employees offer significantly more than do students. Model 2 shows, however, that this result evaporates when variables capturing socio-economic characteristics and risk preferences are taken in consideration. The difference between City Hall employees and students can thus be explained by including the effect of income, cognitive ability (TimeToAnswer), age, gender, and risk aversion. This confirms Hypothesis H6, that the phenomena observed in the experiment are independent of the two subject pools we drew on.

Model 2 further shows that, as predicted, the effect of risk aversion has a negative sign: when subjects are more risk averse, they offer less. The effect is, however, not significant. The effects of the socio-demographic variables, income, age, and gender, also are not significant. The variable TimeToAnswer is highly significant. This variable suggests, in line with the literature (Wilcox, 1993), that a higher cognitive ability decreases giving in Dictator games, and thus moves actions closer to the normative prediction.[21]

Model 3 includes, in addition to the indicator variable for City Hall employees, the variables that were significant in Model 2 and confirms that the responses of City Hall employees are not significantly different from those of students.

Model 4 replaces the variables HighTaskRisk and RiskAversion for variables that measure the interaction effect of task risk and risk aversion. The effect of the risk aversion when the task risk is high is measured by HighTaskRisk*Risk Aversion and is, as predicted, negative and significant (p=0.061). The difference between the effect of risk aversion when the task difficulty is high and that when the task difficulty is low (HighTaskRisk*RiskAversion - LowTaskRisk*RiskAversion) scores highly significant on an F-test (p=0.0047), thus supporting Hypothesis H1'.[22]

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[21] In Model 2 multicollinearity may be a problem. The variable *Age* is highly correlated with income (r=0.62) , *TimeToAnswer* (r=0.49), and *CityHallEmployee* (r=0.78). Multicollinearity also occurs in the estimations under "Model 2" of the Ultimatium scenario analyzed below, both for the offer and the threshold. In the other models no multicollinearity occurs. As the results of Model 3 (no multicollinearity problem) are basically no different from those of Model 2, the multicollinearity of Model 2 does not seem to affect our results in a substantial manner.

[22] This result is fairly robust: regressions using the number of safe choices as a proxy for risk aversion lowers the significance of HighTaskRisk*RiskAversion, but the difference between HighTaskRisk*RiskAversion and LowTaskRisk*RiskAversion scores even more significant on the F-test (p<0.0003). Excluding the inconsistent subjects renders the effect of the variable

Table 8 Regression of offer on socio-demographic variables in the Ultimatum scenario

	Model 1	**Model 2**	**Model 4**
CityHallEmployees	-1.44 (2.43)	1.46 (4.81)	1.46 (4.81)
NoTaskRisk	**46.21*** (1.28)**	**50.18*** (4.68)**	
LowTaskRisk	**45.07*** (1.36)**	**48.50*** (4.76)**	
HighTaskRisk	**46.21*** (1.13)**	**49.65*** (4.65)**	
RiskAversion		-2.69 (2.57)	
NoTaskRisk*RiskAversion			-2.02 (2.74)
LowTaskRisk*RiskAversion			-4.53 (2.92)
HighTaskRisk*Risk Aversion			-1.51 (2.80)
Income		-0.00016 (0.00035)	-0.00016 (0.00035)
TimeToAnswer		0.0006 (0.0056)	0.0006 (0.0056)
Age		-0.14 (0.19)	-0.14 (0.19)
Sex		4.08 (2.77)	4.08 (2.77)
Constant			**49.44*** (4.64)**
Number of observations (Independent clusters)	N=480 (160)	N=396 (132)	

Table 8 shows the three models we tested to explain the amount offered in the Ultimatum scenario. We ran the same tests as we did above for the Dictator scenario (with the exception of Model 3, as none of the socio-demographic variables showed up as significant). The models, once again, confirm hypothesis H6: City Hall employees do not behave differently from students, as the City Hall employee indicator variable is not significant in any of the three models. The models also confirm hypotheses H3 and H3': Task risk and risk aversion have no effect on the offer. As is shown in Model 2, the variable for risk aversion is not significant. By running an F-test on the differences between HighTaskRisk and NoTaskRisk (p=1.00 in Model 1 and p=0.67 in Model 2), the effect of task risk is shown to be insignificant. Also, none of the other pair-wise F-tests

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HighTaskRisk*RiskAversion and the F-Test insignificant; possibly because the number of independent clusters falls from 132 to 85.

between HighTaskRisk, LowTaskRisk and NoTaskRisk report a significant difference in Model 1 or Model 2 (p>0.20). For the interaction effect of task risk and risk aversion we run for Model 4 an F-test on the differences between HighTaskRisk*RiskAversion and NoTaskRisk*RiskAversion (p=0.78), and none of the other pair-wise F-tests between HighTaskRisk*RiskAversion, LowTaskRisk*RiskAversion, and NoTaskRisk*RiskAversion report a significant difference (p>0.14).

Table 9 regression of threshold on socio-demographic variables in the Ultimatum scenario[23]

	Model 1	**Model 2**	**Model 3**	**Model 4**
CityHallEmployees	0.752 (3.131)	-4.089 (5.858)	-4.331 (3.433)	-4.089 (5.858)
NoTaskRisk	**26.581*** (1.640)**	**27.540*** (5.140)**	**22.871*** (2.007)**	
LowTaskRisk	**27.750*** (1.649)**	**28.563*** (5.143)**	**24.040*** (2.048)**	
HighTaskRisk	**30.808*** (1.614)**	**31.989*** (5.061)**	**27.098*** (1.945)**	
RiskAversion		-4.224 (3.433)		
NoTaskRisk*RiskAversion				**-6.358* (3.475)**
LowTaskRisk*RiskAversion				-5.009 (3.532)
HighTaskRisk*RiskAversion				-1.306 (3.569)
Income		-0.00056 (0.00047)		-0.00056 (0.00047)
TimeToAnswer		**0.0169*** (0.0049)**	**0.016*** (0.005)**	**0.0169*** (0.0049)**
Age		0.018 (0.212)		0.0176 (0.212)
Sex		-2.851 (3.312)		-2.851 (3.312)
Constant				**29.364*** (5.084)**
Number of observations (Independent clusters)	N=480 (160)	N=396 (132)	N=480 (160)	N=396 (132)

Table 9 shows the four models we tested to explain the threshold that responders set in the Ultimatum scenario. The models confirm once more Hypothesis H6: City Hall employees do not behave differently from students, as once again the City Hall employee

[23] Models 1, 3, and 4 for the threshold in the Ultimatum scenario (Table 8) are not affected by multicollinearity: the highest variance inflation factors (vif) we observe in Models 1, 3, and 4 are: 1.3 and 2.8. Models 2 and 4 are affected by multicollinearity: the vif is in both models equal to 26.6 for age.

indicator variable is not significant in any of the four models. The models also confirm Hypothesis H5: Higher task risk increases the threshold. Our data do not confirm Hypothesis H5': Higher task risk does not increase the threshold more strongly for risk-averse subjects.

Models 1, 2 (including socio-demographic variables) and 3 (including the significant variables) show that the variable HighTaskRisk is larger than LowTaskRisk which in turn is larger than NoTaskRisk. Subjects thus set a higher threshold when the task risk increases. F-tests on the differences between HighTaskRisk and NoTaskRisk show that the difference is highly significant ($p<0.0001$) in all models (1, 2 and 3), thus confirming Hypothesis H5.

The effect of risk aversion in Model 2, however, has the wrong (negative) sign and is insignificant, suggesting that higher risk aversion does not lead to setting higher thresholds, as Hypothesis H5' implies. As we expect an interaction effect between task risk and risk aversion, we measure the interaction effects in Model 4. While the interaction variable HighTaskRisk*Risk Aversion has the wrong (negative) sign and is insignificant, the interaction variable HighTaskRisk*Risk Aversion is larger than NoTaskRisk*RiskAversion, and an F-test shows that this difference is highly significant ($p<0.001$). The fact that the interaction variable HighTaskRisk*Risk Aversion is larger than NoTaskRisk*RiskAversion indicates that the effect of risk aversion is larger for tasks with task risk than without, supporting Hypothesis 5'. Our results for Hypothesis 5' are thus ambiguous.

Table 10 shows the models we tested for the Trust scenario for the amount given by the proposer on the left (Models P1 and P2), and by the responder on the right (Models R1, R2, and R3). The models confirm once again Hypothesis H6: City Hall employees do not behave differently from students, as the City Hall employee indicator variable is not significant in any of the five models ($p>0.20$). The models also confirm Hypothesis H4; for the amount proposed we do not find a significant effect of task risk ($p>0.85$) or risk aversion ($p>0.49$).

Table 10 Regression of giving on socio-demographic variables in the Trust scenario

	Proposer		Responder		
	Model P1	**Model P2**	**Model R1**	**Model R2**	**Model R3**
CityHallEmployees	-2.980 (4.358)	-10.202 (8.074)	2.886 (3.811)	-5.680 (6.377)	-5.770 (6.376)
HighTaskRisk	-.3425 (1.825)	0.020 (1.988)	**2.977*** **(1.513)**	**3.166*** **(1.820)**	
RiskAversion		3.672 (5.421)		-5.255 (4.505)	
LowTaskRisk*RiskAversion					**-8.388*** **(4.713)**
HighTaskRisk*Risk Aversion					-2.150 (4.679)
Income		0.00029 (0.00061)		0.00004 (0.00056)	0.00005 (0.00056)
TimeToAnswer		**0.0217**** **(0.0084)**		0.0127 (0.0078)	0.0128 (0.0078)
Age		-0.201 0.312		0.192 (0.303)	0.185 (0.303)
Sex		0.726 5.321		2.179 (3.611)	2.278 (3.623)
Constant	**44.517***** **(2.991)**	**40.928***** **(7.328)**	**18.122***** **(1.947)**	**13.185*** **(7.170)**	**14.871**** **(6.983)**
Number of observations (Independent clusters)	N=320 (160)	N=264 (132)	N=288 (157)	N=232 (129)	N=232 (129)

We reject Hypothesis H2: in the HighTaskRisk condition, responders give significantly higher amounts, as can be seen in Model R1 (p=0.05). As Model 2 shows, this effect is robust to the inclusion of the socio-demographic variables (p=0.08). In Model R3 we test if the interaction between task risk and risk aversion is significant. The F-test shows that HighTaskRisk*Risk Aversion is significantly larger than LowTaskRisk*RiskAversion (p=0.02): The effect of risk aversion is larger when the task risk is high than when the task risk is low. Our tentative explanation for this result is that, while people tend to reciprocate, they find it difficult to determine how generous the proposer has been. Our data suggest that subjects are inclined towards optimistic interpretations: More “uncertainty” leads people to believe that the amount given was large, and indeed larger than was actually given. In return, the responders give (too much) in reciprocation.

5. Concluding discussion

We tested the theoretical predictions experimentally on two different subject pools: students of Czech Technical University – a subject pool we have drawn on previously and that has produced behavior in line with the behavior of student subjects elsewhere – and employees of Prague City Hall.

Prague City Hall has a seemingly well-deserved reputation for its high degree of corruption (e.g., Ortmann, 2004, and Rousek, 2010, who documents a recent scandal which is one of many that made the press in the last decade). If municipal employees make, in the battery of standard experimental decision and game theory scenarios we discussed in this manuscript, choices somewhat similar to student subjects, then the problem with corruption in City Hall seems more likely to be one of incentive-incompatible and ineffective anti-corruption measures than that of corrupt employees *per se*, or particularly corruptible employees selecting themselves or being selected in their positions.

The results of our experiment seem to suggest that City Hall employees — or at least lower-level employees which we have reason to believe were the ones attending our experiment — are not more or less generous in giving than our student subjects, once socio-economic variables are taken into consideration (Hypothesis 6). The socio-economic differences between City Hall employees and student subjects were considerable. Firstly, the average monthly disposable income was reported to be 9551 CZK within the CH group, while students reported 2765 CZK, respectively. One could argue that students actually faced higher-powered incentives moving them closer to the decision-theoretic or game-theoretic decision (see e. g. Hertwig & Ortmann, 2001; Holt & Laury, 2002), but it seems unlikely in light of results reported in the literature (e.g., Cherry et al., 2002) that the higher disposable income makes much of a difference. Secondly, cognitive abilities, as proxied by the time that it took our subjects to answer the comprehension questions, varied widely between City Hall employees (average time 9:11 minutes, and median 6:25) and student subjects (average time 3:53 minutes, and median 3:11).[24]

[24] Interestingly, and somewhat puzzling, the corresponding data for student subjects in the control group were unusually large, 5:54 minutes (median 5:20), which is one of the reasons why we have not paid much attention to that set of data. The two sessions for student subjects in the control group were run as the last

Not surprisingly, the behavior of subjects who took longer to answer the questionnaire was typically noisier (we observed more variance in the decisions of subject with questionnaire response time above average) and, in accordance with the literature, farther away from normative predictions (for experimental evidence on how the decision time matters see Wilcox, 1993). This is a noteworthy result, as education, a closely related variable, has been found to *increase* giving in Dictator games (Bekkers, 2007). Bekkers (2007, p.141) suggests that the effect of education may be caused by variables different from cognitive ability, such as the size and quality of social networks and the verbal ability of the higher-educated. Our results support the interpretation Bekkers (2007) has provided.

Table 11 Hypothesized effects of risk on amount proposed or returned

	Supported Hypotheses			**Ambiguous Evidence**	**Rejected Hypothesis**
	Dictator	**Ultimatum**	**Trust**	**Ultimatum**	**Trust**
Proposing	LOWER (Hypotheses H1,H1')	NONE (Hypotheses H3,H3')	NONE (Hypothesis H4,4')		
Threshold/ Returning	-	HIGHER (Hypothesis H5)		HIGHER (Hypothesis H5')	NONE (Hypothesis H2,2')

Table 11 summarizes the results for Hypotheses H1 – H5. We see that all hypotheses except H2 (indicated by the spotted light grey background) and H5' (indicated by the dark grey background) were supported. Most notably, task risk decreases the amount subjects give in Dictator games (H1) and increases the threshold responders set in Ultimatum games (H5), and these effects are stronger when subjects are more risk averse (H1'), thus supporting ERC (Bolton & Ockenfels, 2000). As predicted, task risk and risk aversion had no effect on proposing in the Ultimatum game (H3, H3') or on proposing in the Trust game (H4, H4').

Hypotheses H2 and H2' were rejected: Under task uncertainty subjects give larger sums in response, and this effect is stronger when subjects are more risk averse. A

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sessions at CTU and both time of day as well as the exhaustion of that particular subject pool might be responsible for these numbers.

possible interpretation is that people have a preference to reciprocate a certain amount, and that under the uncertainty introduced by the task risk they assumed – on average – that the proposer gave a larger portion than they in fact did. In this interpretation, subjects show, under risk, an attribution bias ascribing low outcomes to bad luck rather than to a lack of generosity on the part of the proposers.

The results for Hypothesis H5' are ambiguous on the interaction effect of task risk and risk aversion. This result is not that surprising given the heterogeneous subject pool, the relatively small number of subjects, and the imprecise measurement of risk aversion (wide intervals due to switching).

Concluding, we believe that our data suggest that theories of fairness and reciprocity ought to be generalized to include risk in the environment as well as risk attitude. Our data also suggest that it is imperative that experimental tests of (such) theories ought to control — preferably even better than we managed to do here — for variables such as risk attitude, age, gender, income, and cognitive ability, among other (socio-) demographic characteristics.

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Appendix

Table A1: The patterns of answers on the Holt-Laury test and the risk aversion interval

1st	2nd	3rd	4th	5th	Interval	Occurrence
Subjects that were consistent in their choices						
RISKY	RISKY	RISKY	RISKY	RISKY	-∞ — 0-0.148	9%
SAFE	RISKY	RISKY	RISKY	RISKY	-0.148 — 0.1404	4%
SAFE	SAFE	RISKY	RISKY	RISKY	0.140 — 0.405	4%
SAFE	SAFE	SAFE	RISKY	RISKY	0.405 — 0.669	4%
SAFE	SAFE	SAFE	SAFE	RISKY	0.669 — 0.961	9%
SAFE	SAFE	SAFE	SAFE	SAFE	0.961 — +∞	24%
Subjects that had fat risk aversion intervals						
SAFE	RISKY	RISKY	RISKY	SAFE	-0.148 — +∞	2%
SAFE	RISKY	RISKY	SAFE	RISKY	-0.148 — 0.96	2%
SAFE	RISKY	RISKY	SAFE	SAFE	-0.148 — +∞	3%
SAFE	RISKY	SAFE	RISKY	RISKY	-0.148 — 0.669	2%
SAFE	RISKY	SAFE	RISKY	SAFE	-0.148 — +∞	1%
SAFE	RISKY	SAFE	SAFE	RISKY	-0.148 — 0.961	2%
SAFE	RISKY	SAFE	SAFE	SAFE	-0.148 — +∞	3%
SAFE	SAFE	RISKY	SAFE	RISKY	0.140 — 0.961	3%
SAFE	SAFE	RISKY	SAFE	SAFE	0.140 — +∞	1%
SAFE	SAFE	SAFE	RISKY	SAFE	0.405 — +∞	2%
RISKY	RISKY	RISKY	SAFE	RISKY	-∞ — 0.961	4%
RISKY	RISKY	SAFE	RISKY	RISKY	-∞ — 0.669	3%
RISKY	SAFE	RISKY	SAFE	RISKY	-∞ — 0.961	4%
RISKY	SAFE	SAFE	RISKY	RISKY	-∞ — 0.669	1%
Subjects that made contradictory choices						
RISKY	RISKY	RISKY	RISKY	SAFE	-∞ — +∞	3%
RISKY	RISKY	RISKY	SAFE	SAFE	-∞ — +∞	4%
RISKY	RISKY	SAFE	SAFE	SAFE	-∞ — +∞	1%
RISKY	SAFE	RISKY	RISKY	SAFE	-∞ — +∞	1%
RISKY	SAFE	RISKY	SAFE	SAFE	-∞ — +∞	1%
RISKY	SAFE	SAFE	RISKY	SAFE	-∞ — +∞	1%
RISKY	SAFE	SAFE	SAFE	SAFE	-∞ — +∞	7%

Instructions:

Welcome! You are about to participate in an economics experiment. You will be asked to make a series of decisions. Your decisions will have payoff consequences that will also depend on other participants' decisions. You will be paid privately in cash immediately after the experiment is over. You will get 1 CZK for each 20 ECU (experimental currency units) that you earn during the experiment.

We ask that from now on you refrain from any communication, whether verbal or nonverbal, with other participants. If you have a question, raise your hand and an experimenter will come to assist you.

Throughout the experiment you will, for every single decision (where applicable), be matched randomly with one other participant. The probability that you will be matched with the same participant for more decisions is therefore rather low.

All in all you will be asked to make 17 decisions. You will be informed about the payoff consequences of any of these decisions only after your have made your last decision.

[Any questions?]

During the experiment we will use the following three basic scenarios (labeled One, Two, and Three). The computer is instructed to match you randomly with some other participant of the experiment in each of these three scenarios (for every decision you will get a new match). You will also be asked about your preferences (Scenario Four). In this Scenario your payoff cannot be affected by the decision of another participant.

Scenario One involves a pie of size S that is being divided between two participants that we call Participant A and Participant B. Task of Participant A is to split the pie of size S in any way he or she sees fit. Participant B is the recipient of what Participant A allocates; he or she will not make any decision in this scenario. Participant A will be asked to state her or his decision as a number between 0 and 100, i.e., as a percentage of pie size S that he or she allocates to Participant B.

[Any questions?]

Scenario Two involves a pie of size S that is being divided between two participants which we call Participant C and Participant D. Task of Participant C is to split the pie of size S in any way he or she sees fit. But now Participant D may either accept the offer or reject it. Participant C will be asked to state her or his decision of how to split the pie as a number between 0 and 100 (the "offer"), representing a percentage of pie size S that he or she offers to Participant D. Participant D will also be asked to state her or his decision whether he or she accepts the offer in a similar way as a number between 0 and 100 (the "acceptance threshold") representing the minimal offer for which Participant D will not reject the offer. If the acceptance threshold of Participant D is higher than the offer that Participant C made, then the offer is not accepted, and both participants will be paid nothing for this scenario. Otherwise, they will be paid in accordance with the split that Participant C proposed.

[Any questions?]

Scenario Three involves Participants E and F. Participant E is endowed with 500 ECU out of which he or she can send any amount of his or her choice (from 0 to 500 ECU) to Participant F (the rest of the 500 ECU endowment stays on the account of Participant E). The amount sent to Participant F will be multiplied by a factor X before it reaches Participant F. It is then task of Participant F to split the amount received (i.e., X times the amount sent) in any way he or she sees fit. Participant E is the recipient of what Participant F allocates.

[Any questions?]

Scenario Four. The computer assigned to you at the beginning of the experiment a natural number N from 1 to 100 (any number 1, 2, 3, …, 100 is equally likely). This number will be revealed to you only at the end of the experiment. You will have to choose one of the two options "+" or "*". On the screen, you have to fill a blank box with your choice of "+" or "*" and then press the "OK" button. Once you have pressed the "OK" button, you will not be able to go back. The computer is programmed to randomly select one of five such decisions you made during the whole experiment at the end of the experiment. For this purpose, the program uses a generator of random numbers. Choosing any of the five decisions in Scenario Four is equally likely. You will be paid at the end according to your choice in the selected decision and your personal N. (Note that in Scenario Four you do not interact with any other player.)

Example: choice +: 1000 ECU if N>40, 1250 ECU otherwise
or *: 60 ECU if N>40, 2400 ECU otherwise

(note that numbers will vary across decisions)

[Any questions?]

[Please turn your attention now to the computer screen but keep these hard copy instructions readily accessible.]

Thank you for participating in the experiment.

The sequencing of the decisions was the same for all participants:

Decision 1: Ultimatum proposal with no risk (pie size 1000)

Decision 2: Risk attitude measurement (n>40, i.e. Choice 1)

Decision 3: Dictator with low risk (pie size 900 or 1100)

Decision 4: Trust game sending with high risk (factor 1.2 or 2.8)

Decision 5: Ultimatum proposal with high risk (pie size 300 or 1700)

Decision 6: Risk attitude measurement (n>50, i.e. Choice 2)

Decision 7: Ultimatum threshold with high risk (pie size 300 or 1700)

Decision 8: Trust game sending with low risk (factor 1.8 or 2.2)

Decision 9: Ultimatum proposal with low risk (pie size 900 or 1100)

Decision 10: Risk attitude measurement (n>60, i.e. Choice 3)

Decision 11: Ultimatum threshold with low risk (pie size 900 or 1100)

Decision 12: Risk attitude measurement (n>70, i.e. Choice 4)

Decision 13: Dictator with high risk (pie size 300 or 1700)

Decision 14: Ultimatum threshold with no risk (pie size 1000)

Decision 15: Trust game return with high risk (factor 1.2 or 2.8)

Decision 16: Risk attitude measurement (n>80, i.e. Choice 5)

Decision 17: Trust game return with low risk (factor 1.8 or 2.2)

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