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Inequity Aversion Alters Risk Attitudes

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Abstract: Misery loves company. In this paper we find that inequity aversion (the change in behavior out of a desire to avoid unequal outcomes) can alter risk attitudes and, in particular, can mitigate loss aversion (the change in behavior and risk attitudes out of desire to avoid losses). Essentially, having someone to take a loss with removes some of the pain of losing. A model of decision making under risk in social context is constructed and tested empirically in laboratory experiments. Social context is understood as the ability to affect, as well as to observe choices and outcomes of others.

Key words: inequity aversion; risk attitudes; loss aversion; framing; social context
JEL codes: D81, D63

1. Introduction

Although multiple studies have been done relating emotions and risk, there are no experimental studies combining social influences on economic decisions, inequity aversion, risk attitudes, loss aversion, and nature of the reference points. Social influences can be generally categorized into two categories: observing others' decisions and affecting others' decisions (Trautmann & Vieider, 2012). Social issues may play a role in decision making even when those decisions do not directly affect the outcomes for other players. Indeed, the observation of others as well as the awareness of being observed by others may influence the agent's actions. Social psychologists have studied this phenomenon extensively (Asch, 1955; Bond & Titus, 1982; Zajonc, 1965; Lerner & Tetlock, 1999; Shafir et al., 1993). The discovery of "the risky shift" (Stoner, 1961) stimulated further research on social effects on risk taking.

Group discussion and consensus, as well as mere being in a social group are shown to result in riskier decisions, compared to decisions made alone (Wallach, 1962, 1964; Cartwright, 1971; Gardner, 2005). Nevertheless, although some attempts have been made (Brock & Durlauf, 2001; Neugebauer, 2009; Lukinova et al., 2014), in economics there is no general theory of social utility, nor there is a distinction between categories (observing and affecting) of social influences on decision making.

Inequity aversion and risk attitudes are studied thoroughly in economics. In fact Kahneman and Tversky's (1979) prospect theory perfectly unites methods and ideas from economics and psychology by unmasking

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deviations in risk attitudes from those predicted by expected utility theory. Social aspects can be incorporated naturally into this framework, for instance through redefining the origin of the reference point, i.e., considering a social reference point as a comparison of your payoffs to those of the others. At the same time, risk attitudes and inequity aversion are only rarely considered in relation to each other (Trautmann & Vieider, 2012). Neoclassical economics considers a framework of choosing between equal and unequal households, where risk averse individual would be willing to trade off expected income in order to achieve a more equal income distribution (Carlsson et al., 2005; Bolton & Ockenfels, 2010). Some scholars suggest that inequality that results from a risky choice does not affect risk attitudes (Bohnet et al., 2008). Others disagree and imply that "a household whose allocation decisions are motivated by equity will exhibit more risk averse behavior than one whose are not" (Chambers, 2012).

Behavioral economics studies report results for relative domains, as well as for absolute domain of gains, but none of them study inequity aversion and fairness motives in the absolute domain of loss. Studies that explore the social domain introduce a social reference point and relative losses and gains frameworks (Fehr & Schmidt, 1999; Bault et al., 2008; Bault et al., 2011; Linde & Sonnemans, 2011). In particular, Linde and Sonneman's study (2011) finds that participants are more risk averse when they can earn at most as much as another player (relative loss situation), than when they are ensured they will earn at least as much as another player (relative gain situation). Here the social comparison is thought to influence risk attitude by providing a reference point. Mere formulation differences or frames have often been found to influence decisions under risk and uncertainty by psychologists in the past (Takemura, 1994; Miller & Fagley, 1991; Sieck & Yates, 1997). Nevertheless, there is no uniform framing effect (Kuhlberger, 1998), as framing effects often interact and may disappear as a result.

Considering these studies, three main areas are lacking coverage. First, although the importance of fairness motives in risky decisions was broadly illustrated by Kroll and Davidovitz (2003), Bolton, Brandts and Ockenfels (2005) and Krawczyk and Le Lec (2010), there is no consensus as to how inequity aversion and fairness affect risk attitudes. Second, is the coexistence of absolute and relative reference points and superimposition of framing effects. In particular, not only another agent's outcome may act as a reference point in a risky choice, but also, if the choice happens in the absolute loss frame, the absolute reference point, i.e., losing nothing, may interfere with the social reference point. Finally, past research has not incorporated social context, both as observation of decisions and profits of other people and the ability to influence other's profit.

The main research question of this study is how inequity aversion affects risk attitudes, in particular, frequency of choosing a lottery, risky option, against a fixed payoff, sure option, (ρ) in a social context. The paper contributes to a broad body of literature by designing experiments and structuring research that focus on all three areas described above.

The second section of the paper outlines the underlying model of individual behavior under risk in the social context, and elaborates on the questions to be posed by the research and the hypotheses testing. The third section details the experimental design. The fourth section contains the results. The final section summarizes and concludes the paper.

2. Theory

If one follows the theory of sociality (Lukinova et al., 2014), individual utility function consists of two components: individual utility function of an outcome and individual social utility component, sociality.

We model decision making under risk in social context using individual's utility function:

$$U_i = U^0{}_i(z_i) + U^1{}_i(z_i, z_j),\tag{1}$$

Where $U^0{}_i(z_i)$ is individual utility function of outcome and $U^1{}_i(z_i, z_j)$ is an additional component of individual's utility function that is inspired by inequity aversion model and its disutility portion (Fehr & Schmidt, 1999), where *i* is an individual and *j* is another participant (an opponent), whose payoffs an individual observes or can control.

Assumption 1: $U^0{}_i(z)$ is concave for absolute gains and convex for absolute losses, i.e., follows Prospect Theory (Kahneman & Tversky, 1979) results of risk aversion in gains and risk seeking in losses.

In prospect theory, the utility function is given by the following two-piece s-shaped form:

$$u(z) = \begin{cases} z^{\alpha} if z \geq 0 \\ -\lambda \times (-z)^{\alpha} if z < 0 \end{cases}\tag{2}$$

It is often assumed that α is less than one and λ is greater than one. When α is less than one, the utility function exhibits risk aversion over gains, but risk seeking over losses. Moreover, if the loss-aversion coefficient λ is greater than one, individuals are more sensitive to losses than gains. This property is called loss aversion. Several studies provide the estimates of parameters in the equation above using experimental data. Tversky and Kahneman (1992) yield the estimates of α = 0.88 and λ = 2.25. In Figure 1 there is a graphical representation of such function.

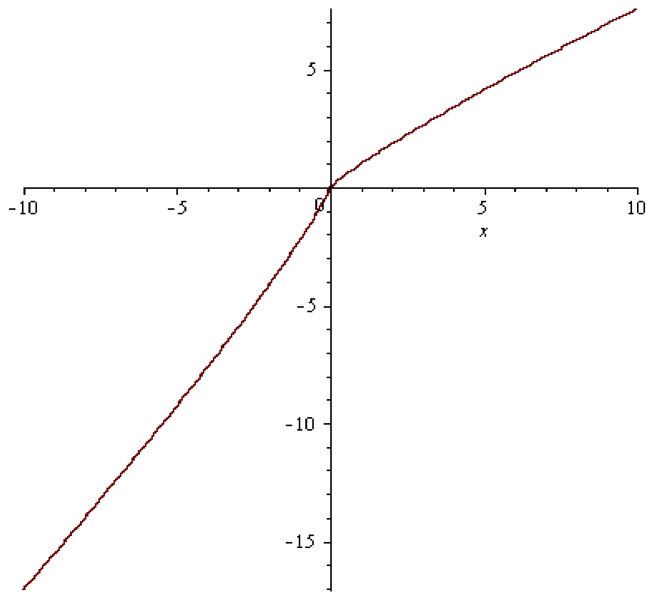

Figure 1 Prospect Theory Utility

Assumption 2: The additional component of utility function $U^1{}_i(z_i, z_j)$ is activated only if participant *i* has any information about outcome of another player.

The inequity aversion model by Fehr and Schmidt, in a two-player game, states that:

$$U_i(z_i, z_j) = z_i - \alpha_i \max\{z_j - z_i, 0\} - \beta_i \max\{z_i - z_j, 0\}\tag{3}$$

Where $i \neq j$,

$z_{i,j}$ is the payoff of player *i* (and opponent *j*),

α_i is a parameter of envy

β_i is a parameter of altruism

$\alpha_i \geq \beta_i; 0 \leq \beta_i < 1$ since the disutility that comes from a position of disadvantage is higher than the disutility that comes from a position of advantage.

Experimental studies provide different estimates of parameters and critique parameters that Fehr and Schmidt use (Shaked, 2006; Yang, 2012). To represent the utility model graphically, values of $\alpha_i = 0.5; \beta = 0.25$ from Fehr and Schmidt (1999) are used. These values are selected, because recent papers (Yang, 2012) portray that distribution of parameters is skewed towards smaller values.

However, if we inherit the disutility portion of Fehr and Schmidt model, a piecewise linear function displayed in Figure 2, then Equation 1 will result in the same function as Prospect Theory suggests in terms of convexity, i.e., second derivative. Thus, risk attitudes will follow Prospect Theory regardless of relative standing of a participant against another.

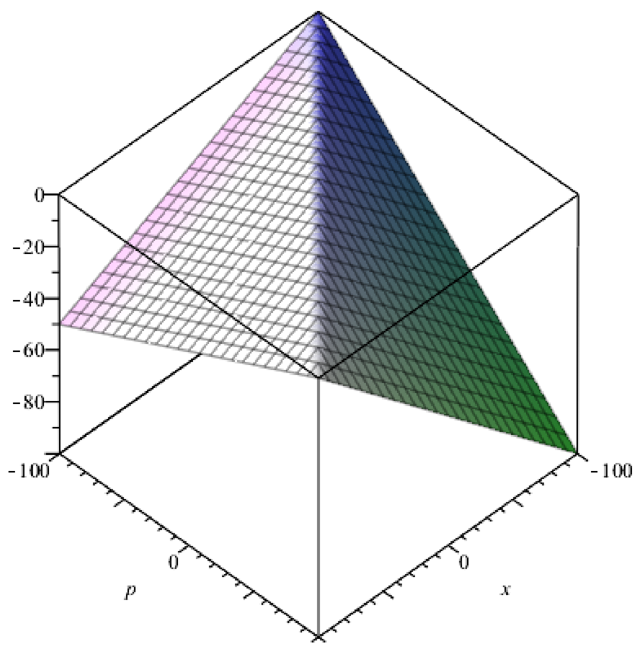

Figure 2 Disutility Portion of Fehr Schmidt Model (z_i is x, z_j is p)

Unlike, we assume that the disutility portion should consist of convex and/or concave pieces in order to be able to change the second derivatives of individual's utility function in Equation 1.

There is no conformity in how inequity aversion and fairness affects risk attitudes. Linde and Sonneman's study (2011) finds that participants are more risk averse when they can earn "at most as much as their referent" (relative loss situation), than when they are ensured they will earn "at least as much as their referent".

We believe that this result can change when relative domain interferes with the absolute domain. In particular, we suggest that misery loves company, so once relative domains can be suppressed and participants regardless of their choice (lottery or fixed) will get the same as their random partner for the trial, they will tend to be more risk seeking, as they are no longer afraid of being the only one to lose a lottery. Once participants start experiencing relative domains they feel differently about it while in absolute losses and absolute gains. In absolute losses one thinks that if his loss of money is compensated by losing less than the others, than he can continue to risk and choose the lottery, but double loss makes him cautious enough to choose the fixed option. In absolute gains, it's the opposite. When participants are winning money and winning against others, they do not need to risk their welfare and their leading place among others and they choose the fixed option. Once the money winning is darkened by losing relative to others, participants risk and choose lottery in order to have chance to win back.

We hypothesize the following:

Hypothesis 1: In absolute losses, for relative loss domain participants are risk averse, for relative gain domain participants are risk seeking, $x = z_i - z_j$.

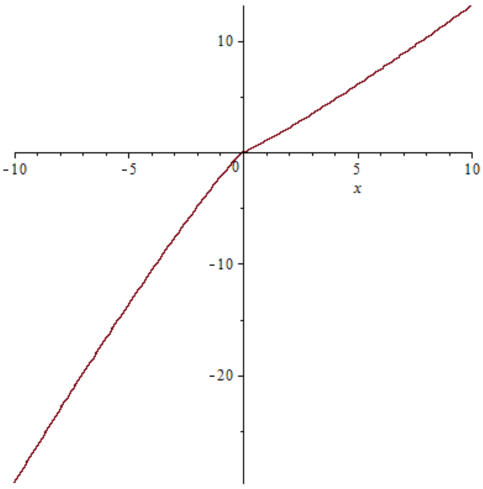

Figure 3 Absolute Losses

Hypothesis 2: In absolute gains, for relative loss domain participants are risk seeking, for relative gain domain participants are risk averse, $x = z_i - z_j$.

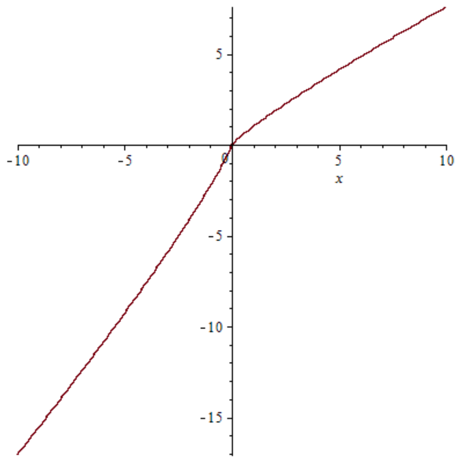

Figure 4 Absolute Gains

Hypothesis 3: When relative domains are suppressed participants are risk seeking both in absolute gains and absolute losses.

Hypothesis testing:

A simple test of hypotheses is done by comparing frequencies of choosing a lottery, risky option, against a fixed payoff, sure option, (ρ) in alone and social conditions. Choosing lottery more than 50% of trials is considered risk seeking behavior, whereas choosing lottery less than 50% of trials is considered to be risk averse behavior.

3. Experimental Design

Participants for the experiment are recruited from the students of Moscow Institute of Physics and Technology (MIPT). MIPT Experimental Economics laboratory is used to carry out all experiments. The experimental design underwent series of transformations with 3 groups of experiments (Group 1: 7032014, 14032014, 15032014; Group 2: 21032014, 22032014; Group 3: 29032014, 4042014, 5042014, 11042014, 12042014) included in the following timeline:

Table 1 Experiments Summary (Participants, Trials)

Date	Participants	Trials (Control)	Trials (Observe, Dictate)	Trials (Interact)	Trials counted
7032014	12, same in gains and losses	12	12	12	2 in each block from hat
14032014	12, same in gains and losses	12	12	12	2 in each block from hat
15032014	12, same in gains and losses	12	12	12	all
21032014	12, same in gains and losses	16	32		1 in Control, 2 in Observe&Dictate
22032014	12, same in gains and losses	16	32		1 in Control, 2 in Observe&Dictate
29032014	12 in gains	4	8	4	1 in Control&Interact, 2 in Observe&Dictate
29032014	10 in losses	4	8	4	1 in Control&Interact, 2 in Observe&Dictate
4042014	12 in losses	4	8	4	1 in Control&Interact, 2 in Observe&Dictate
5042014	10 in gains	4	8	4	1 in Control&Interact, 2 in Observe&Dictate
11042014	12 in losses	1	2	1	all
12042014	16 in gains	1	2	1	all

Table 2 Experiments Summary (Sequence, Random Draw)

Date	Sequence	Random draw
7032014	Control->Observe->Dictate->Interact (first gains, then losses)	Card from a Hat
14032014	Control->Observe->Dictate-> Interact (first losses, then gains)	Card from a Hat
15032014	Observe -> Dictate -> Control -> Interact (first gains, then losses)	Card from a Hat
21032014	Control->Observe ->Dictate (first gains, then losses)	Computer
22032014	Control-> Observe (with photos) -> Dictate (first gains, then losses)	Computer
29032014	10 quest (hypothetical lotteries,)-> Control->Observe->Dictate->Interact-> Red/Blue game pieces (8 periods, (50, (100,0) game)	Computer
29032014	10 quest (hypothetical lotteries,)-> Control->Observe->Dictate->Interact-> Red/Blue game pieces (8 periods, (50, (100,0) game)	Computer
4042014	10 quest (hypothetical lotteries,)-> Control->Observe->Dictate->Interact-> Red/Blue game pieces (8 periods, (50, (100,0) game)	Computer
5042014	10 quest (hypothetical lotteries,)-> Control->Observe->Dictate->Interact-> Red/Blue game pieces (8 periods, (50, (100,0) game)	Computer
11042014	10 quest (hypothetical lotteries,)-> Control->Observe->Dictate->Interact-> Red/Blue game pieces (8 periods, (50, (100,0) game)	Computer
12042014	10 quest (hypothetical lotteries,)-> Control->Observe->Dictate->Interact-> Red/Blue game pieces (8 periods, (50, (100,0) game)	Computer

Table 3 Experiments Summary (Sequence, Random Draw)

Date	Parameters	Money
7032014	fixed = Expected Value (lottery); 40% and 50% with a ratio (2:3) lotteries different in value	Coefficient calculated after all rounds, averaged at 1000 rubles
14032014	fixed = EV (lottery); 40% and 50% (2:3) lotteries different in value	Coefficient calculated after all rounds, averaged at 1000 rubles
15032014	fixed = EV (lottery); 40% and 50% (2:3) lotteries different in value	Coefficient calculated after all rounds, averaged at 1000 rubles
21032014	fixed = EV (lottery), fixed < EV(lottery), fixed > EV (lottery), 50% lotteries (0,10); (0,20)	Money conversion announced before losses part: 1000 rubles +balance (after gains and losses)*10
22032014	fixed = EV (lottery), fixed < EV(lottery), fixed > EV (lottery), 50% lotteries (0,10); (0,20)	Money conversion announced before losses part: 1000 rubles +balance (after gains and losses)*10
29032014	fixed = EV (lottery); 50% lotteries only with 0	Everything in real money (lotteries (0,100)vs 50; (0,200) vs. 100 x2; (0,300) vs. 150)
29032014	fixed = EV (lottery); 50% lotteries only with 0	Everything in real money (given 2000 rubles in the beginning) (lotteries (0,-100)vs -50; (0,-200) vs. -100 x2; (0,-300) vs. -150)
4042014	fixed = EV (lottery); 50% lotteries only with 0	Everything in real money (given 2000 rubles in the beginning) (lotteries (0,-100)vs -50; (0,-200) vs. -100 x2; (0,-300) vs. -150)
5042014	fixed = EV (lottery); 50% lotteries only with 0	Everything in real money (lotteries (0,100)vs 50; (0,200) vs. 100 x2; (0,300) vs. 150)
11042014	fixed = EV (lottery); 50% lotteries only with 0	Everything in real money (given 2000 rubles in the beginning) (lotteries (0,-200) vs. -100)
12042014	fixed = EV (lottery); 50% lotteries only with 0	Everything in real money (lotteries (0,200) vs. 100)

Experiments differed in reality of conditions: real money versus points, number of trials: many trials with 10% randomly selected trials counted or just few, all of them counted, nature of a random draw, and lotteries parameters. In the absolute losses frame, participants were endowed with a certain number of points or money. Participants were not able to lose their own money in these experiments. In some experiments a draw from a hat was used to decide the outcome of the lottery, or trials counted towards the final score. The former used two sets of cards, with pleasant and unpleasant picture, representing win or a loss in the lottery, consequently. The latter used a set of cards with numbers of each trial on them.

Three experiments of Group 1 shared two main design characteristics. First, all three were in points with a money conversion only at the end of experiment, resulting in the average of 1000 rubles among participants payoffs. Second, these experiments used a scheme of drawing a card from the hat, so that all participants that choose the lottery either win or lose together. Experiments of Group 2 have an exact money conversion rate given to participants before the experiment started and vary the fixed option to be not only the same as the expected value of the lottery, but also bigger and smaller. Group 3 experiments use lotteries in real money and added hypothetical lotteries and Red/Blue game pieces stages to the experimental timeline.

Participants completed tasks, which were independently randomized along the following dimensions: order of condition blocks (Alone, Social (multiple variations)), gamble outcomes (absolute gains, absolute losses) and order within each condition.

Alone condition (Control): Participant chooses C (fixed constant) or L (lottery) in a series of choices.

Social condition (Observe): Participant alternates choices with another participant in a series of “rounds”. The participant goes second on each round. On each round, the other participant’s decision is shown on the screen (options are presented together with decision made, outcome is shown), then the participant is presented with the same options and independently makes a choice and receives outcome. At the end of the round, other’s outcome and the participant’s outcome are juxtaposed on the same screen to highlight the equality/inequality, relative domain of that round.

Social condition (Interact): Participant makes a choice between C and L. Only if he and his random partner for the round both choose L, they will play a lottery (the same lottery outcome for both of them). Otherwise, each gets a fixed payoff. In other words the game now can be represented in matrix form in Table 4 and regardless of the decision in every trial participants are shown their decision and outcome and random partner's decision and outcome.

Table 4 Interaction Matrix Form

	Your random partner chooses C	Your random partner chooses L
You choose C	C	C
You choose L	C	L

Example: C = -10; L (-15,-5) 50%

Only if both participants choose lottery they will each get the same amount, either -15 or -5 with 50% probability. Otherwise they both get -10.

Social condition (Dictate): Participant makes a choice between C and L for himself and for a random partner. If the participant chooses L, he and his random partner will play a lottery (the same lottery outcome for both of them). Otherwise, each gets a fixed payoff.

There were additional stages for experiments of Group 3, such as hypothetical lotteries, i.e. questionnaires where participants indicated whether they will choose to play a particular lottery that will not affect their monetary payoff, and Red/Blue game pieces. For the latter participants were divided equally into red and blue players. Then, participants choose in a sequence of trials whether they want to play the lottery or not and their decisions are recorded. At the end of this stage either blue or red card is drawn and this determines the winning color, therefore, the players of the same color win the lottery in all trials they choose to play the lottery.

4. Results

Result 1: Risk seeking is predominant in absolute losses regardless of relative framing.

Hypothesis 1 is rejected. Risk seeking rather than risk averse behavior is seen for potential relative loss condition in absolute losses. Unlike, Hypothesis 1 is supported with risk seeking behavior for potential relative gain condition in absolute losses. Nevertheless, there is no consistency among different groups of experiments as shown in Table 5.

In the absolute gains experiments Hypothesis 2 is not supported. Although in potential relative gains risk averse behavior for experiments of Group 3 and risk seeking behavior in potential relative losses supports the hypothesis, other experimental groups do not go along with the hypothesis. For example, for experiments of Group 1 in absolute gains potential relative gains result in risk seeking behavior and potential relative losses – in risk neutral behavior.

Table 5 Cumulative Results

	Absolute Gains			Absolute Losses		
	Potential Relative Gains	Potential Relative Losses	Relative Domains Removed	Potential Relative Gains	Potential Relative Losses	Relative Domains Removed
Hypotheses	Risk-averse	Risk-seeking	Risk-seeking	Risk-seeking	Risk-averse	Risk-seeking
Group 1	Risk-seeking	Risk-neutral	Undetermined	Risk-seeking	Risk-seeking	Risk-seeking
Group 2	Undetermined	Undetermined	Risk-averse	Risk-seeking	Risk-seeking	Risk-averse
Group 3	Risk-averse	Risk-seeking	Risk-seeking	Risk-averse	Risk-averse	Risk-seeking

Result 2: Risk seeking is seen regardless of absolute framing, when participants cannot lose to or win over one another.

In the condition of suppressed relative framing, i.e., when participant and his random opponent win or lose equally in terms of payoffs, Hypothesis 3 is supported with risk seeking in both absolute losses and absolute gains for experiments of Group 3 and in absolute losses for experiments of Group 1. Experiments of Group 2 seem to be outliers with risk averse behavior in both absolute losses and gains frameworks.

Result 3: Females were more risk seeking than males regardless of whether the choice was framed in gains or in losses.

For our student sample females are riskier than men, both in gains (58% of times choosing the lottery for females against 52% for males) and in losses (63% against 57%), unlike the majority of the studies that suggest male participants to take more risks than female participants (Byrnes, 1999). The key role in such discrepancy plays the singularity of our sample. In Moscow Institute of Physics and Technology (MIPT) females constitute only 10% of the student community. From evolutionary standpoint this seems puzzling, since each male have a lesser chance to find a mate and, thus, needs to take more risks than with balanced sample (50% females, 50% males) to ensure his survival.

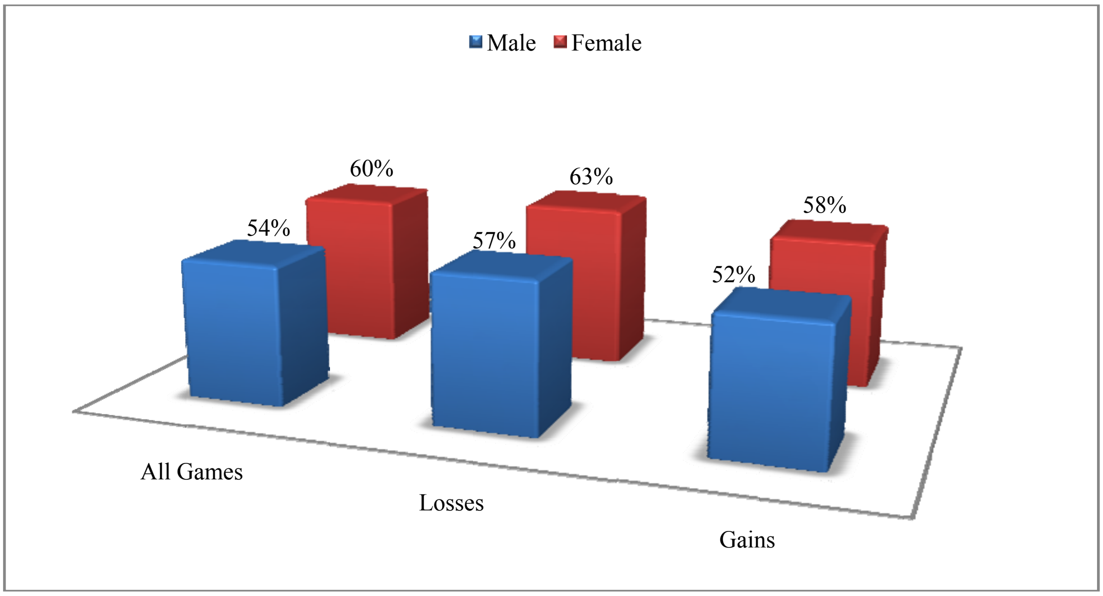

Figure 5 Risk Attitudes in the Lotteries by Gender

Below we describe the most interesting results for each group of experiments separately.

Experiments in points (*Group1*)

Result 4: Risk seeking in absolute losses is higher in potential relative loss situation compared to being alone.

Risk seeking is more pronounced in "Observe" condition when other wins the lottery in losses compared to "Control" condition when participant acts alone. This means that in absolute losses when the participant is potentially losing to the other, risk-seeking is observed, or hypothesis 1 is rejected.

There is no change from baseline in absolute losses when other loses the lottery in "Observe" condition. In absolute gains there is no change (or slight change) if the other wins the lottery. Other modifications do not show any change or consistent change patterns compared to control. The following results are represented in Table 6 (percentage of choosing the lottery) and graphically in Figures 6 and 7.

Table 6 Results (Group 1)

Gains	Control	Observe Fixed	Observe Lottery Win	Observe Lottery Lose	Dictate	Interact
7032014	54%	71%	65%	48%	53%	63%
14032014	50%	41%	50%	75%	49%	44%
15032014	43%	51%	44%	58%	50%	40%
Losses	Control	Observe Fixed	Observe Lottery Win	Observe Lottery Lose	Dictate	Interact
7032014	71%	59%	80%	66%	75%	71%
14032014	62%	67%	67%	67%	68%	65%
15032014	47%	66%	47%	56%	38%	67%

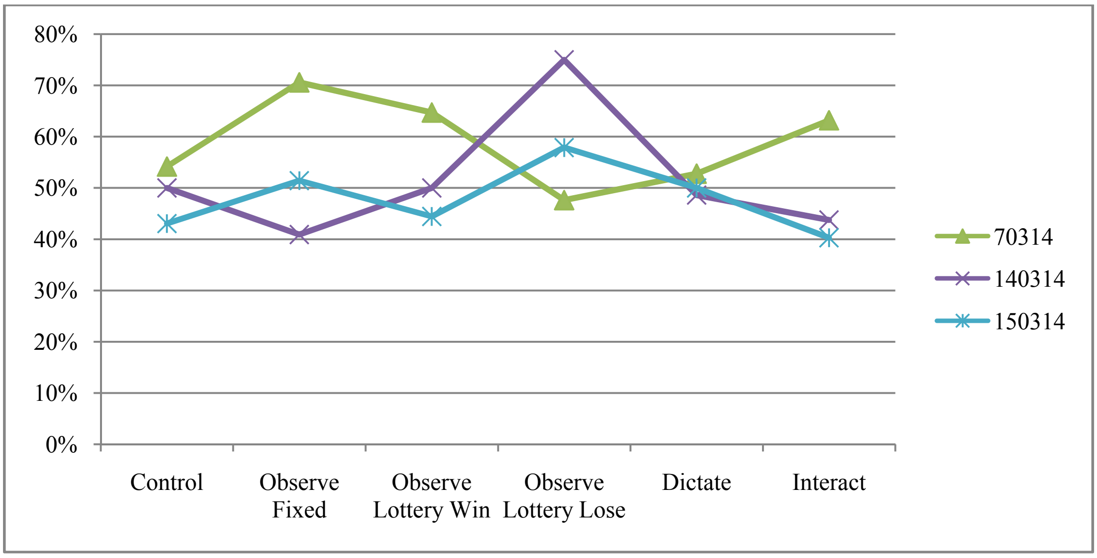

Figure 6 Percentage of Choosing a Lottery (Gains)

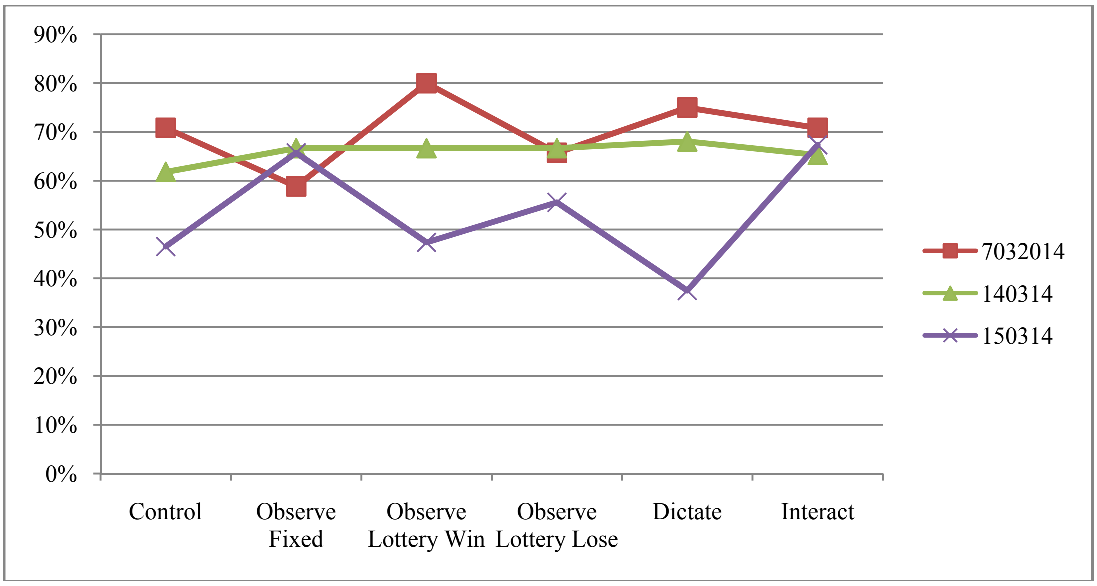

Figure 7 Percentage of Choosing a Lottery (Losses)

Result 5: For absolute losses subjects that exhibit risk seeking individually continue exhibiting risk seeking in the social condition.

Individually, risk-seeking participants in losses showed more consistency in their choices, than in gains (69% in losses on average against 61% in gains continued to be risk-seeking). Consistency means that with the introduction of social context 69% subjects in absolute losses that were risk-seeking in Control stayed risk-seeking.

Table 7 Individual Results (Group 1)

Out of risk-seeking subjects in the control only the following percentages stayed risk seeking in the treatments					
Gains	Observe Fixed	Observe Lottery Win	Observe Lottery Loss	Dictate	Interact
100%	62%	59%	62%	41%	83%
Losses	Observe Fixed	Observe Lottery Win	Observe Lottery Loss	Dictate	Interact
100%	64%	72%	49%	79%	82%

Experiments (*Group 2*)

Result 6: When lotteries are modelled with running average, participants maximize their utility to decide whether to choose lottery or fixed option.

Most of the similar studies that study risk attitudes approximate individual utility function by estimating parameters from experimental data. It is possible to do so, when the fixed option is not only the same as the expected value of the lottery, but also is bigger and smaller, i.e., model lotteries with running average as a fixed option.

Unfortunately, this type of task was considered by students of MIPT as a simple math task of calculating expected value and maximization of utility, thus, did not give any interesting data for further estimation. Students provided us feedback at the end of experiment that during this series of experiments they were simply comparing the fixed option to the expected value and choosing the option that gives them more money.

Table 8 Percentage of Choosing the Lottery (Group 2)

Gains 21032014	Control	Observe Fixed	Observe Lottery Win	Observe Lottery Loss	Dictate
Type 1	88%	100%	90%	82%	90%
Type 2	69%	60%	73%	89%	60%
Type 3	29%	32%	13%	0%	22%
Losses 21032014					
Type 1	93%	100%	94%	97%	89%
Type 2	58%	50%	75%	57%	56%
Type 3	22%	19%	25%	40%	15%
Gains 22032014					
Type 1	35%	82%	77%	68%	69%
Type 2	63%	54%	25%	44%	52%
Type 3	50%	18%	38%	0%	31%
Losses 22032014					
Type 1	43%	92%	95%	76%	83%
Type 2	54%	48%	58%	56%	44%
Type 3	42%	17%	29%	20%	15%

All lotteries were divided into three general types: Type 1: Fixed Value < Expected Value of the Lottery, Type 2: Fixed Value = Expected Value of the Lottery, and Type 3: Fixed Value > Expected Value of the Lottery. Results in Table 6 for lotteries of Type 1 and Type 3 support the fact that most of the subjects interpreted the experimental as a mathematical task, more so on the first experimental day, than on the second.

Kahneman and Tversky prospect theory was also not supported with these experiments, in particular, we saw surprisingly more risk seeking behavior in gains than in losses according to Type 2 lotteries comparison for gains and for losses.

After conducting experiments with points and receiving the feedback from participants we decided to continue with more realistic conditions, in particular, adding real money to all stages of the experiment.

Experiments in real money (*Group 3*)

Result 7: Participants reveal increase in risk-averse behavior with increase in lottery expected values regardless of framing.

Hypothetical lotteries or questionnaires about lotteries give an opportunity for participants to reveal their risk attitudes while facing a variety of options in rubles and euro (the fixed amounts equaled expected values of lotteries and were as follows: 50 rubles, 300 rubles, 400 rubles, 500 rubles, 50 euro, 5000 rubles, 300 euro, 400 euro, 500 euro, 5000 euro). Prospect Theory is supported by hypothetical lotteries with more risk seeking in losses, than in gains. Consistent across all experiments in this group risk-aversion was more pronounced when stakes are high, regardless of whether the choices are framed in gains or in losses. However, 5000 rubles was an outlier from a steady decline. One explanation could be that this amount is far beyond their consumer goods basket, and was the first amount of this sort.

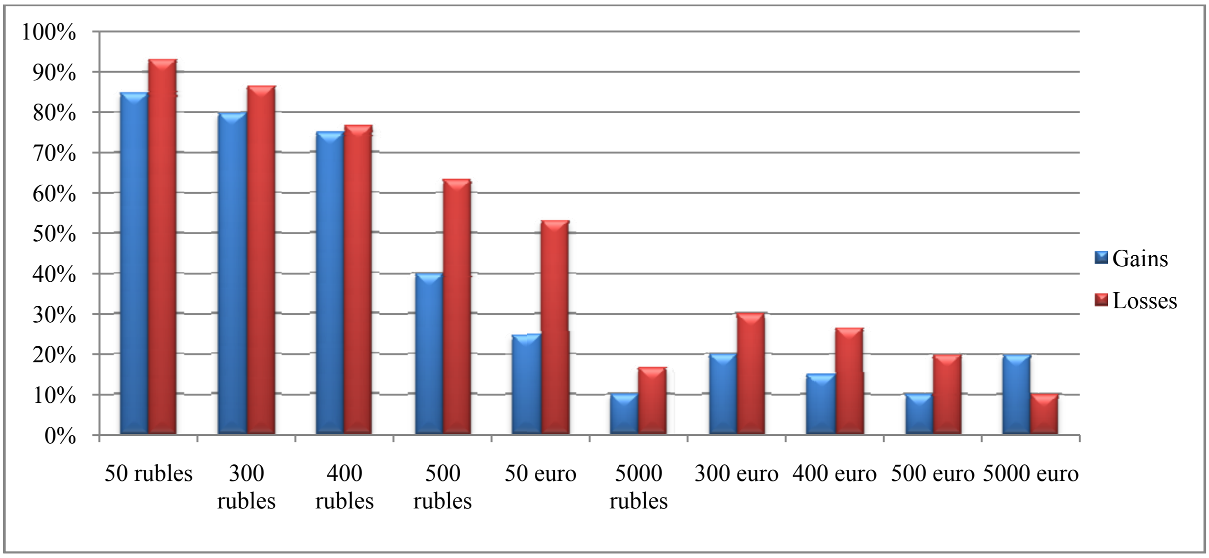

Figure 8 Hypothetical Lotteries

Result 8: With a decrease in number of trials four fold risk seeking is seen regardless of absolute framing and it decreases in social conditions if compared to acting alone.

Risk seeking for experiments 11042014 and 12042014 of Group 3 that consisted of one trial only is seen both in absolute gains and absolute losses. Moreover, risk seeking declines significantly for all social conditions if compared to alone condition. Other experiments of Group 3 that consisted of four trials did not follow this pattern.

One explanation for such change in behavior from four trials to one is that among 4 trials wins and losses in each trial may cancel out, whereas with 1 trial there is exactly one loss or one gain. Opportunity to update beliefs with 4 trials can be another explanation for different patterns of behavior. Overall among Group 3 there is no consistency in dynamics for dictator, interaction conditions compared to control, and control itself. There is consistency in observing fixed (decline in risk taking for gains, increase in risk taking for losses) and in observing lottery win (increase in risk taking for gains and decline in risk taking for losses).

Table 9 Results (Group 3)

Gains	Control	Observe Fixed	Observe Lottery Win	Observe Lottery Lose	Dictate	Interact
29032014	50	37.5	64.3	40	57.5	65
5042014	60	48	62.5	55.5	55	60
12042014	75	25	56	67	69	69
Losses	Control	Observe Fixed	Observe Lottery Win	Observe Lottery Lose	Dictate	Interact
29032014	65	85.7	53.3	72.7	72.5	70
4042014	58	76	55.5	46	58	58
11042014	83	100	80	40	75	83

Another stage of experiment, Red/Blue game pieces, resulted in a slight difference between gains and losses, with 45% choosing the lottery in the former and 52% choosing the lottery in the latter. However, dynamics of participants' decisions did not follow a unique pattern.

5. Conclusion

Our main results showed that in general social context and inequity aversion within it do alter the risk attitudes. Although we were not able to distinguish consistent patterns of behavior change for our experimental group of students, some of the main results are worth repeating. Misery loves company, indeed, participants are eager to take more risk when this does not affect their relative standing in a social group. Improving reality of experimental conditions, i.e., going from experimental points to real money, changes risk attitudes in social condition: while losing relative to the other in absolute losses, participants are ready to risk experimental points, but not real money. Number of trials also significantly changes risk attitudes patterns, so that participants are eager to take risk even in absolute gains.

It is worth noting that our experimental group, a group of students from Moscow Institute of Physics and Technology, is a specific group, where almost everyone is able to calculate expected utility of a prospect and, thus, perform, utility maximization technique. In some sense experimental group that we use is similar in their quantitative skills to a group of individual investors or investment analysts. Thus, our results can be applied to decisions about investments into businesses and stock market. Imagine a group of investors that decide whether to invest or not in a specific risky asset, e.g., decision to hold a share or invest into a project. If one of the investors announces his decision to invest or information about his decision becomes available to others, more investors will follow and decide to invest. This happens because it is easier to risk more, when you know that in this social group of investors, if a loss happens, there will be at least one investor that will also experience this loss and, as we know, misery loves company. Moreover, the more females there are in this group the more investing will happen in the group. Females are shown to be more risk-seeking initially and if information about their decisions will be become available, this will trigger more risk-taking in the whole group. However, the more assets are reviewed at a time (although shares usually are discussed in packages, investment projects can be reviewed separately) the more risk-averse the investors will become, because future win in some assets may cancel warm glow of a loss with somebody for another asset.

Although our main results do not support some of our hypotheses, we still believe that this subject area is worth exploring further. In fact, there is still no conformity in how inequity aversion and fairness affects risk attitudes. As for the nature of the reference points, there is a lot to be done, including the study of their complexity and concatenation. We are confident that a level of complexity is added when relative domain interferes with the absolute domain and this, in turn, is reflected by the position of reference point and alternation pattern of risk attitudes.

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