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### Gender Differences in risk, social, and competitive preference. Experimental evidence from Uzbekistan.

Firuzjon Khayrulloev  
fkhayrulloev@gmail.com

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Gender Differences in risk, social, and competitive preference. Experimental evidence from Uzbekistan.

**May 2021**

**Student: Firuzjon Khayrulloev**

**USF Student ID: 20566487**

**Advisor: Dr. Alessandra Cassar**

## Introduction

Over the past decade, it has been advanced by economists that women are less competitive and less risk tolerant than men. Ors et al. (2013), Gneezy et al. (2003), and Price (2008) found that under competitive pressure, women's performance is markedly less than men's performance. Moreover, Dohmen and Falk (2011), Gupta et al. (2013), and Saccardo et al. (2018) found that females are more risk averse compared to males and they more prefer pay schemes that offer lower but more predictable returns. However, recent research has started to question the less-competitive-female paradigm and demonstrated that, females are as competitive as males, but exhibit it differently.

In this paper we show that competitive behavior critically depends on the type of the rewards structure, because men and women may differently react to a change in the incentive structure. We added option to share of earnings in an otherwise similar environment and found that this type of change in protocol increased women's competitiveness markedly, while leaving men unaffected. This research question is important because it will help us furthering our understanding about societal gender gaps such as gender-wage gap and gender gap in labor market. It is common that competitive fields tend to be payed higher end mostly occupied by men, moreover, majority of representatives among holders of economic and political power are men (Cassar and Rigdon, 2021). The results we got in this paper will offer some promising suggestions for policies intended to close labor market and wage gender gaps, by employing different incentive schemes to increase women's competitiveness.

We hypothesize that the gender gap in competitiveness of the subjects in tournament tasks is due to money-only incentive scheme, where the winner takes all the prize without having the option to share. We tested this hypothesis by including a treatment group where they had socially-oriented incentive to compete (i.e. the winners can share some of the gains with the low performers). We analyze whether gender gap in competitiveness will vanish in this novel environment. We found that our results are consistent with our hypothesis, which is socially-oriented incentives increase competitiveness of females and closes the gender gap.

Next, we provide review of previous literature; in section three we describe experimental design and state our hypothesis; in section four we list procedures of the experiment; section five contains results of the experiment; and final section will conclude and have some discussions.

## Literature:

The Idea that women are less competitive and more risk averse than men have been advanced by many economists. Recent researches, for example, (Ors et al., 2013, Shurchkov, 2012, Gneezy et al., 2004) showed that under competitive pressure the performance of women almost unaffected while men's performance notably increased. Moreover, it was found that women more prefer lower but more predictable returns rather than high-risk, high-return environments (Gupta et al., 2013; Flory et al., 2015; and Saccardo et al., 2018). Next, I review experimental literature on preference differences between men and women, focusing separately on three factors that have been extensively studied: reaction to competition, social and risk preferences.

### Reaction to competition.

In this section we will discuss difference in attitudes toward competition. Croson et al., (2009) states that females are more averse to be engaged in competitive environment than males. Moreover, as the competitiveness of an environment rises, the participation and performance of males rises relative to females. Gneezy, Niederle, and Aldo Rustichini (2003) conducted an experiment in the lab, where they asked subjects to solve mazes for fifteen minutes. The main finding of the paper is that in competitive situation where a winner takes all rewards, men react with extra effort, while women do not. The similar results was obtained in the field study by Gneezy and Aldo Rustichini (2004) where children ran twice over a short track (alone and in pair with opposite gender) with the teacher measuring the speed. Boys' performance increased by .163 seconds in competition, while girls' one improved only by .015 seconds. When children run alone, there was no difference in performance between boys and girls. Moreover, Nabanita Datta Gupta, Anders Poulsen, and Marie-Claire Villeval (2005) find that males competed more against males than against opposite gender.

What if participants had a choice of their own the compensation scheme? The following papers conducted a lab experiments where the subjects had the option of choosing between piece rate and tournament incentive schemes. Niederle and Vesterlund (2007), for example, pointed out that majority of males requested that their performance to be rewarded under the winner-take-all incentive scheme,

while most females choose piece-rate compensation scheme. Controlling for individual ability, they find that majority well-performing females financially hurt themselves by avoiding competing, however, poorly performing males also financially hurt by choosing competition. Similarly, findings by Gneezy and Rustichini (2004); Vandegrift and Brown (2005); and Gupta et al. (2005) suggest that females are less likely to choose to compete than men. Despite, the performance of women who choose to compete is just as well as men in those settings.

To explore whether there are differences between males and females in choosing competitive environments across cultures, Gneezy, Leonard, and List use an experimental approach where they examine a patriarchal society (the Maasai in Tanzania) and a matrilineal society (the Khasi in India). The results show that Maasai men opt to compete two times more than Maasai women. Interestingly, this result is reversed amongst matrilineal society Khasi, where women choose the competition extensively more frequently than Khasi men.

Harbaugh, Krause and Liday (2002) conducted an experiment with children on second, fourth, and fifth grades and compared with the results of the same experiment with older boys from ninth and twelfth grades. Younger boys and girls make the same dictator offers, while older boys make lower dictator offers than older girls. Above two papers showed that gender differences exhibit only later in life, and that “nurture matters”.

## Social Preferences

In modern economic literature social preferences are modeled in the form of reciprocity, inequality aversion, envy or altruism (Matthew Rabin 1993; Gary, Charness and Rabin 2002; G. Bolton and A. Ockenfels 2000; Vai-Lam Mui 1995; G. Becker 1974; J Andreoni 1989).

In this section I will review the literature that demonstrates how strongly social preferences manifest themselves in females and in males. Research from psychology (Carol Gilligan 1982) shows that females are more sympathetic to social cues in determining proper behavior than are males. Two lab experiments, for example, (Eckel and Grossman, 2001; Sara J. Solnick, 2001) examine gender effect in ultimatum setting, and both find that males and females offer the same amount. Interestingly, offers made to males are higher than offers made to females. Studies by Eckel and Grossman showed that females are more likely to accept smaller offers compared to males. However, Solnick (2001) confirms that female subjects demanding more than male subjects.

Eckel and Grossman (1998), conducted another experiment where subjects play a double-blind dictator game with a \$10 pie. The results of the game show that in conditions of anonymity, female subjects give two times more than males to their paired recipient. Bolton and Katok (1995) used less anonymous structure of dictator game with \$10 pie. The results they got was consistent with Eckel and Grossman's findings, where females give more than males. The other four papers run different contexts of dictator game and all four of them conclude that women are more inequality averse in their dictator giving. Moreover, they provide an evidence that females are more sensitive to the social context of the experiment in ways that males are not.

### Risk Preferences

In this section, I will review the experimental literature examining gender differences in risk preferences. A number of previous literature (Catherine C. Eckler and J. Grossman 2008; P. Byrnes, C. Miller, and D. Schafer 1999) conclude that women are more risk averse than men in the vast majority of tasks and environments. Interestingly, Finucane et al. (2000) find difference among white males and females, but not among any other ethnic group. This is principal because it implies there may be cultural biases causing gender differences in risk taking. Another paper by Schubert et al. (1999), who framed a objective probability lottery as losses rather than gains, find that males are more risk averse than females. E. Sunden and J. Surette (1998) finds that gender plays crucial role in asset allocation, by investigation of the allocation of defined contribution plan assets. They conclude that single women were less risk prone than single men. P. Hinz et al. (1997) using data on members of the federal government's Thrift Savings Plan, find that female participants invest their pensions more conservatively than male participants. Similarly, Bernasek and Shwiff (2001), controlling for the gender of the household's decision makers, again confirmed that women tend to be more risk averse. M. Atkinson et al. (2003), however, compared investment behavior of male and female fixed income mutual fund managers, and did not find any significant difference between male and females. These results may suggest that the gender difference may be related to the level of knowledge and wealth constraints. In summary, most papers states that females are more risk averse than males in lab settings as well as in investment decisions in the field, and these results are relatively consistent.

## Experimental Design and Hypothesis

Evolutionary psychology proposes a theoretical framework to explain some of the experimental behavioral differences between males and females (Cosmides & Tooby, 1997). The methodological idea is that a specific trait or behavior, empirically observed, may show us something about the evolutionary forces that contributed to shape it.

In this part I will state the hypothesis of the paper and describe experimental design used. We hypothesize that females may value socially-oriented incentives rather than monetary incentives. It is assumed that females could get important benefits from the option of sharing their gains. However, in most cases experiments which designed to measure competitiveness of the human are focused on the winner-take-all structure. As Darwin (1888) mentioned, this type of protocol may exceptionally fit the nature of the males, excluding the features that may matter for female to compete more.

To test our hypothesis that says adding a socially-oriented option may increase females' competitiveness, the study compares subjects' behavior under two treatment conditions: baseline (where winner takes all) and dictator (where subjects allowed to share their winnings). Conducting an experiment under this type of protocol will allow us to test whether female subjects are indeed motivated to compete more when they can allocate their winnings.

In our experiment we used two activities: first is counting zeros where subjects had to count number of zeros in the table, second is risk tusk where subjects had to choose one of the objective probability lotteries with different risk level. Our outcome of interest is competitive behavior and risk preference of the subjects. Competitive behavior is measured comparing performance of the subjects under two treatments, while risk aversion is measured by comparing the level of risk of the chosen lotteries. The *Baseline* treatment is simple winner-take-all tournament in which subjects individually compete in groups of four: the top two performers in each group are the winners and the bottom two performers are the losers. The two top performers were awarded \$0.50 USD for each correctly solved table and two bottom performers were not awarded.

The Winner:  $x \times \$0.50 = \$0.50x$

The Loser:  $x \times \$0 = \$0$

$x$ —the number of correctly solved tables.

In Dictator treatment the only difference is that the monetary prize is socially oriented, this means we added a sharing option to the contest and let the participants know about it prior the competition task. In this setting the winner, dictator, is awarded a prize ( $\$0.50x$ ) and given the opportunity to re-allocate any amount of his reward to the low performing opponent, the recipient (Cassar & Rigdon, 2021). In our experiment, all subjects in treatment, who are the winner, will be given such a chance to share their prize anonymously with low performers. To sum-up, the monetary incentives are similar across both treatments. However, the only difference is whether the subjects are competing for only money or whether they are contesting for control or influence over re-allocating their prize.

During the experiment we noted three facts that are consistent with findings on Cassar and Rigdon's (2021) paper. First, the all subjects should be incentivized to solve as many tables as they can in both treatments. Second, any subject who is competing only for money will not re-allocate any amount in dictator game. And third, if the subjects are competing only for money the performance of the subjects will be identical across the two treatments. Based on these notes we come up with following hypothesis:

1. Men enter in to competition more than women in winner-take-all tournaments.
2. Adding a sharing option, decreases the gender gap.
3. Men are more risk loving than are women

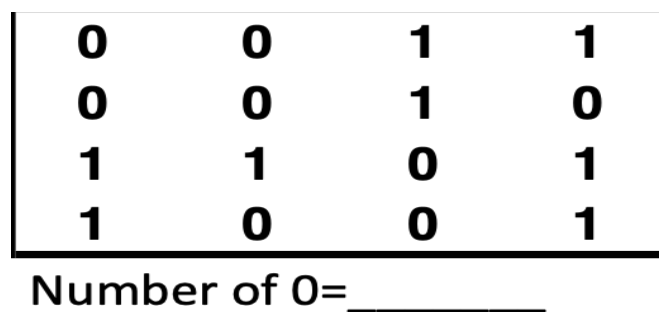
## **Procedures**

The experiment was conducted in Uzbekistan, Samarkand at Institute of Foreign languages and at University of Agriculture. The sample size of experiment is 212: 88 females and 124 males. The experiment consisted of 11 sessions which was conducted between March and April of 2021. Just for showing up we gave to each participant \$1 show-up payment and they had an opportunity to earn more amount based on the decisions they and others would make during the experiment. Participants started the experiment by reading a consent form that was approved by the University of San Francisco Institutional Review Board. The experiment consisted of three activities: 1. A real-effort task tournament called "Counting zeros", 2. A Risk preference assessment "Coin Toss", 3. Final Survey.



For the subjects, each experiment started by reading the instructions explaining the “Counting zeros” task, and incentives structure for their treatment. The all instructions for the experiment were common knowledge to all subjects before the experiment.

Participants were given a sheet consisting of 16 matrixes and in each matrix, they had to count the number of zeros. Each matrix is a 4 x 4 array of the 16 numbers of 1 and 0 (see Figure 1). The subjects were given 35 seconds to solve as much as possible matrixes and wright down their answers under each matrix. Each subject was anonymously grouped with other 3 subjects and form group of four competitors. Next we ranked participants by their score of how many matrixes they correctly solved and informed of their rank and let them know whether they are the winners (top 2 score) or losers (bottom 2 score).



**Figure 1**

In Baseline treatment the top two performers earned \$0.50 per each correctly solved matrix, and the bottom two performers earned \$0. We let the participants know how much they earned right after the tournament. In Dictator settings, however, the two top performers along with earning \$0.50 per matrix will have a chance to re-allocate their earnings from the tournament with one of the two low performers. The total amount earned by two low performers is equal to the amount transferred by two top performers.

To correlate participants’ behavior in the treatment with risk attitudes, we conducted the second task called “Risk task”, which measures the risk tolerance of the subjects. In this activity subjects had to choose which of the six  $\frac{50}{50}$  lottery tickets they wished to play. The firs ticket is risk free ticket: choosing it means that the subject will earn guaranteed \$4.50. The second ticket is coin flip lottery where the subject has a 50% chance to win \$4 and 50% chance to win \$5.50. The ticket number 6 is the riskiest ticket where subjects had 50% chance to win \$2.20 and 50% chance to win \$9.5. Participants were given 1 minute to

choose one of the six objective probability lotteries and mark their choice. After they make a choice the coin was flipped to execute the gamble. Finally, the third activity was filling the survey questionnaire which contained demographic and socio-economic questions, moreover, there was a question about their views toward competition. The subjects on average earned \$9.3 from participating on the experiment.

## Results

The main result of the experiment illustrated in the Figure 2, where vertical axis represents the portion of subjects choosing to compete. The results showed that approximately 61% of the male subjects choose to compete, while only 45% of females chose to compete in the baseline treatment. However, the gender gap in competitiveness vanished in the dictator settings where competitiveness by males decreased to 46%, while females' competitiveness increased to 50%. Our first and second hypothesis are supported by the data: in baseline treatment, we observed a significant 16% gender gap in competitiveness of the subjects; in dictator treatment, the gap vanishes to -4% due to increase in competitiveness by women.

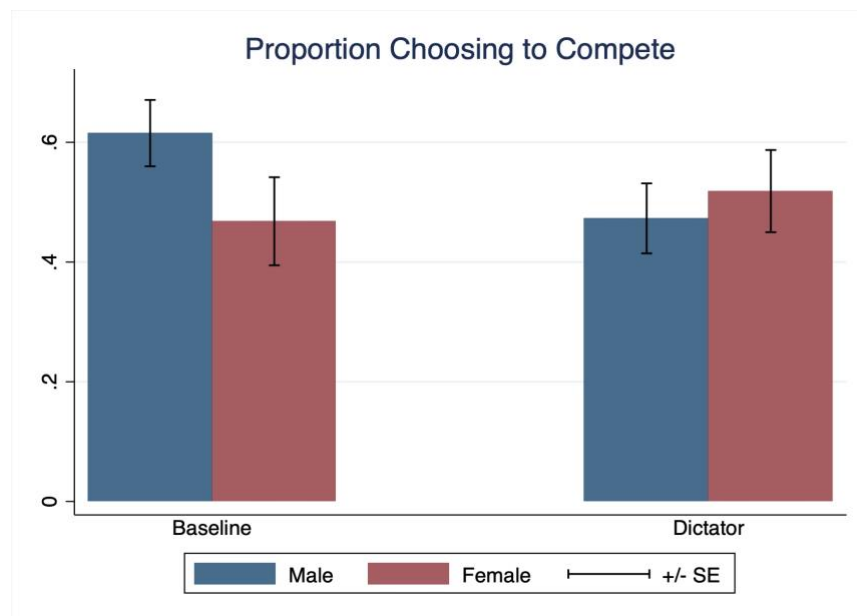


Figure 2

Figure 3a depicts performance of the subjects by gender and treatment for the first activity. From the graph we can see that females overperformed males in all three rounds of the first activity for both

treatments. However, t-test shows that this gender difference is not statistically significant ( $p=0.00$ ). Thus, we can say that there is no significant difference in performance between males and females.

Risk preference and confidence of the subjects illustrated in Figure 3b. Surprisingly, in baseline treatment female students are more risk loving compared to males ( $p=0.6674$ ). In dictator treatment, however, females risk preference markedly decreased while males become riskier. This result shows that, when females are given a chance to reallocate their earnings, they become more conservative and tried to earn more with less risk. The other two columns in the graph represent the level of confidence of the subjects. We can note that in the baseline, females are less confident than males, while in dictator settings the vice versa scenario, girls are more confident than boys.

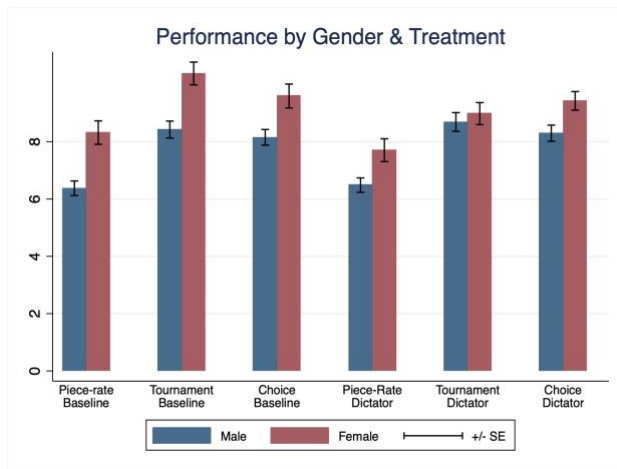


Figure 3a

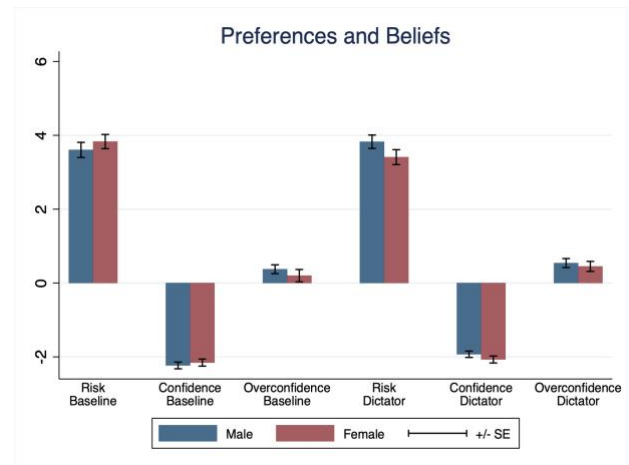


Figure 3b

Our main regression results are gathered in Table 1. Our primary OLS regression model is as following:

$$Compete_i = \beta_0 + \beta_1(Female_i) + \beta_2(Dictator) + \beta_3(Female_i \times Dictator) + \varepsilon$$

Where  $Compete_i$  is our dependent variable and equal to 1 if subject chose to compete and 0 otherwise,  $Female_i = 1$  if female (0 if male),  $Dictator_i = 1$  if dictator treatment (0 if baseline treatment), and  $Female_i \times Dictator_i$  is the interaction effect between  $Female_i$  and  $Dictator$ .

In column 1 we can see OLS results only for female and it has negative and insignificant effect on dependent variable. This means that females are less competitive than males. However, when we added interaction term and other control variables, the coefficient on female become significant and still negative, interestingly, coefficient on interaction term between female and treatment conditions has a

positive effect and it is highly significant (see column 3 Table1). This effect shows that females increase their competitiveness when incentives are socially oriented.

Column 5 shows OLS results only for females, while column 6 depicts only for males. From column 6 it is clear that males in dictator settings of the experiment has a negative effect and it is significant, providing

VARIABLES	(1) compete	(2) compete	(3) compete	(4) compete	(5) compete	(6) compete	(7) compete	(8) compete
female	-0.0308 (0.0700)	-0.108 (0.0990)	-0.174* (0.101)	-0.174* (0.101)			-0.189* (0.107)	0.0396 (0.104)
Dictator		-0.147** (0.071)	-0.188** (0.0899)	-0.187** (0.0939)	0.0431 (0.112)	-0.193** (0.0953)		
<u>FemaleDictator</u>		0.145 (0.140)	0.224** (0.080)	0.223** (0.091)				
Round2Tournament			0.0242* (0.0137)	0.0240* (0.0140)	0.0453** (0.0219)	0.00269 (0.0187)	0.0308 (0.0213)	0.0195 (0.0192)
ACTIVITY2CoinToss			0.0341* (0.0190)	0.0343* (0.0195)	0.0230 (0.0336)	0.0409* (0.0242)	0.0434 (0.0278)	0.0271 (0.0282)
confidence			0.0668 (0.0421)	0.0672 (0.0430)	-0.00115 (0.0682)	0.124** (0.0566)	0.0662 (0.0626)	0.0648 (0.0608)
University				0.00411 (0.0833)	0.0105 (0.137)	0.0143 (0.106)	0.00580 (0.131)	0.00208 (0.111)
Constant	0.508*** (0.0451)	0.586*** (0.0658)	0.416** (0.200)	0.414** (0.205)	-0.0886 (0.334)	0.688** (0.265)	0.320 (0.304)	0.289 (0.256)
Observations	212	212	212	212	88	124	104	108
R-squared	0.001	0.013	0.066	0.066	0.056	0.100	0.080	0.042

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 1**

evidence that males' competitive preference decreases when the incentives are socially oriented. Column 7 represents OLS results only for baseline treatment and column 8 provides OLS results only for dictator settings. We again can see that in the baseline females are less competitive than males. Moreover, these specifications indicate that our results are robust when controlling for a number of different characteristics of the subjects, indicating that selection of participants on observables is not the driver of our results. To control for the probability that responses of the subjects are driven by the differences in risk preferences I added risk parameters in the regressions for each subject, and find no change in the main results.

## Conclusion

Many experiments around the world found that females are less competitive than males. Recent literature and meta-analysis suggest that such gender gap in competitiveness more often appear in individualistic and gender-egalitarian societies rather than at less economically developed traditional societies (Cassar and Rigdon 2021). We hypothesize that having the option to share of their prize may incentivize women to compete more. However, most laboratory experiments are based on the winner-take-all incentive structure, as they appear predominant in the economy. In this paper we showed that the incentive structure plays crucial role to accurately identify the level of competitive performance of the subjects. We showed that under the winner-take-all environment, women demonstrate a lower desire to compete, our treatment group, however, showed that different incentive structure may reduce this gap between genders. Our experiment displays that women react to a different reward which may not be interesting for the men, therefore usual the winner-take-all settings may not illustrate real live competitive situations better than the modified model used in our work which has a sharing option. Our experiments with sharing option showed that there is no difference in competitive performance between male and female, and in some situations, females are more competitive than males. According to Falk and Hermle (2018), gender difference in preference such as trust, reciprocity, altruism and risk have a positive effect on economic development alongside with societal gender equality. Our findings, that socially-oriented incentives increase women's competitiveness, suggests that the incentives that seem equal can be structured differently, socially oriented for example, thus women's competitive performance can be increased.

To conclude, we can say that our work can be useful to address such socioeconomic problems as gender wage gap and women's unemployment. All these problems used to be explained by economists, that women are less competitive. Our experimental findings suggest that these problems can be resolved by using incentive structure in which women are more interested (socially-oriented, for example).

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