The Effect of Information on Gender Differences in Competitiveness: Experimental Evidence

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February 2011

Abstract

An important line of recent literature has found gender differences in attitudes toward competition, with men being more likely to choose competitive incentive schemes, even when factors such as ability and risk aversion are controlled for. This paper examines the effect of information on the gender gap in tournament entry. We present experimental evidence that the competitiveness difference between men and women declines significantly when individuals are given performance feedback before making their incentive scheme choice. The result suggests that policies that reduce uncertainty can reduce the gender gap in tournament entry.

JEL Codes: C91, D83, J16.
Keywords: Experiments, gender, competition, information, incentive schemes.

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I. Introduction:

The issues of gender segregation in occupations and gender disparity in wages have attracted considerable attention in the recent years. In the workplace, gender composition at high-level positions is quite uneven, and in academic settings, there are strong gender-based selection effects into certain programs such as the sciences (see, for example, Blau et al. (2002)).

An important line of recent economic research has focused on conducting laboratory and field experiments to analyze gender and competitiveness. This research has found that tournaments motivate men more than women (e.g. Gneezy et al. (2003), Gneezy (2004)), and that women tend to self-select into competitive incentive schemes less than equally able men (Gneezy and Rustichini (2004), Niederle and Vesterlund (2007)). Giving subjects a choice between tournament and piece-rate incentive schemes, Niederle and Vesterlund (2007) (NV hereafter) find a stark difference: while 73% of males choose the competitive scheme, only 35% of females do. This tendency of women to shy away from competition has been offered as a potential explanation for the observed differences in labor market outcomes, since top-level positions usually involve competitive career paths.

In this paper, we study the availability of information as a potential determinant of the gender gap. In the NV study, participants know only their own performance when they make tournament entry choice. In many contexts, however, individuals have at least some information about the performance of others, sometimes through social interaction and sometimes through performance feedback policies. Especially in organizational and educational settings, principals oftentimes have information about the performance distribution, and how much of this to reveal to agents is a choice variable. Therefore, from a policy perspective it is important to know how the availability of information and the amount of uncertainty interact with men and women's competition decisions. In fact, performance feedback policies have recently received considerable attention both theoretically (Ederer (2009), Ertac (2006)) and in the context of laboratory, field and natural experiments (Azmat and Irriberi (2010), Ertac (2009), Barankay (2010)).

Our experimental manipulation involves giving subjects information about the highest performance in their group in a previous tournament, before they make their tournament entry choice. While our no-information treatment replicates the NV results (men competing significantly more than women do), there is no significant difference in competition percentages across gender when subjects can condition

their decisions on information. Our findings suggest that more transparent performance feedback policies can be useful in reducing the gender gap in self-selection into tournaments and increase the efficiency of the outcome. [1]

The paper is organized as follows: Section 2 presents the experimental design and procedures, Section 3 presents the results, and Section 4 provides a discussion and concluding remarks.

II. Experimental Design and Procedures

We follow the design in NV quite closely, in order to facilitate comparison with their results. The experiment consists of three periods. In each period, subjects work on an addition task for 5 minutes, where they are asked to add sets of five 2-digit numbers. In the first period, subjects work under a piece-rate incentive scheme, where they earn 50 cents per question they solve correctly. In the second period, they are assigned to 4-person groups (composed of 2 men and 2 women), and solve questions under a tournament scheme. Under this compensation scheme, they receive 2 dollars per correct answer, but only if they were the best performer in their group. In case of ties, the winner is determined randomly. The third period gives subjects a choice between the piece-rate and tournament incentive schemes. In NV, competing in this third period amounts to competing with the best performance of the opponents in the period-2 tournament. That is, subjects who chose the tournament receive money if their performance in the third period exceeds the best performance of the others in their group in the second period. The difference between our setup and NV is that before the choice, we give subjects information about the best performance of the others in the group in the period-2 tournament, essentially giving them information about the performance target that they need to surpass for receiving a prize. In order to address the possibility that differences in the subject pool can cause differences in behavior, we also ran two control sessions with 40 subjects, which replicated NV's design. This control treatment did not have the information stage.[2]

[1] Given that males and females have similar performance, the gender gap in entry leads to an inefficient outcome, since lower-ability males over-enter and higher-ability females under-enter.

[2] Experimental instructions are available upon request.

The experiments were conducted at the California Social Science Experimental Laboratory (CASSEL), using undergraduate UCLA students as subjects.[3] In total, 148 subjects participated, 74 men and 74 women. 8 sessions were conducted. Each participant received a $5 show-up fee, a fixed payment of $7 for completing the experiment, plus their earnings from performance. Earnings from performance were calculated by randomly selecting one of the 3 periods and implementing the corresponding payment scheme. A volunteer subject threw a die at the end of the experiment, which determined which period would count for payoffs. Sessions lasted less than an hour, with payments averaging around $20.

III. Results

Performance in the task is significantly higher under the tournament than the piece-rate incentive scheme (Wilcoxon test, p=0.0000), and no significant difference exists in either piece-rate performance or tournament performance across genders (Mann-Whitney test, z=0.97 and z=0.93 for piece-rate and tournament, respectively). Our main result concerns the choice of incentive scheme in the presence of performance feedback. In the information treatment, roughly 44% of the women and 48% of the men choose the tournament. A chi-square test of proportions shows that there is no significant gender difference in the decision to compete (p=0.70).[4] This is in stark contrast to NV's results, where 35% of women and 73% of men chose to compete. Naturally, this difference could come from differences in the subject pool, as well as the fact that the tournament environment is less uncertain than in NV. To account for this, possibility we use data from the control (no information) treatment. When subjects decide without information, 60% of the males and 30% of the females compete. This difference is statistically significant (p=0.056 with a two-sided and p=0.028 with a one-sided test of proportions), replicating NV's results. This suggests that the difference between the two treatments stem from the difference in information rather than subject pool—with information, the proportion of competing women increases, while that of competing men decreases.

An important question is whether the reduction in the gender gap comes from increases in competitive choices by high-performing females, or decreases in the competitiveness of low-

[3] The experiment was computerized using the z-tree software (Fischbacher (1999)).

[4] A two-sample test of proportions also confirms this result, with p=0.69.

performing males, or both. In order to understand this, we consider the choices of males and females with above- and below-median performance in the forced (period 2) tournament, across the information treatments. Figure 1 shows that the reduction in the gap stems mainly from the increase in competitive choices by high-performing females—the competition rate in this group increases from 38% to 65% with information.

<Figure 1 about here>

In addition to the data on incentive scheme choice, we also collected some information on self-professed competitiveness and risk-aversion through an end-of-experiment survey.[5] In order to see the effects of these characteristics on competitive choice, we consider the following regression model:

$$compete = f(\beta_0 + \beta_1 * female + \beta_2 * info + \beta_3 * female * info + \beta_4 * competitive + \beta_5 * risk\text{-}loving)$$

where *info* is the treatment dummy and f(.)= is the standard logit function.

The results of this regression are given in Table 1. The information treatment significantly increases the propensity of women to compete, and self-professed competitiveness and risk-loving are both significant as well.

<Table 1 about here>

IV. **Concluding Remarks**

After the documentation of gender differences in competitiveness, the next natural step in the research agenda has been to understand what types of institutional factors can influence the observed difference. One crucial policy variable in this respect is the availability of information. We find that with more performance information, there is no significant difference between men and women in terms of competitive choice. This suggests that feedback policies that reduce the uncertainty inherent in competitive settings can motivate women to enter tournaments more, and reduce the gender gap. One channel through which the observed effect of information in this paper might be working is ambiguity aversion, since it is subjective beliefs that determine the competition choice. In experiments, gender

[5] Because of a software problem, survey data was lost for 19 subjects.

differences in ambiguity aversion have been found in some contexts but not others (Borghans et al. (2009), Schubert et al. (1999)). Further research that manipulates the type/level of uncertainty/ambiguity is necessary to shed more light into this issue.

Acknowledgments

We would like to thank John List for helpful comments. Seda Ertac acknowledges generous support from the National Science Foundation. We thank Muriel Niederle for making the software for their experiment available, and Tao-Yi Wang for helping with modifications.

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Figure 1: Frequency of Individuals Who Compete, by Gender, Performance and Treatment

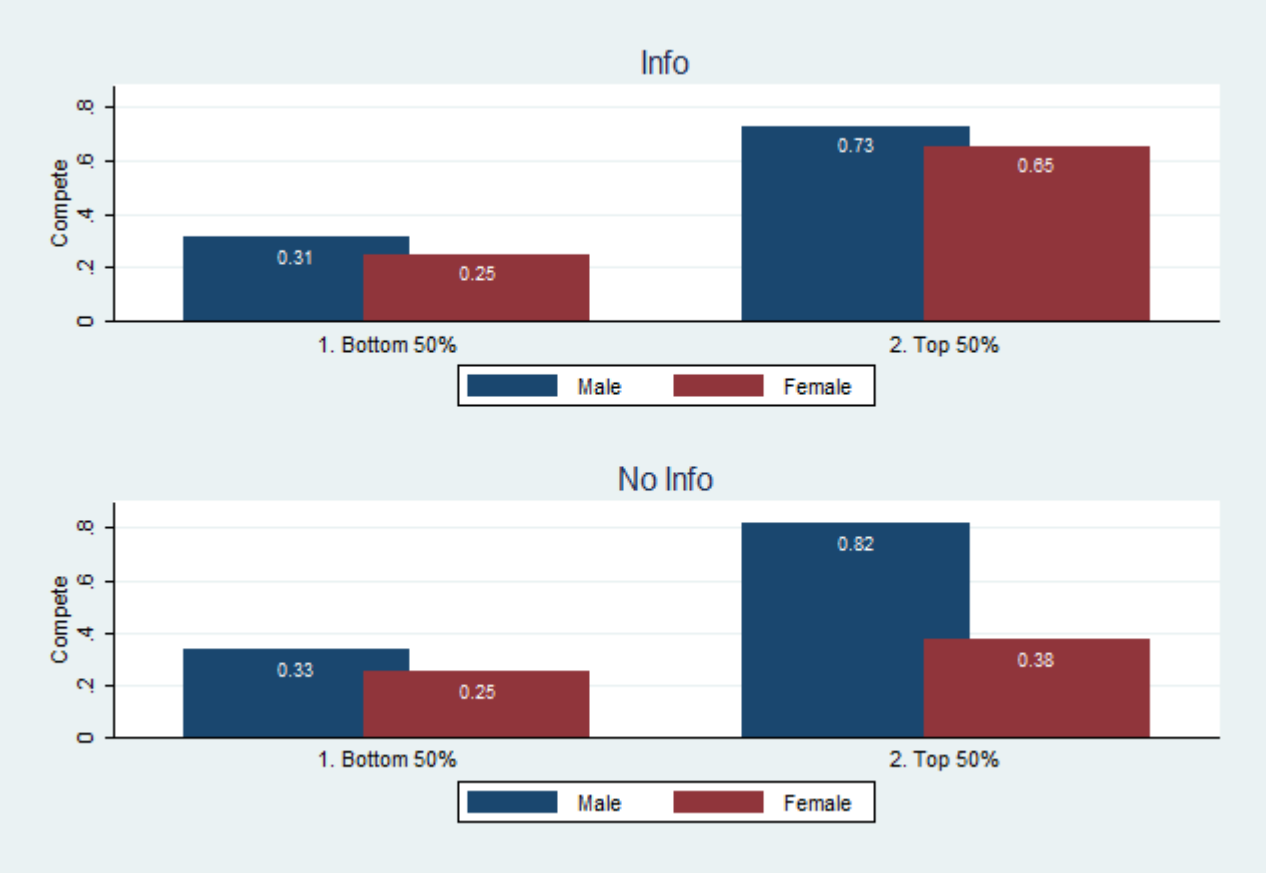

TABLE 1: Logistic Regression of the Decision to Compete

Female	-1.095 (0.708)
Information	-0.672 (0.574)
Female*information	1.697** (0.854)
Risk-loving	0.258** (0.125)
Competitive	0.293** (0.121)

Note: Standard deviations in parentheses beneath the coefficient estimates. *'s denote significance at levels; *** p<0.01, ** p<0.05, * p<0.1. Based on 129 observations.

Appendix:

1. Instructions

Welcome to CASSEL. This is an experiment on decision-making.

In the experiment today you will be asked to complete three different tasks. None of these will take more than 5 minutes. At the end of the experiment you will receive $7 for having completed the three tasks, in addition we will randomly select one of the tasks and pay you based on your performance in that task. Once you have completed the three tasks, we will determine which task counts for payment by drawing a number between 1 and 3. The method we will use to determine your earnings varies across tasks. Before each task we will describe in detail how your payment is determined.

Your total earnings from the experiment are the sum of your payment for the randomly selected task, your $7-payment for completing the tasks, and a $5 show up fee. Please do not talk with one another for the duration of the experiment. If you have any questions, please raise your hand.

Task 1 – Piece Rate

We will now explain you the first task of the experiment. For Task 1 you will be asked to calculate the sum of five randomly chosen two-digit numbers.

You will be given 5 minutes to calculate the correct sum of a series of these problems. You cannot use a calculator to determine this sum, however you are welcome to write the numbers down and make use of the provided scratch paper. You submit an answer by clicking the submit button with your mouse. Your answers to the problems are anonymous.

If Task 1 is the one randomly selected for payment, then you get 50 cents per problem you solve correctly in the 5 minutes. Your payment does not decrease if you provide an incorrect answer to a problem. We refer to this payment as the *piece rate* payment.
ARE THERE ANY QUESTIONS BEFORE WE BEGIN?

Task 2 – Tournament

As in Task 1 you will be given 5 minutes to calculate the sum of a series of five 2-digit numbers. However, for this task your payment depends on your performance relative to that of a group of other participants. Each group consists of four people, the three other members of your group are located in the same row as you (note: each row had 4 people). If Task 2 is the one randomly selected for payment, then your earnings depend on the number of problems you solve compared to the three other people in your group. The individual who correctly solves the largest number of problems will receive $2 per correct problem, while the other participants receive no payment. We refer to this as the

tournament payment scheme. If there are ties the winner will be randomly determined. Please do not talk with one another. If you have any questions, please raise your hand.

ARE THERE ANY QUESTIONS BEFORE WE BEGIN?

Task 3 - Choice

As in the previous two tasks you will be given 5 minutes to calculate the correct sum of a series of five 2-digit numbers. However you will now get to choose which of the two previous payment schemes you prefer to apply to your performance on the third task.

If Task 3 is the one randomly selected for payment, then your earnings for this task are determined as follows. If you choose the *piece rate* you receive 50 cents per problem you solve correctly. If you choose the *tournament* your performance will be evaluated relative to the performance of the other three participants of your group in the **Task 2** -tournament. The Task 2-tournament is the one you just completed. If you correctly solve more problems than they did in Task 2, then you receive four times the payment from the piece rate, which is $2 per correct problem. You will receive no earnings for this task if you choose the tournament and do not solve more problems correctly in Task 3, than the others in your group did in the Task-2 tournament. If there are ties the winner will be randomly determined.

Before you make your choice, you are going to be given information on what the best performance of the three other members of your group was, in Task 2. Remember that if you choose the tournament, this is the performance that you will need to exceed.

The next computer screen will give you the information about group performance, and ask you to choose whether you want the piece rate or the tournament applied to your performance in Task 3. You will then be given 5 minutes to calculate the correct sum of a series of five randomly chosen two-digit numbers.

Please do not talk with one another. If you have any questions, please raise your hand.

ARE THERE ANY QUESTIONS BEFORE WE BEGIN?

2. End of Experiment Survey

Do you consider yourself a "competitive" person? Please rate on a scale of 1 to 10, with 1 being "not competitive at all", and 10 being "extremely competitive". _____

How would you rate your attitudes toward risk on a scale of 1 to 10? (1: I am extremely risk-averse, 10: I am extremely risk-loving) _____

Do you think men or women would do better in this addition task?

Men _____
Women_____
No difference_____

Gender: _____