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Affirmative Action and Team Performance

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Affirmative Action and Team Performance

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Abstract: We experimentally investigate spillover effects of affirmative action policies on team performance and the willingness to work in teams. We find that such policies in form of gender quotas do not harm performance and cooperation within teams, and do not discourage selection into teams.

Keywords: Affirmative action, cooperation, competition, teams, selection, experiments

JEL: D03, C91, C92

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1. **Introduction**

Gender differences in labor market outcomes are a prevalent and hotly debated topic in society and public policy. One finding that has been put forward as a potential explanation for these differences is that women tend to shy away from competition (e.g., Niederle and Vesterlund, 2007; Brandts et al., 2014; Sutter and Rützler, 2015).[2] Affirmative action policies, intended to promote women and to reduce this gender gap, have become a popular tool aimed at diminishing this imbalance. Recent experimental studies examined the efficacy of such programs, showing that they indeed have the desired effect of promoting women without harming efficiency (Balafoutas and Sutter, 2012; Villeval, 2012; Niederle et al., 2013; Calsamiglia et al., 2013). Much less is known, however, about potential detrimental effects of affirmative action policies. The implementation of quotas in tournaments, for example, might create negative spillover effects on subsequent interactions because they are perceived as unfair. Such situations are relevant, for instance, in firms when members of the same team or department compete for a promotion, and afterwards have to collaborate with the very same people again. Discontent about (potentially unfair) promotional decisions that are not solely based on performance might then harm work morale. This, in turn, might negatively affect team performance either in form of reduced effort, or in form of increased adverse behavior.[3] Furthermore, this might also reduce the willingness to work in teams, which is important because firms increasingly rely on the use of team incentives (Lazear and Shaw, 2007). In this study, we provide experimental evidence on the effects of gender quotas in tournaments on performance and selection into a subsequent team task under two different work environments.

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[2] Of course, many other important factors such as discrimination or differences in preferences contribute to the observed discrepancies, too.

[3] See e.g. Leibbrandt et al. (2015) and Fallucchi and Quercia (2016) for studies on affirmative action and sabotage and retaliation, respectively.

2. The Experiment

Our experimental design is based on previous studies on affirmative action (e.g. Balafoutas and Sutter, 2012) and consisted of four stages. In each stage, subjects had to work on a real-effort task, in which they had to add as many sets of five two-digit numbers as possible within 3 minutes. In Stage 1 (*piece-rate*), subjects received a piece-rate of €0.50 for each correctly solved calculation. This serves as our individual measure for productivity.

In Stage 2 (*tournament*), subjects were randomly assigned into groups of four (two men and two women) and had to compete against each other.[4] In the *NoQuota* treatment, the winners were the two group members with the highest number of correct calculations. In the *Quota* treatment, the best–performing woman was always one of the winners. The other winner was the best performing subject among the remaining three group members. Ties were broken randomly in both treatments. The two winners of the tournament received €1.00 per correctly solved calculation, while the other two group members did not receive any payment.

In Stage 3 (*team*), we implemented two treatments aimed at measuring two dimensions of team performance: *effort* and *concealment*. In *Base*, each correctly solved calculation by any group member generated €0.50 for the entire group and was split equally among all four group members (yielding an individual payoff of €0.125). In the *Hide* treatment, procedures were the same as in *Base* except for the fact that before earnings were split, subjects had the opportunity to conceal their true performance by hiding some (or all) of their correctly solved calculations from the group. Each hidden calculation yielded a private benefit of €0.40 but no benefit to any of the other group members. Hence, while hiding effort is individually beneficial, reporting the own performance truthfully is socially efficient.

In Stage 4 (*voting*), subjects could determine the payment scheme themselves by voting for either *piece-rate* (as in Stage 1) or *team incentives* (as in Stage 3). In each group, one vote was randomly selected and implemented for all group members. At the end of the experiment, subjects received feedback about the outcomes of all stages.

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[4] The gender composition of groups was common knowledge, and group composition remained the same until the end of the experiment.

The experiment was run in a 2x2 between-subjects design, leading to four experimental conditions: *Base-NoQuota*, *Base-Quota*, *Hide-NoQuota*, and *Hide-Quota*. The experiment was conducted using z-Tree (Fischbacher, 2007) and subjects were recruited using ORSEE (Greiner, 2015). We conducted two sessions per treatment with either 28 or 32 subjects, leading to a total of 252 subjects. Subjects received a show-up fee of €4 plus their earnings from one randomly selected stage (Stage 1-4).
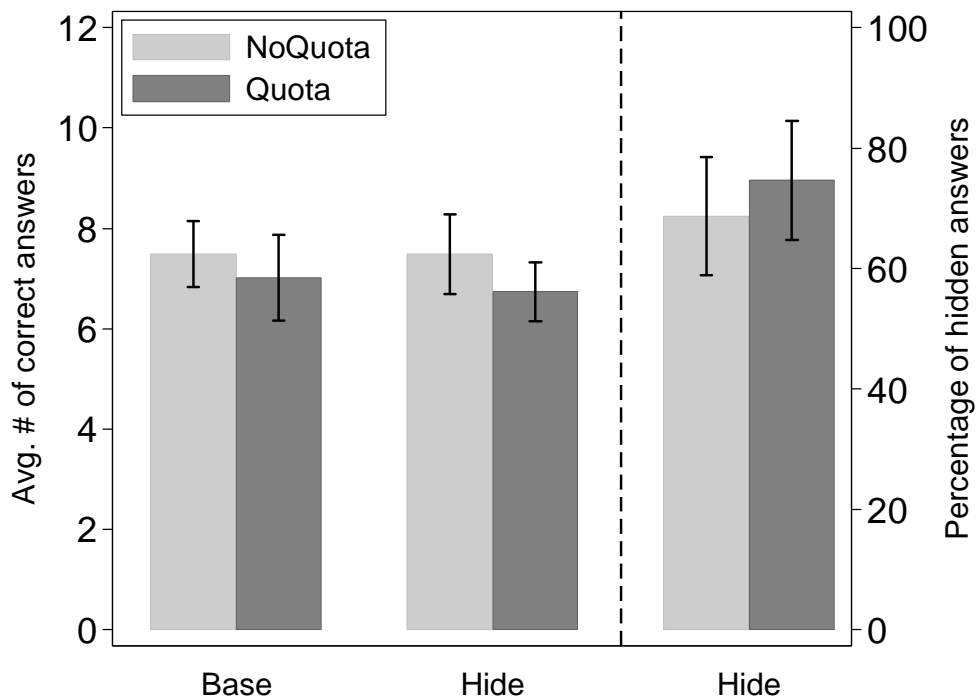

Figure 1: Average number of correctly solved calculations (left) and average percentage of hidden answers (right) in Stage 3 by treatment. Error bars indicate 95% confidence intervals.

3. Results

Similar to previous studies using the same task, we find that men perform slightly better than women and that quotas do not negatively affect tournament performance (see Table A1 in the Supplementary Material).

Figure 1 displays the mean performance in Stage 3, indicating that quotas have no significantly negative effect on team performance. While the number of correctly solved questions is slightly

lower under *Quota*, the effect is not statistically significant, neither in *Base* nor in *Hide* ($p = 0.410$ and $p = 0.363$, respectively).[5] With regard to the concealment of effort, we find an overall remarkably high level of 72% hidden answers, with no significant differences between men and women, and low and high productive subjects. Similar to the previous finding, we do not find a significant difference in the percentage of hidden answers between *Quota* and *NoQuota* ($p = 0.360$).
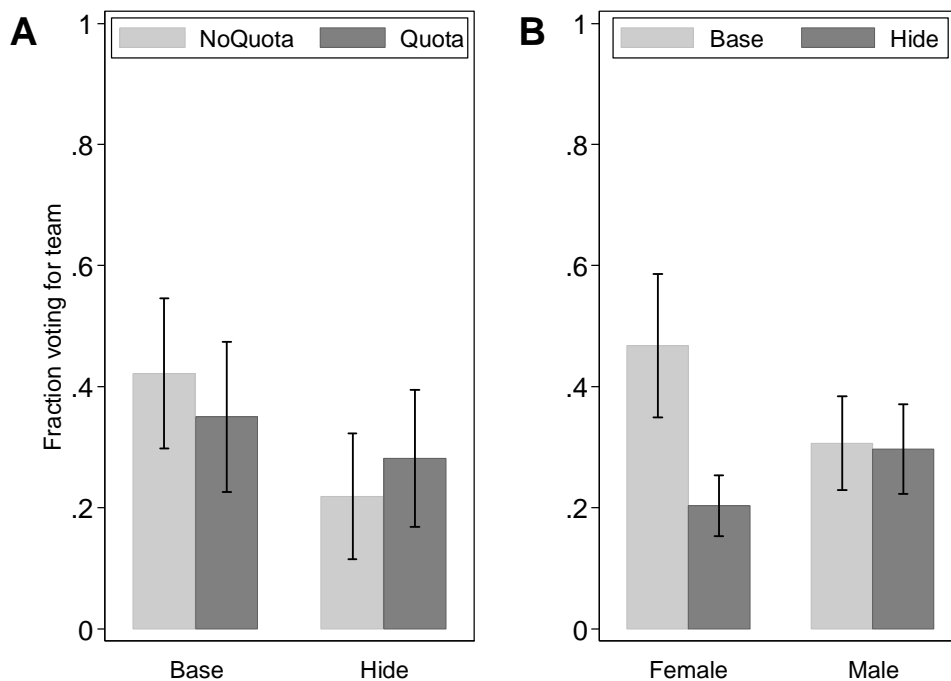

Figure 2: Fraction of subjects voting for team incentives in Stage 4 by treatment (Panel A) and gender answers (Panel B). Error bars indicate 95% confidence intervals.

Figure 2 summarizes the voting decision in Stage 4. Panel A displays the fraction of subjects voting for team incentives in all four treatments. It shows that the quota has no systematic effect on selection into teams. The fraction of subjects willing to work in teams in *Quota* and *NoQuota* is statistically indistinguishable both in *Base* ($\chi^2(1) = 0.674$, $p = 0.412$) and in *Hide* ($\chi^2(1) =$

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[5] If not stated otherwise, we report p-values from OLS regressions using treatment dummies and subjects' performance in Stage 1 (to control for individual heterogeneity in abilities) as independent variables. We cluster standard errors at the individual level (see Table A2 in the Supplementary Material). All results are robust to using non-parametric tests.

0.667, $p = 0.414$). Panel A further shows that adding the possibility to hide effort decreases the attractiveness of team incentives, leading to significantly lower rates of selection into teams ($\chi^2(1) = 5.463$, $p = 0.019$). Regression analysis confirms these results and further reveals that more productive subjects are less likely to select into teams (compare models (1) - (3) in Table 1).

Table 1: Determinants of selection into teams

Independent variables	(1)	(2)	(3)	(4)
Quota *1 if Quota, 0 otherwise*	-0.022 (0.058)		-0.080 (0.082)	
Hide *1 if Hide, 0 otherwise*		-0.136** (0.057)	-0.194** (0.077)	-0.019 (0.085)
Quota × Hide			0.119 (0.114)	
Female *1 if Female, 0 otherwise*				0.123 (0.082)
Female × Hide				-0.235** (0.114)
Productivity	-0.040*** (0.011)	-0.040*** (0.011)	-0.040*** (0.011)	-0.039*** (0.011)
Constant	0.564*** (0.081)	0.621*** (0.084)	0.658*** (0.093)	0.553*** (0.096)
Observations	252	252	252	252
R^2	0.056	0.077	0.081	0.092

Notes: OLS linear probability model. The dependent variable takes the value 1 if a subject voted for team incentives, and 0 otherwise. Productivity is measured as the number of correct solved calculations under piece-rate incentives (Stage 1). Robust standard errors clustered at the individual level are in parentheses. Significance levels * p < 0.1, ** p < 0.05, *** p < 0.01.

Panel B of Figure 2 disentangles the effect of lower selection into the *Hide* environment by gender. Interestingly, this effect is entirely driven by females. While men select into teams equally often in *Base* and *Hide* (31% vs. 30%, $\chi^2(1) = 0.014$, $p = 0.907$), women's willingness to work in teams significantly reduces by more than half when the opportunity of hiding effort is available (47% vs. 20%, $\chi^2(1) = 9.923$, $p = 0.002$). The interaction between gender and work environment is significant (see model (4) in Table 1). These results are in line with recent

evidence showing that women are more attracted to cooperative environments than men (Kuhn and Villeval, 2015), but go beyond that by demonstrating that the observed gender differences might be subject to subtle features of the work environment. In particular, women's larger attraction to teams completely disappears when adverse behavior is possible.

4. Conclusion

Affirmative action policies such as quotas have been proposed as one tool to reduce the gender imbalance in labor market outcomes. Building on recent evidence (Balafoutas and Sutter, 2012; Balafoutas et al., 2016), here we show that such policies have no harmful spillover effects on subsequent performance within teams. We further demonstrate that they do not discourage selection into teams. While this is good news for advocates of such policies, more research is needed to evaluate the overall efficacy of affirmative action programs.

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Appendix

A. Additional tables

Table A1: Mean performance in Stages 1-3, and voting decision in Stage 4 by treatment and gender.

Treatment	Stage 1 (*piece-rate*)			Stage 2 (*tournament*)			Stage 3 (*team*)			Stage 4 Voting for Team (in %)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Base-NoQuota	6.91	5.06	5.98	7.56	6.59	7.08	8.34	6.63	7.48	34.4	50.0	42.2
(n=64)	(0.55)	(0.36)	(0.35)	(0.57)	(0.37)	(0.34)	(0.50)	(0.37)	(0.33)	(8.53)	(8.98)	(6.22)
Base-Quota	5.83	5.73	5.78	7.33	6.10	6.72	7.40	6.63	7.02	26.7	43.3	35.0
(n=60)	(0.35)	(0.64)	(0.36)	(0.52)	(0.61)	(0.41)	(0.51)	(0.69)	(0.43)	(8.21)	(9.20)	(6.21)
Hide-NoQuota	6.34	6.06	6.20	7.28	6.75	7.02	7.84	7.13	7.48	25.0	18.8	21.9
(n=64)	(0.62)	(0.35)	(0.35)	(0.62)	(0.47)	(0.39)	(0.63)	(0.49)	(0.40)	(7.78)	(7.01)	(5.21)
Hide-Quota	5.94	5.28	5.61	6.66	6.31	6.48	6.94	6.53	6.73	34.4	21.9	28.1
(n=64)	(0.40)	(0.42)	(0.33)	(0.40)	(0.47)	(0.34)	(0.43)	(0.41)	(0.30)	(8.53)	(7.42)	(5.66)

Notes: Performance is measured as the number of correctly solved calculations. Standard errors are in parentheses.

Table A2: Effects of quota on effort provision (model (1) and (2)) and effort concealment (model(3)).

Independent variables	(1)	(2)	(3)
Quota	-0.313	-0.323	6.489
1 if Quota, 0 otherwise	(0.379)	(0.354)	(7.067)
Productivity	0.768***	0.719***	0.895
	(0.064)	(0.058)	(1.178)
Constant	2.890***	3.026***	63.157***
	(0.400)	(0.439)	(9.362)
Observations	124	128	128
R^2	0.514	0.503	0.010

Notes: OLS regressions. In model (1) and (2), the dependent variable is the number of correctly solved calculations in the team task. In model (3) the dependent variable is the percentage of hidden effort. Productivity is measured as the number of correct solved calculations under piece-rate incentives (Stage 1). Robust standard errors clustered at the individual level are in parentheses. Significance levels * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

B. Experimental instructions

Instructions on paper (translated from German)

Welcome to an experiment on decision-making. We thank you for your participation!

During the experiment, you and the other participants will be asked to make certain decisions. Your own decisions as well as the decisions of the other participants will determine your payment from the experiment, according to the rules that will be described in what follows.

The experiment will be conducted on the computer. You enter your decisions on the keyboard. All decisions and answers will remain confidential and anonymous. Also the payments at the end of the experiment will be anonymous, i.e., no one will receive any information about the payments of others.

The experiment consists of 4 stages. One of these four stages (1-4) will be randomly selected for your payment. Your total earnings from the experiment will be the sum of your payments for the randomly selected stages, plus a show up fee of €4.

You will receive instructions for each of the four stages, one after the other. We will read the instructions aloud and then give you time for questions. Please do not hesitate to ask questions if anything is not clear.

Please do not talk to each other during the experiment. If you have any questions, please raise your hand.

Stage 1 – Piece rate *[same in all treatments]*

Your task in stage 1 is to solve correctly as many addition exercises as possible. To be more precise, you will have 3 minutes' time in order to solve as many additions of five randomly selected two-digit numbers as possible, by entering the sum of the five numbers. You are not allowed to use calculators but you can write down the numbers and use the provided scribbling paper for your

calculations. You enter an answer by clicking with the mouse on the "Confirm" button. When you enter an answer, you immediately find out on the screen whether it was correct or not.

 If stage 1 is the stage selected for payment (among stages 1-4), then you will receive €0.50 (i.e., 50 cent) for each correct answer that you entered within the 3 minutes. Your payment is not reduced when you enter a wrong answer. From now on, we call this method of payment the Piece-rate payment.

  Directly before the start of this stage you will be given one minute in order to familiarize yourselves with the screen: During this time you can solve addition exercises, which do not count for the experiment. Afterwards, stage 1 will begin.

Stage 2 – Tournament *[NoQuota]*

As in stage 1, you will have 3 minutes' time in order to solve correctly as many addition exercises as possible. However, your payment in this stage depends on your performance relative to the performance of a group of participants.

 Allocation in groups: Each group consists of 4 participants, 2 of whom are men and 2 are women. Groups are randomly formed at the beginning of this stage and **each participant stays in the same group until the end of the experiment. You will not find out the identity of the other participants in your group during or after the experiment, so that all decisions remain anonymous.**

If stage 2 is the stage selected for payment (among stages 1-4), then your payment depends on how many additions you have solved correctly in comparison with the other three participants in your group. The two group members who have entered the most correct answers are the two winners of the tournament. The two winners receive **€1.00 per correct answer** each, while the other four members do **not receive any payment**. In case of a tie, the ranking among the members with equal performances is determined randomly. From now on, we call this method of payment the Tournament payment.

At the end of this stage, you will be informed about whether you have won or not.

As in stage 1, you will have 3 minutes' time in order to solve correctly as many addition exercises as possible. However, your payment in this stage depends on your performance relative to the performance of a group of participants.

Allocation in groups: Each group consists of 4 participants, 2 of whom are men and 2 are women. Groups are randomly formed at the beginning of this stage and **each participant stays in the same group until the end of the experiment. You will not find out the identity of the other participants in your group during or after the experiment, so that all decisions remain anonymous.**

The two winners of the tournament are determined as follows In each group, one of the two winners is in any case the woman with the best performance (of all two women). The other winner is the group member with the best performance among the remaining members (i.e., excluding the best-performing woman). The two winners receive **€1.00 per correct answer**each, while the other four members do **not receive any payment**. In case of a tie, the ranking among the members with equal performances is determined randomly. From now on, we call this method of payment the Tournament payment.

We now give an example, in order to illustrate the way that the winners are determined in the tournament. We order the four group members according to their performance within each gender, so that *fA* is the woman with the best performance, and *fB* is the woman with the second-best performance. In the same way, *mA* is the man with the best performance, and *mB* is the man with the second-best performance. The woman with the best performance, fA, is definitely one of tw winners in the tournament. In order to determine the second winner, we must find out who is the person with the best performance among the remaining three group members (besides *fA*). Since there is only one more winner, this can either be *fB* or *mA*, depending on their performance.

Summary:

A woman wins the tournament if she has the best performance among all women <u>or</u> if she is one of the two persons with the highest performance within her group. A man the tournament if he is the man with the best performance <u>and at the same time</u> one of the two persons with the highest

performance within his group. Therefore, there is at least one woman and at most one man as winners in the tournament.

At the end of this stage, you will be informed about whether you have won or not.

Stage 3 – Team *[Base]*

As in stages 1 and 2, you will have again 3 minutes' time in order to solve correctly as many addition exercises as possible. The group composition (with 2 men and 2 women) is the same as in stage 2. As in stage 2, your payment in this stage depends on your performance as well as on the total performance of all other members in your group; however, in a different manner as in stage 2.

If stage 3 is the stage selected for payment (among stages 1-4), then your payment is determined as follows. You receive **12.5 eurocent** for each correct answer that a member of your group has entered in the 3 minutes. This means that each correct answer is worth **€0.50 for the entire group** (i.e., all 4 members). It also means that all members of a group receive the same payment in this stage, and this depends **only on the total performance of the group, i.e., on the sum of all correct answers of the 4 group members**.

After stage 4 you will be informed about the performance of the whole group, which will determine your payment from this stage. Your payment is not reduced when you (or any of your group members) enter a wrong answer. From now on, we call this method of payment the Team payment.

Stage 3 – Team *[Hide]*

As in stages 1 and 2, you will have again 3 minutes' time in order to solve correctly as many addition exercises as possible. The group composition (with 2 men and 2 women) is the same as in stage 2. As in stage 2, your payment in this stage depends on your performance as well as on the total performance of all other members in your group; however, in a different manner as in stage 2.

If stage 3 is the stage selected for payment (among stages 1-4), then your payment is determined as follows. At the end of stage 3, you will be informed about how many additions you solved correctly. You then have to decide how many of these additions you want to **hide** from the group. For each answer you hide, you receive **40 eurocent** and the other group members receive **0 eurocent.** Conversely, you also receive no payment from answers your group members hide. For each answer you **do not hide**, you and each of the other three group members receive **12.5 eurocent**. Likewise, you and each of the other group members receive **12.5 eurocent** for each correct answer one of your group members does not hide. That means that each answer that is **not hidden** is worth **€ 0.50** for the **group as a whole** (i.e. all 4 group members together).

After stage 4 you will be informed about the performance of the whole group, which will determine your payment from this stage. Your payment is not reduced when you (or any of your group members) enter a wrong answer. From now on, we call this method of payment the Team payment.

Stage 4 – Choice *[same in all treatments]*

As in stages 1, 2 and 3, you will have again 3 minutes' time in order to solve correctly as many addition exercises as possible. However, you must now choose yourself your preferred payment method for your performance in stage 4. You can either choose the **Piece-rate payment** (as in stage 1) or the **Team payment** (as in stage 3). Your group members will make the same decision between Piece-rate payment and the Team payment. The group composition (with 2 men and 2 women) is the same as in stages 2 and 3. After all group members have made their decision, one group member will be randomly selected and his decision will be implemented. That means that the decision of this group member determines the payment method (Piece-rate payment or the Team payment) that is implemented for the entire group in stage 4.

If stage 4 is the stage selected for payment (among stages 1-4), then your payment is determined as follows.

- If the **Piece-rate payment** is the implemented payment method, then you will receive **€0.50 for each correct answer.**

- If the **Team payment** is the implemented payment method, then the exact same rules as in stage 3 apply. Therefore, please have another look at the instructions of stage 3.

You will first be asked whether you want to choose the Piece-rate payment or the Team payment for your performance in stage 4. After that, you will be informed about which payment method will be implemented and count in stage 4. Then, you will have 3 minutes' time to solve correctly additions of two-digit numbers. At the end, you will receive information about your payment from stage 4.