Bidding for the Better Jobs: An Experiment on Gender Differences in Competitiveness without a Real-Effort Task

BSE Working Paper 1185
June 2020 (Revised: December 2021)

Andrej Angelovski, Jordi Brandts, Werner Güth

bse.eu/research

Bidding for the Better Jobs:
An Experiment on Gender Differences in Competitiveness without a Real-Effort Task

Andrej Angelovski*, Jordi Brandts** Werner Güth***

*Middlesex University

**Instituto de Análisis Económico (CSIC) and Barcelona School of Economics

***LUISS Guido Carli, Rome and Max Planck Institute for Research on Collective Goods, Bonn

December 2021

Abstract

We model the competitive striving for high-level positions in firms by letting experimental participants compete in bidding for prizes of different sizes in a hierarchy. Our set-up includes both a flat hierarchy and a steep hierarchy. We mainly focus on whether men and women behave differently with respect to bidding for higher and lower positions, but also consider other possible sources of heterogeneity in behavior. On average, we find no statistically significant differences between women and men, except for the top position of the flat hierarchy, where women bid significantly higher. For lower positions, bids are generally close to optimal bidding whereas they are relatively lower for higher positions. Women do win the top positions significantly more often, but there are no significant gender differences in earnings, the difference between prizes and bids. Overall, we only find minor differences between women's and men's behavior. Our results suggest that the strong gender differences in attitudes towards competition that were found in numerous previous studies based on competition in tournaments with real-effort tasks may not carry over to other environments. A broader implication of our results thus is that a particular phenomenon should be studied using various experimental designs.

Keywords: Experiments, Gender differences, Competition

JEL Classifications: C91, J16

Brandts thanks the Spanish *Ministerio de Ciencia e Innovación* through Grant: PID2020-114251GB-I00 and through the Severo Ochoa Program for Centers of Excellence in R&D (Barcelona School of Economics CEX2019-00915-S) and the *Generalitat de Catalunya* (Grant: 2017 SGR 1136) for financial support. We thank Anne-Wil Harzing for very helpful comments. Financial support by the Max-Planck Institute for Collective Goods is gratefully acknowledged.

1. Introduction

Starting with Gneezy et al. (2003) and Niederle and Vesterlund (2007) gender differences in competitive behavior have been extensively studied using real-effort tasks and tournament incentives as a representation of competition in society, documenting that women perform worse under tournament incentives and shy away from entering such competitions (see Niederle, 2017, for a recent survey of the experimental literature). The results obtained in these real-effort environments have yielded some path-breaking insights and have been replicated numerous times. They are based on a very interesting but nevertheless particular way of representing competition. In this paper we present an experimental study of gender differences in behavior in a competitive environment using a completely new design. In our setting there are stylized hierarchies with ranked positions meant to represent jobs in firms and other organizations. Our experimental participants, men and women, obtain positions in these hierarchies through a competitive bidding process and our focus is on gender differences in bidding for the positions. In our context, higher bidding for positions corresponds to behaving more competitively.

A key difference between the environments referred to above and ours is that ours is a pure choice experiment: it does not involve a real-effort task. Most economic experiments are pure choice experiments following the induced value approach set forward in Smith (1976). This methodological approach has been, in our view, very fruitful, as shown in all the literature on markets. Another avenue of laboratory experiments uses real-effort tasks, which are particularly suited to represent aspects of work environments (see Angelovski et al. 2021, for a recent paper of ours with a real-effort task). We do not think that one approach is superior to the other. They may yield complementary insights on the same issue, like they do in this case. At this point it is important to highlight that most experimental designs are models. They are simplified representations of the situation one is interested in, where, inevitably, the relevant situation is looked at from one particular viewpoint and not from others. To get a complete picture of the situation one is interested it may entail taking into account, perhaps with different weights, results from different pieces of research in which different viewpoints are taken.

Competing for jobs in a market economy involves many aspects of behavior which cannot all be captured by head-to-head competition in one particular real-effort task in a tournament environment. Here we directly represent competition for different positions in hierarchies. The environment represents the process of aspiring employees applying at the same time for different positions, with some of these positions being more difficult to obtain than others. Our representation captures the following features which we believe are crucial characteristics of competitive processes: i) in society, as in individual organizations, different positions yield different salaries, ii) to obtain better positions individuals need to spend resources, which depend on the position, and iii) positions are allocated through a competitive process. Competition for positions is multi-faceted. It involves spending resources at many stages and in many different ways such as investing in costly training, exhibiting initiative and leadership, networking and working long hours. In our representation of job competition via a competitive bidding process, bids sum up monetarily various aspects of how one competes for higher positions in organizations.

The monetary-sum approach to representing agents' options is standard in economics, as when the costs of a firm are represented by a monetary amount, which is the sum of a variety of expenditures on different items used in the firm's production process. When we posit that a firm's objective is to minimize costs, we subsume under this approach many distinct efforts, each of which is a complex matter in itself, at negotiating with distinct suppliers of very different inputs. Naturally, by not using a real-effort task in our experiment a number of relevant issues are not dealt with. In particular, any element of skill at carrying out a particular task, learning the task and self-confidence for (see Charness et al., 2018) and stress (Buser et al., 2017) in performing the task are lost.

In our environment participants bid competitively for certain positions, but it is not a typical auction experiment. Indeed, the features of our design are meant to parallel, in a simplified way, crucial features of the situation of competing for positions in hierarchies that we are interested in. The resulting design features an auction-like mechanism, but one that has not been studied before. It is true that auction experiments have found that women are more competitive than men: they make larger bids and end up earning less in winner

pay common value auctions (see, for example, Casari et al., 2007; Ham and Kagel, 2006; Chen et al. 2013; Pearson and Schipper, 2013; Price and Sheremeta, 2015). However, we think that these results do not necessarily carry over to our environment, which is quite different. Compared to most auction experiments (see Kagel and Levin, 2008, for a review) our contests: a) do not follow the standard way of representing common value auctions, involving potential bidders obtaining independent signals about the common vale b) have a job market frame, and c) are more complex since participants submit more bids for several positions at the same time.

Given that ours is a pure choice experiment without any real-effort element, the similarity to a common auction is hard to avoid. As formulated by Stigler (1987): "Competition is a rivalry between individuals (or groups or nations), and it arises whenever two or more parties strive for something that all cannot obtain," and, in this sense, any experimental environment involving competitive choice (not real effort) resembles an auction to some extent. However, we think that our experiment has sufficiently many new features that distinguish it clearly from previous work.

We study competition for positions in two parts. In part 1, two groups of participants bid in two separate hierarchies, as in intra-firm competition. In a second part we open up competition so that the separate groups can now bid for positions in both hierarchies, as in broader inter-firm market competition. One of the hierarchies is relatively flat, in the sense that the difference in prizes between the top and intermediate positions is small, whereas the other hierarchy is steep. In within-firm competition they have to submit two bids, one for the top and one for the intermediate positions, and in inter-firm bidding competition they have to submit four bids, namely for the top positions and intermediate positions in both firms. In our view, letting individuals bid separately for various positions at the same time makes sense, since their various bids for the different positions may reflect how much more they are interested in one position versus another.

In contrast to the research based on real-effort tournaments we do not find women to behave less competitively. There is no statistically significant difference between women's and men's behavior, except

for the top position of the firm with the flat hierarchy where women bid significantly higher than men. For the lower prizes, average bids are nearly optimal but relatively lower for the higher prizes. Women do win the top positions significantly more often, but there are no significant gender differences in earnings. In broad terms we consider our gender differences to be very minor. Our results show that using a different stylized representation of the competitive process leads to different results and suggests different conclusions than those of previous studies based on tournaments with real-effort tasks[1]. Although we believe that our representation of competition for jobs captures some interesting key aspects of the process we are interested in, we do not view our setting as a necessarily superior representation of competition in society than those of other studies. However, our results suggest that when studying gender differences with respect to competition, one needs to look at the issue from more than one angle.

Section 2 introduces the bidding setup, presents the experimental protocol and states the main hypotheses. In section 3, we present the results. We discuss our conclusions, also by relating them to the literature, in section 4.

2. Experimental protocol and hypotheses

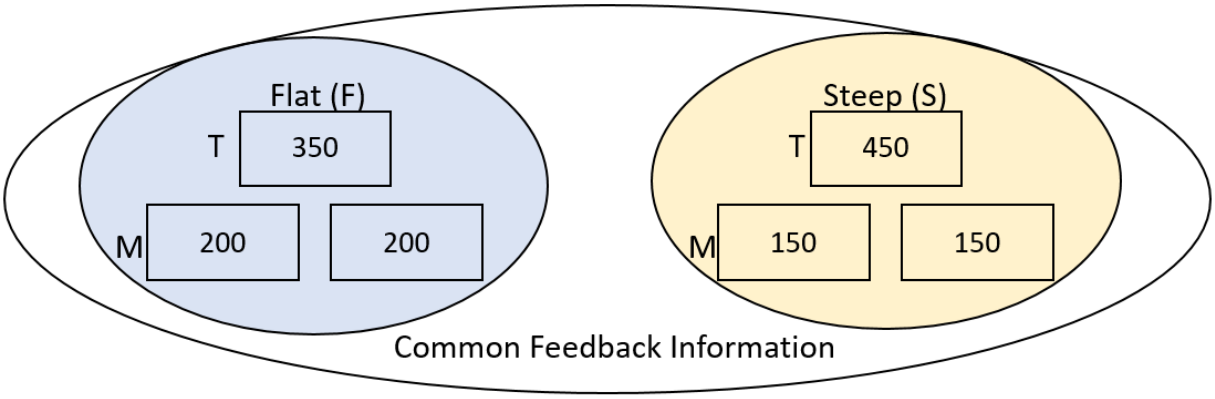
We use the same notation as in the (translated) instructions, which can be found in the appendix. An experimental group is composed of eight participants, who bid in two separate groups of four before they become one group of eight interacting bidders. We do this to study the effects of more or less competition. In groups of four, participants bid for one position $\boldsymbol{t}$ and two positions $\boldsymbol{m}$ yielding salary $\boldsymbol{T}$ or $\boldsymbol{M}$ to winners and $\boldsymbol{U}$ to non-winners in the $\boldsymbol{F}$ firm (for relatively flat salaries), whereas the other group of four participants bids for one $\boldsymbol{t}$ and two $\boldsymbol{m}$ positions in the $\boldsymbol{S}$ firm (for relatively steep ones). The two firms differ in their salary amounts. Firm $\boldsymbol{F}$ pays (in ECU): $\boldsymbol{T} = 350$; $\boldsymbol{M} = 200$, and firm $\boldsymbol{S}$ pays (in ECU): $\boldsymbol{T} =$

[1] There is evidence that the type of real-effort task also matters when it comes to gender differences in competition (see Dreber at al., 2014).

450; $\boldsymbol{M} = 150$. When not obtaining any of these superior salaries the default payoff is $\boldsymbol{U} = 50$, irrespective whether one belongs to firm F or S.[2]

Figure 1 illustrates the setting of separate bidding interaction of the two groups of four and Figure 2 the interaction when the two groups are joined.

Figure 1: The first four periods (Phase 1) of intrafirm bidding but common end-of-period feedback across firms



During the four periods of phase 1 candidates $i(k)$ for firm $k = F, S$ submit bids $b_{i(k)}(t_k)$ and $b_{i(k)}(m_k)$ with $b_{i(k)}(t_k) \geq b_{i(k)}(m_k) \geq 0$ where $i(k)$ varies from 1 to 4. The rules in case of intra-firm competition assign for $k = F, S$ positions as follows:

- the top position and salary t_k to the highest bidder $i^*(k)$ with $b_{i^*(k)}(t_k) \geq b_{i(k)}(t_k)$ for all $i(k) = 1, \dots, 4$ at the price of the second-highest bid $b_{i(k)}(t_k)$:
  $$p(t_k) = \max\{b_{i(k)} \mid i(k) \neq i^*(k)\},$$ i.e. the highest non-winning bid $b_{i(k)}(t_k)$;

- the two intermediate position and salaries m_k are then allocated among the remaining three bidders to those two whose bids $b(m_k)$ are (first or second) highest (among the three remaining bidders) at the price $p(m_k)$ of the minimal bid $b_{i(k)}(m_k)$:
  $$p(m_k) = \min\{ b_{l(k)}(m_k) \mid l(k) \neq i^*(k)$$

- The remaining bidder $l(k)$, who has not acquired t_k or m_k, earns the default pay of $U = 50$.[3]

[2] Only when employing even more bidder participants, i.e. when allowing for unemployment, would bidding also for U-positions make sense.

[3] We think that this order of allocating positions makes economic sense. The positions are allocated in top-down order of the size of the salary.

Payoffs of bidders in firms $k = F, S$ are:

- $t_k - p(t_k)$ at the top position,
- $m_k - p(m_k)$ at the intermediate positions, and
- U at the bottom level

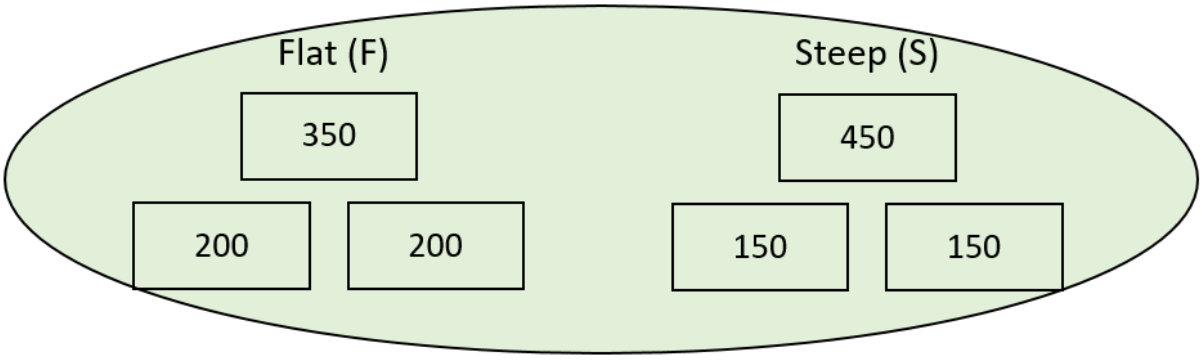
In phase 2 the rules require four bids, namely individual bids

$$b_i = (b_i(t_s),\ b_i(t_f),\ b_i(m_f),\ b_i(m_s))$$

by all eight members $i = 1, \ldots, 8$ before belonging either to firm F or S, for which monotonicity requires

$$b_i(t_s) \geq\ b_i(t_f) \geq\ b_i(m_f) \geq\ b_i(m_s) \geq 0$$

Figure 2: The last four periods (Phase 2) of intrafirm bidding with common feedback information



Job assignment follows similar rules as before from highest to lowest salary by determining

- first the highest bid for $b(t_S)$ for the highest top salary of *S*, and the price $p(t_S)$ via the second highest-bid $b(t_S)$,
- then among the seven remaining bidders the highest bid $b(t_F)$ for the top salary in *F* and the price $p(t_F)$ via the second highest-bid $b(t_F)$ of the remaining bidders,
- then among the remaining six participants the two highest $b(m_F)$ bidders at the price $p(m_F)$ via the third highest $b(m_F)$-bid,
- finally among the four remaining bidders the two highest $b(m_S)$ bidders at the price $p(m_S)$ of the third highest $b(m_S)$ bid , whereas
- the two remaining bidders earn U=50 each.

Payoffs are $t_k - p(t_k)$, $m_k - p(m_k)$, or U in firm $k = F, S$ and U otherwise.

Figures 1 and 2 also illustrate that all participants in a group of eight obtain feedback information about behavior in both firms in both parts.[4] Specifically, what each of the eight participants learns after each period are the prices for the top positions, $p(t_F)$ and $p(t_S)$, as well as for the middle positions, $p(m_F)$ and $p(m_S)$, in groups F and S, respectively. Each participant is also independently informed about their own payoff $T - p(t)$ or $M - p(t)$ due to the position t or m they obtain or, respectively, the payoff of U, if they fail to obtian a position.[5]

Our experiment involves multiple periods and we refer to eight successive periods as a run. To allow for learning participants play four such runs, i.e. in total thirty-two periods, sixteen each with intra-, respectively inter-firm competition. Each group is composed of eight participants, who compete for six (two top, four intermediate) potentially better paid positions, and remain constant across periods and phases, i.e. we employ a within-partners design. It seemed natural to begin with intra-firm competition, which is simpler, and to introduce the more global inter-firm job competition only when participants have already experienced job assignment by competitive bidding.

Before the start of the experiment we asked a number of control questions about the design. Most participants did not have any problems with the questions. The few that did typically had difficulties understanding the monotonicity rule, i.e. the fact that it was not possible to bid more for a lower-paying position than for a higher-paying position.

Each session included two or three groups of eight participants and lasted about one hour and twenty minutes. In total, 168 participants (45% female and 55% male) self-registered for participation at CESARE lab (LUISS Guido Carli University). No subject participated in more than one session. Earnings (including a show-up fee of 5 euros) range from 0 euros to 25 euros, with an average of 12.3 euros. The experiment was programmed using z-Tree (Fischbacher, 2007).

[4] For studies on bidding in second-price auctions see Güth et al. (1983) and Cooper and Fang (2008).
[5] Regarding the debate whether the earnings of managers should be public we have implemented the case where, via public information about auction prices, the remuneration of managers becomes public.

After completing all 32 periods of the experiment, participants filled out an unincentivized questionnaire which included demographics, a cognitive reflection test, a 10-item big-5 personality test, as well as a risk aversion test.[6] Participants were paid once the questionnaires had been completed, and they left the lab. Payments were based on one randomly selected run (composed by a phase 1 and a phase 2) for which they received the payoff of one randomly selected period of the first four periods (phase 1) and one randomly selected period of the second four periods (phase 2), i.e. payments were based on two random periods of a random run.

Before presenting our gender hypothesis, the focus of our study, we introduce a preliminary hypothesis pertaining to rational behavior under own payoff maximization. Due to the incentive compatible rules the obvious benchmark prediction in view of common opportunism, i.e. based on own payoff maximization, is:[7]

Hypothesis 0:

$$b^*_{i(k)}(t_k) = t_k - U, \text{and} \quad b^*_{(k)}(m_k) = m_k - U$$

for either $k = F, S$ and, of course,

$$b^*_{i(k)}(t_k) = t_k - U, \text{and} \quad b^*_{i(k)}(m_k) = m_k - U$$

for both $k = F$ and $k = S$ in all periods which implies the auction prices

$$p(m_k) = m_k - U, \text{and} \quad p(t_k) = t_k - U$$

for $k = F, S$ and the same payoff U for all eight bidders.

This hypothesis applies, of course, to both women and men.

One reason to believe that opportunism will not prevail is that it may be difficult for participants to grasp the logic behind Hypothesis 0 and deviate from it in various ways. Some participants may (be

[6] For a recent study on the influence of cognitive ability in an auction environment see Lee et al. (2020).
[7] In the sense of dominance solvability, i.e. the benchmark bids are weakly undominated meaning that their optimality requires no common knowledge of (opportunistic) rationality.

anticipated to) misperceive the situation and this may influence their (others') bidding. In particular, they may fail to understand that *U* has to be subtracted when determining the opportunistic bids.

To take into account that participants may, for different reason, misinterpret their monetary incentives we will analyze whether bidding behavior is influenced by the score of the cognitive reflection test. Note, however, the paragraph in the instructions alerting participants about the incentive compatibility of the auctions. This could at least discourage overbidding and should help participants to understand that, except for intrinsic competitiveness concerns, there exist no strategic incentives nor image concerns (other than self-image ones) to deviate from benchmark bidding.

A different issue is that the incentive compatible 2nd or 3rd price rule may trigger ring formation, i.e. collusion of bidders.[8] In our setup all positions could be obtained for essentially nothing when all bids, except those of the designated winners, are close to zero implying that the designated winners pay essentially nothing. Although without preceding communication bidder collusion is, difficult to establish collusion incentives nevertheless exist. Collusion seems easier when fewer bidders are involved, i.e. in phase 1. We will pay attention to whether collusion incentives as well as repeated bidding of constant groups partly trigger significant underbidding, i.e. lower bids than predicted by Hypothesis 0. If so, there should be less systematic underbidding in the later of the four periods and with more bidders (for end-game effects see Selten and Stoecker, 1978).

A separate question is whether winners earn more or less than non-winners. Overbidding winners in the sense of $b(t_k) > t_k - U$ and $b(m_k) > m_k - U$ for $k = F, S$ may not necessarily suffer in terms of payoffs as the highest non-winning bids and thus the prices to be paid may not be exceeding $t_k - U$, respectively $m_k - U$. But they may not always be so lucky which allows those at the bottom level of the hierarchies to potentially earn more than those above them. Since competitive auctions render those who are excessively overoptimistic as winners, we will investigate whether winners earn on average less than

[8] One's bid only separates the regions of too high prices, which one does not want to pay, and low enough prices which one is willing to pay but not directly the price which one pays.

non-winners and whether bidding optimally, on average, is correlated with better earnings and whether overbidding is worse than underbidding.

Our main focus, however, is not on deviations from optimality, but on whether men bid higher than women. The formulation of a gender hypothesis needs to be informed by a variety of previous evidence. There are miscellaneous studies that find that attitudes towards status differ across gender, with men usually found to attribute more importance to status than women (Frank 1999, Carlsson et al. 2009, Mujcic and Frijters 2013). This evidence would suggest that in our environments men will bid higher than women. Similarly, the studies about competitiveness using real-effort tasks discussed in the introduction point in the direction of men bidding higher. However, the fact that our environment bears some resemblance to a common value auction would suggest that women will bid higher than men. In the end we cannot base our gender hypothesis in any strict sense on previous work or a theoretical model. Based mostly on intuition we conjecture that men will bid higher.

This differential competitiveness may only show up in the bids for the top position, $b(t_k)$ for $k = F, S$, before and after merging the two firms. The idea of individuals bidding more agressively only for the top positions would be in line with the alleged statement of Julius Caesar when crossing the Alps and looking down to an Alpine village: "I would rather be the first man in this village than the second in Rome, (see also Avrahami et al. 2019, who discuss such views and study them experimentally).

However. it could also extend to the bids in the lower position in the hierarchy, $b(m_k)$ for $k = F, S$, perhaps due to male bidders wanting to avoid not winning due to some perceived stigma of being unemployed (i.e. not winning a positions). We therefore distinguish two cases in our gender hypothesis:

Gender Hypothesis G:[9]

(a) Male bidders bid, on average, higher than female bidders for the top positions

[9] Chen et al. (2013) and Pearson and Schipper (2013) investigate how women' behavior in auctions is affected by the menstrual cycle.

(b) Male bidders bid, on average, higher than female bidders for all positions.

An additional hypothesis related to gender differences is that men will win the top positions more frequently. This, however, does not follow directly from (a) or (b).

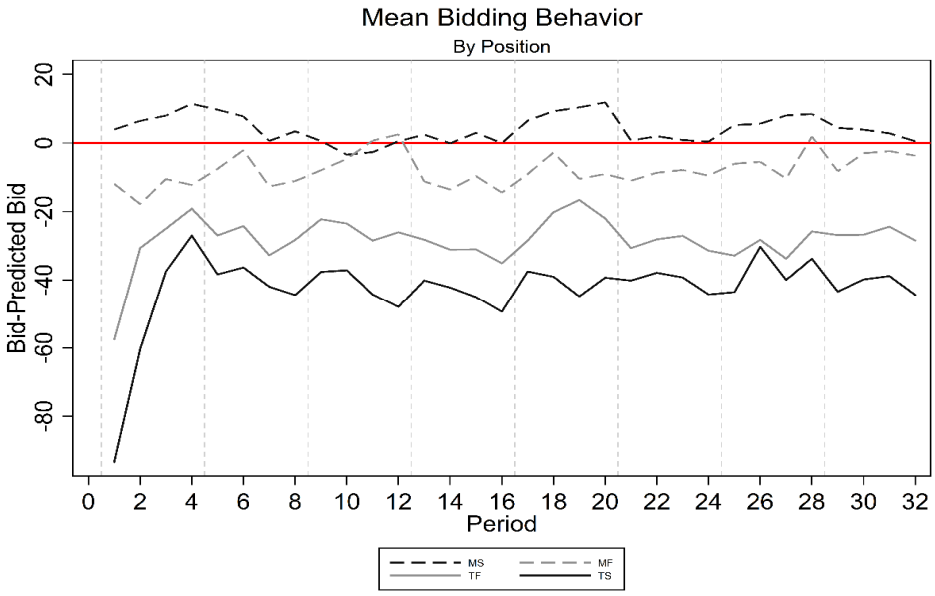
Although our main focus is on gender differences we also look at effects of other sources of heterogeneity on bidding behavior. To this end we post-experimentally ask participants to complete a demographics survey, a cognitive reflection test and a personality questionaire (see Gosling et al., 2003).

3. Results

In this section we first look at bidding behavior, then at gender differences in obtaining the top positions, and finally at gender differences in earnings. In all three subsections we first present figures to get a first impression of our findings and move then to regression tables for a proper statistical analysis.

3.1. Bidding behavior compared to the theoretical benchmark

Figure 3: Dynamics of average normalized bids across periods.



Figures 3 is meant to give a first impression of bidding behavior. It shows the evolution of average deviations from optimal bids across all 32 periods separately for the four positions. The only strong dynamic feature of the data is the very low bidding for the top positions in periods 1-3. This behavior has been observed before (see Abbink et al, 2006). Bidders initially bid very cautiously, but competition quickly leads to an increase in bids. The most remarkable overall feature of the data is the strong underbidding for the top positions, whereas for the middle positions bidding is close to the prediction of Hypothesis 0, with slight over bidding in one case and slight under bidding in the other. An explanation of this overall pattern could be satisficing behavior: bidders aspire to the middle positions more than to the top positions.

In relation to the issue of ring formation and collusion mentioned above the information in Figure 3 does not clearly point to this possibility. We do observe significant underbidding for the top positions, but it does not depend on whether there is less (phase 2) or more competition (phase 1).

Figure 4: Average deviations from benchmark bidding, separately for each position, gender and phase.

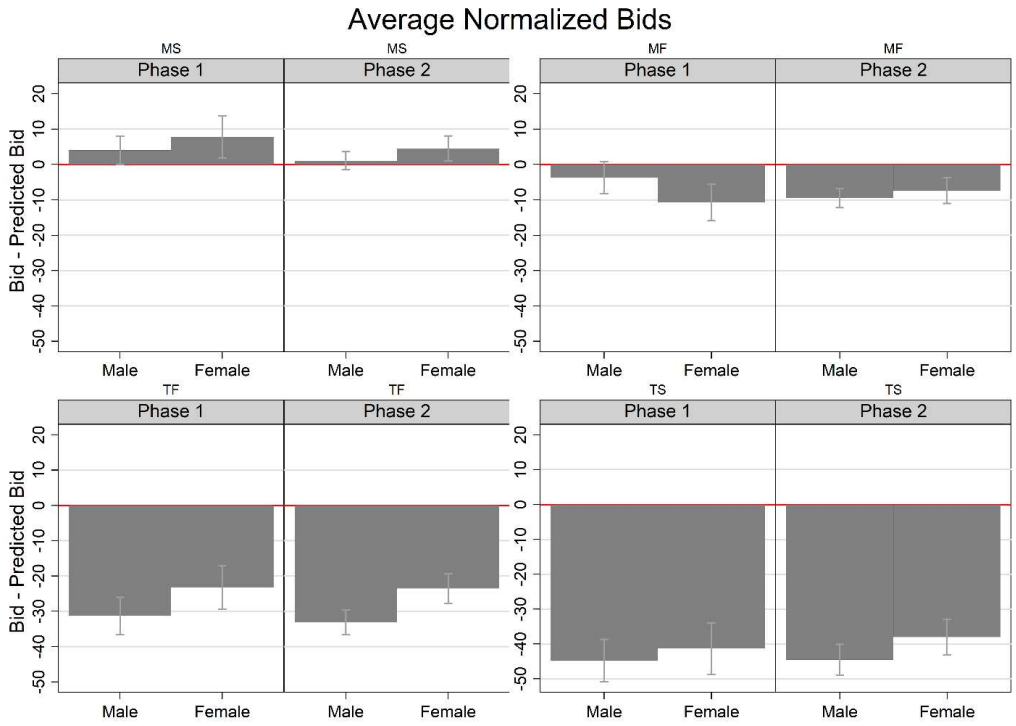


Figure 4 shows average bid deviations from predicted bids (Hypothesis 0), separated by gender for each of the four position and the two phases. Average male bids do not appear to be higher than average female bids. Indeed, the significantly lower underbidding of female participants for t_f in both phases is our first evidence that, if women bid at all differently than men, they bid somewhat more aggressively. However, none of the differences for the other three cases are significant.

Table 1: Mixed-Effects Panel Regression on bids clustered at individual and group levels

	Mixed Effects Panel Regressions on Bids							
	MS Bids		MF Bids		TF Bids		TS Bids	
Period	**-0.020**	**-0.281**	**0.157****	**0.49**	**0.163**	**0.299**	**0.052**	**-0.309**
	(-0.25)	(-0.40)	(2.00)	(0.70)	(1.60)	(0.33)	-0.45	(-0.30)
Phase 2	**-3.967*****	**-4.178**	**-1.093**	**-2.010**	**-3.580***	**-5.454**	**3.705**	**4.898**
	(-2.60)	(-1.27)	(-0.71)	(-0.61)	(-1.80)	(-1.29)	-1.61	-1.02
Female	**1.677**	**2.936**	**1.477**	**2.213**	**12.200***	**14.880***	**6.849**	**11.49**
	(0.28)	(0.43)	(0.24)	(0.30)	(1.88)	(1.90)	(0.77)	(1.08)
Age	**-0.959**	**-0.788**	**-0.971**	**-0.754**	**-4.038*****	**-4.191*****	**-4.224****	**-4.403****
	(-0.76)	(-0.58)	(-0.73)	(-0.52)	(-2.88)	(-2.70)	(-2.23)	(-2.11)
Run		**1.478**		**-3.54**		**-2.359**		**1.751**
		(0.26)		(-0.63)		(-0.33)		-0.21
Cognitive R. Score		**-4.342**		**-2.303**		**0.187**		**0.0537**
		(-1.35)		(-0.67)		(0.05)		(0.01)
Extraversion		**-2.359**		**-2.741**		**-0.662**		**-1.519**
		(-1.15)		(-1.26)		(-0.28)		(-0.48)
Agreeableness		**-3.12**		**-2.758**		**-0.683**		**0.646**
		(-1.34)		(-1.11)		(-0.26)		(0.18)
Conscientiousness		**-1.873**		**-0.528**		**-2.161**		**-3.224**
		(-0.87)		(-0.23)		(-0.89)		(-0.98)
Neuroticism		**1.158**		**1.791**		**1.018**		**-0.198**
		(0.62)		(0.90)		(0.48)		(-0.07)
Openness		**0.865**		**0.636**		**1.26**		**3.323**
		(0.43)		(0.30)		(0.55)		(1.07)
Risk Aversion		**-3.795***		**-2.918**		**-1.204**		**2.206**
		(-1.72)		(-1.24)		(-0.48)		(0.65)
_cons	**32.10**	**84.23***	**12.33**	**49.23**	**64.20***	**88.10***	**45.85**	**51.58**
	(1.08)	(1.93)	(0.39)	(1.06)	(1.93)	(1.77)	(1.02)	(0.77)
N	3456	3456	3456	3456	3456	3456	3456	3456

We use *, ** and *** for significance at the 10%, 5% and 1% level.

A possible explanation of this feature of the data is that participants aim at satisficing aspiration levels. Women (in relative terms) somehow settle for being at the top in the flat firm.

In Table 1 we show the results from regressing the normalized bids on period, phase 2, female, age, run (a phase 1 plus a phase 2) as well as the personality variables. One can see that gender has a significant effect at the 10% level on bids only for the top position in the flat firm, and that women bid higher than men. None of the personality variables have a significant effect, except for risk aversion, albeit only in one of the regressions and at the 10% level.

On the basis of the regressions in Table 1 and the average data in Figure 5 we reject both parts (a) and (b) of the Gender Hypothesis. That is, men do not bid higher on average or for the top positions. We do find some unexpected evidence for women bidding higher than men for the top position in the flat firm.

3.2. Gender differences in obtaining the top positions

We find few gender differences in bidding, but is it gender dependent who ends up in one of the two top positions? In a way, this is really the underlying question, for which we try to find some answers using our model. Figure 5 shows the average frequency of female participants winning any of the positions by phase, compared to the expected frequencies based on the proportion of women in the participant pool. One can see that women are more likely to obtain the two top positions, particularly the one in the flat firm and in phase 2. For the middle positions, the differences between actual and expected frequencies are smaller than for the top positions, with the actual frequency being lower than the expected one in three of four cases. Women also obtain the benchmark positions somewhat more often than expected.[10]

[10] Figure A1 in the appendix shows individual (gross) bids for the four positions separated by gender.

Figure 5: Actual vs. expected frequency of women in each position.

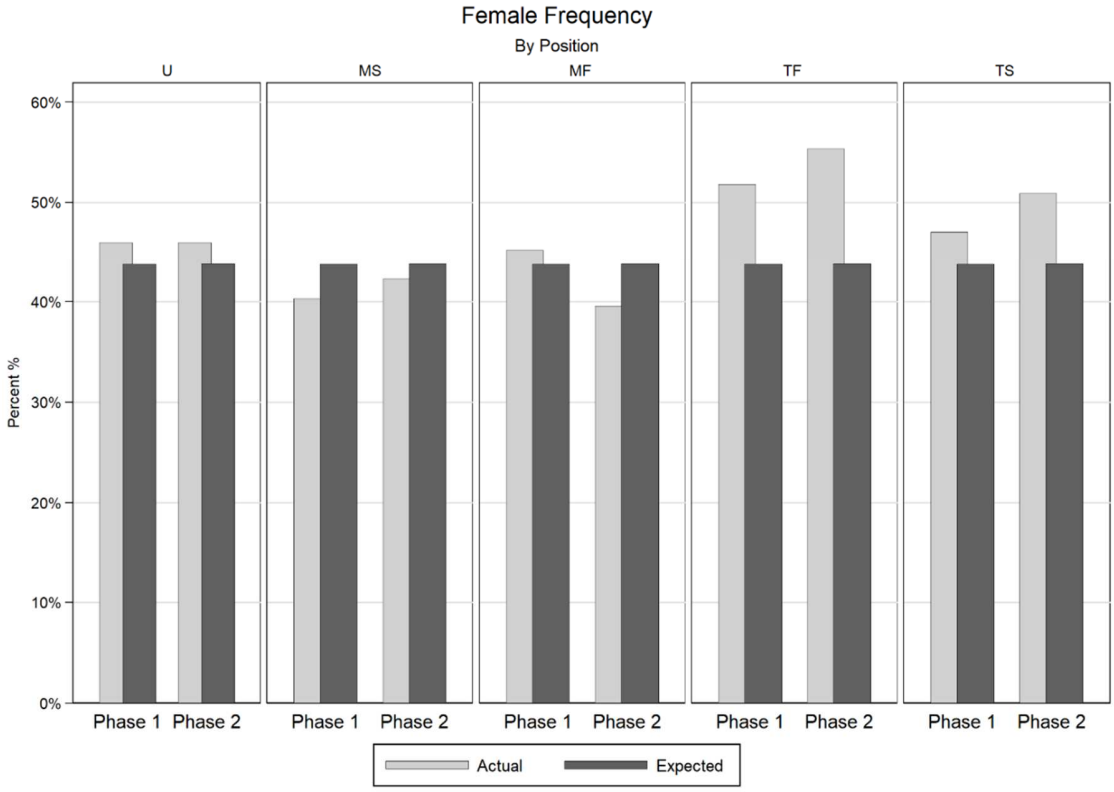


Table 2 shows the results of regressions to study the access to the top positions in more detail. We present regressions both only with the basic variables and including the personality traits. According to these regressions making it to the top is significantly more likely for female participants, mostly due to the more competitive bidding in phase 2. Our data, hence, reject the additional hypothesis mentioned in the introduction that men win the top position more often. Women are more likely to obtain a top position and from Figure 6 we know that the difference comes mainly from the flat firm. With respect to other sources of heterogeneity, we find that individuals with high score in extraversion and agreeableness are less likely to end up in a top position, but only in one of the phases.

Table 2: Mixed-Effects Logit Regression on winning a T position clustered on individual and group levels[11]

	All Data		Phase 1		Phase 2	
Female	**0.434****	**0.435****	**0.298**	**0.311**	**0.589****	**0.557****
	(2.40)	(2.200)	(1.61)	(1.500)	(2.55)	(2.200)
Age	**-0.0605**	**(0.048)**	**-0.051**	**(0.035)**	**-0.063**	**(0.050)**
	(-1.59)	(-1.26)	(-1.31)	(-0.88)	(-1.31)	(-1.04)
Cognitive R. Score		**(0.131)**		**(0.142)**		**(0.113)**
		(-1.44)		(-1.49)		(-0.97)
Extraversion		**-0.114***		**(0.078)**		**-0.155****
		(-1.95)		(-1.28)		(-2.07)
Agreeableness		**-0.135****		**-0.173****		**(0.093)**
		(-2.05)		(-2.52)		(-1.11)
Conscientiousness		**(0.006)**		**(0.011)**		**0.039**
		(-0.10)		(-0.17)		(0.490)
Neuroticism		**(0.036)**		**(0.008)**		**(0.068)**
		(-0.69)		(-0.15)		(-1.02)
Openness		**(0.054)**		**(0.080)**		**(0.044)**
		(-0.97)		(-1.35)		(-0.61)
Risk Aversion		**(0.012)**		**(0.013)**		**(0.031)**
		(-0.19)		(-0.19)		(-0.38)
Constant		**1.820**		**1.624**		**1.558**
		(1.500)		(1.280)		(1.000)
_cons	**-0.126**	**1.036*****	**-0.256**	**0.938*****	**-0.248**	**1.546*****
	(-0.14)	(-6.27)	(-0.28)	(-5.06)	(-0.22)	(-5.39)
N	4608	4608	2304	2304	2304	2304

We use *, ** and *** for significance at the 10%, 5% and 1% level.

3.3 Gender differences in earnings

We complete our analysis by studying earnings. We begin with the gender comparison and move then to the question whether earnings in the top positions are higher than in the middle positions, something we referred to in Section 2. Figure 6 displays average earnings over time separately by gender. There are clear differences by phase and one can also see that earnings are particularly high at the beginning, consistent with we saw in Figure 3. There are no apparent gender differences.

[11] We also tested for a gender difference in ending up in the flat firm, but using a Mann-Whitney Rank-Sum test don't find a significant difference (p=0145), two-sided.

Figure 6: Gender differences in dynamics of earnings across periods.

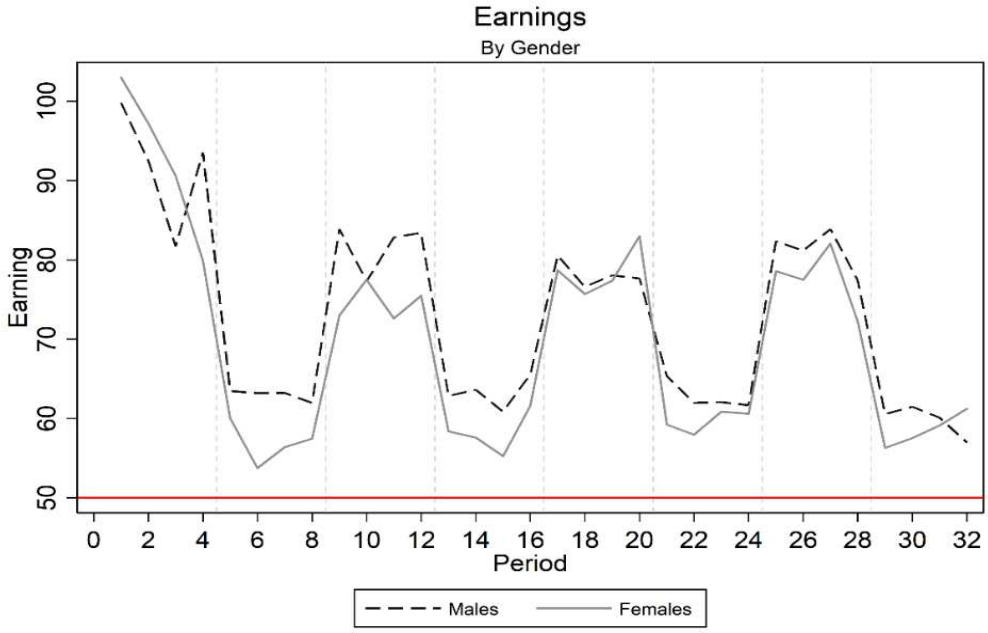
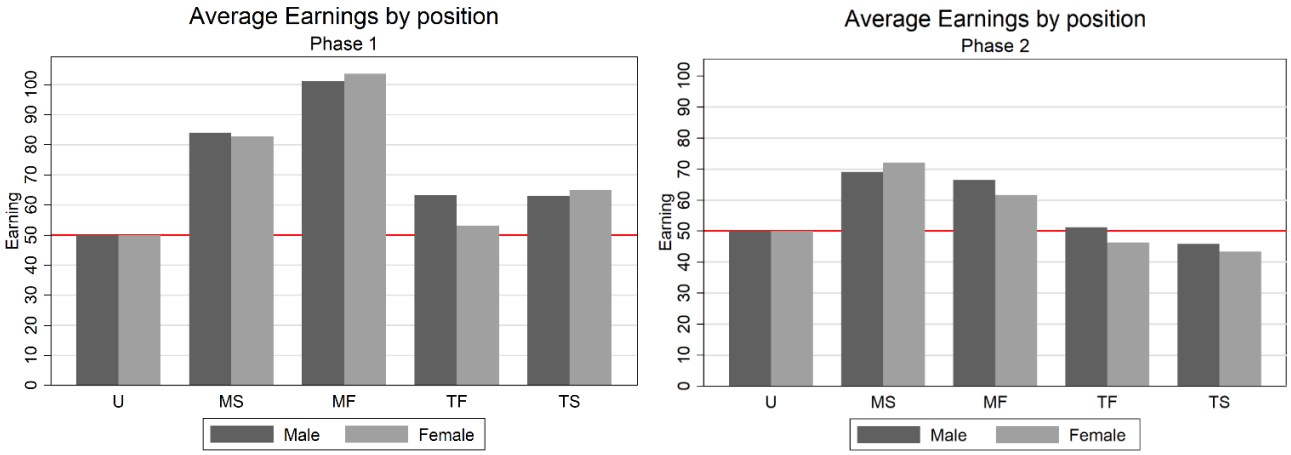


Figure 7 shows average earnings by position and gender separately by phase, again relative to the benchmark of 50.[12] In phase 1 earnings appear to be much higher in the middle than in the top positions. The explanation for this large difference is that, in spite of the higher average bidding for the top position (see Figure A1 in the appendix), participants can bid for all positions at the same time and positions are allocated top-down according to their prizes. This leads to individuals who tend to bid high on both middle and top positions to win the top positions and exit the competition for the middle positions. As a consequence bidders who remain in the competition bid relatively low and, as a consequence, earn more in the middle positions.[13] In Figure 5 one can also see that earnings are higher for MF than for MS, whereas the difference between the two top positions appear to be minor. Altogether, gender differences are very

[12] Figure A2 in the appendix shows the dynamics of earnings by position. There one can see that winners of the top position often earn less than the losers, particularly in early periods and for the top position in the steep firm.
[13] 16.36% of bidders overbid for both top and middle positions, whereas only 6.55% of bidders overbid only for the top position.

minor, except perhaps for TF, where women earn less than men, consistent with the fact seen in Figure 5 that women obtain the top position more frequently than expected.

Figure 7: Average (across participants and periods) earnings in phases 1 and 2, separately for each salary and gender.



In phase 2 we see the same pattern of higher earnings for the middle than for top positions, but with earnings now being lower overall, due to the stronger competition: earnings are above 50 in the middle positions but below it in the top positions. With respect to gender differences there are somewhat higher female earnings in MS and somewhat higher male earnings in all other positions.

Table 3 shows the results of regressions on earnings. The variable for female is not significant in any of the models. The bottom line here is that, on average, women's extra effort to get to the top position in the middle firm does not translate into higher earnings. Phase 2 is negative and strongly significant, as already suggested by what we saw in Figures 7 and 9. More open competition simply leads to lower earnings. The coefficient for the steep firm is not significant. In models 2 and 4 of Table 3 we have added variables for the two middle and the two top positions, relative to earnings level of 50 (as for ***U***). The results show that in both middle positions earnings are higher than in benchmark, whereas they are not different from it in the top positions. A test of the difference in the coefficients for MS and MF reveal equality in favor of the coefficient for MF being larger (p=0.0014). Also, with respect to the question posed in the

Table 3: Mixed-Effects Panel Regression on earnings clustered at individual, and group levels

	Model 1	Model 2	Model 3	Model 4
Period	**-0.136**	**-0.136**	**-0.329*** **	**-0.329*** **
	(-1.02)	(-1.02)	(-2.62)	(-2.62)
Phase 2	**-16.44*** **	**-16.44*** **		
	(-11.05)	(-11.05)		
Female	**-1.995**	**-0.224**	**-1.995**	**-0.224**
	(-0.60)	(-0.07)	(-0.60)	(-0.07)
Steep Firm	**-2.207**	**-0.323**	**-2.207**	**-0.323**
	(-1.48)	(-0.23)	(-1.48)	(-0.23)
Age	**0.377**	**0.364**	**0.377**	**0.364**
	(0.66)	(0.7)	(0.66)	(0.7)
Cognitive R. Score	**1.702***	**0.879**	**1.702***	**0.879**
	(1.67)	(0.94)	(1.67)	(0.94)
Extraversion	**1.492** **	**1.459** **	**1.492** **	**1.459** **
	(2.21)	(2.23)	(2.21)	(2.23)
Agreeableness	**-0.026**	**-0.434**	**-0.026**	**-0.434**
	(-0.03)	(-0.51)	(-0.03)	(-0.51)
Conscientiousness	**-0.231**	**0.027**	**-0.231**	**0.027**
	(-0.23)	(0.03)	(-0.23)	(0.03)
Neuroticism	**-0.131**	**-0.567**	**-0.131**	**-0.567**
	(-0.26)	(-1.21)	(-0.26)	(-1.21)
Openness	**-0.061**	**-0.399**	**-0.061**	**-0.399**
	(-0.06)	(-0.52)	(-0.06)	(-0.52)
Risk Aversion	**0.796**	**0.762**	**0.796**	**0.762**
	(0.72)	(0.75)	(0.72)	(0.75)
Reference Cat - U		.		.
		.		.
MS		**28.47*** **		**28.47*** **
		(6.93)		(6.93)
MF		**35.36*** **		**35.36*** **
		(6.68)		(6.68)
TF		**3.535**		**3.535**
		(0.63)		(0.63)
TS		**5.167**		**5.167**
		(1.13)		(1.13)
_cons	**75.90*** **	**63.33*** **	**54.42*** **	**41.85** **
	(3.76)	(3.54)	(2.7)	(2.36)
N	**4608**	**4608**	**4608**	**4608**

We use *, ** and *** for significance at the 10%, 5% and 1% level.

introduction whether winners earn more than losers, the answer is that winners of the middle position earn more than losers, but winners of the top position do not.

In models 1 and 3 the coefficient of cognitive reflection score has a positive effect, significant at the 10% level. There is, hence, only very weak evidence that cognitive capability matters. By contrast, in all models extroversion is positive and significant at the 5% level. As mentioned above we did not have any ex ante hypothesis about the effects of this variable, but the result may inspire some future work.

4. Conclusions

In this paper we study competition for jobs in a market economy using a monetary-sum approach to representing agents' options instead of a real-effort task in a tournament environment. We follow this approach to capture the fact that competition for jobs is typically multi-faceted. It involves spending resources to obtain a high position not just in one way, but in many different ways. Some of these ways are investing in costly training, exhibiting initiative and leadership, networking and working long hours, but surely there are others. In our representation of job competition via a competitive bidding process, bids sum up monetarily these aspects of how one competes for higher positions in organizations. This way of representing the process of aspiring employees applying for different positions in hierarchical organizations allows us to look at the issue at hand from a new angle.

Our main finding is rather surprising: unlike in many (but not all) previous experimental studies women do not behave less competitively; if anything they bid, on average, more aggressively, although this effect is very small. Previous experimental results reporting gender differences in competitiveness where obtained using settings with real-effort tasks (see also Schram et al. 2019). As already discussed in the introduction, this is a very interesting but not the only way of representing an environment in which our variable of interest, namely competition for better-paid jobs by females and males, can be experimentally

explored. In other words, real-effort settings have been very useful in generating interesting results, but they are not the only possible ones.[14]

It is important to be clear about how, in light of previous research in the area, our results should be interpreted. In our view, our results suggest that if one considers all resources spent by women and men to access high-level positions in hierarchies, there are only minor gender differences. The fact that we find does, of course, not mean that there is no difficulty in women's access to high positions in organizations and in society in general. Here it is important to recall the distinction of Gino et al. (2015) who group obstacles to women's advancement into two broad categories: Demand-side factors or interpersonal effects (institutional barriers, discrimination).and supply-side factors or intrapersonal effects (perceptions held, decisions made or behaviors enacted by men and women). Demand-side factors, obstacles to women's advancement set up by others, may turn out to be much more important in the society. Hence, our results should be interpreted only as taking some weight away from intra-personal factors as mainly responsible, and have no bearing on the impact of inter-personal factors. In particular, they have nothing to say about the effects of discrimination and similar obstacles to women's advancement.

Aside from few gender differences, we find large deviations from rational bidding for own payoff maximization. In particular, whereas bidding for the middle positions is close to the prediction of Hypothesis 0, bidding for top positions is considerably below the prediction. One interpretation of this result is that participants 'satisfy' in the sense that they only aspire to reaching the middle positions, perhaps also due to the fact that there are two of them in each firm, so that they may appear easier to obtain. We also find evidence for a moderate gender difference in satisficing, since women bid higher than men for the top position in the flat firm.[15]

[14] Apicella et al. (2017) report that there are no gender difference when competing against self and Cassar et al. (2016) report similarly no gender differences when competition is for the benefit of offspring. See also Gillen et al. (2019) and Van der Heldhuizen (2016) for in-depth analysis of the motives behind observed behavior in the real-effort environment.

[15] Relatedly, see Chen et al. (2015) on gender differences in the value of winning.

REFERENCES

Abbink, K., Brandts, J., & Pezanis-Christou, P. (2006). Auctions for Government Securities: A Laboratory Comparison of Uniform, Discriminatory and Spanish Designs. *Journal of Economic Behavior and Organization, 61*, 284-303.

Apicella, C. L., Demiral, E. E., & Mollerstrom, J. (2017). No gender difference in willingness to compete when competing against self. *American Economic Association, Papers and Proceedings, 107(5),* 136-40.

Angelovski, A., Brandts, J. & Solà, C. (2021). Equal and Unequal Profiit Sharing in Highly Interdependent Work Groups: A Lab Experiment. *Journal of Economic Behavior and Organization, 184(C),* 232-252.

Avrahami, J., Ezer, A., Güth, W., Kardosh, N., Kareev, Y., & Zak, U. (2020). To be at the tail of the lions or the head of the foxes?. *Journal of Behavioral Decision Making, 33*(2), 121-138.

Buser, T., Dreber, A., & Mollerstrom, J. (2017). The impact of stress on tournament entry. *Experimental Economics*, *20*(2), 506-530.

Carlsson, F., Gupta, G., & Johansson-Stenman, O. (2009). Keeping up with the Vaishyas? Caste and relative standing in India. *Oxford Economic Papers, 61*, 52-73.

Casari, M., Ham, J.C., & Kagel, J.H. (2007). Selection Bias, Demographic Effects, and Ability Effects in Common Value Auction Experiments. *American Economic Review*, *97*, 1278- 1304

Cassar, A., Wordofa, F., & Zhang, Y. J. (2016). Competing for the benefit of offspring eliminates the gender gap in competitiveness. *Proceedings of the National Academy of Sciences*, *113(19),* 5201-5205.

Charness, G., Rustichini, A., & van de Ven, J. (2018). Self-confidence and strategic behavior. *Experimental Economics*, *21(1)*, 72-98.

Chen, Z., Ong, D. & Sheremata, R.. (2015). The gender difference in the value of winning. *Economic Letters*, *137*, 226-229.

Chen, Y, Katuscak, P., & Ozdenoren, E. (2013). Why can't a woman bid more like a man? *Games and Economic Behavior*, *77(1)*, 181-213.

Cooper, D., & Fang, H. (2008) Understanding Overbidding in Second Price Auctions: An Experimental Study. *The Economic Journal, 118(532)*, 1572-1595.

Dreber, A., von Essen, E., & Ranehill, E. (2014). Gender and competition in adolescence: task matters. *Experimental Economics*, 17(1), 154-172.

Fischbacher, U. (2007) Z-Tree: Zurich Toolbox for Ready-made Economic Experiments. *Experimental Economics*, *10(2)*, 171-78.

Frank, R.H. (1999). *Luxury Fever.* Princeton University Press, New Jersey.

Gillen, B., Snowberg, E., & Yariv, L. (2019). Experimenting with Measurement Error: Techniques with Applications to the Caltech Cohort Study. *Journal of Political Economy*, *127(4)*, 1826-1863.

Gino, F., Wilmuth, C. A., & Brooks, A. W. (2015). Compared to men, women view professional advancement as equally attainable, but less desirable. *Proceedings of the National Academy of Sciences*, *112(40)*, 12354-12359.

Gneezy, U., Niederle, M., & Rustichini, A. (2003). Performance in competitive environments: Gender differences. *Quarterly Journal of Economics*, *118(3)*, 1049-1074.

Gosling, S. D., Rentfrow, P. J., & Swann Jr, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*(6), 504-528.

Güth, W., Schmittberger, R., & Schwarze, B. (1983). A theoretical and experimental analysis of bidding behavior in Vickrey-auction games. *Zeitschrift für die gesamte Staatswissenschaft/Journal of Institutional and Theoretical Economics*, 269-288.

Ham, J. C., & Kagel, J. H. (2006). Gender effects in private value auctions. *Economics Letters*, *92(3)*, 375-382.

Kagel, J. H., & Levin, D. (2008). Auctions: A survey of experimental research, 1995-2008. *Handbook of experimental economics*, *2*(2).

Lee, J. Y., Nayga, R. M., Deck, C., & Drichoutis, A. (2020). Cognitive Ability and Bidding Behavior in Second Price Auctions: An Experimental Study. *American Journal of Agricultural Economics*, *102(5)*, 1494-1510.

Mujcic, R. & Frijters, P. (2013). Economic choices and status: Measuring preferences for income rank. *Oxford Economic Papers*, *65*, 47-73.

Niederle, M., & Vesterlund, L. (2007). Do women shy away from competition? Do men compete too much?. *Quarterly Journal of Economics*, *122(3*), 1067-1101.

Niederle, M. (2017). A gender agenda: a progress report on competitiveness. *American Economic Review*, *107(5)*, 115-19.

Pearson, M., & Schipper, B. (2013). Menstrual cycle and competitive behavior. *Games and Economic Behavior*, *78*, 1-20.

Price, C. R., & Sheremeta, R. M. (2015). Endowment origin, demographic effects, and individual preferences in contests. *Journal of Economics & Management Strategy*, *24(3)*, 597-619.

Selten, R., & Stoecker, R. (1986). End behavior in sequences of finite Prisoner's Dilemma supergames A learning theory approach. *Journal of Economic Behavior & Organization*, *7(1)*, 47-70.

Schram, A., Brandts, J., & Gërxhani, K. (2019). Social-status ranking: a hidden channel to gender inequality under competition. *Experimental Economics*, *22(2)*, 396-418.

Smith, V. (1976). Experimental Economics: Induced Value Theory. *American Economic Review*, *66(2)*, 274-279.

Stigler, G. (1987). Competition. In J. Eatwell, M. Milgate, P. Newman (eds). *The New Palgrave: A Dictionary of Economics*, *531*. The Macmillan Press, London.

Van der Heldhuizen, R. (2016). Gender Differences in Tournament Choices: Risk Preferences, Overconfidence or Competitiveness? *WZB Discussion Paper*, SP-II 2016-207, November 2016.

APPENDIX

Translation of Experimental Instructions

Welcome to our experiment! During this experiment you will be asked to make several decisions and so will the other participants.

Please read the instructions carefully. Your decisions as well as the decisions of the other participants will determine your earnings according to rules, which will be explained below. For participating in this experiment you will receive a participation fee of 5 euros. You can earn more money but also lose some money, depending on the decisions by you and others during the experiment. However, you will not lose money for participating in the experiment, as losses cannot exceed your participation fee (5 euros). The final amount you earn during the experiment will be paid individually immediately after the experiment. No other participant will learn from us how much you have earned.

All monetary amounts in the experiment are computed in ECU (Experimental Currency Units). At the end of the experiment, earned ECUs will be converted into euro using the following exchange rate:

10 ECU= 1 euro

This experiment is fully computerized. You will submit your decisions by clicking buttons on the screen. All participants are reading the same instructions and participate in this experiment for the first time.

Please note that from now on any communication between participants is strictly prohibited. If you violate this rule, you will be excluded from the experiment with no payment. If you have any questions, please raise your hand. The experimenter will come to you and answer your questions privately.

Description of the Experiment

In the experiment, you will first interact in a group of four participants but also learn what happens in another group with four interacting participants. We refer to these two informationally connected groups by *S* and *F*. At the beginning of the experiment you will be randomly assigned and told whether you belong to group *S* or *F*.

After 4 periods of interaction within your own group the two groups will be merged and the experiment will continue with all eight participants interacting repeatedly for another 4 periods.

What you and the other three, respectively seven participants with whom you are interacting have to decide is how much you are willing to bid for acquiring the top position, *t*, as well as for one of the two lower positions, *m*, in a hierarchical organisation. Thus, all of you will submit bids, $b(t)$, for the top position *t*, as well as bids, $b(m)$, for one of the two lower positions m. In the following, we refer to stating the bids, $b(t)$and $b(m)$, as bidding and to your individual choices $b(t)$and $b(m)$ as your bids. Let us now explain how your and the others' bids determine what you earn.

If you acquire the top position you will receive the salary of T (in ECU=Experimental Currency Units) whereas one of the lower positions will only grant you a salary of M, with $T > M$. If you do not obtain a position (t or m), you will earn *U*, where $M > U > 0$.

The two groups differ in that the salary amounts for the two positions are:

In group F (in ECU): $T = 350; M = 200; U = 50$
In group S (in ECU): $T = 450; M = 150; U = 50$

However, you also would have to pay the price for your respective position, *t* or *m*, which in the first four periods is decided according to the following rules:

- To acquire the top position your bid $b(t)$ has to be highest and the price $p(t)$ which you would pay for position t is the second highest bid $b(t)$, submitted by another participant in your group of four participants. Thus, if you achieve the top position you will earn what the top position yields minus its price i.e. $T - p(t)$.
- Only those who do not obtain the top position compete for one of the lower positions m. These two *m*-positions are granted to those whose two bids $b(m)$ are highest among the three remaining bidders and the price $p(m)$ they have to pay for position m is the third highest bid. Thus, what those who obtain the *m*-positions earn is what the top position yields minus its price i.e. $M - p(m)$.
- The remaining bidder in your groups earns *U* for which they do not have to pay a (positive) price.

Note that you could lose money when your bid for position *t* is higher than *T* or when your bid for position *m* is higher than *M*.

What each of the eight bidders learns after each period are the prices for the top positions, $p(t_F)$ and $p(t_S)$, as well as for the m positions, $p(m_F)$ and $p(m_S)$, in groups F and S where:

- $p(t_F)$ and $p(t_S)$ denote the prices for the top position $\boldsymbol{t}$ in groups F and S
- $p(m_F)$ and $p(m_S)$ denote the prices for the $\boldsymbol{m}$ positions in groups F and S

You will also be informed about your own payoff $T - p(t)$ or $M - p(t)$ due to the position t or m you acquire or, respectively, the payoff of U, if you fail to acquire a position.

As stated above, after the first 4 periods groups *F* and *S* merge and all 8 interacting participants can bid for positions *F* and *S*. So in the later for periods you will submit four bids namely for top position t_F and t_S as well as for the lower positions m_F and m_S. These bids must satisfy:

$$0 \leq b(m_S) \leq b(m_F) \leq b(t_F) \leq b(t_S) \leq 500$$

Positions after the merge are assigned according to the following rules:

- first determining the highest bid for the top position in *S*, i.e. $b(t_S)$, and its price $p(t_S)$ via the second highest-bid $b(t_S)$, i.e. the highest bidder would earn $450 - p(t_S)$,
- Then determining among the seven remaining bidders the highest bid for the top position in *F*, $b(t_F)$, and the price $p(t_F)$ via the second highest-bid $b(t_F)$ of the remaining bidders, i.e. the highest bidder would earn $350 - p(t_F)$
- Followed by determining among the remaining six participants the two highest bids $b(m_F)$ and the price $p(m_F)$ via the third highest-bid $b(m_F)$i.e. the two highest bidders would earn $200 - p(m_F)$ each,
- Finally determining among the four remaining participants the two highest bids $b(m_S)$ and the price $p(m_S)$ via the third highest bid $b(m_S)$i.e. the two highest bidders would earn $150 - p(m_S)$ each.

- The two remaining participants obtain no position and each earns U=50 each since they do not have to pay a positive price.

In the first 4 periods bids must satisfy:

$$0 \leq b(m) \leq b(t) \leq 500$$

i.e. the minimal bid is 0 while the maximal bid is 500. Similarly, in the last 4 periods bids must satisfy:

$$0 \leq b(m_S) \leq b(m_F) \leq b(t_F) \leq b(t_S) \leq 500$$

We refer to the first four periods before merging F and S and the successive four periods after merging as one run which will been repeated three more times, i.e. this experiment will have four runs with altogether 32 periods. You and the other 7 participants are randomly assigned to F and S at the beginning of each run. Therefore, you will be randomly reassigned to F and S three more times after the initial run.

Payments are based on one randomly selected run for which you will earn the payoff of one randomly selected period of the first four periods (before the merge) and one randomly selected period of the second four periods (after the merge), i.e. payments of this experiment are based on two random periods of a random run.

Figure A1: Distribution of bids by gender and position

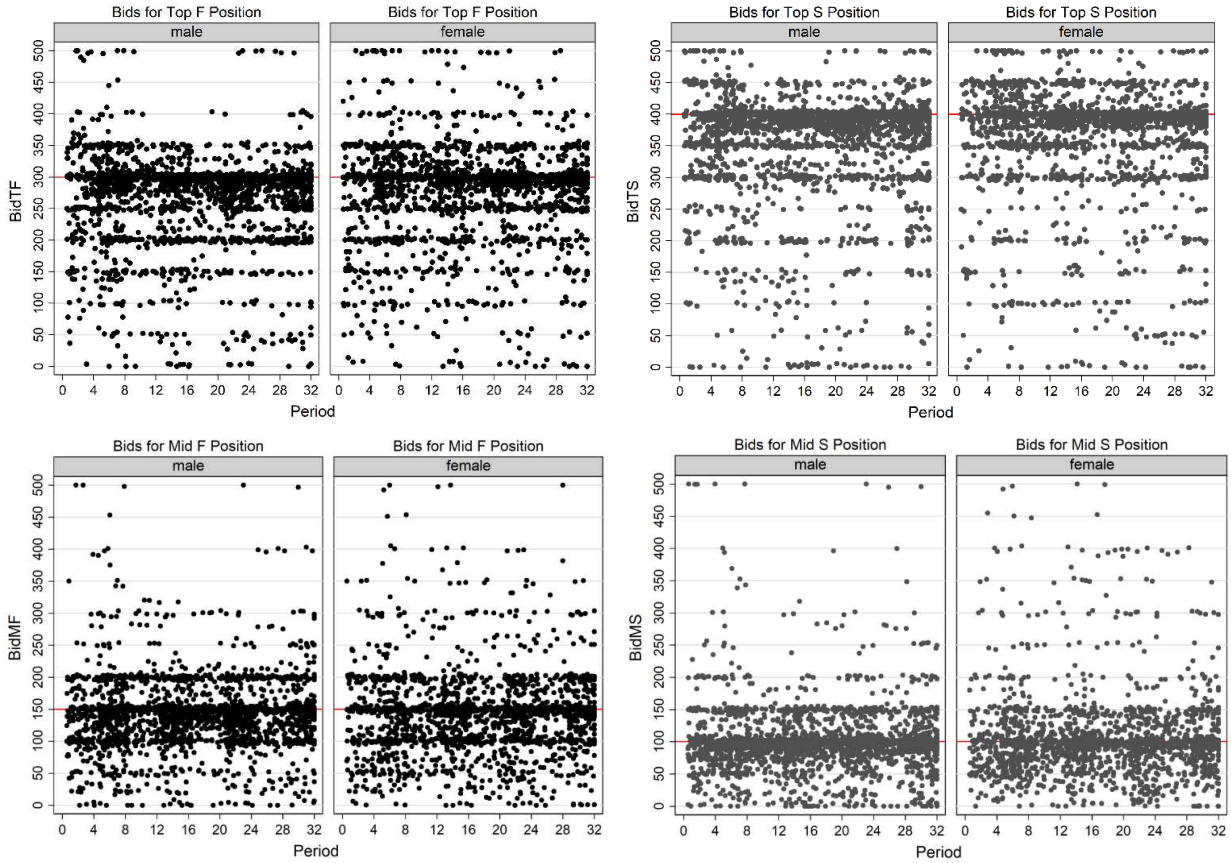


Figure A shows individual bids for the four positions separated by gender. Starting with the two top positions one can see again that there is strong underbidding (many more bids below the benchmark than above it) both in the flat and in the steep firm, with bunching around bids of 300 and 400 respectively, without any clear difference between women and men. For the middle positions it is less clear whether overall there is over or under bidding. Again, there are no clear differences between women and men. Observe, however, that the high bids appear to come from women.

Figure A2: Dynamics of earnings across periods.

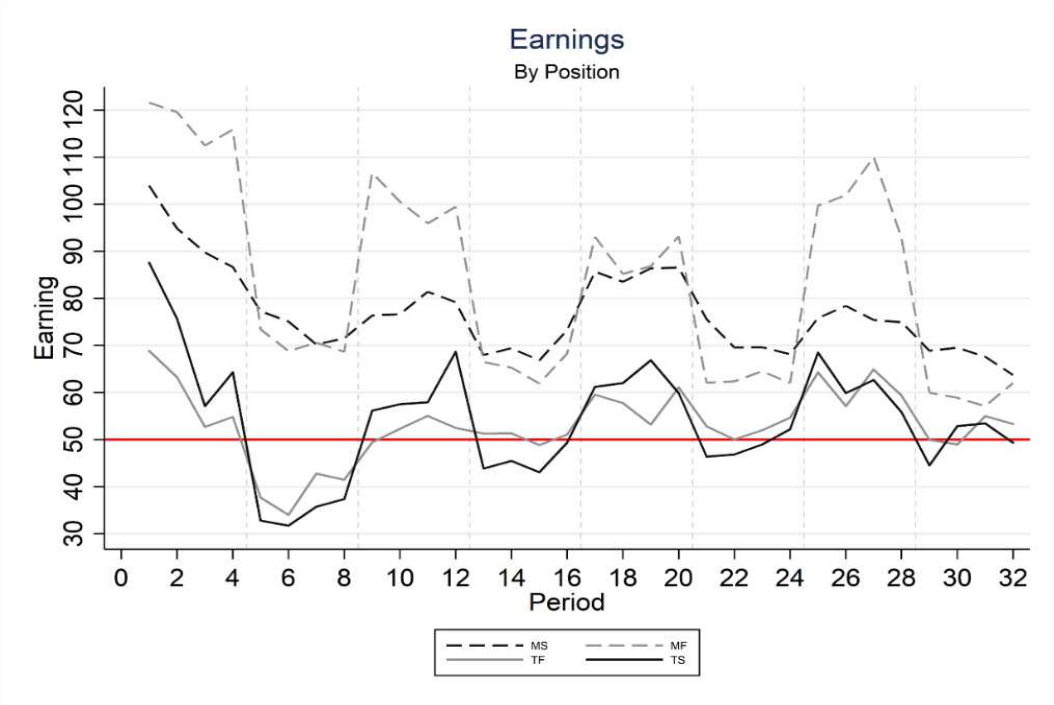


Figure A2 displays average earnings over time for all four positions, relative to the benchmark payoff of 50, corresponding to U earnings. Earnings move with the phase consistent with what one can see in Figure 6 and are higher in the middle positions than in the top position. The figure also suggests that in phase 1 earnings in the middle position in the flat firm are higher than in the steep firm.