The Gender Difference in the Value of Winning

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Abstract

We design an all-pay auction experiment in which we reveal the gender of the opponent. Using this design, we find that women bid higher than men, but only when bidding against other women. These findings, interpreted through a theoretical model incorporating differences in risk attitude and the value of winning, suggest that women have a higher value of winning than men.

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1. Introduction

There is robust evidence that women bid more aggressively than men in winner-pay common value (Casari et al., 2007; Ham and Kagel, 2006) and first-price auctions (Chen et al., 2013). Such aggressive bidding by women seems inconsistent with a large body of experimental work on tournament entry (Croson and Gneezy, 2009; Niederle and Vesterlund, 2011), suggesting that women are less (not more) competitive than men because they tend to choose the pay-for-performance over the tournament payment scheme (Niederle and Vesterlund, 2007; Cason et al., 2010; Sutter and Glätzle-Rützler, 2015).[1]

The main problem in interpreting and reconciling the findings from the auction literature and the tournament entry literature is that a choice to bid in an auction and a choice to enter a tournament may depend on the same factors, such as risk preferences, as well as unrelated factors, such as familiarity with competitive market interactions. For example, women's lower tolerance to risk (Croson and Gneezy, 2009) could explain why they avoid tournaments (Dohmen and Falk, 2011), and it could also explain more aggressive bidding in winner-pay auctions (Harrison, 1989). Therefore, it may be tempting to conclude that gender differences in bidding behavior and tournament entry are driven by the same factor. However, it is also possible that there are other factors unique to each environment that may be driving such differences.[2]

We contribute to the ongoing debate about gender difference in competitiveness by designing an all-pay auction experiment in which we reveal the gender of the opponent. Our

[1] This literature uses tournament entry decisions in "real effort" experiments to measure competitiveness. Subjects in these experiments have a choice to be rewarded by a tournament payment scheme (e.g., to be the best of four) or a pay-for-performance payment scheme (i.e., per unit of output).

[2] Women's choice to avoid tournaments could be also driven by lower confidence (Kamas and Preston, 2012), beliefs and gender stereotypes (Niederle and Vesterlund, 2007, 2011). Similarly, women may overbid in auctions because they are not as familiar with competitive market interactions (Ham and Kagel, 2006) and cannot calculate the optimal bidding strategies (Geary, 1996; Casari et al., 2007).

experimental treatments mimic the comparative statics predictions of a simple theoretical model, allowing us to examine differences in bidding that are due to differences in risk attitude and the value of winning. By revealing the gender of the opponent, we can rule out a number of other confounds that may be causing gender differences, such as beliefs, mistakes and stereotypes.

Confirming prior findings from the auction and contest literature, we find that women bid higher than men (Ham and Kagel, 2006; Casari et al., 2007; Chen et al., 2013; Mago et al., 2013; Price and Sheremeta, 2015; Dechenaux et al., 2015). Importantly, this is only when women bid against other women. Therefore, we can rule out that higher bidding by women is due to lack of familiarity with competitive market interactions or due to inferior mathematical skills which prevent women from figuring out the optimal bidding strategies. Such impediments would increase women's bids not only against women but also against men. Our data, interpreted through a theoretical model, suggests that women have a higher value of winning.

2. Theoretical Predictions

All-pay auctions are often used to model real life contests when the costs of competing are unrecoverable (Hillman and Riley, 1989; Baye et al., 1996). In a standard two player all-pay auction with complete information, player 1 with the higher valuation for winning the auction V_1 submits bid b_1 and player 2 with the lower valuation V_2 submits bid b_2. The player who submits the highest bid wins the auction and receives the corresponding prize. However, both players have to pay their bids irrespective of who wins the auction (hence the term "all-pay auction").

Behavior in the all-pay auction can be characterized by a mixed strategy equilibrium, in which both players randomly draw their bids from a certain interval (Hillman and Riley, 1989; Baye et al., 1996). Theoretically, such behavior depends on the valuation for winning V, which

may not necessarily be reflected by the monetary value of the prize (Sheremeta, 2010, 2013, 2015), and risk aversion R (Fibich et al., 2006; Gneezy and Smorodinsky, 2006).[3] Our theoretical model considers these two factors simultaneously. The details of the theoretical model and the proofs of the theoretical predictions can be found in Appendix A. Here we provide only a short overview of our main results. For convenience, we use "bid" to refer to the "mean bid" (since the equilibrium bid is defined by a mixed strategy).

Table 1: Theoretical Bids by Gender and Opponent

	Valuation V, Risk aversion R			
Gender Pairs	$V_M > V_F$ $R_M < R_F$	$V_M > V_F$ $R_M > R_F$	$V_M < V_F$ $R_M < R_F$	$V_M < V_F$ $R_M > R_F$
MM vs. FF	>	<=>	<=>	<
FM vs. FF	<=>	<	<=>	<
MF vs. MM	<	<=>	<	<=>
FM vs. MM	<	<	=	=
MF vs. FF	=	=	<	<
MF vs. FM	<=>	>	<	<=>

Table 1 provides theoretical predictions for our experiment. For convenience, FF (female-female), FM (female-male), MF (male-female) and MM (male-male) refer to the mean bids by females against females, females against males, males against females and males against males, respectively. The predictions are based on the assumption that men and women differ in their valuation for winning the auction (V_M vs. V_F) and risk aversion (R_M vs. R_F). When valuation and risk aversion have the same effect on the predicted behavior, we have strict inequalities. For example, lower valuation for men ($V_M < V_F$) as well as lower risk aversion for men ($R_M < R_F$) both imply MF < MM (see Appendix A), so the joint effect is certain: MF < MM. On the other

[3] The value of winning can be viewed as an approximation to different non-monetary considerations, such as the non-monetary utility of winning (Sheremeta, 2010, 2013, 2015), the disutility of losing (Delgado et al., 2008), envy (Mago et al., 2015), status (Charness et al., 2013; Clingingsmith and Sheremeta, 2015; Chen et al., 2015), and recognition (Andreoni and Petrie, 2004; Samek and Sheremeta, 2014). Similarly, risk attitude can be viewed as an approximation to factors influencing individual behavior under uncertainty, such as risk aversion (Sheremeta, 2011), loss aversion (Shupp et al., 2013), and strategic risk (Masiliunas et al., 2014).

hand, lower valuation for men ($V_M < V_F$) implies MM < FF but lower risk aversion for men ($R_M < R_F$) implies MM > FF, so the joint effect is uncertain: MM <=> FF.

3. Experiment

We recruited a total of 192 subjects, 98 subjects (51 males, 47 females) from Shenzhen University and 94 subjects (39 males, 55 females) from University Town. Subjects were paired randomly and anonymously into four pairings: MM (42 subjects), MF (48 subjects), FM (53 subjects), and FF (49 subjects).

The experiment was conducted in the standard lecture hall. To reduce the time necessary for the experiment, we gave monitors envelopes according to rough estimates of the number of people in each lecture hall. Each envelope contained a bidding sheet with instructions (available in Appendix B) informing subjects that they had 10 CNY and could bid for additional 10 CNY in an all-pay auction. For a comparison, a student assistant makes 10-15 CNY per hour.

On the bidding sheet, subjects could mark a bid ranging from 0 to 10 CNY in 0.5 CNY increments. The winner got the prize of 10 CNY. Bids of zero always gave subjects the endowment of 10 CNY. We gave subjects 10 examples of bids and corresponding payoffs, allowing two minutes for questions and answers. There was a place on the bidding sheet for students to write down their name and account information. The instructions told the students to put the bidding sheet back into the envelope. We transferred payments to their accounts after all sessions of the experiment were finished.

4. Results

Figure 1 shows the average bid in the all-pay auction experiment by gender and opponent. If we were to assume that there are no gender differences in the value of winning ($V_M = V_F$) and risk attitude ($R_M = R_F$), then there should be no differences in behavior between men and women irrespective of the gender of the opponent. However, this is not what we find.

Figure 1: Average Bid by Gender and Opponent

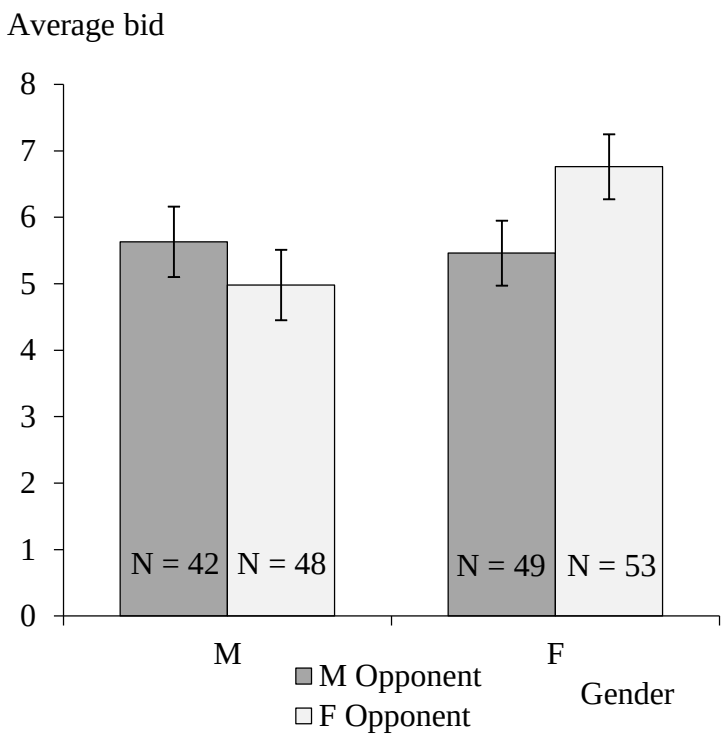

Table 2: Comparison of Average Bids between Pairings

Gender Pairs	*p*-value	Sign
MM vs. FF	0.07	=
FM vs. FF	0.04	<
MF vs. MM	0.47	=
FM vs. MM	0.81	=
MF vs. FF	0.02	<
MF vs. FM	0.64	=

According to the theoretical predictions provided in Table 1, there are four possible scenarios which can be tested by pairwise comparison of bids. Table 2 provides comparison of average bids between different pairings. Consistent with our predictions, we find different average bids depending on the gender of the opponent. Based on the Wilcoxon rank-sum test, women against women (FF) bid significantly more than women against men (FM) and significantly more than men against women (MF). Interestingly, women against men (FM) bid similarly to men against men (MM). These observations (i.e., MF < FF and FM = MM) are only consistent with the theoretical predictions derived under the assumption that women have a higher value of winning than men ($V_M < V_F$). However, these results are not conclusive about the impact of risk aversion on bidding behavior in all-pay auctions ($R_M < R_F$ or $R_M > R_F$).[4]

Table 3: OLS Regressions

Bid	(1)	(2)
MM	-1.13	-0.65
	(0.72)	(0.89)
MF	-1.79**	-2.00**
	(0.72)	(1.01)
FM	-1.30*	0.58
	(0.69)	(0.76)
MM×UT		-1.42
		(1.10)
FF×UT		-0.10
		(0.96)
MF×UT		0.33
		(1.07)
FM×UT		-3.67***
		(0.83)
Constant	6.77***	6.82***
	(0.49)	(0.61)
N	192	192

Note: * indicates statistical significance at the 10% level, ** significant at 5%, and *** at 1%. Robust standard errors are in parentheses.

[4] Gneezy and Smorodinsky (2006) also find that risk aversion is not a plausible explanation for behavior in all-pay auctions.

To check the robustness of our findings, we provide an additional regression analysis. Table 3 reports OLS regressions with robust standard errors, where the dependent variable is bid, and the independent variables are pairing dummies MM, MF and FM. The omitted pairing dummy is FF, which serves as a references point. Regression (1) confirms our earlier finding that men against women bid lower (negative estimate of MF) than women against women (the omitted variable FF). This is also true when we control for school (University Town vs. Shenzhen University) in regression (2). The interaction of the pairing dummy FM and school dummy UT is significantly negative, suggesting that women at University Town have lower value of winning than women at Shenzhen University.

5. Discussion and Conclusions

Our experiment shows that women bid higher in all-pay auctions than men, but only when bidding against other women. These findings, interpreted through a theoretical model, suggest that women have a higher value of winning than men.

The advantage of our design is that instead of a winner-pay auction, we use an all-pay auction.[5] Theoretically, overbidding in the winner-pay auction is consistent with higher risk aversion (Harrison, 1989). So, the fact that women bid more than men in winner-pay auctions is fully consistent with women being more risk averse (Croson and Gneezy, 2009). In contrast, overbidding in the all-pay auction is only consistent with lower (not higher) risk aversion (Gneezy and Smorodinsky, 2006). Therefore, the fact that we find that women bid more than

[5] Employing an all-pay auction also has some advantages over real-effort tournaments. Most studies examining performance of subjects in real-effort tasks find that women decrease their performance under competition (Gneezy et al., 2003; Gneezy and Rustichini, 2004; Gunther at al., 2010). However, in these studies the subject's ability is unobservable, which makes a clean comparison of effort impossible. The advantage of using an all-pay auction is that we can directly control the "ability" of subjects, by making all players in the auction symmetric.

men in the all-pay auction, implies that either (1) women are less risk averse, or (2) women have a higher value of winning. Our experimental evidence, interpreted through a theoretical model, suggest that it is the latter.

While the implications of our findings for the literature on gender differences in competitiveness are more provocative than conclusive (until replicated by others and in other countries), a gender difference in the value of winning would seem important in explaining why women only enter tournaments in which they either have higher odds of winning, e.g., as incumbents in political contests (Fulton et al., 2006), or they are traditionally stronger, e.g., in verbal reasoning (Niederle and Vesterlund, 2011), or when women can through higher effort or "grit" (Duckworth and Seligman, 2006) prepare more to increase their odds of success, e.g., in educational settings (Angrist et al., 2009).

Future research should further try to reconcile gender differences in tournament entry and bidding behavior in auctions. We make a small step in this direction by pointing out that risk aversion is not a good candidate, since it would imply women bidding less in all-pay auctions (which is opposite to what we find). Instead, we suggest that a possible reason why women overbid in all-pay auctions is that they have a higher non-monetary value of winning the auction.[6]

It is important to emphasize, however, that women having a higher value of winning cannot explain both aversion to entering tournaments and higher bidding in auctions. Instead, we suggest that perhaps when entering a tournament, individuals are myopic as to the potential value of winning such a tournament. It is also possible that the value of winning may simply not be reflected in tournament entry decisions. Irrespective of the exact interpretation, more research

[6] The value of winning can be viewed as an approximation to different non-monetary considerations, such as the non-monetary utility of winning, the disutility of losing, spite, envy, etc. Although we cannot distinguish between these different considerations in this study, we see this as a promising avenue for future research.

should be done reconciling gender differences in the auction literature and the tournament entry literature.

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Appendix A – Theoretical Proofs

When modeling an all-pay auction with complete information, we assume that player 1 has a higher valuation V_1 for winning the auction and player 2 has a lower valuation V_2, i.e., $V_2 < V_1$. Both players simultaneously and independently submit their corresponding bids b_1 and b_2. The player who submits the highest bid wins the auction and receives the prize. However, both players have to pay their bids, win or lose.

The mixed strategy equilibrium for the asymmetric all-pay auction with complete information and two risk neutral players is characterized by the following two equations:

$$\begin{cases}(V_2 - b)G_1(b) + (-b)\big(1 - G_1(b)\big) = 0 \\ (V_1 - b)G_2(b) + (-b)\big(1 - G_2(b)\big) = V_1 - V_2\end{cases} \tag{1}$$

Here, $G_1(b)$ is the probability that player 1 bids lower than b and $G_2(b)$ is the probability that player 2 bids lower than b.

An intuitive derivation follows. In any equilibrium, the higher valuation player 1 can always bid the lower valuation V_2 and win, getting $V_1 - V_2$ with certainty. The lower valuation player 2 can always bid zero and get at least zero. Neither can get more than what they can guarantee because of competition. The same argument goes through in the risk-averse case (Fibich et al., 2006; Gneezy and Smorodinsky, 2006), with the only difference that player 1 gets the *utility* of $U_1(V_1 - V_2)$ and player 2 gets the *utility* of $U_2(0)$ in equilibrium. Here we assume that the utility functions of players are increasing and weakly concave, that is, $tU_i(c_1) + (1 - t)U_i(c_2) \leq U_i(tc_1 + (1 - t)c_2)$ for $i = 1, 2$.

$$\begin{cases}U_2(V_2 - b)G_1(b) + U_2(-b)\big(1 - G_1(b)\big) = U_2(0) \\ U_1(V_1 - b)G_2(b) + U_1(-b)\big(1 - G_2(b)\big) = U_1(V_1 - V_2)\end{cases} \tag{2}$$

Equations described by (2) define a mixed strategy Nash equilibrium in which players must make each other indifferent between what they can get for sure (the right hand side of the

equation) and what they can get in any bid (the left hand side). From (2), we can solve for the equilibrium cumulative distribution functions (CDFs) or the "bidding functions":

$$\begin{cases} G_1(b) = \frac{U_2(0)-U_2(-b)}{U_2(V_2-b)-U_2(-b)} \\ G_2(b) = \frac{U_1(V_1-V_2)-U_1(-b)}{U_1(V_1-b)-U_1(-b)} \end{cases} \tag{3}$$

Note that if players are risk neutral and have the same value of winning, i.e., $U(x) = x$ and $V_1 = V_2 = V$, then in equilibrium both players should randomly choose their bids between 0 and V. That is:

$$\begin{cases} G_1(b) = \frac{b}{V} \\ G_2(b) = \frac{b}{V} \end{cases} \tag{4}$$

Before we derive the implications for the all-pay auctions in our experiment, we point out some general properties of the comparative statics of bidding functions (3). We will use these "rules" to give intuitions about how this auction theory applies to our female-female (FF), female-male (FM), male-female (MF) and male-male (MM) treatments. For convenience, we use "bid" to refer to "mean bids".

Rule 1: Player 1's bid *increases* (on average) in player 2's valuation.

To see this, note that $G_1(b)$ is *decreasing* in V_2.

Rule 2: Player 2's bid *decreases* in player 1's valuation and *increases* in his own.

To see this, note that $G_2(b)$ is *increasing* in V_1 and *decreasing* in V_2.

Rule 3: If the opponent's risk aversion increases, the bidder must decrease his bid.

First, observe that only the opponent's risk aversion affects the bidder's bid. If the opponent becomes more risk-averse, the bidder will bid lower. Consider what happens when player 2 becomes more risk-averse from U_2 to U_2'. By the definition of risk aversion, the value of any gamble for U_2' is less than that for U_2. Then, player 2 will strictly prefer bidding zero, should

player 1 maintain his strategy of bidding according to $G_1(b)$. But, if player 2 only bids zero, player 1 will want to bid lower. Equilibrium will be restored if player 1 plays $G_1'(b) > G_1(b)$ such that $U_2'(V_2 - b)G_1'(b) + U_2'(-b)\big(1 - G_1'(b)\big) = U_2'(0)$. In other words, when the bidder i's risk aversion increases, the opponent's bidding function, $G_j(b)$, must increase to compensate for the greater risk aversion of bidder i and in order to maintain the indifference between all possible bids of bidder i and what bidder i can get for sure.

Based on the rules that we have described, we develop comparative statics predictions for our experiment. For convenience, FF (female-female), FM (female-male), MF (male-female) and MM (male-male) refer to the average bids by females against females, females against males, males against females and males against males, respectively. We begin by assuming that females have a higher valuation for the prize than males $V_{\mathrm{M}} < V_{\mathrm{F}}$, holding the same risk aversion across gender. Given this assumption, we derive the following lemmas:

Lemma 1: MM < FF.

Proof: $G_{\mathrm{FF}}(b) = \frac{U(0)-U(-b)}{U(V_{\mathrm{F}}-b)-U(-b)} = \frac{U(0)-U(-b)}{U(V_{\mathrm{F}}-b)-U(V_{\mathrm{M}}-b)+U(V_{\mathrm{M}}-b)-U(-b)} <$

$< \frac{U(0)-U(-b)}{U(V_{\mathrm{M}}-b)-U(-b)} = G_{\mathrm{MM}}(b)$.

Intuitively, by Rule 1, the higher valuation player (F) bids higher against the higher valuation opponent than against the lower valuation opponent (M).

Lemma 2: FM < FF.

Proof: $G_{\mathrm{FF}}(b) = \frac{U(0)-U(-b)}{U(V_{\mathrm{F}}-b)-U(-b)} = \frac{U(0)-U(-b)}{U(V_{\mathrm{F}}-b)-U(V_{\mathrm{M}}-b)+U(V_{\mathrm{M}}-b)-U(-b)} <$

$< \frac{U(0)-U(-b)}{U(V_{\mathrm{M}}-b)-U(-b)} = G_{\mathrm{FM}}(b)$.

By Rule 1, the higher valuation player bids lower against the lower valuation opponent than against the higher valuation opponent.

Lemma 3: MF < MM.

Proof: $G_{\mathrm{MM}}(b) = \frac{U(0)-U(-b)}{U(V_{\mathrm{M}}-b)-U(-b)} < \frac{U(0)+U(V_{\mathrm{F}}-V_{\mathrm{M}})-U(0)-U(-b)}{U(V_{\mathrm{M}}-b)+U(V_{\mathrm{F}}-V_{\mathrm{M}})-U(0)-U(-b)} \leq$

$\leq \frac{U(0)+U(V_{\mathrm{F}}-V_{\mathrm{M}})-U(0)-U(-b)}{U(V_{\mathrm{M}}-b)+U(V_{\mathrm{F}}-b)-U(V_{\mathrm{M}}-b)-U(-b)} = \frac{U(V_{\mathrm{F}}-V_{\mathrm{M}})-U(-b)}{U(V_{\mathrm{F}}-b)-U(-b)} = G_{\mathrm{MF}}(b).$

Intuitively, by Rule 2, the lower valuation player bids lower against the higher valuation opponent than against the lower valuation opponent. Note that the weak inequality is due to $U(V_{\mathrm{F}}-b) - U(V_{\mathrm{M}}-b) \leq U(V_{\mathrm{F}}-V_{\mathrm{M}}) - U(0)$ which results from the fact that the utility function $U(\cdot)$ is weakly concave. To see this note that for $b \in [0, V_{\mathrm{M}}]$ and $V_{\mathrm{F}} > V_{\mathrm{M}}$, we have $U(0) \leq \min\{U(V_{\mathrm{F}}-V_{\mathrm{M}}), U(V_{\mathrm{M}}-b)\} \leq \max\{U(V_{\mathrm{F}}-V_{\mathrm{M}}), U(V_{\mathrm{M}}-b)\} \leq U(V_{\mathrm{F}}-b)$. By concavity we have $(1-t)U(0) + tU(V_{\mathrm{F}}-b) \leq U(V_{\mathrm{F}}-V_{\mathrm{M}})$ for $t = \frac{V_{\mathrm{F}}-V_{\mathrm{M}}}{V_{\mathrm{F}}-b} \in (0,1]$, and $(1-s)U(0) + sU(V_{\mathrm{F}}-b) \leq U(V_{\mathrm{M}}-b)$ for $s = \frac{V_{\mathrm{M}}-b}{V_{\mathrm{F}}-b} \in [0,1)$. Therefore, $U(V_{\mathrm{F}}-V_{\mathrm{M}}) + U(V_{\mathrm{M}}-b) \geq (1-t)U(0) + tU(V_{\mathrm{F}}-b) + (1-s)U(0) + sU(V_{\mathrm{F}}-b) = (2-s-t)U(0) + (s+t)U(V_{\mathrm{F}}-b)$, and since $s + t = \frac{V_{\mathrm{M}}-b}{V_{\mathrm{F}}-b} + \frac{V_{\mathrm{F}}-V_{\mathrm{M}}}{V_{\mathrm{F}}-b} = 1$, we have $U(V_{\mathrm{F}}-V_{\mathrm{M}}) + U(V_{\mathrm{M}}-b) \geq U(0) + U(V_{\mathrm{F}}-b)$, i.e., $U(V_{\mathrm{F}}-b) - U(V_{\mathrm{M}}-b) \leq U(V_{\mathrm{F}}-V_{\mathrm{M}}) - U(0)$.

Lemma 4: FM = MM.

Proof: $G_{\mathrm{MM}}(b) = \frac{U(0)-U(-b)}{U(V_{\mathrm{M}}-b)-U(-b)} = G_{\mathrm{FM}}(b).$

To see this, note that F was assumed to be the highest valuation player in FM, and M is of course the highest valuation player in MM. According to the bidding function $G_1(b)$ derived previously, the highest valuation player 1's bid is not a function of his own valuation V_1.

Lemma 5: MF < FM.

Proof: $G_{\mathrm{FM}}(b) = \frac{U(0)-U(-b)}{U(V_{\mathrm{M}}-b)-U(-b)} < \frac{U(0)+U(V_{\mathrm{F}}-V_{\mathrm{M}})-U(0)-U(-b)}{U(V_{\mathrm{M}}-b)+U(V_{\mathrm{F}}-V_{\mathrm{M}})-U(0)-U(-b)} \leq$

$\leq \frac{U(0)+U(V_{\mathrm{F}}-V_{\mathrm{M}})-U(0)-U(-b)}{U(V_{\mathrm{M}}-b)+U(V_{\mathrm{F}}-b)-U(V_{\mathrm{M}}-b)-U(-b)} = \frac{U(V_{\mathrm{F}}-V_{\mathrm{M}})-U(-b)}{U(V_{\mathrm{F}}-b)-U(-b)} = G_{\mathrm{MF}}(b).$

Lemma 6: MF < FF.

Proof: Follows from FF > FM and FM > MF.

Intuitively, by Rule 2, the lower valuation player bids lower against the higher valuation opponent than the higher valuation player against the higher valuation opponent.

Now assume that females are more risk-averse than males $R_{\mathrm{M}} < R_{\mathrm{F}}$, holding the same valuation. Given this assumption, we derive the following lemmas:

Lemma 7: MM > FF.

Proof: By Rule 3, F bids lower against the more risk-averse opponent F.

Lemma 8: FM > FF.

Proof: By Rule 3, F bids lower against the more risk-averse opponent F.

Lemma 9: MF < MM.

Proof: By Rule 3, M bids lower against the more risk-averse opponent F.

Lemma 10: FM = MM.

Proof: Fixing the opponent fixes the effect of risk aversion on bidder's bid. Thus, FM = MM.

Lemma 11: MF = FF.

Proof: Again, by Rule 3, fixing the opponent fixes the effect of risk aversion.

Lemma 12: MF < FM.

Proof: By Lemmas 8 and 11, MF = FF < FM.

We can create a table of comparative statics predictions, based on the assumptions that we made (i.e., $V_{\mathrm{M}} < V_{\mathrm{F}}$ and $R_{\mathrm{M}} < R_{\mathrm{F}}$) and the corresponding lemmas that we derived (i.e., Lemma 1 – Lemma 12). When valuation and risk aversion have the same effect on the predicted behavior, we get strict inequalities. For example, lower valuation for men ($V_{\mathrm{M}} < V_{\mathrm{F}}$) as well as

lower risk aversion for men ($R_{\mathrm{M}} < R_{\mathrm{F}}$) both imply MF < MM (see Lemma 3 and Lemma 9), so the joint effect is certain: MF < MM. On the other hand, lower valuation for men ($V_{\mathrm{M}} < V_{\mathrm{F}}$) implies MM < FF but lower risk aversion for men ($R_{\mathrm{M}} < R_{\mathrm{F}}$) implies MM > FF, so the joint effect is uncertain: MM <=> FF. These comparative statics predictions, as well as all other comparative statistics prediction that can be derived in a similar fashion, are shown in Table 1.

Appendix B – Experimental Instructions

You are…	Your opponent is…
Name:	A **Female** student in **UT**

- Please write down your name in the left block
- Your opponent is also a subject in this experiment. You can find the school or school and gender of your opponent in the right block.
- We paired you and your opponent randomly before today.
- There will be an auction between the two of you.
- From now on, each of you is endowed with 10 CNY.
- When the auction begins, you will use the 10 CNY we gave you to bid in the auction.
- The prize of this auction is 10 CNY as well.
- Both you and your opponent can only bid once in the auction. When you decide your bid, please mark the corresponding circle on the right graph. Please mark only one circle. Marking more than one will be treated as mistake. If you do not mark any circle in the graph, you are bidding zero.
  - ✧ Please note that if your opponent chooses a lower bid than you do, you are the winner in the auction and earn the extra 10 CNY which is the prize of the auction. Your opponent earns no extra money since he/she loses, but he/she still has to pay his bid.
  - ✧ In the same reasoning, if your opponent chooses a higher bid than you do, he/she will be the winner and earns the extra 10 CNY. But both of you have to pay your own bid.
  - ✧ If the two of you choose the same bid, you will split the 10 CNY prize and pay your own bid.
  - ✧ If both of you bid zero, that is, both of you do not mark any circle, then none of you earns any additional payment.
- Please note that your final payment in this experiment is exactly equal to the payment after you bid using the 10 CNY we give you in this auction. We do not provide any other payment.
- Please now decide your bid.
- After you finish marking your bid, please write down your name and bank account in the box, and then put this paper back to the envelop.

10	○
9.5	○
9	○
8.5	○
8	○
7.5	○
7	○
6.5	○
6	○
5.5	○
5	○
4.5	○
4	○
3.5	○
3	○
2.5	○
2	○
1.5	○
1	○
0.5	○

Name _____

Bank account No. _____