

# Experience and Gender Effects in an Acquiring-a-Company Experiment Allowing for Value Messages

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## Abstract

This paper focuses on a bargaining experiment in which the privately informed seller of a company sends a value message to the uninformed potential buyer who then proposes a price for acquiring the company. Participants are constantly in the role of either seller or buyer and interact over 30 rounds with randomly changing partners in the other role. We test how overstating the value of the company, underpricing the received value message and acceptance of price offers are affected by experience and gender (constellation). Like in our companion paper on single play (Di Cagno et al. 2015) we control via treatments for awareness of gender (constellation). One main hypothesis is that gender (constellation) matters but that the effects become weaker with more experience and that the main experience effects apply across gender (constellations).

**Keywords:** bargaining, cheap-talk, experience effect, experiment, gender, winner's curse.  
**JEL:** C78; C91

## 1. Introduction

Cheap talk has been shown to improve coordination, e.g. in game experiments with multiple equilibria, and to crowd out costly punishing, e.g. in ultimatum game experiments, where it represents a less costly alternative for expressing own anger or disappointment. To the best of

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our knowledge, little research addressed the role of cheap talk in experiments on bargaining with focus on experience and gender effects. In experiments, cheap talk may reduce or even resolve the problem of asymmetric information which can lead to no-trade results in markets for lemons (Akerlof, 1970) and in the Acquiring-a-Company game (Samuelson and Bazerman, 1985).

We modify the latter game by allowing for an initial (cheap talk) value message from the privately informed seller to the buyer who then proposes a take-it-or-leave-it price offer to the seller. The modified game has the structure of a signaling game since the uninformed buyer might infer from the value message some information about the true value of the firm owned by the seller. However, if accepting a price offer is optimal for some given value of the firm, then this is even better for any lower value of the firm: sellers of low value firms would send high value messages, like sellers of high value firms. Therefore, only pooling equilibria emerge with the same uninformative (high) value messages sent by sellers.

Behaviorally, however, cheap talk may matter. Indeed, in our companion study based on a single incentivised play of this game we show that value messages positively and significantly increase price offers.<sup>1</sup> Will experience strengthen or weaken this effect? We expected the latter, i.e., convergence to pooling. On the other hand, trade is always efficiency enhancing and at least some seller participants might be intrinsically motivated to signal the true value. Actually a surprisingly constant positive share of participants invests in role reputation by abstaining from overstating (their firm's value). Altogether it should depend, in our view, on intrinsic motivation and social dynamics whether behavior converges to pooling or whether some trust in value messages pertains, possibly together with price offers aiming at fairly sharing the surplus from trade. What this indicates already is that we are interested mainly in experience effects by comparing findings for different levels of experience and not in individual learning (see the chapter on individual learning in Camerer, 2003).

Regarding gender (constellation) effects when playing just once, Di Cagno et al. (2015)

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<sup>1</sup>See Di Cagno et al (2015).

report that female participants significantly cheat more than male participants. An obvious hypothesis claims this to be considerably weakened and even eliminated, e.g. in the last 10 of altogether 30 rounds, by game playing experience. If so, this could suggest that gender (constellation) effects mainly rely on data of inexperienced decision making.

Since treatments partly allow for commonly known gender constellations this does not only apply to conditioning behavior on own gender but also on other's gender. Our two studies together demonstrate that it is very interesting and informative to compare behavior of inexperienced and experienced participants which both matter economically, e.g. when designing spot markets whose traders change frequently, respectively when establishing institutions which are to be encountered repeatedly. Rather than reporting all our findings in one, in our view, too loaded paper, gender (constellations) effects of inexperienced participants are shown to exist in our companion paper whereas in the study at hand we mainly report how experience affects behavior and questions gender (constellation) effects.

Section 2 introduces the modified game. Section 3 describes the experimental protocol. Descriptive statistics are discussed in Section 4. Section 5 provides the regression analysis. Section 6 concludes.

## 2. Game Model

The buyer's value  $v$  of the firm, owned by the seller, is randomly generated according to a uniform density concentrated on  $(0, 1)$ . This is commonly known, as well as that the seller evaluates the firm only  $qv$ , with  $0 < q < 1$ . If trade occurs at price  $p$ , the buyer earns  $v - p$  and the seller earns  $p - qv$ . The timing of the game is as follows:

- (i) knowing  $v$ , the seller sends the value message  $\hat{v} = \hat{v}(v)$  which might be true ( $\hat{v} = v$ ) or false ( $\hat{v} \neq v$ );
- (ii) after receiving the message  $\hat{v}$ , the buyer proposes the price  $p = p(\hat{v})$ ;

(iii) after receiving the price offer, the seller accepts it ( $\delta(p) = 1$ ) or rejects it ( $\delta(p) = 0$ ).

The seller earns  $\delta(p)(p - qv)$  and the buyer  $\delta(p)(v - p)$ . When trading, i.e., when  $\delta(p) = 1$ , the total surplus is  $v(1 - q)$  which is always positive. When not trading, i.e., when  $\delta(p) = 0$ , both buyer and seller earn nothing.

Since  $\delta(p) = 1$  is only optimal for  $p \geq qv$ , a risk neutral buyer expects to earn

$$\int_0^{p/q} (v - p) dv = (0.5 - q) \frac{p^2}{q^2} \quad (1)$$

which increases (decreases) with  $p$  for  $q < 0.5$  ( $q > 0.5$ ). Since  $v < 1$  implies  $qv < q$ , it is never optimal for the buyer to offer a price higher than  $q$ . It follows that the price  $p = q$  is optimal for  $q \leq 0.5$  and  $p = 0$  for  $q > 0.5$ . This benchmark solution is not questioned by cheap talk.

The Acquiring-a-Company game is a convenient experimental workhorse to study the winner's curse even when modified by allowing for cheap talk. Indeed, buyer participants may fail to anticipate that positive price offers are accepted only if  $v \leq p/q$ . This then might induce them to offer prices  $p$  which yield (assuming  $\delta(p) = 1$  whenever  $p \geq qv$ ) less than expected, i.e., less than  $(\frac{1}{2} - q)$  for  $q \leq 1/2$  and an expected loss for  $q > 1/2$ . Of course, the benchmark solution denies such winner's curse and predicts for  $q \leq 1/2$  and  $p = q$  with probability  $q$  the buyer to lose  $v - q (< 0)$  and with probability  $1 - q$  to gain  $v - q (> 0)$  whereas for  $q > 1/2$  no trade at all is predicted.

Let us briefly discuss how the benchmark solution, based on buyer's risk neutrality and backward induction, is questioned when (i) the seller may be averse to overstating, i.e., to send a value message  $\hat{v}(v) > v$  and (ii) the buyer may or not be aware of the seller's moral concerns. The game theoretic approach would investigate these modifications via a signaling game with the better informed (about the firm's value as well as own guilt feelings) seller moving first so that the uninformed buyer can possibly infer the firm's value from the value signal  $\hat{v}$ . Obviously an interesting analytic exercise but one which is extremely unrealistic

since the seller’s idiosyncratic guilt feelings will never be common knowledge.<sup>2</sup>

Still one might want to speculate how behavior is affected when – at least some – seller participants are feeling obliged to tell the truth. When expecting this, buyer participants may believe the message  $\hat{v}$  and suggest a price between  $q\hat{v}$  and  $\hat{v}$ . Strongly fairness-minded buyer participants might even propose the price  $p(\hat{v}) = \frac{(1+q)\hat{v}}{2}$  to share the surplus from trade  $(1 - q)\hat{v}$  equally. We will show that quite some seller participants feel obliged to choose  $\hat{v}(v) = v$ , and that many price offers lie between  $q\hat{v}$  and  $\hat{v}$ . However, cheap talk value messages more often induce opportunistic sellers to try to exploit buyers by “making up” via  $\hat{v}(v) > v$  and this, in turn, questions buyers’ trust in the message sent by sellers. It seems more likely that after learning most participants will not trust the value messages what should also discourage attempts to share the surplus (more or less) equally.

This denies cyclic adaptations, e.g. in the sense of trustworthiness ( $\hat{v}(v)$  close to  $v$ ) and trusting ( $p(\hat{v}) > \hat{v}$ ) first evolving, then eroding before possibly recovering. Furthermore, we expect experience effects to depend on the gender (constellation) of the trading partners.

### 3. Experimental protocol

We refer here to the basic part of our broader experimental project, to analyze experience and gender effects.<sup>3</sup> This stage with 30 rounds of playing the same bargaining game, has been preceded by one incentivized trial round what should have allowed our participants to understand their decision tasks in the following 30 rounds.<sup>4</sup> We ran 12 sessions with a total of 376 students (11 sessions with 32 participants each plus one session with 24), recruited among the undergraduate population of Jena University using Orsee (Greiner, 2004), at the laboratory of Max Planck Institute in Jena. The experiment was fully computerized using

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<sup>2</sup>Indeed, the common priors assumption in the tradition of Harsanyi (1967-1968) is philosophically interesting, and possibly informative, but very unrealistic.

<sup>3</sup>The first part one incentivized round only. At the beginning of the experiment, and after completing the first part is based on instructions for the following part were provided and read aloud by the experimental proctor. The English translation of the Instructions is reported in Appendix B.

<sup>4</sup>For the results of the incentivized trial round refer to Di Cagno et al. (2015)

z-Tree (Fischbacher 2007).

At the beginning of the experiment, each participant was randomly assigned to one of the two possible roles (seller or buyer) and remained in this role throughout the experiment: half of the participants were buyer; the other half seller. What they were not aware of is that half of the sellers and buyers were male and the other half females. In each round participants were randomly matched with one partner in the other role. The task was to possibly trade the firm owned by the seller. The value of the firm  $v$ , randomly selected for each seller-buyer pair according to a discrete uniform distribution concentrated on  $(0, 100)$ , was told only to the seller (the actual values in the experiment, selected in steps of 5, were 5, 10, ..., 95). Both (seller and buyer) were aware of the proportion ( $q$ ), correlating the true evaluations  $v$  and  $qv$  linearly. This proportion  $q$  was randomly selected from a discrete uniform distribution  $(0, 1)$ ; the actual values  $q$  in the experiment were rescaled in % and could only assume the following values: 10, 20, 30, 40, 50, 60, 70, 80 or 90 percent.

In each round (see Table 1) bargaining proceeds in the following way: the seller sends a value message ( $\hat{v}$ ) to the buyer which can be true or false but not exceed 100. After receiving the message, the buyer proposes a price  $p$  which cannot exceed 100. Having received the price offer, the seller can accept it or not. If accepted, the firm is sold at the offered price; if not, no trade takes place. After each round, payoffs are calculated and privately communicated to buyer and seller, respectively.

### 3.1. Treatments

We run four treatments differing in information only: in treatment  $U$  (Unknown), trading partners, randomly matched in pairs, are unaware of other's gender, which is known in treatment  $G$  (awareness of Gender constellation). Treatment  $OC$  (Other Confound) informs about the field of study instead (Economics versus Non-Economics). Finally, treatment  $E$  (Embedded gender constellation) provides information about other's gender and field of study. With the last treatment we try to check possible demand effects when informing

Table 1: Road map of game rounds

Step <sup>†</sup>	Seller	Buyer	Description
0	$q, v$ known Partner information*	$q$ known Partner information*	Initial information provided to buyers and sellers
1	Message $\hat{v}$	⌘	Seller sends message to Buyer
2	⌘	Price offer $p(\hat{v})$	Buyer makes price offer
3	Acceptance $\delta(p)$	⌘	Seller accepts or refuses price offer
4	Payoff $\delta(p)(p - qv)$	Payoff $\delta(p)(v - p)$	Seller and Buyer informed on payoff

<sup>†</sup> We interpret each round as involving four-steps.

\* Partner information depends on the treatment played, see Section 3.1.

⌘ Participants wait for partner's decision, i.e., when they are inactive.

about gender (constellation).

### 3.2. Matching

Random matching between buyers and sellers was implemented to balance our sample by gender constellation: pairs occurred in equal proportion: male buyer/female seller, male buyer/male seller, female buyer/male seller and female buyer/female seller. Participants were reminded in each round that participants are randomly paired.

### 3.3. Payment

At the end of each round, participants were informed about their final payoff for that round (in ECU). The conversion rate from experimental points to euro (1 euro=30 ECU) was announced in the instructions. If the seller accepted the offered price, the buyer earned the difference between the value of the firm and the price ( $v - p$ ) and the seller the difference between the accepted price and her evaluation of the firm ( $p - qv$ ). If the price was not accepted, the final payoff for both was zero. Participants received an initial endowment of 300 ECU (10 euro) in order to avoid bankruptcy. The actual payment is the payment of a randomly selected round (out of the 30 rounds).

Figure 1: Intervals of price offers

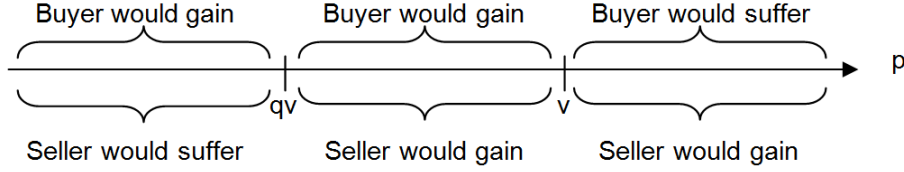


Table 2: Probability of acceptance

	Early phase <sup>†</sup>			Intermediate phase <sup>†</sup>			Late phase <sup>†</sup>			All rounds <sup>†</sup>			Ttests: Early-Late <sup>*</sup>		
	F	M	Both	F	M	Both	F	M	Both	F	M	Both	F	M	Both
$p \leq qv$	6.99 (0.21)	4.66	5.84	4.44 (0.91)	4.28	4.36	2.85 (0.575)	3.53	3.19	4.59 (0.572)	4.1	4.35	(0.01)	(0.44)	(0.01)
$v > p > qv$	88.72 (0.63)	89.91	89.3	89.84 (0.79)	90.48	90.17	82.15 (0.18)	86.13	84.18	87.02 (0.21)	88.89	87.97	(0.02)	(0.15)	(0.01)
$p \geq v$	97.88 (0.21)	99	98.46	97.93 (0.11)	99.57	98.73	99.1 (0.96)	99.51	99.3	98.26 (0.06)	99.32	98.79	(0.28)	(0.53)	(0.22)

<sup>†</sup> P-values in parenthesis. Test for gender differences within stage are above each observation.

<sup>\*</sup> Test for dynamic differences for males, females and pooled observations.

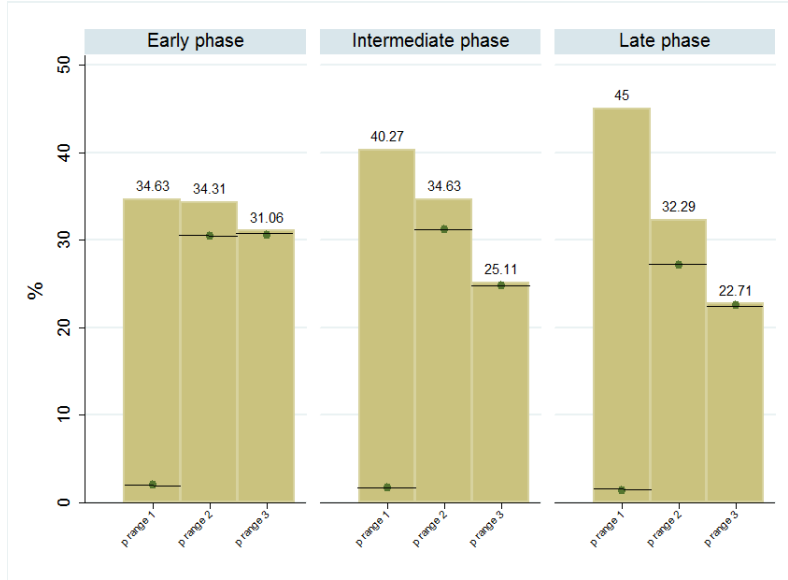
## 4. Descriptive statistics

We analyze here how experience affects (*i*) acceptance of price offers, (*ii*) price offers  $p$  and suspicion  $\hat{v} - p$ , (*iii*) value messages  $\hat{v}$  and “make-up”  $\hat{v} - v$  by comparing three successive phases consisting of 10 rounds each and labeled *early* phase (rounds 1 to 10), *intermediate* phase (rounds 11 to 20) and *late* phase (rounds 21 to 30).

### 4.1. Sellers’ Acceptance

We consider three intervals for price offers depending on who gains, respectively suffers a loss from acceptance:  $p \leq qv$  so that buyers gain and sellers suffer a loss;  $qv < p < v$  when both, sellers and buyers, gain;  $p \geq v$  so that sellers gain and buyers lose (see Figure 1). Figure 2 shows, for the three price intervals, the offers by phase and the probability of acceptance. Table 2 reports the probability of acceptance by gender.

Figure 2: Price offers by phase



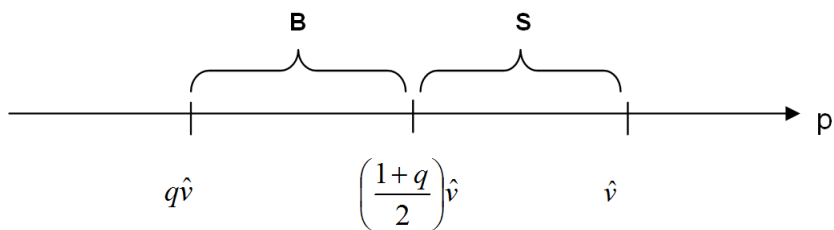
**Notes:** *p range 1:*  $p \leq qv$ ; *p range 2:*  $qv < p < v$ ; *p range 3:*  $p \geq v$ . Horizontal lines are the acceptance probabilities.

The share of price offers with  $p \geq v$  is decreasing across phases from 31.06% to 22.71% of total offers and such offers are nearly always accepted; the share of price offers with  $p \leq qv$  is increasing across phases from 34.63% to 45% of total offers and such offers are mostly refused (see Figure 2).

For male sellers, the probability of refusing an offer with  $p \geq v$  is close to zero in every phase. For female sellers, the probability of refusing an offer with  $p \geq v$  is slightly higher than for male sellers in each phase and is decreasing across phases (see Table 2). For male sellers, the probability of accepting an offer with  $p \leq qv$  is non-negligible but decreases across phases from 4.66% to 3.53%. For female sellers, the probability of accepting an offer with  $p \leq qv$  is higher than for male sellers in the early phase and lower in late phase (see Table 2).

Thus gender differences are stronger in the early phase and tend to disappear in the late phase, mainly due to the adaptation dynamics of female sellers who seem to be more influenced by experience. Furthermore, acceptance behavior is not influenced by other regarding

Figure 3: Regions of price offers



preferences: there is no evidence of “altruistically minded” sellers rejecting high price offers to protect buyers from losses, i.e., of refusing price offers  $p > v$ . This finding is reinforced across phases.

The share of price offers from which both, seller and buyer, gain are fairly constant across phases and the probability of accepting them declines over time. Time lapses to accept price offers decline across rounds, revealing clear experience effects for both, female and male sellers. Moreover, the time lapse is shorter when it is straightforward to accept ( $p \geq v$ ), respectively to refuse (when  $p \leq qv$ ). When instead both, sellers and buyers, would gain better the time lapse is longer (see Appendix A, Table 12).

**Result 1.** *Acceptance of price offers yielding a loss for the seller is rare and decreases with experience. Moreover, sellers do not protect buyers from a loss. Gender differences in acceptance behavior tend to disappear with experience.*

## 4.2. Price offers and suspicion

Price offers partly express how buyers want to share the surplus from trade and partly reveal suspicion regarding the value message received. Price offers such that  $q\hat{v} < p < \hat{v}$  could reveal trust in the value message. Moreover, when  $\hat{v}(v) = v$ , offering  $p = \frac{(1+q)}{2}\hat{v}$  would imply equal sharing of the surplus from trade: offers higher (lower) than  $\frac{(1+q)}{2}\hat{v}$  would imply sellers (buyers) gain more (see Figure 3). Price offers  $p \leq q\hat{v}$  clearly reveal suspicion: since

Table 3: Probability of price offers

	Early phase <sup>†</sup>			Intermediate phase <sup>†</sup>			Late phase <sup>†</sup>			All rounds <sup>†</sup>			Ttests: Early-Late <sup>*</sup>		
	F	M	Both	F	M	Both	F	M	Both	F	M	Both	F	M	Both
$p \leq q\hat{v}$	49.47 (0.96)	49.57	49.52	58.72 (0.64)	57.66	58.19	64.89 (0.74)	64.15	64.52	57.7 (0.67)	57.13	57.41	(0.00)	(0.00)	(0.00)
$q\hat{v} < p < \frac{(1+q)\hat{v}}{2}$	36.81 (0.45)	38.51	37.66	36.06 (0.89)	35.74	35.9	30.74 (0.62)	31.81	31.28	34.54 (0.52)	35.35	34.95	(0.01)	(0.00)	(0.00)
$\frac{(1+q)\hat{v}}{2} \leq p < \hat{v}$	9.68 (0.12)	7.66	8.67	3.94 (0.57)	4.47	4.2	3.09 (0.68)	2.77	2.93	5.57 (0.31)	4.96	5.27	(0.00)	(0.00)	(0.00)
$p \geq \hat{v}$	4.04 (0.82)	4.26	4.15	1.28 (0.15)	2.13	1.7	1.28 (1.00)	1.28	1.28	2.2 (0.38)	2.55	2.38	(0.00)	(0.00)	(0.00)

<sup>†</sup> P-values in parenthesis. Test for gender differences within phase are above each observation.

<sup>\*</sup> Test for dynamic differences for males, females and pooled observations.

truth-telling sellers would reject them, buyers should propose them only when expecting the message to overstate the value of the firm.<sup>5</sup>

Figure 4 shows the distribution of price offers by phase and range of  $q$ . There is substantial evidence of buyers' suspicion and demand for higher share of surplus, which increases over time. However, there are no relevant gender differences (Table 3). Decision time decreases for both female and male buyers. Decision lapses on price offers with  $p \leq q\hat{v}$  are shorter than those with  $p > q\hat{v}$ . Decision lapses for offers in the range  $(q\hat{v}, \hat{v})$  are longer probably because buyers try to balance what both trade partners gain. Interestingly, male buyers need more time when demanding more for themselves, i.e., when offering  $p > \frac{(1+q)\hat{v}}{2}$  whereas female buyers need more time when demanding less for themselves (see Appendix A, Table 13).

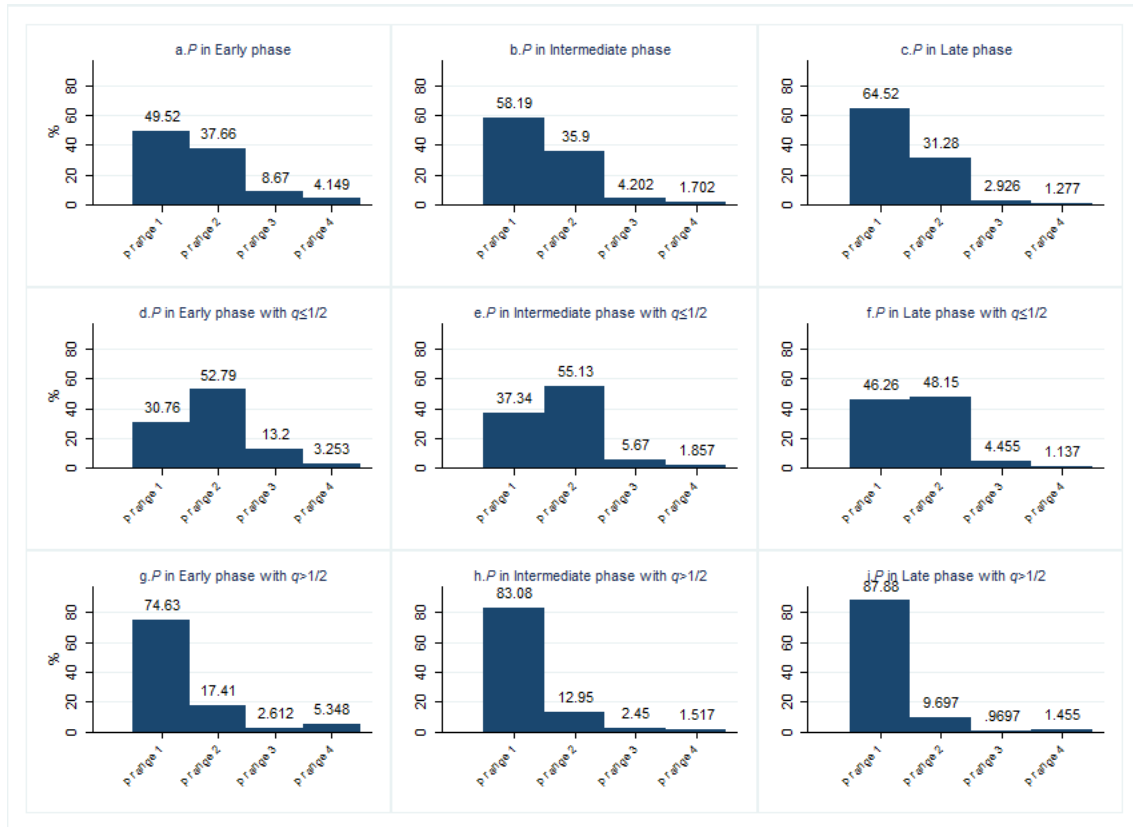
**Result 2.** *Buyers become more suspicious with experience and offer more often prices lower than  $q\hat{v}$  which a truth-telling seller should find unacceptable.*

### 4.3. Value messages and “Make Up”

Buyers make up, i.e., choose  $\hat{v} > v$  mostly, even though there is significant evidence of truth-telling and a surprising evidence of understating. Table 4 shows that 71% of value messages overstate the value of the firm, 12% understate it and 16% are truthful. The share of understating value messages decreases across phases, whereas the shares of overstating

<sup>5</sup>Except possibly for noise, we do not expect buyers to offer  $p \geq \hat{v}$ .

Figure 4: Price offers by phase and by level of  $q$



Notes: p range 1:  $p \leq q\hat{v}$ , p range 2:  $\frac{(1+q)}{2}\hat{v} > p > q\hat{v}$ , p range 3:  $\frac{(1+q)}{2}\hat{v} \leq p < \hat{v}$ , p range 4:  $p > \hat{v}$ .

and truth-telling value messages remain rather stable across time.

Male sellers are generally more sincere than females sellers: the share of true messages by male sellers increases across rounds, reaching in the last phase 20% of their messages while the share of true messages sent female sellers remains fairly stable (in the last phase: 16%). Decision time shows a strong experience effect: it steadily decreases across phases. As expected, truth-telling is faster than strategizing. Male sellers think longer than female ones when overstating (see Table 14 in Appendix A).

If truth-telling is due to ethical obligations, one should expect the same seller participants to mainly choose  $\hat{v}(v) = v$ . Otherwise, truth-telling could be due to once in a while investing in the informativeness of value message  $\hat{v}$ .<sup>6</sup> The transition matrix in Table 5 reports relative frequencies of seller participants who are truth-telling  $i = 0; 1; 2; 3; 4; 5$  or more times in one phase and truth-telling  $j = 0; 1; 2; 3; 4; 5$  or more times in the following phase.<sup>7</sup> Except for those, who never tell the truth, and those who do it at least five times, there is not much consistency in sellers' attitude across phases: seller participants are either not at all or seriously restricted by ethical concerns or just once in a while investing in the informativeness of value messages  $\hat{v}$ .

**Result 3.** *The majority of value messages overstate with this share remaining constant across phases. There is significant and persistent evidence of truth-telling. Surprisingly, understating is non-negligible but decreasing across phases. The probability of truth-telling does not decrease across phases and is even largest (17.55%) in the last phase.*

#### 4.4. Winner's curse

Do buyer participants suffer from a “generalized” winner's curse and offer non-optimal prices, thus earning less than expected? Figure 6 reports the difference between expected earnings

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<sup>6</sup>In Figure 5 we report the frequencies of truth-telling by phase and by gender.

<sup>7</sup>For instance, half of the 66 seller participants who never told the truth in the intermediate phase also never told the truth in the late phase.

Table 4: Value messages: truth-telling, overstating and understating

	Early phase <sup>†</sup>			Intermediate phase <sup>†</sup>			Late phase <sup>†</sup>			All rounds <sup>†</sup>			Ttests: Early-Late <sup>*</sup>		
	F	M	Both	F	M	Both	F	M	Both	F	M	Both	F	M	Both
truth-telling ( $\hat{v} = v$ )	15.95	15.10	15.53	14.46	16.70	15.53	15.95	19.14	17.55	15.46	16.98	16.22	(1.00)	(0.02)	(0.10)
		(0.61)			(0.18)			(0.07)			(0.12)				
overstating ( $\hat{v} > v$ )	66.81	72.77	69.79	72.87	72.02	72.45	72.55	71.60	72.07	70.74	72.13	71.44	(0.01)	(0.57)	(0.12)
		(0.00)			(0.68)			(0.64)			(0.25)				
understating ( $\hat{v} < v$ )	17.23	12.13	14.68	12.66	11.28	11.97	11.49	9.26	10.37	13.79	10.89	12.34	(0.00)	(0.04)	(0.00)
		(0.00)			(0.36)			(0.11)			(0.00)				

<sup>†</sup> P-values in parenthesis. Test for gender differences within phase are above each observation.

<sup>\*</sup> Test for dynamic differences for males, females and pooled observations.

Figure 5: Frequencies of truth-telling by phase and by gender

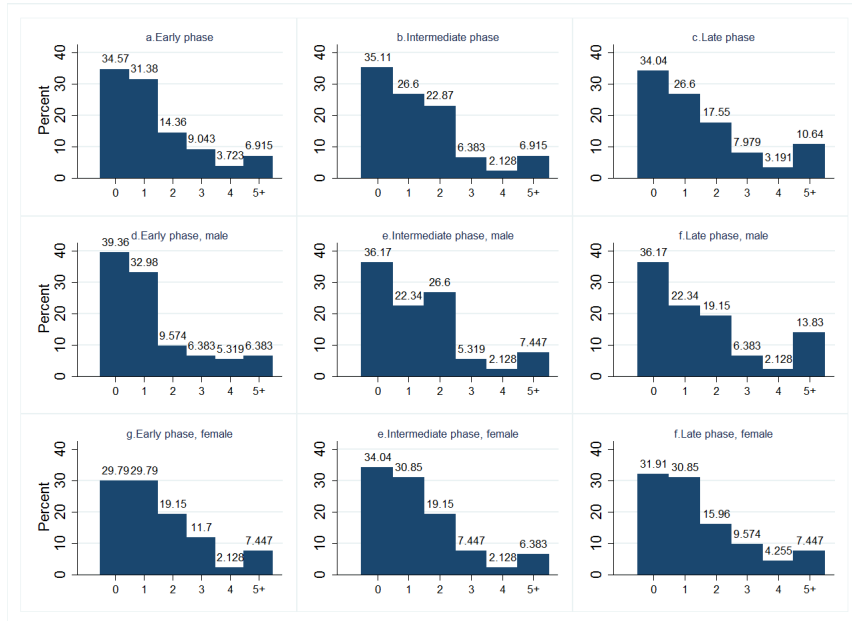


Table 5: Transition matrix of truth-telling

Times of truthtelling in phase E (in rows) <sup>†</sup>	Times of truthtelling in phase I (in columns)					
	0	1	2	3	4	5+
0 (65)	<b>0.508</b>	0.277	0.154	0.062	0.000	0.000
1 (59)	0.322	<b>0.271</b>	0.339	0.034	0.017	0.017
2 (27)	0.296	0.259	<b>0.259</b>	0.111	0.037	0.037
3 (17)	0.235	0.353	0.235	<b>0.059</b>	0.000	0.118
4 (7)	0.000	0.429	0.286	0.000	<b>0.000</b>	0.286
5+ (13)	0.154	0.000	0.000	0.154	0.154	<b>0.538</b>
Times of truthtelling in phase I (in rows) <sup>†</sup>	Times of truthtelling in phase L (in columns)					
	0	1	2	3	4	5+
0 (66)	<b>0.500</b>	0.303	0.121	0.061	0.000	0.015
1 (50)	0.320	<b>0.400</b>	0.140	0.080	0.040	0.020
2 (43)	0.326	0.163	<b>0.326</b>	0.093	0.047	0.047
3 (12)	0.083	0.167	0.167	<b>0.167</b>	0.083	0.333
4 (4)	0.000	0.250	0.250	0.000	<b>0.000</b>	0.500
5+ (13)	0.000	0.000	0.077	0.077	0.077	<b>0.769</b>

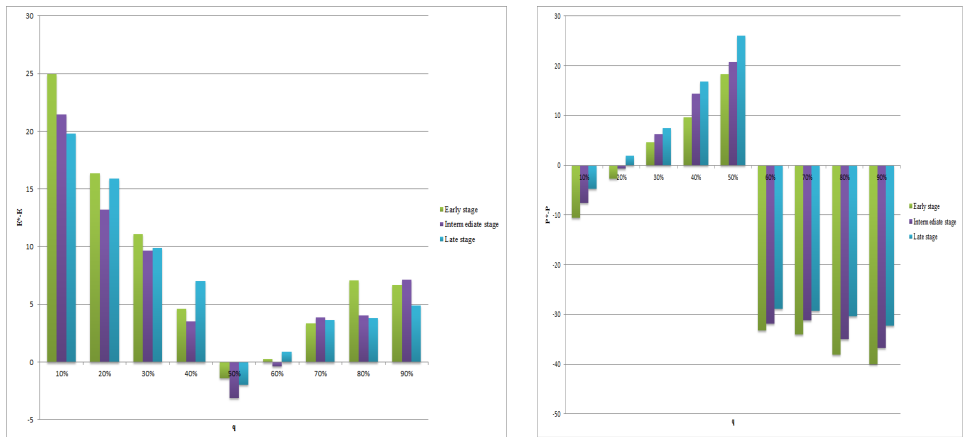
<sup>†</sup> In brackets number of sellers telling the truth (0, 1, ..., 5+) times.

and actual earnings, by level of  $q$  and by experience. Figure 6 illustrates the difference between the optimal price offer and the actual price offer, by level of  $q$  and of experience.<sup>8</sup> According to Figure 6 for  $q$  lower than 0.5 and higher than 0.6 optimal earnings exceed the actual ones. Figure 6 provides an explanation: in the interval  $0.1 < q < 0.5$  too low price offers often exclude trade for which the accepted optimal price  $p = q$  would have implied a positive expected profit for the buyer. For  $q > 0.5$  on the contrary, positive price offers partly induce sellers to accept them what, however, implies negative expected profits for the buyer. Thus we confirm a winner's curse which, however, becomes less severe across phases (Figure 6), especially for extreme values of  $q$ .

Also the difference between the optimal and the actual price is monotonically decreasing with experience (from the early to the late phase) for all levels of  $q$ : it seems that with more experience buyers learn to avoid the winner's curse. The effect on buyer profits is weaker since it depends on the seller's acceptance. In Table 15 (Appendix A) we also report the results separately by gender: no gender difference emerges from this table, i.e., male and

<sup>8</sup>Recall that the optimal price offer is  $p = q$  for  $q \leq 0.5$  and  $p = 0$  for  $q > 0.5$ , while expected earnings are  $0.5 - q$  for  $q \leq 0.5$  and zero for  $q > 0.5$ .

female buyers similarly suffer from the winner’s curse and learn to avoid it.



(a) Earning data for winner’s curse

(b) Price data for winner’s curse

(a) Difference between optimal and actual earning (pooled sample)

(b) Difference between optimal and actual price (pooled sample)

Figure 6: Winner’s curse

## 5. Regression analysis

The following econometric analysis explores the determinants of acceptance, suspicion and “make up”. Exploiting the longitudinal dimension of our dataset, we estimate panel regressions to account for the fact that participants play the Acquiring-a-Company game 30 times (rounds).<sup>9</sup>

### 5.1. Acceptance behavior

Table 6 reports the results of different model specifications for the pooled sample and for the gender sub-samples. We model acceptance decision in round  $t$  as a function of value of the firm  $v$ , parameter  $q$ , price offer  $p$ , round  $t$  and acceptance decisions in the three rounds

<sup>9</sup>We run panel regressions with random effects using the STATA command xtreg for suspicion and “make up” and xtprobit for acceptance. As a robustness check, we also estimate a dynamic panel data model with xtabond2 which allows to fit the Arellano and Bover (1995) and Blundell and Bond (1998) estimators. The results obtained are qualitatively similar, even though xtreg and xtprobit are preferred with dataset characterized by large T (in our case, 30 rounds) and large N.

previous ( $t - 1$ ,  $t - 2$  and  $t - 3$ ). Moreover, we include alternatively the payoff gained by the seller in the previous round ( $t - 1$ ) or the suspicion manifested by the buyer in the previous round ( $t - 1$ ), i.e., the difference between the value message and the price offer in  $t - 1$ .

In Table 6, columns 1 to 6 report the results for the pooled (column 1 and 2) as well as the by gender separated sample (respectively 3 and 4 for female, 5 and 6 for male sellers). As expected, the value of the firm  $v$  and the parameter  $q$  are negatively and significantly associated with the probability of acceptance, while the price offer is positively associated. Interestingly, the probability of acceptance does not vary across rounds, i.e., the coefficients of the variable  $t$  is not statistically significant (with the only exception of column 1).

Looking at the results by gender the association between previous acceptance and current acceptance holds only for  $t - 1$  with an opposite sign for female and male sellers whose significance, however is questioned when including previous payoff, respectively previous suspicion. In particular, when we include the previous payoff, acceptance in  $t - 1$  positively affects acceptance in round  $t$  by female sellers. On the contrary, when we include suspicion in  $t - 1$ , acceptance in  $t - 1$  negatively affects acceptance in time  $t$  by male sellers. We conclude that, keeping all other variables constant, male sellers are more sensitive to previous gains than females when accepting or not.

In order to explore any potential gender constellation effect, we run the same specifications only with data from the treatments Embedded gender constellation and Gender, for female and male separately: the coefficient of the partner's gender is positive but not statistically significant, i.e., we do not confirm a gender constellation effect.

## 5.2. Suspicion

Table 7 collects results on the dynamics of suspicion. Models 1 to 6 include data from all treatments controlling for parameter  $q$ , value message, round and the level of suspicion up to the three last periods. Furthermore, we alternatively control for lagged earnings and lagged “make up”. As expected, suspicion depends positively (and significantly) on  $\hat{v}$  and negatively

Table 6: Acceptance behavior

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	All	All treatments		M	M	F	Treatment E and G		M
	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$
<i>q</i>	-0.06*** (0.00)	-0.06*** (0.00)	-0.05*** (0.00)	-0.05*** (0.00)	-0.06*** (0.00)	-0.06*** (0.00)	-0.05*** (0.01)	-0.05*** (0.01)	-0.06*** (0.00)	-0.06*** (0.01)
<i>v</i>	-0.06*** (0.00)	-0.06*** (0.00)	-0.06*** (0.00)	-0.06*** (0.00)	-0.06*** (0.00)	-0.06*** (0.00)	-0.06*** (0.01)	-0.06*** (0.00)	-0.06*** (0.00)	-0.07*** (0.00)
<i>p</i>	0.11*** (0.01)	0.11*** (0.00)	0.10*** (0.01)	0.10*** (0.01)	0.12*** (0.01)	0.12*** (0.01)	0.11*** (0.01)	0.11*** (0.01)	0.12*** (0.01)	0.12*** (0.01)
round	-0.01* (0.00)	-0.00 (0.00)	-0.01 (0.00)	-0.01 (0.00)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.01)
acceptance (lag1)	0.08 (0.06)	-0.02 (0.06)	0.19** (0.09)	0.16 (0.10)	-0.05 (0.07)	-0.23** (0.10)	0.28** (0.12)	0.31*** (0.12)	-0.15 (0.11)	-0.30*** (0.10)
acceptance (lag2)	0.02 (0.06)	0.02 (0.05)	0.02 (0.08)	0.02 (0.09)	0.01 (0.08)	0.01 (0.07)	0.00 (0.09)	0.00 (0.09)	0.08 (0.11)	0.09 (0.09)
acceptance (lag3)	-0.05 (0.06)	-0.05 (0.07)	-0.01 (0.09)	-0.01 (0.07)	-0.11 (0.08)	-0.11 (0.09)	-0.03 (0.10)	-0.03 (0.09)	-0.18* (0.11)	-0.18 (0.12)
earning (lag1)	-0.00** (0.00)		-0.00 (0.00)		-0.01** (0.00)		0.00 (0.00)		-0.00 (0.00)	
suspicion (lag1)		-0.00 (0.00)		0.00 (0.00)		-0.00* (0.00)		0.00 (0.00)		-0.00 (0.00)
Male partner							0.16 (0.11)	0.16 (0.11)	0.09 (0.09)	0.09 (0.07)
Constant	3.34*** (0.21)	3.40*** (0.20)	3.09*** (0.28)	3.07*** (0.28)	3.66*** (0.31)	3.84*** (0.36)	3.12*** (0.44)	3.10*** (0.37)	3.72*** (0.34)	3.93*** (0.41)
Observations	5076	5076	2538	2538	2538	2538	1728	1728	1728	1728

Notes:

(and significantly) on  $q$ . The coefficient of round is positive and significant, i.e., suspicion increases through time. The coefficient of lagged earning is negative and significant, i.e., a larger payoff in the previous round induces buyers to be less suspicious. Furthermore, larger “make-up” of sellers in the previous round increases significantly buyer suspicion.

In columns 7 to 10 we check for gender constellation effects by considering the Embedded gender constellations treatment and the Gender treatment. Data for female (male) buyers are reported in columns 7 and 8 (9 and 10). Controlling for partner’s gender, we find that the effect of lagged earning and lagged “make up” has the same sign but is not significant anymore. On the other hand, female buyers interacting with male sellers tend to be more suspicious. To check whether this latter result is due to a specific gender constellation effect, the similar specification controlling for the partner’s field of study (economics vs non-economics) with data from the Other Confound treatment (see Table 8) finds the partner’s field of study not as statistically significant. This altogether confirms an interesting gender constellation effect: (female) participants find the information about the partner’s gender relevant, and this effect is persistent across rounds.

As an additional check, we estimated the initial specification using only data from the

Table 7: Suspicion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All treatments						Treatment E and G			
	All	All	F	F	M	M	F	F	M	M
	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$
$q$	-0.19*** (0.02)	-0.19*** (0.02)	-0.21*** (0.02)	-0.21*** (0.02)	-0.18*** (0.02)	-0.18*** (0.02)	-0.22*** (0.03)	-0.22*** (0.03)	-0.18*** (0.03)	-0.18*** (0.03)
$\hat{v}$	0.72*** (0.01)	0.72*** (0.01)	0.69*** (0.02)	0.69*** (0.02)	0.75*** (0.02)	0.75*** (0.02)	0.70*** (0.02)	0.70*** (0.02)	0.74*** (0.02)	0.74*** (0.02)
round	0.13*** (0.03)	0.13*** (0.03)	0.13*** (0.04)	0.13*** (0.04)	0.13*** (0.04)	0.13*** (0.04)	0.14*** (0.05)	0.14*** (0.05)	0.11** (0.05)	0.12** (0.05)
Suspicion (Lag1)	0.15*** (0.01)	0.13*** (0.01)	0.16*** (0.02)	0.14*** (0.02)	0.14*** (0.02)	0.12*** (0.02)	0.14*** (0.02)	0.13*** (0.02)	0.14*** (0.02)	0.13*** (0.03)
Suspicion (Lag2)	0.13*** (0.01)	0.13*** (0.01)	0.12*** (0.02)	0.12*** (0.02)	0.13*** (0.02)	0.13*** (0.02)	0.12*** (0.02)	0.12*** (0.02)	0.14*** (0.02)	0.14*** (0.02)
Suspicion (Lag3)	0.11*** (0.01)	0.12*** (0.01)	0.10*** (0.02)	0.10*** (0.02)	0.12*** (0.02)	0.12*** (0.02)	0.09*** (0.02)	0.09*** (0.02)	0.13*** (0.02)	0.13*** (0.02)
Earning (Lag1)	-0.05*** (0.01)		-0.04** (0.02)		-0.05*** (0.02)		-0.02 (0.02)		-0.03 (0.02)	
Make-up (Lag1)		0.02*** (0.01)		0.02** (0.01)		0.02* (0.01)		0.02 (0.01)		0.01 (0.01)
Male partner							1.17* (0.70)	1.18* (0.70)	1.18 (0.90)	1.20 (0.90)
Constant	-16.00*** (1.53)	-16.03*** (1.53)	-13.55*** (2.03)	-13.53*** (2.04)	-18.24*** (2.22)	-18.33*** (2.21)	-13.06*** (2.52)	-13.10*** (2.53)	-18.91*** (2.67)	-18.97*** (2.64)
Observations	5076	5076	2538	2538	2538	2538	1728	1728	1728	1728

Notes:

Other Confound treatment and Unknown treatment, where no information about the trading partner is disclosed, and found lagged earnings and lagged “make up” to be even more influential and more significant (see Table 9). Thus conditioning on gender (constellation) seems to interact with path-dependence: male buyers are more influenced by own idiosyncratic past experiences than reacting to their partner’s or own gender whereas female buyers persistently are more suspicious when encountering male sellers.

### 5.3. Make-Up

Table 10 collects results on the dynamics of “make up”. Models 1 to 6 include data from all treatments controlling for parameter  $q$ , value of the firm, round and lagged level of “make up” up to three periods. Furthermore, we alternatively control for lagged earnings and lagged suspicion. As expected, the coefficients of  $q$  and  $v$  are positive, respectively negative, and highly significant. The round is never statistically significant, i.e., “make up” does not follow a clear path across rounds. However, there is persistence in cheating: lagged “make up” is positive and significant. Lagged suspicion is always positive and significant: sellers increase “make up” after having met a suspicious buyer. Interestingly, the coefficient of the payoff in

Table 8: Suspicion

	(11)	(12)	(13)	(14)
	Treatment OC			
	F	F	M	M
	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$
$q$	-0.18*** (0.05)	-0.18*** (0.05)	-0.18*** (0.06)	-0.18*** (0.05)
$\hat{v}$	0.67*** (0.04)	0.67*** (0.04)	0.73*** (0.04)	0.73*** (0.04)
round	0.14 (0.11)	0.15 (0.11)	0.11 (0.08)	0.11 (0.09)
Suspicion (Lag1)	0.14*** (0.04)	0.12** (0.05)	0.13** (0.05)	0.09* (0.05)
Suspicion (Lag2)	0.12*** (0.03)	0.13*** (0.03)	0.07** (0.04)	0.08** (0.04)
Suspicion (Lag3)	0.10** (0.04)	0.10** (0.04)	0.14*** (0.05)	0.13*** (0.05)
Earning (Lag1)	-0.06* (0.04)		-0.13** (0.05)	
Make-up (Lag1)		0.03 (0.03)		0.07** (0.04)
Partner Study: Economics=1	2.92 (2.00)	3.10 (2.08)	0.65 (1.80)	0.75 (1.68)
Constant	-14.16*** (5.33)	-14.46*** (5.30)	-15.63** (6.44)	-15.90** (6.50)
Observations	432	432	432	432

Notes:

Table 9: Suspicion

	(15)	(16)
	Treatment U & OC	
	All	All
	$\beta/(se)$	$\beta/(se)$
$q$	-0.18*** (0.03)	-0.18*** (0.03)
$\hat{v}$	0.71*** (0.02)	0.71*** (0.02)
round	0.14*** (0.05)	0.14*** (0.05)
Suspicion (Lag1)	0.16*** (0.02)	0.13*** (0.02)
Suspicion (Lag2)	0.12*** (0.02)	0.12*** (0.02)
Suspicion (Lag3)	0.11*** (0.02)	0.12*** (0.02)
Earning (Lag1)	-0.10*** (0.02)	
Make-up (Lag1)		0.04** (0.02)
Constant	-16.43*** (2.69)	-16.56*** (2.69)
Observations	1620	1620

Notes:

Table 10: Make-up

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	All	All treatments		M	M	F	Treatment E and G		M
	$\beta/(se)$	$\beta/(se)$	F	F	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	F	M	M
	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$	$\beta/(se)$
$q$	0.11*** (0.02)	0.11*** (0.02)	0.14*** (0.03)	0.14*** (0.03)	0.09*** (0.02)	0.08*** (0.02)	0.13*** (0.03)	0.13*** (0.03)	0.09*** (0.03)	0.09*** (0.03)
$v$	-0.62*** (0.02)	-0.62*** (0.02)	-0.61*** (0.03)	-0.61*** (0.03)	-0.64*** (0.03)	-0.64*** (0.03)	-0.61*** (0.04)	-0.61*** (0.04)	-0.66*** (0.04)	-0.66*** (0.04)
round	0.03 (0.03)	-0.02 (0.03)	0.06 (0.04)	-0.01 (0.04)	0.01 (0.04)	-0.03 (0.03)	0.04 (0.05)	-0.04 (0.05)	0.05 (0.04)	0.01 (0.04)
Make-up (Lag1)	0.19*** (0.02)	0.18*** (0.01)	0.22*** (0.02)	0.19*** (0.02)	0.16*** (0.02)	0.16*** (0.02)	0.25*** (0.03)	0.20*** (0.02)	0.18*** (0.02)	0.18*** (0.02)
Make-up (Lag2)	0.20*** (0.01)	0.18*** (0.01)	0.22*** (0.02)	0.19*** (0.02)	0.18*** (0.02)	0.17*** (0.02)	0.22*** (0.02)	0.18*** (0.02)	0.19*** (0.02)	0.17*** (0.02)
Make-up (Lag3)	0.16*** (0.01)	0.14*** (0.01)	0.15*** (0.02)	0.13*** (0.02)	0.17*** (0.02)	0.15*** (0.02)	0.15*** (0.02)	0.12*** (0.02)	0.16*** (0.02)	0.15*** (0.02)
Earning (Lag1)	0.01 (0.02)		-0.05 (0.03)		0.06* (0.03)		-0.10** (0.04)		0.08* (0.04)	
Suspicion (Lag1)		0.14*** (0.01)		0.17*** (0.02)		0.10*** (0.02)		0.21*** (0.03)		0.10*** (0.02)
Male partner							0.29 (1.00)	0.21 (0.97)	0.46 (0.87)	0.51 (0.86)
Constant	34.01*** (2.12)	30.22*** (2.12)	30.69*** (3.08)	25.75*** (3.02)	37.16*** (2.84)	34.73*** (2.84)	31.31*** (3.67)	25.26*** (3.54)	36.76*** (3.53)	34.57*** (3.52)
Observations	5076	5076	2538	2538	2538	2538	1728	1728	1728	1728

Notes:

the previous round is positive and significant for male sellers but negative for female sellers. To explore any potential gender constellation effect for acceptance and suspicion, we run the same specifications only with data from the treatments Embedded gender constellations and Gender, separately for female and male sellers without diagnosing any significant effect, i.e., the coefficient of the partner's gender is not statistically significant.<sup>10</sup>

## 6. Conclusions

This study is part of our rather systematic attempt to account for possible effects of gender (constellation) in an easily understood (by participants) but nonetheless complex environment allowing for asymmetric information, truth-telling and deception, other regarding concerns in bargaining and conditioning on gender (constellation) as well as on another confound (field of study). The common experimental workhorse is the modified Acquiring-a-Company game (Samuelson and Bazerman, 1985) allowing the better informed seller to send a value message before the buyer's price offer. The main motivation here has been to explore how

<sup>10</sup>Using data from the Treatment Other Confound we also investigate potential effects of including the partner's field of study. We find that this variable does not have any effect and all our results are confirmed.

both, experience and gender (constellation) influence behavior of buyers and sellers. Rather than speculating about gender differences in individual learning (see, for instance, the respective chapter of Camerer, 2003), for which there exists no obvious hypotheses, we wanted to see which gender (constellation) effects survive extensive game playing experience and whether conditioning on gender constellation can newly evolve.

Table 11 provides an overview of findings demonstrating how conditioning on gender (constellation) is affected by game playing experience and past outcome and behavior. The main experience and gender (constellation) effects apply to suspicion, i.e., the pricing behavior in the light of the received values messages. Interestingly, sellers adapt more to past experiences whereas in the role of buyer one conditions more on gender constellation.

Table 11: Interdependency of experience and gender (constellation) effects

How is suspicion reacting to experience?	Female buyers more suspicious than male buyers when encountering male sellers
	Male suspicion but not female suspicion increases with past making up
	Without information about partner male suspicion increases with past payoffs and make up
Does experience matter more for one role?	Experience effects mainly for sellers whereas buyers are more affected by gender constellation

There are other surprising results: the significantly positive shares of underreporting and truth telling messages persist where the reasons are partly due to "obsession with truth telling" or "investing to maintain trust in the informativeness of value messages". And, more fundamentally, there is hardly any evidence of other regarding concerns suggesting that these are rather context dependent and likely to be crowded out in stochastic environments, especially those involving asymmetric information.

Of course, we did not experimentally induce from the very beginning a female handicap, e.g. by a lower parameter  $q$  of female than of male sellers. Such an initial handicap strongly has been prevailing in the field due to traditional labor division in most human societies. Also our experimental workhorse allows for chance effects (the randomness of value  $v$ ), asymmetric information about  $v$ , bargaining whether to trade and, if so, how to share the gains from welfare enhancing trade, with buyer participants risking to suffer from a winner's

curse, and – due to our modification – also for deception (see Gneezy et al. (2013) for some experimental studies of deception). In our view, such a stylized complex decision environment can soon or later crowd out or at least discourage attempts to condition decision making on gender (constellation) what may not be the case in simpler decision environment for which the cognitive load is less demanding. In future research this could be tested by exploring experience and gender effects for simpler versions of our setup, e.g. by forcing seller participant to accept whatever price proposal or by imposing a positive cost when deceiving so that truth-telling is encouraged.

From a theoretical perspective, it is shown – as predicted – that even extensive game playing experience does not imply convergence to equilibrium play, e.g. price offers  $p = q$  for  $q \leq 0.5$  and  $p = 0$  for  $q > 0.5$ . Nevertheless behavior is improved by experience: the winner’s curse is more often avoided, respectively seller participants are more often rejecting price offers that would make them suffer a loss. The latter, of course, means that there is no trade even though it would be welfare enhancing.

From a theoretical perspective one also might be interested how recursive play of the Modified Acquiring-a-Company game would evolve when always paired with the same other participant in the other role. Would seller participants initially signal the truth and only change to making up when approaching the last round as part of endgame behavior? Would buyer participants initially believe in the truth of  $\hat{v}$  and suggest prices which share  $(1 - q)\hat{v}$  equally? These are interesting research questions indeed. However, in our view, such a scenario does not seem very likely- when successively bargaining over takeovers this hardly ever will be done by the same parties.

Compared to our companion paper Di Cagno et al. (2015), based on playing a single incentivized round of the Modified Acquiring-a-Company game, in recursive play by (random) strangers gender differences emerge and partly become stronger across phases. Male and female participants learn to react differently both to past behavior and the gender of their trading partner.

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## Appendix A, Tables

Table 12: Time (seconds) for acceptance by  $p$ ,  $q$ , experience and gender

	Early stage			Intermediate stage			Late stage			All rounds			Ttests: Early-Late		
	F	M	Both	F	M	Both	F	M	Both	F	M	Both	F	M	Both
$p \leq qv$	6.40 (0.63)	6.20 (0.63)	6.30 (0.63)	3.60 (0.47)	3.41 (0.47)	3.50 (0.47)	2.63 (0.07)	3.13 (0.07)	2.88 (0.07)	4.08 (0.74)	4.14 (0.74)	4.11 (0.74)	(0.00)	(0.00)	(0.00)
$v > p > qv$	7.34 (0.27)	6.85 (0.27)	7.10 (0.27)	5.00 (0.38)	4.66 (0.38)	4.83 (0.38)	3.75 (0.44)	3.47 (0.44)	3.60 (0.44)	5.44 (0.08)	5.01 (0.08)	5.22 (0.08)	(0.00)	(0.00)	(0.00)
$p \geq v$	6.68 (0.16)	5.82 (0.16)	6.23 (0.16)	3.94 (0.54)	4.18 (0.54)	4.05 (0.54)	3.19 (0.09)	2.54 (0.09)	2.87 (0.09)	4.76 (0.23)	4.40 (0.23)	4.58 (0.23)	(0.00)	(0.00)	(0.00)
<b>By level of <math>q</math>: <math>q \leq 50</math></b>															
	Early stage			Intermediate stage			Late stage			All rounds			Ttests: Early-Late		
	F	M	Both	F	M	Both	F	M	Both	F	M	Both	F	M	Both
$p \leq qv$	6.14 (0.92)	6.20 (0.92)	6.16 (0.92)	3.88 (0.14)	3.18 (0.14)	3.53 (0.14)	2.56 (0.15)	3.18 (0.15)	2.86 (0.15)	4.09 (0.94)	4.06 (0.94)	4.07 (0.94)	(0.00)	(0.00)	(0.00)
$v > p > qv$	7.45 (0.39)	7.02 (0.39)	7.24 (0.39)	4.74 (0.76)	4.62 (0.76)	4.68 (0.76)	3.86 (0.41)	3.53 (0.41)	3.69 (0.41)	5.40 (0.24)	5.08 (0.24)	5.24 (0.24)	(0.00)	(0.00)	(0.00)
$p \geq v$	7.19 (0.09)	5.41 (0.09)	6.27 (0.09)	3.10 (0.11)	3.96 (0.11)	3.53 (0.11)	2.39 (0.53)	2.14 (0.53)	2.26 (0.53)	4.57 (0.32)	4.07 (0.32)	4.32 (0.32)	(0.00)	(0.00)	(0.00)
<b>By level of <math>q</math>: <math>q &gt; 50</math></b>															
	Early stage			Intermediate stage			Late stage			All rounds			Ttests: Early-Late		
	F	M	Both	F	M	Both	F	M	Both	F	M	Both	F	M	Both
$p \leq qv$	6.60 (0.48)	6.20 (0.48)	6.40 (0.48)	3.43 (0.72)	3.54 (0.72)	3.49 (0.72)	2.68 (0.24)	3.09 (0.24)	2.88 (0.24)	4.07 (0.63)	4.19 (0.63)	4.13 (0.63)	(0.00)	(0.00)	(0.00)
$v > p > qv$	6.86 (0.35)	5.92 (0.35)	6.44 (0.35)	6.20 (0.26)	4.89 (0.26)	5.54 (0.26)	3.09 (0.86)	3.21 (0.86)	3.16 (0.86)	5.63 (0.09)	4.64 (0.09)	5.13 (0.09)	(0.00)	(0.00)	(0.00)
$p \geq v$	6.20 (0.99)	6.21 (0.99)	6.21 (0.99)	4.52 (0.77)	4.36 (0.77)	4.44 (0.77)	3.81 (0.12)	2.89 (0.12)	3.38 (0.12)	4.92 (0.54)	4.69 (0.54)	4.81 (0.54)	(0.00)	(0.00)	(0.00)

**Notes:** P-values in parenthesis: we run tests both for static gender differences (above each observation) and dynamic differences across periods for male, female and pooled sample (last three columns on the right).



Table 14: Time for message by truth-telling, overstating and understating

	Early stage			Intermediate stage			Late stage			All rounds			Ttests: Early-Late		
	F	M	Both	F	M	Both	F	M	Both	F	M	Both	F	M	Both
$v = \hat{v}$	10.47 (0.46)	10.98	10.72	6.94 (0.57)	7.19	7.08	5.33 (0.25)	5.67	5.52	7.60 (0.65)	7.74	7.68	(0.00)	(0.00)	(0.00)
overstating value of $v$	11.18 (0.17)	11.60	11.40	7.75 (0.45)	7.93	7.84	6.19 (0.60)	6.30	6.24	8.30 (0.04)	8.30	8.46	(0.00)	(0.00)	(0.00)
understating value of $v$	13.31 (0.43)	12.67	13.05	8.38 (0.63)	8.68	8.52	6.38 (0.63)	6.63	6.49	9.88 (0.51)	9.58	9.75	(0.00)	(0.00)	(0.00)
<b>By level of <math>q</math>: <math>q \leq 50</math></b>															
	Early stage			Intermediate stage			Late stage			All rounds			Ttests: Early-Late		
	F	M	Both	F	M	Both	F	M	Both	F	M	Both	F	M	Both
$v = \hat{v}$	9.70 (0.17)	10.86	10.27	6.58 (0.37)	7.10	6.86	5.27 (0.13)	5.88	5.59	7.19 (0.12)	7.81	7.51	(0.00)	(0.00)	(0.00)
overstating value of $v$	11.21 (0.41)	11.56	11.39	7.45 (0.30)	7.79	7.62	6.07 (0.26)	6.38	6.22	8.19 (0.05)	8.63	8.41	(0.00)	(0.00)	(0.00)
understating value of $v$	13.16 (0.73)	12.80	13.02	8.89 (0.40)	8.26	8.60	5.95 (0.25)	6.55	6.23	9.86 (0.34)	9.31	9.62	(0.00)	(0.00)	(0.00)
<b>By level of <math>q</math>: <math>q &gt; 50</math></b>															
	Early stage			Intermediate stage			Late stage			All rounds			Ttests: Early-Late		
	F	M	Both	F	M	Both	F	M	Both	F	M	Both	F	M	Both
$v = \hat{v}$	11.52 (0.76)	11.16	11.35	7.40 (0.88)	7.30	7.35	5.43 (0.95)	5.41	5.42	8.17 (0.32)	7.66	7.90	(0.00)	(0.00)	(0.00)
overstating value of $v$	11.14 (0.24)	11.64	11.40	8.05 (0.90)	8.10	8.07	6.33 (0.67)	6.20	6.26	8.41 (0.36)	8.62	8.51	(0.00)	(0.00)	(0.00)
understating value of $v$	13.65 (0.31)	12.43	13.11	7.09 (0.02)	9.66	8.33	7.29 (0.74)	6.86	7.12	9.93 (0.75)	10.18	10.04	(0.00)	(0.00)	(0.00)

**Notes:** P-values in parenthesis: we run tests both for static gender differences (above each observation) and dynamic differences across periods for male, female and pooled sample (last three columns on the right).

Table 15: Winner’s curse, measured by differences in earnings and prices

Difference between optimal earning and actual earning									
<i>q</i> levels	10%	20%	30%	40%	50%	60%	70%	80%	90%
All rounds	22.06	15.10	10.25	5.10	-2.11	0.26	3.60	4.91	6.23
Early stage	24.97	16.35	11.11	4.60	-1.39	0.26	3.34	7.05	6.65
Intermediate stage	21.44	13.19	9.68	3.52	-3.11	-0.35	3.84	4.06	7.14
Late stage	19.77	15.91	9.90	7.00	-1.98	0.90	3.63	3.79	4.89
t-test E versus L (P-value)	<b>(0.05)</b>	(0.86)	(0.52)	(0.21)	(0.70)	(0.64)	(0.81)	<b>(0.01)</b>	(0.17)
Difference between optimal price and actual price									
<i>q</i> levels	10%	20%	30%	40%	50%	60%	70%	80%	90%
All rounds	-7,64	-0,63	6,05	13,83	21,60	-31,33	-31,49	-34,42	-36,28
Early stage	-10,63	-2,77	4,59	9,68	18,27	-33,16	-33,99	-38,10	-39,94
Intermediate stage	-7,64	-0,62	6,19	14,37	20,78	-31,89	-31,21	-35,01	-36,80
Late stage	-4,71	1,90	7,41	16,77	26,09	-28,92	-29,23	-30,31	-32,31
t-test E versus L (P-value)	<b>(0.00)</b>	<b>(0.00)</b>	<b>(0.03)</b>	<b>(0.00)</b>	<b>(0.00)</b>	<b>(0.01)</b>	<b>(0.00)</b>	<b>(0.00)</b>	<b>(0.00)</b>

Notes: P-values in parenthesis: we run tests for dynamic differences across periods.

## Appendix B, Instructions

## Introduction

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 some rules, which will be shortly explained later. In addition to your earnings from your decisions over the course of the experiment, you will receive a participation fee of 10 euro. Besides this amount, you can earn more euro. However, there is also a possibility of losing part of the participation fee, as it will be explained in the next section of these instructions. *But do not worry: you will never be asked to pay with your own money, as your losses during the tasks will be covered by the participation fee.* The participation fee and any additional amount of money you will earn during the experiment will be paid individually immediately at the end of the experiment; no other participant will know how much you earned. All monetary amounts in the experiment will be computed in ECU (Experimental Currency Units). At the end of the experiment, all earned in ECUs will be converted into euro using the following exchange rate:

$$30 \text{ ECU} = 1 \text{ euro}$$

You will be making your decisions by clicking on appropriate buttons on the screen. All the participants are reading the same instructions and taking part in this experiment for the first time, as you are.

Please note that hereafter any form of communication between the 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 individually.

## **Description of the Experiment**

This experiment is fully computerized. This experiment consists of the following **four phases, each composed by a different number of rounds**: Phase I of 1 round, Phase II of 30 rounds, Phase III of 12 rounds, and Phase IV of 10 rounds. After completing Phase I, you will proceed to Phase II; after completing Phase II, you will proceed to Phase III; after completing Phase III you will proceed to Phase IV. You can earn money in each phase of the experiment.

At the beginning and at the end of the Experiment, you are asked to reply to a short questionnaire.

At the beginning of the Experiment, each participant is randomly assigned one of two possible roles. Half the participants will be assigned the role of **Buyer**; the other half will be assigned the role of **Seller**. You will remain in the same role you have been assigned throughout the experiment.

In each of Phase I, II and III and in each of their rounds you will be matched with a different participant randomly assigned to you. In Phase IV you will decide individually and independently of your role.

## Description of the Task – Phase I

In Phase I selling of a firm between a Seller, who owns the firm, and Buyer can take place. You will be told if you are Buyer or Seller, and will be matched with one of the other participant in the other role. For example, if you are selected as Buyer, then you will be randomly and anonymously matched with another participant who is a Seller.

The computer will randomly select the value of the firm among the following values: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90 and 95 (all the values are equally likely). This value will be communicated only to the Seller. The Buyer will not learn the value of the firm selected randomly by the computer.

The Seller's evaluation of the firm is proportional to the value of the firm selected by the computer. This proportion will be randomly selected by the computer and can only take one of the following values: 10, 20, 30, 40, 50, 60, 70, 80 or 90 percent (all the values are equally likely). The Seller's evaluation is the value of the firm multiplied by the selected proportion. The proportion will be communicated to both, Buyer and Seller, whereas the value of the firm will be known only to the Seller. *Do not worry: the software will provide the information on the decision screen, depending on your role, Seller or Buyer.*

As an example, suppose that the computer selected a value of the firm equal to 90 and a proportion of 50 percent, so that the Seller's evaluation of the firm will be 45, corresponding to 50 percent of 90. *In this case, the Seller will find on the screen of the computer that the value of the firm is 90, the proportion is 50 percent and that the Seller's evaluation is 45; the Buyer will find on the screen only the proportion of 50 percent.* Another example: suppose that the computer selected a value of the firm equal to 90 and a proportion of 80 percent. In this case, the Seller's evaluation will be equal to 72, corresponding to 80 percent of 90. *In this case, the Seller will find on the screen of the computer that the value of the firm is 90, the proportion is 80 percent and that the Seller's evaluation is 72; the Buyer will find on the screen only the proportion of 80 percent.*

The Seller sends a value message to the Buyer about the value of the firm, which can be either true or false. Therefore, the value message is not necessarily equal to the firm value nor to the Seller's evaluation of the firm. The message consists of an integer value between 0 and 100.

After having received the message, the Buyer makes a take-it-or-leave-it offer to the Seller by proposing a price, an integer number between 0 and 100. When making this offer, the Buyer just knows the value message and by which proportion of the value the Seller evaluates the firm.

After having received the price offer of the Buyer, the Seller decides whether to accept it or not. If she accepts, the firm will be sold for the offered price to the Buyer. If she does not accept, no trade takes place. After the Seller has decided, the payoffs of Buyer and of Seller are calculated and individually communicated at the end of Phase I. These payoffs are calculated as explained below and they are paid to all participants at the end of the experiment.

### Calculation of the payoff in Phase I

The payoff of the unique round in Phase I does not depend on the value message and is calculated as follows:

If the Seller has accepted the offered price, the payoffs are:

- The Buyer earns the difference between the value of the firm and the accepted price
- The Seller earns the difference between the accepted price and the Seller's evaluation of the firm

An example: suppose that the firm value is equal to 45 and that the proportion of the firm value is 80 percent, so that the Seller's evaluation of the firm is 36. Suppose the Buyer offer a price equal to 40, and that the Seller accepts it. In this case, the Buyer earns  $45 - 40 = 5$ , and the Seller earns  $40 - 36 = 4$ .

Another example: suppose that the firm value is equal to 45 and that the proportion of the firm value is 80 percent, so that the Seller's evaluation of the firm is 36. Suppose the Buyer offers a price equal to 55, and that the Seller accepts it. In this case, the Buyer earns  $45 - 55 = -10$ , and the Seller earns  $55 - 36 = 19$ .

If the Seller does not accept the Buyer's offer, the payoffs are 0 for both Seller and Buyer.

## Description of the Task – Phase II

In Phase II, you will face for 30 rounds the same situation as in Phase I. As in the previous Phase, in each of the rounds you will be matched with a different participant randomly assigned to you.

The same instructions as in Phase I apply to Phase II, also the calculation of the payoffs.

The payment from this Phase will consist of the payoff of **one of the 30 rounds randomly selected**. For example, if round number five is selected, your payment for Phase II will be the payoff you earned in that round.

### Calculation of the payoff in each round in Phase II

The payoff of each round in Phase II does not depend on the value message and is calculated as follows:

If the Seller has accepted the offered price, the payoffs are:

- The Buyer earns the difference between the value of the firm and the accepted price
- The Seller earns the difference between the accepted price and the Seller's evaluation of the firm

An example: suppose that the firm value is equal to 45 and that the proportion of the firm value is 80 percent, so that the Seller's evaluation of the firm is 36. Suppose the Buyer offer a price equal to 40, and that the Seller accepts it. In this case, the Buyer earns  $45 - 40 = 5$ , and the Seller earns  $40 - 36 = 4$ .

Another example: suppose that the firm value is equal to 45 and that the proportion of the firm value is 80 percent, so that the Seller's evaluation of the firm is 36. Suppose the Buyer offers a price equal to 55, and that the Seller accepts it. In this case, the Buyer earns  $45 - 55 = -10$ , and the Seller earns  $55 - 36 = 19$ .

If the Seller does not accept the Buyer's offer, the payoffs are 0 for both Seller and Buyer.

### **Description of the Task – Phase III**

In Phase III, you will face for 12 rounds the same situation as in Phase I. As in the previous Phase, in each of the rounds you will be matched with a different participant randomly assigned to you.

The same instructions as in Phase I apply to Phase III.

At the beginning of the Phase you will be asked if you prefer to be paid on the basis of the payoff of **one of the 12 rounds randomly selected** *or* on the basis of **the average payoff of the 12 rounds**. On the basis of your choice, the computer will calculate your payoff for this Phase.

### Calculation of the payoff in each round in Phase III

The payoff of each round in Phase II does not depend on the value message and is calculated as follows:

If the Seller has accepted the offered price, the payoffs are:

- The Buyer earns the difference between the value of the firm and the accepted price
- The Seller earns the difference between the accepted price and the Seller's evaluation of the firm

An example: suppose that the firm value is equal to 45 and that the proportion of the firm value is 80 percent, so that the Seller's evaluation of the firm is 36. Suppose the Buyer offer a price equal to 40, and that the Seller accepts it. In this case, the Buyer earns  $45 - 40 = 5$ , and the Seller earns  $40 - 36 = 4$ .

Another example: suppose that the firm value is equal to 45 and that the proportion of the firm value is 80 percent, so that the Seller's evaluation of the firm is 36. Suppose the Buyer offers a price equal to 55, and that the Seller accepts it. In this case, the Buyer earns  $45 - 55 = -10$ , and the Seller earns  $55 - 36 = 19$ .

If the Seller does not accept the Buyer's offer, the payoffs are 0 for both Seller and Buyer.

### **Description of the Task – Phase IV**

Phase IV consists of 10 rounds; during this Phase you won't interact with other participants. During this Phase you are asked to choose between pairs of lotteries. In particular, in each round for each lottery pair you have to assess which one you would prefer to play.

At the end of the experiment, **one round** will be randomly selected for payment, and the computer will play on your screen the lottery that you have preferred in this round. The payment of Phase IV is given by the result of this lottery.

### **Your Final Payment**

Your final payment will be displayed on the screen at the end of the experiment. It is determined as the sum of:

- Payoff from the unique round in Phase I (in euro)
- Payoff from one randomly selected round in Phase II (in euro)
- Payoff from EITHER one randomly selected round OR an average payment between 12 rounds from Phase III (in euro)
- Payoff from one randomly selected round in Phase IV (in euro)
- Participation fee.