

Trust and Trustworthiness - A Survey of Gender Differences

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Abstract

This article reviews papers about gender differences in trust and reciprocity. The literature about experimental trust games finds striking gender differences in participants' reciprocal behavior. Most papers report that female first movers in trust games trust less than male ones. In trust games there is ample evidence that female second movers are more trustworthy than male ones. Interestingly it can be found that reciprocal behavior of female decision makers is stronger in the environment of a real-effort task. The results of gift-exchange gender studies document that female workers' are discriminated in the laboratory and receive smaller wages than men in a double-auction market. In general there is a tendency in trust games that men trust more than women and women are more trustworthy than men. A real-effort task furthermore amplifies these results. In gift-exchange games it can be found that female principals show higher levels of reciprocity and female workers receive lower wages in some setups.

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1 Introduction

Over the last thirty years Experimental Economics received increasing attention and economists realized that peoples' decisions can often not be explained with standard economic theory. For instance the seminal paper of Fehr and Schmidt (1999) documents that people not only care about their own outcome, they would rather give up money to generate equal outcomes. Other studies like the investment game (Berg et al. (1995)) emphasized that people reciprocate fair offers. These studies and myriads of other papers enabled economists to rethink about models. That is, economists reinvented the so-called "Homo Oeconomicus" and included emotional components in economic decision-making models.

Some time ago, economists also carried out that there exist substantial gender differences in many economic decisions. Since economic outcomes crucially depend on the behavior of human decision makers, economists noticed that they not only have to focus on peoples' emotions but also on possible gender differences. Trust and reciprocity are one of the core elements of economic decision making. Most of these decisions would not work without people trusting other people. In business there exist lots of examples where trust and reciprocity play a superior role. For instance if two business partners decide about a joint investment project one party often has to act as a first mover, i.e. she has to decide whether to trust the other person and to invest a positive amount into the project. If the first mover invested her money the other person is in a comfortable position because she can easily exploit the first mover. However, the second mover can also show positive reciprocity and send back a positive fraction of the money which has been increased due to the joint project. Here, both parties would be better off. This example can also be applied when a lender has to decide whether she gives a credit to a private investor. As can be seen, the decision whether to trust a private investor has essential impacts: without banks trusting private investors many economic projects would not take place and therefore economic growth would slow down. However, if banks trust too much and investors do not behave reciprocally this might lead to bad loans and possibly to a financial crisis (this once more emphasizes the important role of first movers' beliefs about the behavior of the partner in a trust game). Principal-agent relations are another example for the important role of trust and reciprocity in economics. In business many principal-agent relations can often be characterized by incomplete contracts. That is, employers pay wages to employees without the guarantee that the expected effort level will be exerted. Thus, if employers pay a certain wage to their workers they act as first movers. Hence, workers can easily shirk and exert no or low effort levels. For this reason an efficient principal agent relation crucially depends on employees' reciprocity. These examples summarize the important role of trust and reciprocity in modern economic life. Thus, if there exist gender differences in trust and reciprocity it should have crucial impacts for the investments in projects and principal-agent relations should also be concerned. Therefore these differences cannot be ignored.

This article focuses on gender differences in experimental *trust games*, *gift-exchange games*, and related setups.¹ In the next sections the basic work horses to analyze this behavior are in-

¹For a complete survey about gender differences in different economic setups see Croson and Gneezy (2009).

roduced. Afterwards the literature about gender differences in trust and reciprocity is reviewed.

2 Trust Games

A common work horse to analyze trust and reciprocity in experiments are investment and trust games. The investment game has been introduced by Berg, McCabe, and Dickhaut (1995). It consists of two players: a “trustor” who acts as a first mover and a “trustee” who acts as a second mover. In their experiment the authors divided a group of students into two different rooms. In the “no history” treatment 32 subjects were sent along as subjects A in room A and 32 subjects were placed as subjects B in room B. Both types of subjects received \$10 as a show-up fee. Afterwards every subject A had to decide about the investment sum (S_A) of her endowment she was willing to send to a matched subject in room B. Subjects B made their decisions in a “double blind” condition which is a mechanism to ensure that subjects made their decisions anonymous such that both the experimentator and subjects A could not observe subjects’ B decisions. Then every dollar sent to subject B was tripled such that subjects B received: $3S_A$. Subject B had to decide about the amount she was willing to send back to subject A. This amount can be denoted with: $S_B(3S_A)$. Thus, the final payoffs of both players are the following:

Subject A (first mover): $P_A(S_A, S_B) = \$10 - S_A + S_B(3S_A)$

Subject B (second mover): $P_B(S_A, S_B) = 3S_A - S_B(3S_A)$

If the game is not repeated and played only once, backward induction predicts that a second mover who receives a positive amount ($3S_A > 0$) will not return anything. This is why the second mover has not to fear punishment by subject A. A rational subject A should anticipate this, i.e. in the standard subgame perfect Nash equilibrium subject A will not invest anything. However, if second movers have social preferences and do not only care about monetary payoffs it could be that they send back positive amounts. If subjects A belief that subjects B reciprocate their offers then it might be a dominant strategy for first movers to send $S_A > 0$.

Contrary to the standard economic equilibrium Berg et al. (1995) observe that subjects A on average send \$5.16 to subjects B. They find that subjects B reciprocate this and return on average \$4.66 to subjects in room A. Interestingly only two subjects of room A follow the standard economic predictions and send \$0. In contrast there were 5 out of 32 subjects who send their entire endowment of \$10 to the subject in room B. If subjects B receive small amounts $\$1 \leq S_A < \5 they often return $S_B \leq S_A$. However, if subjects B receive large amounts they often send back amounts which are higher than S_A . For instance, if subjects A send \$5 subjects B return on average \$7.17 and investments of \$10 lead to a payback of \$10.20. Berg et al.’s (1995) results highlight that second movers observing a kind action of first movers reciprocate this by returning high amounts. If first movers send high amounts they receive higher returns compared to the case when sending low amounts. Thus, second movers show positive reciprocity in the domain of high investments and negative reciprocity when receiving small investments.

There also exist simplified variants of the trust game where a first mover only has to make a binary choice. In contrast to Berg et al.’s (1995) setup the trustor in these non-continuous

designs cannot decide how much money to invest, they can only define whether to trust or not. If first movers trust they automatically invest a predetermined amount. When the trustor does not trust the trustee nothing happens and both subjects receive their endowment. Since first movers only have two options (trust or not trust) first movers who trust can never induce negative reciprocity² Hence, if we observe second movers who send back small amounts this can only be attributed to exploitation behavior.

In the following I discuss papers analyzing gender effects for both types of trust games: continuous and binary choice trust games. In the next subsection trust game designs where the first movers does not know the gender of the second mover are discussed.

2.1 Gender differences in Trust Games

In this subsection I discuss standard trust game studies, i.e. setups where no information about the interaction partner was given. The first mover and the second mover do not know anything about the partner's gender.

Croson and Buchan (1999) investigate in an interesting inter cultural setup gender differences in trust and reciprocity. The authors use a continuous trust game à la Berg et al. (1995) and analyze subjects of four different countries (USA, China, Japan, and Korea). In total 186 subjects participated in this study. All trustors were endowed with 1,000 experimental units. Table 1 presents the results of Croson and Buchan.

Gender	Amount Sent	Amount returned	Proportion returned
Men	696.4 (286.1)	928.0 (688.7)	28.6 (17.8)
Women	630.4 (260.6)	1215.1 (603.1)	37.4 (13.8)
Total	680.1 (280.1)	1013.5 (674.2)	31.2 (17.1)

Table 1: Avg. amount sent/ returned (generated with data of Croson and Buchan (1999))

When focusing on gender effects with respect to trusting behavior of first movers, the authors find no significant differences between male and female *trustors* no matter of their nationality. However, table 1 illustrates that men on average send 696.4 units compared to female who slightly send smaller amounts (630.4). This result is in line with many other papers analyzing gender differences in trusting behavior of first movers in trust games. For instance Clark and Sefton (2001) and Cox and Deck (2006) confirm these results in binary choice trust games.³

²In continuous designs the reason for a second mover sending back a too low amount could be attributed to first mover offers which might be too low.

³There exist lots of other trust game designs who find no significant gender differences regarding first mover behavior. For example see Bohnet (2007), Schwioren and Sutter (2008)

Although Croson and Buchan (1999) cannot find a significant difference in first mover behavior, they find a striking gender difference in terms of trustworthiness of men and women. The authors report that men return on average 28.6 percent compared to 37.4 percent which is returned by women. A non-parametric Wilcoxon test reveals that this difference is highly significant ($p = 0.0183$). Thus, the authors find that women are more trustworthy than men. This result is supported by a couple of papers studying gender differences in trust games. For instance Croson and Buchan (1999), Chaudhuri and Gangadharan (2007), Snijders and Keren (2001) also find that female second movers send back significant higher amounts than male. Croson and Buchan (1999) furthermore find a positive correlation between the amounts received by a trustee and the amount which is sent by the trustor. However, their regressions reveal that there does not exist a cultural effect. Subjects' nationality had no effect on returning behavior of second movers at all.

Another interesting study about gender differences in trust games is Chaudhuri and Gangadharan (2007). The authors apply the design of Berg et al. (1995) and add an extension compared to Croson and Buchan (1999). Their study basically investigates whether there exists a correlation between the behavior as a first mover and a second mover when subjects have to decide in both roles. A further crucial difference to Croson and Buchan (1999) is that students are asked how much money they expect to get back when acting as a first mover. In total they invited 100 subjects to the laboratory. In the experiment everybody had to complete a decision as a first mover, followed by a decision as a second mover. Therefore the subjects were divided in room A and B and were matched twice. That is, every subject was matched to a certain person, when acting as a first mover. The same person was also matched to a different person when acting as a second mover. Subsequently, everybody received AU \$10 and first acted in the role as a first mover (sender). The senders first had to decide how much money they were willing to send to their matched receiver in the other room. Afterwards everybody acted as a receiver and observed how much money was received by the matched first mover. The subjects then had to decide about the amount they were willing to return. Because subjects in this design have to think about both decisions (deciding as a first- and second mover) it might be that subjects were affected by this. To be more precise it is possible that subjects who send high amounts also return high amounts when acting as a second mover. However, the authors find no evidence for a correlation between sender- and receiver behavior. Chaudhuri and Gangadharan report that a non-parametric Spearman correlation test reveals a correlation coefficient of 0.1432 with a corresponding p-value of 0.1994 which is not significant. In contrast to Croson and Buchan (1999), Chaudhuri and Gangadharan (2007) find a gender difference in trusting behavior. Their results reveal that men trust more as first movers compared to women. On average they find that men send \$5.30 compared to only \$3.47 which was sent by women. This difference is statistically significant (non-parametric Wilcoxon ranksum test $p\text{-value} = 0.0367$).⁴ For instance this results are also confirmed by Eckel and Wilson (2004), Snijders and Keren (2001), Buchan et al. (2004), and Migheli (2007) who also find that men trust more in environments where the gender of the

⁴Although this difference is significant, the result is in line with Croson and Buchan (1999) because Croson and Buchan (1999) at least find that men slightly show more trust compared to women.

interaction partner is unknown.

Interestingly Chaudhuri and Gangadharan (2007) report a strong correlation between first-movers' expectations about second mover behavior and the amount sent by first movers (Spearman Correlation coefficient of 0.58, p-value < 0.01). Thus, the authors line out that conditional trust can be an explanation for first movers transferring money. That is, senders transfer money because they expect their investments to be reciprocated by the second movers. When comparing the trustworthiness of receivers (i.e. the amounts returned by second movers) Chaudhuri and Gangadharan again find a strong gender effect. That is, their results emphasize that female receivers send back higher amounts compared to men. On average female second movers return 19.8 percent compared to men who only send back 14.7 percent. A Tobit regression supports a significant difference. Therefore Chaudhuri and Gangadharan's results are in line with the gender trust game literature.

The data of Blanco, Engelmann, Koch and Normann (2011) reveals another interesting gender effect. The authors find that gender differences in trust games might depend on the way the players make their decisions. That is, the players seem to behave differently when their decisions are obtained by the "strategy method"⁵ compared to a standard setup where players directly make their decisions. The authors conducted a trust game variant with a binary choice option (*sequential prisoner's dilemma*), where players had to decide in both roles: as first movers and second movers as well. Similar to Chaudhuri and Gangadharan (2007) Blanco et al. (2011) are interested whether there exists a correlation between first- and second-mover behavior in the trust game. However, Blanco et al. (2011) rather test the impact of a belief elicitation task on the correlation between second- and first-mover choices. The crucial difference to Chaudhuri and Gangadharan (2007) is that the authors use the strategy method to elicit their data. That is, subjects do not know to whom they are matched to. Moreover, they first have to decide as a second mover (choose either *cooperate* or *defect*) being not matched to another player. Afterwards they also have to decide as a first mover not knowing to whom they will be matched. Subsequently every first-mover (second-mover) decision of a player is randomly matched to the second-mover (first-mover) decision of another player. Thus, there is an important difference when applying the strategy method: players hypothetically state what they would do if something happens. In order to show trustworthiness it might matter whether the players are able to put oneself in a hypothetical situation where a first mover hypothetically shows trusting behavior. The question whether a second mover shows trustworthiness also depends on the fact whether second movers are empathic. Applying the strategy method requires for the second movers that they hypothetically feel empathic about first movers who have sent positive investments. Therefore it might be possible that there exist gender differences in "hypothetical empathy". Figure 1 illustrates the game tree used in Blanco et al. (2011).

⁵The strategy method which was proposed by Selten (1967) is a method where players are hypothetically asked what to do in different situations. For instance players have to state what they would do as a first mover and as a second mover as well. Subsequently pairs of players are matched and they receive a payoff as a consequence to their hypothetical decisions.

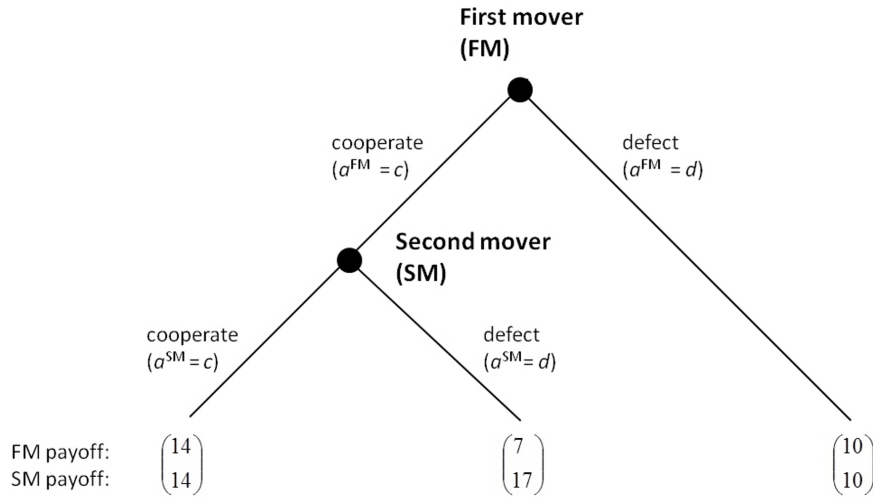


Figure 1: Sequential prisoner's dilemma game (as used in Blanco et al. (2011))

A first mover either chooses *cooperate* (c) or *defect* (d). If she chooses d the second mover's decision does not matter: everybody receives 10. However, if the first mover chooses c , the second mover can either be trustworthy (choose c) or exploit the first mover (choose d). If the second mover is trustworthy both are better off (each player receives 14). If she chooses *defect* her payoff is higher (17) compared to choosing *cooperate*, however the first mover is worse off and only receives 7. Blanco et al. implement four different treatments: (1) *Baseline*, (2) *Belief Elicitation*, (3) *True Distribution* and (4) *True Distribution+*. The *Baseline* treatment is the control treatment where players decide with the strategy method as a second mover and afterwards they decide as a second mover, not knowing to whom they will be matched to. The *Belief Elicitation* condition is exactly the same as in the *Baseline*. The only difference is that they have to do a belief elicitation task after their first choice (as a second mover). More precisely, the players had to state their belief about how many of the other players will cooperate as a second mover. Subsequently the players had to make their choice as a first mover. The difference of the *True Distribution* and *True Distribution+* treatments to the *Belief Elicitation* treatment is, that players are informed about the true distribution of actual second mover cooperators of the other nine players. Note that the *True Distribution* and the *True Distribution+* treatments take usage of the same written instructions, the only difference is the oral information which was given during the *True Distribution* and the *True Distribution+* treatment.⁶ Table 2 summarizes Blanco et al.'s (2011) results.

⁶During the "+" treatment the players were informed more precisely about the likelihood (depending on the actual distribution) of being exploited or not when choosing *cooperate* as a first mover.

	Treatment				
	Baseline	Elicit Beliefs	True Distrib.	True Distrib. (+)	Avg.
Firstmover					
Men	31.30%	50.00%	57.10%	42.90%	46.20%
Women	25.00%	61.50%	50.00%	65.40%	51.00%
Overall	27.50%	55.00%	52.50%	57.50%	48.90%
Secondmover					
Men	56.30%	44.10%	50.00%	35.70%	46.20%
Women	54.20%	65.40%	61.50%	69.20%	62.70%
Overall	55.00%	53.30%	57.50%	57.50%	55.60%

Table 2: Overview of FM- and SM-behavior (generated with data of Blanco et al. (2011))

Focusing on players behavior as first movers the authors find that on average half (48.20%) of the players trust. A deeper look into the data also does not reveal a difference between men and women. About half of all men (46.20%) and women (51%) trust as first movers. Thus, the result is in line with most of the gender trust games: no significant difference in first mover behavior of men and women can be found. This pattern changes when investigating second mover behavior: here, 55.60% of all players behave trustworthy. Focusing on the amount of men who showed trustworthy behavior reveals that again the same amount of men are trustworthy. If we focus on the amount of females who showed trustworthiness we find an intense gender difference: more female (62.70%) do not exploit first movers, in contrast to only 46.20% men ($\chi^2 = 4.279$, $d.f. = 1$, $p = 0.039$). This gender difference is very stable in all treatments.⁷ The data of Blanco et al. has strikingly shown that gender differences are sensitive to the way people make their decisions. Here, the strategy method only enabled women to show trustworthy behavior as second movers. In contrast, men always made the same decisions as first- and second movers. Therefore it may be the case that men’s degree of empathy is too weak to “survive” the hypothetical *strategy method*.

All surveyed studies only focused on environments where the subjects decided about money which was exogenously given to them at the beginning of the experiment. However, this assumption might be unrealistic to some extent. When considering economic setups which focus on fairness issues it may also be asked whether subjects would behave the same way if they had to decide about money which was earned by a real-effort task. In this regard I discuss the setup introduced by Heinz, Juranek and Rau (2011) where subjects have to do a real-effort task before deciding.

⁷The effect can be found in 3 out of 4 treatments, only in the baseline treatment there is no difference.

2.2 Gender Differences Induced by a Real-Effort Task

In contrast to the studies discussed before we now focus on a study which analyzes endogenized money. That is, subjects in this experiment first had to a “real-effort” task which determines the size of their endowment.

In contrast to the other papers discussed so far, Heinz, Juranek, and Rau (2011) analyze whether a real-effort task may induce reciprocal behavior of subjects. In this regard they analyze with a modified dictator game whether there exist gender differences in terms of reciprocity induced by the working task.

In the standard dictator game, originally introduced by Kahneman, Knetsch, and Thaler (1986) a subject is endowed with a certain money amount. Afterwards the subject is asked how much she is willing to send to an anonymous receiver. Contrary to other games the receiver has no choice and the dictator’s offer cannot be rejected by the receiver. Thus, the dictator has not to fear punishment by the other person. The standard predicted outcome is that dictators do not send anything. Nevertheless there exists a bulk of dictator game studies which report that dictators usually send about 15-20 percent (e.g. see Forsythe et al. (1994), Hoffman et al. (1996)). Interestingly Cherry, Frykblom, and Shogren (2002) show that dictators’ generosity melts down when they first have to earn the money to decide about within a real-effort task. During the real-effort task dictators first had to answer questions of the *GMAT-test*. Afterwards subjects received either \$10 or \$40 depending on the amount of correctly solved questions. Although Cherry et al. (2002) do not find a stake-size effect, they report that dictator giving dramatically declined and 95 percent of their dictators made zero offers in the double blind environment. This result is striking and shows that an external factor like the real-effort task can significantly influence the outcome of the game.

Heinz, Juranek, and Rau (2011) extended the Cherry et al. (2002) setting to test real effort’s impact on subjects’ reciprocal behavior.⁸ The authors modify Cherry et al.’s (2002) setup in that the receivers first have to do a real-effort task. Afterwards the dictators get to know about the corresponding money outcome and have to decide about the money which has to be dictated to the receivers. The main difference to Cherry et al. (2002) is that letting receivers work adds a strategic component to the setup. When receivers exert effort they play a trust game because they do not know how much money will be sent back by the dictators. If a receiver believes that the dictator is not trustworthy she should not work at all. Thus dictators in that setup correspond to second movers of a trust game and receivers correspond to first movers. In their experiment Heinz et al. (2011) analyzed 352 subjects. The authors implemented two treatments: *Windfall* and *Real Effort*. After arriving, subjects were randomly assigned the role of a dictator or receiver. Afterwards dictators and receivers were placed into two different rooms.⁹ Their *Windfall* treatment served as baseline treatment where subjects did not have to do a real-effort task. Instead they took part in a lottery in order to determine whether they were endowed with 5 or 10 Euros. In the *Real Effort* treatment subjects had to solve a *GRE* test. Subjects who

⁸Note that similar setups also have been conducted by Ruffle (1998) and Oxoby and Spraggon (2006). However, both designs do not focus on gender differences.

⁹Before subjects were separated they could see each other. This was done in order to sustain credibility for dictators that there really existed a receiver.

had at least correctly answered 13 out of 20 questions received 10 Euros. If subjects were not successful they only received 5 Euros. Afterwards the dictators were asked to dictate the money endogenized by the receivers.

Heinz et. al (2011) find that on average men receive higher endowments and solve more questions correctly. However, this difference is only small and not significant. Nevertheless this could be evidence for a slightly higher level of trust of men. This is consistent with the other trust game papers without real-effort tasks. Interestingly the authors find striking gender differences in dictators' reciprocity. Table 3 reports the average taking rate of the dictators in the *Windfall* and *Real Effort* treatment.

Gender	Stake size	Windfall	obs.	Real Effort	obs.	Avg.	obs.
males	5 Euros	68.73 (24.40)	15	74.21 (27.73)	24	72.10 (26.31)	39
males	10 Euros	77.27 (21.62)	22	76.52 (25.65)	25	76.87 (23.38)	47
Avg.	-	73.81 (22.56)	37	75.39 (26.44)	49	74.71 (24.72)	86
females	5 Euros	72.68 (21.62)	28	63.33 (20.33)	21	68.67 (21.38)	49
females	10 Euros	76.11 (22.59)	18	63.26 (20.92)	23	68.90 (22.35)	41
Avg.	-	74.02 (21.82)	46	63.30 (20.40)	44	68.68 (21.70)	90

Table 3: Dictators' taking rates (generated with data of Heinz et al. (2011))

It can clearly be seen that in the *Real Effort* treatment female dictators behave more trustworthy than male dictators. Neglecting stake size, female dictators in *Real Effort* on average take 63.30 percent of the receivers compared to men who take 75.39 percent. A non-parametric Mann-Whitney test shows that this difference is statistically significant (p-value = 0.021). In the *Windfall* treatment where reciprocity cannot play a role there is no gender effect. On average men take 73.81 percent and women take nearly the same amount (74.02). Thus Heinz et al. (2011) highlight that a real-effort task induces reciprocal behavior for females only. Table 3 also reports that female dictators do not show a stake-size effect in *Real Effort*. Independent from receivers' performance female dictators always take around 63 percent. Figure 2 demonstrates the significant gender effect with CDF diagrams of the *Windfall* and the *Real Effort* treatments.

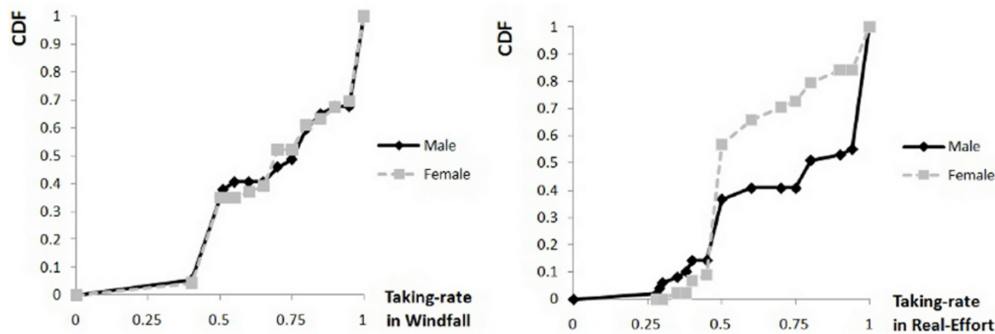


Figure 2 CDF of dictators' taking-rates divided by gender (Heinz et al. (2011))

The left diagram shows that in the absence of a real-effort task, both male and female dictators behave quite the same. The CDFs do not differ at all. This result is statistically supported by a Kolmogorov Smirnov test (Max. $D = 0.062$, p -value = 1.000). Furthermore the CDF diagram shows that in the environment of a real-effort task female dictators behave significantly different compared to male dictators. Here, a Kolmogorov Smirnov test reveals that there exist a highly significant difference (Max. $D = 0.362$, p -value = 0.011). Heinz et al. (2011) show that a remarkable fraction (57%) of female dictators take the equal split. Whereas only 37% of male dictators equally share the endogenized money. The CDF also documents that a small amount (16%) of all female dictators take all the endogenized money. This stands in stark contrast to men, where 45% decide to take all the money.

Heinz et al.'s (2011) study therefore supports the findings of the gender trust game papers which mainly find that female second movers are more trustworthy and show higher amounts of reciprocity than men. It also shows that reciprocity can be induced by a real-effort task. Interestingly it can be seen that only women are sensitive to that. It is also surprising that receivers' performance does not play a role. The surveyed literature showed so far, that most of the papers find that men trust more than women. Although not every paper finds statistical support for this, at least small differences can be found to confirm this tendency. In the next subsection it will be analyzed whether these findings also hold for trust game setups where first movers receive information about their interaction partners.

2.3 Gender Differences in Trust Games with Introduced Information

In contrast to the trust game gender studies of subsection 2.1 there also exist some studies where subjects get information about the interaction partner. For example they get to know about the gender of the other player. These studies involve a more realistic environment because in everyday life people mostly know their business partners. If peoples' actions are sensitive to the gender of their interaction partner this might have crucial implications. For instance if women trust only other women an implication for negotiations within companies would be to establish only female negotiators when negotiating with females. It is also interesting to analyze whether male and female trustors or trustees behave differently when their interaction partner is not of

the same gender. If male receivers often exploit female trustors and if female senders anticipate this, it might be an indication for the origins of the gender wage gap. This could explain why women possibly behave more reluctantly compared to men in the presence of male negotiators.¹⁰ In the following I discuss trust game studies which control for these interaction effects.

An interesting variant of the standard trust game is introduced by Eckel and Wilson (2004). They use a binary version of the standard trust game and vary the information condition of second movers. Therefore first movers were first presented a trust game and different kinds of icons of faces. Subsequently the first movers have to choose whether they want to trust or not and afterwards they also have to choose one of the faces. The faces represented different emotions: some of them showed smiling faces and others showed angry people. The authors thereby told the first movers that they had to choose with whom they want to interact. Eckel and Wilson (2004) find that most first movers want friendly partners to interact with. Regarding trusting behavior, their results are consistent to the evidence about trust games without information. Interestingly in the treatment where female first movers could not choose an interaction partner they trust less than men. However, if females could choose the partner to interact they show more trust compared to men. Contrary to the literature about no partner information, Eckel and Wilson (2004) find no gender difference in trustworthiness of second movers.

In their study Croson, Buchan and Solnick (2008) also extend the information given to the players in a trust game. Their study consists of a continuous trust game study which controls for gender interaction effects. The special feature of this experiment is that they control for the impacts when one interaction partner knows the gender of the other player. This information was given by informing participants about the first names of their interaction partners. The authors also focus on the outcome when both parties are informed about the other subject's gender. In total they had 754 subjects in their experiment. First- and second movers were separated into two different rooms and the first movers were given envelopes and \$10 to decide about. In this respect they used four treatments to test for the impacts of knowing the receiver's gender. In a control treatment ("number identification") subjects did not receive information about the first names of the interaction partners (subjects were only told a participation number of the partner). In contrast in the "mutual name identification" treatment the gender of the first- and the second mover was known. The authors also include two conditions called "asymmetric name identification" where only the first (second) mover is informed about the gender and the second (first) mover was only told the number of the other decision maker. Table 4 presents their results regarding the average amounts sent, when only the gender of the responder was known (first column). The second column documents their findings when only the gender of the sender was known. Finally the results when both genders are known are presented in the third column.

¹⁰Note that many studies also show that female subjects behave less competitive than males in negotiations (e.g. Gneezy, Niederle, and Vesterlud (2003), Sutter and Rützler (2010)).

Condition and Responder					
Sender	Sender's gender unknown Responder's gender known		Sender's gender known	Sender's gender known Responder's gender known	
	Responder	Responder	Responder's	Responder	Responder
	male	female	gender unknown	male	female
Male	8.17 (2.96)	8.42 (2.33)	7.2 (3.74)	8.08 (2.98)	7.85 (3.18)
Female	7.08 (2.79)	7.13 (3.00)	7.31 (2.80)	6.68 (3.16)	5.84 (3.17)
Total	7.69 (2.90)	7.68 (2.78)	7.25 (3.32)	7.39 (3.13)	6.82 (3.31)

Table 4: Average amounts sent (generated with data of Croson et al. (2008))

Focusing on the first asymmetric treatment where only the gender of the responder (second mover) was known, the authors find that there exists no difference in the amount females and males received. Ignoring gender of senders, male responders receive on average \$7.69 and female responders receive \$7.68. Analyzing the other asymmetric treatment the authors find that when ignoring receivers' gender, male and female first movers get back nearly the same amounts (male: \$7.20, female: \$7.31). When both genders are known there is only a slight difference between the amounts male and female responders receive: male receive \$7.39 and female \$6.82. The gender of the sender does not play a role: male and female senders are both not affected by the gender of the corresponding responders. This holds for all three conditions. Thus, it can be summarize that, information about the gender of an interaction partner does not change the results. Instead the authors confirm in their baseline treatment (where no information about gender was given) the result that on average male first movers trust more than female first movers.¹¹ It will be interesting to analyze whether this result also holds for the amount sent back by the responders when information about gender is given. Table 5 illustrates Buchan, Croson and Solnick's (2008) results regarding the amount sent back, when gender was known.

¹¹They find that men send \$7.45, whereas women do only send \$6.08.

Condition and Sender		Responder		
		Male	Female	Total
Sender's gender known	Sender	26.0	28.2	27.1
	Male	(19.8)	(26.1)	(22.8)
Responder's gender unknown	Sender	17.8	36.6	26.9
	Female	(17.0)	(16.2)	(19.0)
Responder's gender known	Sender's	29.6	36.5	33.0
	gender unknown	(16.9)	(15.1)	(16.3)
Sender's gender known	Sender	32.5	35.9	34.2
	Male	(20.0)	(16.9)	(18.6)
Responder's gender known	Sender	32.0	29.0	30.9
	Female	(20.3)	(17.0)	(18.7)

Table 5: Average amounts returned (generated with data of Croson et al. (2008))

Analyzing the amounts send back, when only the gender of the sender was known, it appears that there is no difference between the amounts returned. Buchan et al. find that male senders (27.1%) and female senders (26.9%) get back the same amounts. No difference can be found for male and female second movers when the senders have the same gender as the second moves. That is, men send back 26% to male senders, whereas female senders only receive 17.8%. The same pattern can be observed for females: they send back 28.2% to male senders, whereas female senders receive 36.6%. Men and female responders again send back nearly the same amounts when their gender was known. Focusing on the gender interaction effects when both genders are known, it can be seen that on average male senders receive slightly more than female senders (male receive: 34.2% and female receive: 30.9%). Here, male second movers are not sensitive to the senders' gender: they send back 32% to both. However, female responders return more to male senders (35.9%) compared to female senders (29.0%) when both genders are known. Thus, it can be seen that subjects are sensitive to the information about the gender of their interaction partner when deciding about the amount to return. In contrast when focusing on sender behavior the information about the gender of the interaction partner has no influence on senders' decisions. In the next section the experimental setup of a principal-agent framework called "gift-exchange" game is introduced. Afterwards I discuss gender differences in trust and reciprocity in "gift-exchange" games.

3 Gift Exchange Games

Many real-life business situations involve principal-agent relations where a manager is employed by a company. The economic literature about principal-agent relations is huge. For instance Akerlof (1982) introduced the gift exchange game and analyzed a setup where an employee is

matched to an employer. The “gift-exchange” game is a well-known working horse model for incomplete labor contracts. In more detail the game usually consists of two players (principals and agents) and it involves two stages. In the first stage the wages are determined by the principals. In the second stage the agent chooses the effort he is willing to exert. In this framework exerting effort is costly to the employee and the wage payments reduce the principal’s payoff at the same time. Analyzing the one-shot game¹² there exists an unique subgame-perfect Nash equilibrium. That is, the principals and the agents as well do not make a wage payment and no effort is exerted by the worker respectively. The reasoning for this equilibrium is easy: solving the game by backward induction requires for the agent to think about the employee’s action after having received a positive wage payment. For instance if the employer pays \$50 to the worker, the worker has no incentive to exert any positive amount of effort at the second stage of the game. This is due to the fact that the game ends after the second stage. If the employer solves this game by backward induction she anticipates this and will not make a positive wage payment at the first stage. Fehr, Kirchsteiger and Riedl (1993) were the first to experimentally test the gift-exchange game. In the following I present examples for the payoffs of principals and agents. Therefore I use the common cost and payoff functions introduced by Fehr, Kirchlner, Weichbold and Gächter (1998).

$$\begin{aligned} \text{Principal : } \quad \pi_i &= (v - w_i) \cdot e_i \\ \text{Agent : } \quad u_j &= w_j - c_0 - c(e_j) \end{aligned}$$

The definition of the principal’s payoff prevents losses for the principal. The labor costs of the principal depend on the effort chosen by the agent. As long as the principal does not choose wages that are higher than v his payoff will always be positive.¹³ The agent is free to choose a minimum effort level that does not imply any cost but she cannot choose zero effort. Fehr et al. (1998) assume that there is a convex relation between effort and the costs that arise for the agent. Table 6 presents the action space of the agents in the gift-exchange game.

e	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
c(e)	0	1	2	4	6	8	10	12	15	18

Table 6: Agents’ effort-cost-relation following Fehr et al. (1998)

Note that gift-exchange games are similar to trust-games. A crucial difference is that trust-games involve an efficiency factor which usually triples the invested amount of senders, after they have made their investments. The second movers receive the tripled investment to decide about the amount they are willing to send back. That is, the receivers in the trust game profit from the efficiency factor because it directly increases their endowment. In contrast in the gift-exchange game the efficiency factor multiplies the effort choices exerted by the workers. That is, the factor only increases the payoff an employer receives.

¹²A one-shot game is a game that is played without repetition.

¹³Usually the principal’s actions are restraint to wages lower than v

The literature about experimental gift-exchange games mainly focuses on fairness issues. In this regard Fehr et al. (1993) find in their laboratory study that opposed to the theoretical predictions employers make positive wage payments to their workers. A surprising result is that employees reciprocate the wage payments of the employers and exert positive effort levels. Another astonishing finding of Fehr et al. (1993) is that the authors experimentally show that Akerlof’s “Fair Wage-Effort Hypothesis“ is right. Akerlof’s (1982) “Fair Wage-Effort Hypothesis” postulates that there exist a positive monotonic correlation between the wages paid and the efforts exerted. Figure 3 presents Fehr et al.’s (1993) results regarding the evidence of the “Fair Wage-Effort Hypothesis”.

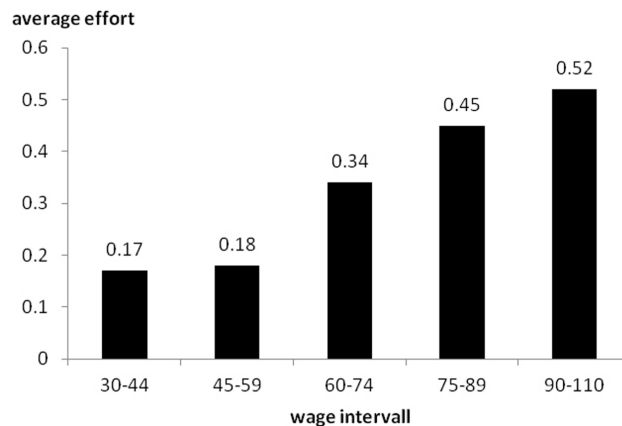


Figure 3: The Wage-Effort Relation (plot generated with data of Fehr et al. (1993))

The diagramm clearly documents the positive correlation between wages paid and exerted average efforts. The result supports the idea that employees invest more effort when they have been paid higher wages. It thus, emphasizes the finding that employees positively reciprocate higher wages with higher efforts. In the next subsection I analyze gift-exchange setups and report whether there exist gender differences in terms of paid wages and exerted efforts.

3.1 Gender Differences in Gift-Exchange Games

The experimental literature about gender differences in gift-exchange games is relatively small. Nevertheless, there exist some interesting designs with astonishing results. This subsection focuses on three studies investigating gender differences in first-mover and second-mover behavior of gift-exchange setups. In this regard Chaudhuri and Sbai (2011) study a repeated gift-exchange setup with random matching. In more detail, at the beginning of the experiment their subjects were given fixed roles to either act as a first mover (employer) or as a second mover (employee). First of all employers had to decide about a wage payment to the employee and the same time the employers have to request an effort level (e^*) for the workers. Note that sending a suggestion is similar to “cheap talk” because independent of the demanded level the employees are free to choose any effort level. After the principal made her wage decision the worker can either reject (choose a zero effort ($e = 0$)) or accept (choose $e > 0$) the offer. In total the game was played for 10 periods. When deciding about the wages and effort participants did not know the gender

of their interaction partner. The authors find no gender difference in first mover behavior, i.e. male principals pass the same average wage payment to receivers as female principals do. Figure 4 illustrates the development of male and female principals' average wage payments over time.

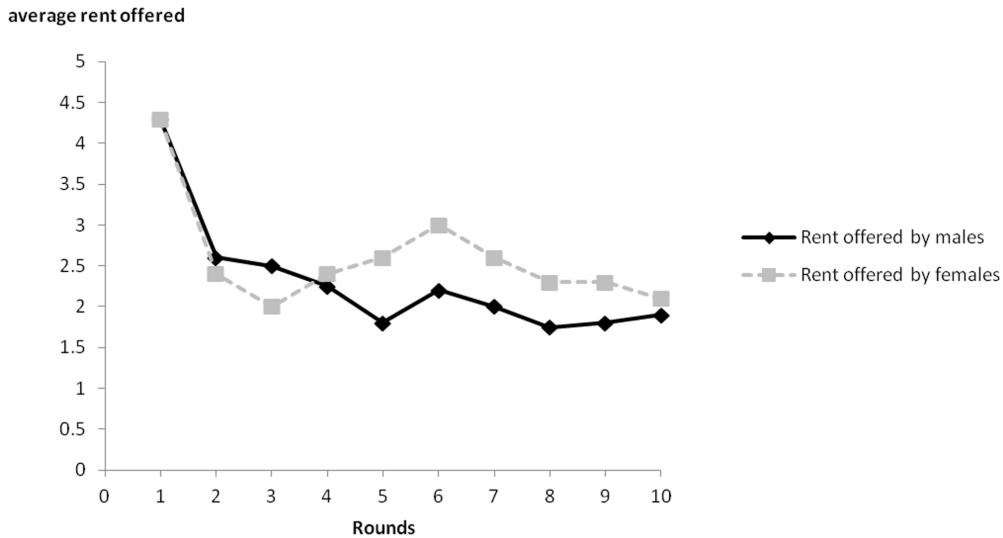


Figure 4: Average rents offered (plot generated with data of Chaudhuri and Sbai (2011))

Figure 4 documents that male and female employers' wage payments decrease over time. The average wage payments cut in half when comparing period 10 (about 2) with the beginning of the game (about 4.4). Focusing on exerted effort levels of employees (i.e. the workers' tendency to reciprocate) the authors find that female workers more often shirk than male workers, i.e. there are more women who exert less than the requested effort compared to male workers. Table 7 presents the frequency of male and female employees shirking.

	Male		Female		Total
Contracts offered	210		170		380
Contracts rejected	14		9		23
Contracts accepted	196		161		357
Shirk ($e < e^*$)	141	(72%)	130	(80%)	271
Work ($e \geq e^*$)	55	(28%)	31	(19%)	86

Table 7: Contracts offered (generated with data of Chaudhuri and Sbai (2011))

Both men and women accept most contract offers. However, when accepting a contract employees usually shirk and make effort choices (e) below the demanded level (e^*). On average there are 80% of female employees who shirk compared to only 72% of male workers. A regression analysis reveals statistical significance of this difference. The authors furthermore outline that this difference decreases over time.

There also exists a gift-exchange setup which focuses on competition effects between workers in a framework with two employees employed by the same employer. Benndorf and Rau (2011) analyze in a modified gift-exchange game whether the presence of a co-worker increases average efforts of employees. To induce competition pressure they modify the standard gift-exchange game and use the setup introduced by Abeler, Altmann, Kube, and Wibrall (2010). In this setup there are two workers who act as first movers and simultaneously choose their effort level. Subsequently a principal can observe the effort levels of both workers and can decide about the wage payments for each employee. Because workers move before the employers they cannot shirk. Furthermore they are faced with competition pressure because there is a co-worker who simultaneously chooses an effort level. Thus, the principal can reward the more productive worker. The authors compare their results to a treatment with the same move order. Note there exists a crucial difference: only one employee is matched to the employer. The setup is repeated for 12 periods. Benndorf and Rau report that average effort levels are only slightly smaller in the non-competitive treatment compared to the multiple workers treatment. However, they find an intense learning behavior of employees in the multiple workers treatment. That is, having the possibility to observe the performance of the co-worker significantly boosts the workers' effort levels. Benndorf and Rau (2011) find in their multiple worker treatment a strong increase in average effort in periods 1-6. This effect cannot be found in their control treatment.¹⁴

The authors' data also reveals interesting gender effects. Although there is no gender difference in competition behavior between the employees, a distinct gender effect can be found when focusing on the employers. Focusing on average payments in general¹⁵ Benndorf and Rau find that female employers paid on average higher wages compared to male employers. To be more precise, employers in that setup could pay every integer between zero and 100 and female principals paid on average 30.94 compared to males who only paid 21.69. Since employers act as second movers they could exploit the workers (first movers) by making a zero wage payment. Thus, the result can be interpreted such as that female principals behave more reciprocally (or trustworthy) than male ones. Hence Benndorf and Rau's finding is in line with the evidence about reciprocity in trust games. Since wage payments can be interpreted as revealing reciprocity it is also interesting to analyze whether there also exists a gender difference of paid wages according to workers' performance. In more detail it will be exciting to examine whether employers differently evaluate the workers who outperform their co-workers. Figure 5 reports the average wage payments to employees who perform better (*high effort employees*) or weaker (*low effort employees*) than their co-worker.

¹⁴The difference in learning behavior between their single worker and multiple worker treatment is significant.

¹⁵Note here, it is neglected whether an employee performed better (weaker) than his co-worker.

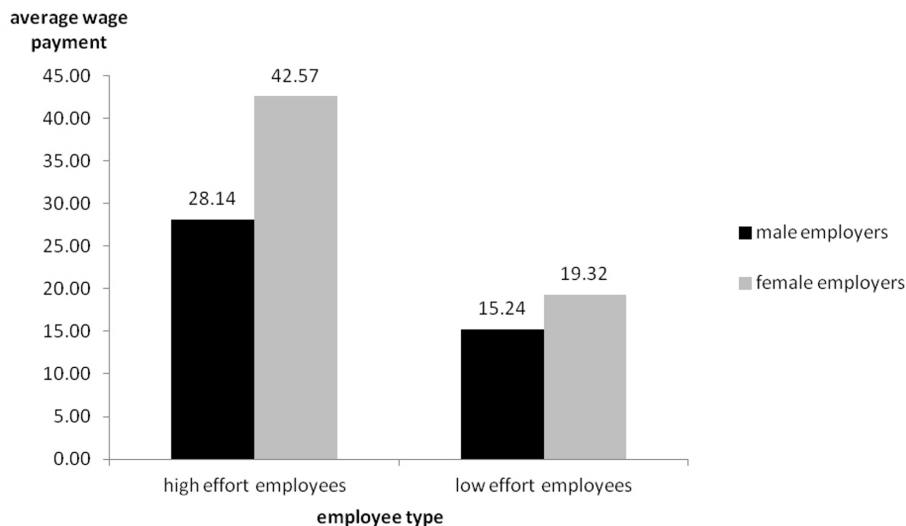


Figure 5: Average wage payments to low- and high-performing employees

First of all it appears that female employers on average pay higher wages compared to males. This is true for the wage payments which are received by low- and high-performing employees as well. Interestingly the difference in average wage payments by female and male employers is higher when focusing on the employees who exerted high effort levels. The wages paid by female employers are higher for 51% compared to the wages paid by male employers. In contrast the wages paid by female employers to low-performing workers are only higher for 27% compared to the males' choices. Thus, Benndorf and Rau find evidence that female principals show a higher magnitude of reciprocity.

Schwieren (2003) analyzes whether the “gender wage gap” can be observed in a laboratory gift-exchange game. The “gender wage gap”¹⁶ describes the phenomenon of gender wage differentials between women and men of equal productivity. Schwieren employs the special double-auction gift-exchange setup introduced by Falk and Fehr (1999) to analyze whether women receive lower wages in the laboratory. Furthermore the author investigates whether differences in productivity (reciprocity) can be related to these differences. The Falk, Fehr (1999) design uses a double auction mechanism¹⁷ with an excess supply of work, i.e. there are six employees and only four employers. Schwieren furthermore informs both: employers and employees about the gender of the interaction partners. In Schwieren’s homogenous treatment all employers were men (women) and the employee were women (men). For instance, at the beginning of the experiment the experimenter told the participants : “All men are employers and all women are workers”. The author finds that female workers were offered significant smaller average wages compared to male workers, no matter whether they are employed to a male or female employer. That is, male principals on average pay to male workers about 50. In contrast, if male principals employ female workers wage payment is only about 41. Interestingly female employees are also discriminated by female employers: female employees receive from female employers a wage of

¹⁶See Weichselbaumer and Winter-Ebmer (2005) for a meta-study of the overwhelming empirical evidence of the gender wage gap.

¹⁷In a double-auction mechanism participants post bids and asks to a market. If employers and employees agree on the same price the contract is accepted and the employee decides about the effort level to exert.

about 40. Whereas male employees receive average wage payments of about 63. Schwieren (2003) furthermore investigates whether male and female employees as well showed reciprocal behavior due to wage payments. That is, it is tested whether effort levels do correlate with wages paid. When splitting the data by sex, the author only finds a strong significant effect for male workers. That is, the exerted effort by male workers is significantly correlated with wages paid (Pearson correlation $r = 0.5$, one-sided p-value = 0.002). In contrast female workers' effort choices are only weakly correlated to wages paid (Pearson correlation $r = 0.25$, one-sided p-value = 0.081). Although there is a weaker correlation of effort levels and the wages paid, female employees do behave reciprocally. Schwieren (2003) shows that male and female workers reciprocate low wage payments less strongly than high wage payments. Since female employees more often receive small wage payments in contrast to men, they do not show the same reciprocal behavior. This finding emphasizes the importance of further factors which may have an effect on reciprocal behavior: the fact that employers knew that workers were female lead to smaller wage payments. Thus, female workers exerted low effort and received small wage payments in the following period.

4 Conclusion

The surveyed papers about gender differences in trust and gift-exchange games emphasize that there exist striking gender differences. Although there are some papers which do not find a significant difference in trusting behavior, most of the papers show that men in general trust more. That is, men usually send higher amounts to second movers compared to women. Note that this behavior can also be related to differences in risk attitudes. That is, many papers find that men behave more risk seeking in contrast to women who behave rather risk averse (e.g. see Gneezy and Croson (2009)). Interestingly men invest more than women but at the same time they are less trustworthy than women. Furthermore the results show that female second movers' reciprocity is amplified in the presence of a real-effort task. Here, only female dictators showed higher levels of reciprocity and return high amounts to workers. This finding is very interesting in the context of voluntary bonuses. If female bosses reward their employees more often with voluntary bonuses this could have an impact on long term motivation of the employees. Another interesting finding is that the reversed gift-exchange game revealed that female employers in that setup behaved differently in terms of wage payments compared to men. This may also have significant effects on the incentive structure in a company if female bosses reward workers who outperform their co-workers. The results of Croson, Buchan, and Solnick (2008) and Schwieren (2003) strikingly showed that subjects in trust and gift-exchange games behave differently when knowing the gender of their interaction partners. These studies highlight the presence of the "gender wage gap" because it is showed that this phenomenon exists even in the laboratory. All these studies show a high degree of gender differences in trust and reciprocity. Thus, it follows that these results cannot be ignored when analyzing economic decision-making of trust and reciprocity.

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