



Trust and gender: An examination of behavior and beliefs in the Investment Game

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ABSTRACT

How does gender influence trust, the likelihood of being trusted and the level of trustworthiness? We compare choices by men and women in the Investment Game and use questionnaire data to try to understand the motivations for the behavioral differences. We find that men trust more than women, and women are more trustworthy than men. The relationship between expected return and trusting behavior is stronger among men than women, suggesting that men view the interaction more strategically than women. Women felt more obligated both to trust and reciprocate, but the impact of obligation on behavior varies.

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The existence of gender differences in trust behavior (trusting others, being trusted by others and being trustworthy, i.e., rewarding trust through reciprocation) has important implications for economic behavior, yet broad empirical evidence from a variety of contexts that measure trust directly or indirectly in a number of different ways is mixed at best in terms of demonstrating which gender may be more trusting or trustworthy in an economic interaction and in suggesting the influence of a gender interaction (i.e., differing results when a male interacts with a male than with a female).

Survey evidence on which gender is more trusting is similarly divided. A meta-analysis of scales from widely used personality inventories from 1940 to 1992 showed that females scored slightly but consistently higher on scales of trust (Feingold, 1994). These measures reflected a belief in the honesty and positive intentions of other individuals, as well as of experts, public officials, the media, and so on. On the other hand, studies have found that persons belonging to groups that historically have been discriminated against (e.g., minorities and women) were *less* likely to believe “most people can be trusted,” even when controlling for a host of demographic characteristics (Terrell and Barrett, 1979; Alesina and La Ferrara, 2002; Glaeser et al., 2000). Research in business has demonstrated that female consumers have greater trust concerns than men and are less likely to engage in purchasing over the web (Sheehan, 1999), yet in an empirical investigation in the accounting profession, male and female auditors were equally trusting of clients (Shaub, 1996).

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Evidence as to the more trusted gender also is mixed. A study of psychological attitudes using *Rotter's interpersonal trust scale* (1967), containing 40 items sampling a range of situations and potential groups that one might trust, revealed greater trust towards women than towards men (Wright and Sharp, 1979). In Shaub's study of auditors, male clients were believed to be less trustworthy than female clients. Conventional wisdom also appears to consider women more trustworthy. For example, in Mexico City, government officials created all-female teams of traffic cops in the belief that female officers are less likely to take bribes (Treaster, 1999). Other international evidence indicates that women are less likely both to take bribes and to condone taking bribes and that corruption is less common in countries with greater female participation in public life (Swamy et al., 2001; Dollar et al., 2001).

However, Jeanquart-Barone and Sekaran (1994) report that among female civil service employees, male supervisors were trusted more than female supervisors; in this study, trust was measured by three predictors: participation in decision making, gender discrimination, and the supervisor's role as mentor. Additionally, in an experimental study in which participants could elect to receive a bribe, no significant gender differences were found (Frank and Schulze, 2000). Finally, the existence of a gender interaction on trusting and trustworthy behavior is unclear; very few studies have investigated interaction effects.

This evidence highlights an ambiguous understanding of the role of gender on trust behavior and suggests that the measure of trust and trustworthiness used and the context in which it is measured may influence gender results. Furthermore, given that each of the works cited studied only one or two aspects of trust behavior (focusing only on which gender is more trusting, for example), we do not have a full picture of the extent of the influence of gender on trust and trustworthiness.

We contribute to this literature by examining all facets of trust behavior (which gender is more trusting, more trusted, more trustworthy) in a single experimental setting, the Investment Game (Berg et al., 1995), capturing both main and interaction effects of gender. We employ this context because it is explicitly designed to measure trust and trustworthiness in an economic interaction. Additionally, we examine the issue both behaviorally (by looking at individuals' behavior) and attitudinally (by examining their expectations and beliefs). This more comprehensive research approach will allow a broader understanding of the influence of gender on trust behavior and a deeper understanding of the psychological motivations for those differences. This study represents a middle ground between general attitudinal measures of trust (which may or may not correlate well with actual behavior) and behavior in the field (where endogeneity problems such as self-selection may bias the results).

1. Why would we expect gender effects on behavior in the Investment Game?

The mixed set of results from the research discussed above suggests that the context of an interaction may influence whether gender effects are likely to arise. Research from psychology on social role theory suggests that the economic interaction captured in the Investment Game is a context ripe for the influence of gender.

We believe that our exchange situation will prompt traditional gender role interpretations. The social role theory of gender differences suggests that differences in social behavior are an outgrowth of gender roles that dictate the behaviors that are appropriate for men and women (Eagly and Wood, 1991). The influence of gender roles on behavior is caused by two processes. In the first, the "expectancies associated with gender roles act as normative pressures that foster behaviors consistent with these gender-typical work roles" (Eagly, 1997, p. 1381). In the second, men and women acquire different skills and beliefs through their participation in gender-segregated roles throughout their lives, which influence their behavior.

Social role theory emphasizes that males and females are differentiated along the *agentic* (instrumental, outcome-based) versus *communal* (procedural, process-based) continuum described by Bakan (1966), a proposition supported in a meta-analysis of gender differences in personality by Feingold. Specifically, the female gender role promotes communal behavior, and the male gender role promotes agentic (sometimes called instrumental or agency) behavior. Archer claims that "all aspects of men's and women's social behavior can be characterized as arising from their agency and communion" (Archer, 1996, p. 915).

Manifestations of these agentic versus communal tendencies have been demonstrated in a large body of research. For example, in task-oriented small groups, men are more focused on the task whereas women tend to be more social (Anderson and Blanchard, 1982). Men are more aggressive in general (Eagly and Steffen, 1986), but women are more likely to attend to their partner in a social interaction, displaying more empathy (Ickes et al., 1986). Finally, women, more than men, emphasize equality and harmony in relationships (Cross and Markus, 1993).

We propose that the two roles in our economic exchange will prompt different behaviors by men and women because of these differences in agentic (instrumental) and communal tendencies. We will attempt to tap into the expectations and beliefs of men and women in our experiment by asking them their expectations about the partner's behavior and the degree to which they feel obligated to send or return money to the partner, then testing whether the impact of these expectations and obligations on behavior vary by gender. For those with instrumental motivations (men), we predict that expectations will have a stronger impact on behavior. For those with communal motivations (women), we predict that social obligations will have a stronger impact on behavior.

Social role theory does not specify what will happen when the genders interact in an economic setting (e.g., when men play men vs. when men play women), and just as there is little and contrasting empirical evidence regarding this interaction effect, theories regarding it are few and yield contradictory propositions. For example, social identity theory from psychology suggests that in order to bolster their own identity and the identity of their particular group, males will be more trusting and trustworthy when paired with other males and females likewise with other females (Tajfel and Turner, 1979, and review

articles by Brewer, 1979; Messick and Mackie, 1989). On the other hand, expectation states theory, developed in sociology, suggests that gender is a status characteristic that may influence behavior in groups. Because females are generally considered to possess low status relative to males, females may try to elevate their status by displaying high levels of trust and trustworthy behavior to men, relative to the levels they display toward women (Sell, 1997; Ridgeway, 1982). Because of the disparate nature both of empirical evidence and grounded theory regarding the gender interaction, we will not *a priori* hypothesize what outcomes might be expected. Instead, we view testing of the interaction as exploratory and as an important step in understanding whether gender interactions appear in the trust context.

This paper proceeds as follows. First we review the literature concerning the influence of trust in economic games and derive specific hypotheses for our experiments based on previous empirical results. We then discuss the experimental methodology and behavioral results. We next turn to an analysis of beliefs in the Investment Game by examining subject responses to a questionnaire and demonstrating the possible relationship between those beliefs and behavior in the game. Finally we discuss how our findings lend support to the above theories from sociology and psychology regarding the influence of gender on trust and trustworthy behavior.

2. The influence of gender on trust in economic games

To examine whether gender influences the amount of trust or trustworthiness extended in the Investment Game, we conduct four conditions of the game, allowing for varying levels of information about the gender of the parties involved. In the control condition – which replicates the one conducted by Berg et al. (1995) – both parties are identified only by number and no gender information is available. In two “asymmetric” information conditions, the gender of only one of the parties is revealed (through the use of gender-specific first names); for example, the sender’s name will be identified, but the responder will be identified by number. In the fourth condition, the names of both parties are revealed, allowing us to test the effects of gender composition of the dyad on trusting and trustworthy behavior.

A growing literature in experimental economics has examined the influence of gender on behavior. Below we profile these results and present our hypotheses regarding sender and responder behavior for our four experimental conditions.

Three studies that have looked at which gender is more trusting and trustworthy in the standard Investment Game (in which players’ genders are not identified) have produced somewhat differing results. Croson and Buchan (1999) conducted the game in three Asian countries and the United States. They found that across all countries, male and female senders sent similar amounts, while female responders returned a higher proportion of their wealth. In a modified version of the Investment Game, Chaudhuri and Gangadharan (2002) found that male senders sent more than female senders.¹ Although female responders returned a greater proportion of the amount they had available than did male responders, this difference was not significant. Finally, Snijders and Keren (1999) conducted a version of the game in which participants provided decisions in the roles of both sender and responder over several games. They found males to be significantly more trusting (sent more) and less trustworthy (reciprocated less) than females. All these results involved settings in which participants in the game did not know the gender of their counterpart.

Three recent studies have used photographs to cue subjects about the gender of their counterparts in an Investment Game. In a simplified game in which senders chose whether to send all or none of their funds to the responder, males and females were equally trusting and equally likely to return at least as much as they were sent (Eckel and Wilson, 2003). The same researchers also used a game that permitted senders to send some of their own funds. That experiment also found no difference in trust between men and women, but female responders returned more than male responders (Eckel and Wilson, 2005). Finally, Petrie (2003) found that males sent more than females (although this effect was not always significant across conditions) and that females returned a higher proportion of their funds in certain conditions, but there was no difference in others.

Together these results suggest that male senders may send more than female senders and (more confidently) indicate that female responders will be more trustworthy than male responders. We predict, across all conditions in our experiment,

H1a. Male senders will send more than female senders.

H1b. Female responders will return more than male responders.

Our research extends earlier Investment Game studies by varying the gender information available to participants. In the control condition, we examine which gender is more trusting and more reciprocal in an Investment Game in which players are identified only by number. In two other conditions we examine whether males or females are extended more trust or trustworthiness by revealing the first name of one of the parties in the dyad while the other remains anonymous.

Which gender will be trusted more? One investigation into gender and trust defined trust as willingness to engage in a Prisoner’s Dilemma game rather than opt out (Orbell et al., 1994). In the experiments, both men and women deemed women more likely to cooperate, but they did not act on that belief by playing with women at a higher frequency than they

¹ In their procedure, only senders received \$10. Responders must rely entirely on the kindness of senders for their earnings. However, each participant had the opportunity to act as sender and responder (matched with a different person in each interaction). Furthermore, participants made decisions on record sheets rather than exchanging actual currency.

played with men. In other words, women were considered more trustworthy, but they were not actually trusted more. In Investment Games experiments using photographs, men and women were trusted equally (Eckel and Wilson, 2003, 2005; Petrie, 2003). We propose the following null hypothesis regarding behavior for the condition in which only the responder's gender is revealed:

H2a. Amount sent will not differ by gender of the responder.

Next, we ask whether one gender receives more reciprocation than the other. That is, are people more trustworthy toward males than females, or vice versa? Studies of discrimination in economic contexts suggest that women are sometimes treated worse than men. Ayres and Siegelman (1995) conducted over 300 paired audits among new car dealerships and revealed that salespeople quoted women significantly higher prices than men who used the same scripted bargaining strategies. The evidence seems to concur with the conventional stereotype that women are less effective at negotiating than men and are less likely to get a “fair shake” (Kray et al., 2002). Investment Games using photographs found mixed results. Responders were more likely to return at least as much as was sent to female senders in one study (Eckel and Wilson, 2003) but more was returned to male senders (Petrie, 2003; Eckel and Wilson, 2005) in two others. The weight of evidence suggests that responders may be less trustworthy toward female senders than toward male senders. We hypothesize that when only the sender's gender is known,

H2b. Proportions returned will be lower to female senders than to male senders.

Finally, in a fourth condition we examine trust and trustworthiness when gender of both parties is common knowledge. Showing manipulated photographs to players in a simplified Investment Game, DeBruine (2002) found that participants were more trusting of opponents who resembled them, but they did not differentiate when reciprocating. According to this pattern, we might expect more trust among same gender pairs. Petrie found strong trust and trustworthiness in all-female pairs, yet Snijders and Keren, in a modified Investment Game in which each player made a decision as both sender and responder, did not find greater trust in same gender pairs, and Eckel and Wilson (2003) likewise found no effects of gender pairing.

Based on this research we cannot predict what influence, if any, mutual gender identification will have on behavior in the Investment Game when both genders are known.

H3a. There will be no gender by role identification interaction on amounts sent.

H3b. There will be no gender by role identification interaction on return.

3. Experimental methodology

Participants were recruited for this research at the University of Wisconsin and the University of Miami. A total of 754 individuals (or 377 pairs) played the game. Participants were sophomore or junior students in economics or business classes who were paid their actual monetary earnings from the experiment. Participants signed up for the experiment without knowledge of any differentiation in experimental conditions.

The basic procedure for the game is as follows. Participants in each room were positioned to provide each person maximum privacy and were instructed not to communicate with anyone during the experiment. Participants received written instructions for the game, which included a quiz to make certain that all participants understood the task. Once participants completed the quiz correctly, they were given an envelope containing the experimental money (\$10).

Senders removed their money from the envelope and placed in a transport envelope that bore their name or number and the name or number of their partner (depending upon condition) any money they wished to send to the responder. Monitors took the envelopes to a different room where the experimenter recorded the amount sent, tripled it, and passed the envelopes to a different monitor for delivery to the appropriate responder. After senders made the decision about how much money to send, they completed the experimental questionnaire containing questions as to their gender, how much they expected in return, and a question about how obligated they felt to send money to the responder (Likert-scaled).

While the responders were waiting for any money to be sent to them, they completed a similar questionnaire containing questions as to their gender, how much they expected to receive from the sender, and a question about how obligated they felt to return money to the sender (Likert-scaled). Once the envelopes were delivered, the responders decided how much of their own experimental plus any (tripled) money received to return to the appropriate sender. Money the responders wished to send was put back in the transport envelope; money they wished to keep was placed into their own envelopes. Monitors gave the transport envelopes to the experimenter who recorded the amounts returned and forwarded the envelopes into the senders' room for distribution by the sender room monitors. At this point the experiment ended.

Note that this experiment implements a double-blind procedure (Hoffman et al., 1996). The monitor who saw the participants did not know the amount they sent, while the experimenter, who saw the amount sent, did not know their identities. The participants, of course, did not know the identity of their partners in the other room. To enable the monitor to identify each participant's name or number in order to return the proper envelope, a small note was placed by each participant in view only of the monitor.

Participants were divided into four conditions. At the outset of the game, each participant was given an envelope that he or she would use to send money to the other party. The sender and the responder were identified either by first name or by

Table 1
Number of pairs by gender and condition

Sender	Responder		Total
	Male	Female	
I. Both numbers			
Male	11	10	21
Female	7	11	18
Total	18	21	39
II. Sender number, responder name			
Male	24	18	42
Female	19	24	43
Total	43	42	85
III. Sender name, responder number			
Male	23	22	45
Female	20	19	39
Total	43	41	84
IV. Both names			
Male	43	41	84
Female	42	43	85
Total	85	84	169
All conditions			
Male	101	91	192
Female	88	97	185
Total	189	188	377

a number assigned by the experimenter. In the “number identification” condition, senders and responders were identified to each other only by number. In this condition, they had no information about the gender of their counterparts. Although [Table 1](#) shows the number of pairs in each category (e.g., female/female pairs), the participants themselves did not know whether they were matched with a male or female.

At the other extreme 169 pairs participated in the “mutual name identification” condition, in which senders and responders were known to each other by their gender-identifying first names. In this condition, the gender identity of both players was common knowledge.

In the two “asymmetric name identification” conditions, one person was identified by his or her first name, and the other person was known by number only. Both parties understood the asymmetry of the information. In the “sender number, responder name” condition, the senders knew whether they were matched with a male or female responder, but the responders had no information about the gender of their sender. In the “sender name, responder number” condition, the senders had no information about their responders, but the responders knew whether their senders were male or female.

Note that the use of gender specific names is a subtle manipulation of gender identification (as opposed to using photographs or face-to-face interactions) and represents a conservative test of gender effects. Participants with gender-neutral names participated in the asymmetric or number conditions of the study. The nature of this study allowed us to conduct any combination of name, number, or asymmetric conditions within a single session; thus, no participant was turned away from a session because of a gender-neutral name. Because of the privacy given to each participant, participants were unaware that different conditions of the experiment were being conducted.

As a check on the validity of the gender-identifying/gender-neutral categorization of names used in the experiment, we conducted a survey among 61 participants unrelated to the original experiment. This survey contained 20 randomly chosen names of actual participants from the experimental economic exchange that had been classified as female, 20 randomly chosen names that had been classified as male, and 20 randomly chosen names which had been classified as gender-neutral. The task of the survey was to identify the name listed as belonging to a male, a female, or a person of indeterminate gender. Therefore, for each category, we collected 1220 responses (61 participants times 20 names in each category). The survey was completed among undergraduates for course extra credit. Of the names categorized in the experiment as female, 96.4 percent of survey responses identified the names as female, and of the 43 (of 1220) misidentified responses, there was no distinct pattern to suggest that a particular name was repeatedly misidentified. Of the 20 names categorized as male, 97.7 percent were correctly identified in survey responses as male. Finally, of the 20 names categorized as gender-neutral, 39.7 percent were identified as female, 29.8 percent were identified as male, and 29.6 percent were identified by survey participants as indeterminate. Based upon these results we have a high degree of confidence that the gender-based categories we constructed based on participants' names were externally valid.

Table 2
Trusting behavior: amount sent (S.D.)

Condition and responder							
Sender	Both number	Sender number, responder name		Responder number, sender name	Both name		Total
		Responder male	Responder female		Responder male	Responder female	
Male	7.45 (3.15)	8.17 (2.96)	8.42 (2.33)	7.20 (3.74)	8.08 (2.98)	7.85 (3.18)	7.80 (3.17)
Female	6.08 (3.90)	7.08 (2.79)	7.13 (3.00)	7.31 (2.80)	6.68 (3.16)	5.84 (3.17)	6.66 (3.12)
Total	6.82 (3.53)	7.69 (2.90)	7.68 (2.78)	7.25 (3.32)	7.39 (3.13)	6.82 (3.31)	7.24 (3.19)

Table 3
Analyses of amount sent: coefficient (standard error) ($N = 377$)

Variable	Model 1	Model 2	Model 3
Constant	7.57 (0.55)***	3.13 (0.66)***	4.42 (0.79)***
Sender gender (0 = female, 1 = male)	2.39 (0.63)***	2.04 (0.55)***	1.69 (0.56)**
Condition (name condition omitted)			
Both number	−0.43 (1.07)	−0.01 (0.94)	0.16 (0.93)
S number, R name	0.97 (0.81)	0.11 (0.71)	0.22 (0.70)
S name, R number	0.30 (0.81)	0.54 (0.71)	0.60 (0.70)
Proportion expected return		3.53 (0.20)***	3.66 (0.40)***
Obligation (1 = low, 7 = high)			−0.41 (0.14)**
LR Chi ²	16.32	97.30	105.33

** $p < 0.01$.

*** $p < 0.001$.

4. Results

4.1. Gender effects on behavior

Our data will be analyzed by TOBIT analysis. The key dependent variables we examine are the amount sent by the sender and the proportion returned by the responder. To calculate the proportion returned, we divide the amount returned by the total amount available, which is the amount sent times three plus the \$10 originally given to the responder.²

We first analyze the main effects of gender differences in trusting and trustworthy behavior. Male senders sent significantly more than female senders, confirming H1a. On average across all conditions, male senders sent \$7.80 while female senders sent \$6.66 (Table 2). More than half (55.7 percent) of all male senders sent the entire \$10, while only a third (34.0 percent) of female senders did so ($p < 0.001$ in Chi-squared test). While gender is a significant predictor of amount sent in regression analysis ($p < 0.001$), condition is not (Model 1 in Table 3).

H1b is also supported by the data. Female responders return a higher proportion of the amount they control to the sender. Female responders return 33.2 percent of their funds across all conditions while male responders return 28.8 percent (Table 4). The influence of gender on proportion returned is significant; women return 4 percentage points more than men ($p < 0.05$ in regression including gender of responder and condition, Model 1 in Table 5).

Is one gender trusted more? We find that amount sent does not differ according to the gender of the responder, in support of H2a. When only the responder's gender is known, mean amounts sent to male and female responders differ by just a penny (\$7.69 for men, \$7.68 for women). Responder gender does not enter significantly in regression analysis (not shown).

Are people more trustworthy toward one gender than the other? Female senders and male senders are treated the same, contrary to H2b. When only sender gender is known, male senders receive 27.1 percent and female senders receive 26.9 percent of funds available to the responder. The influence of sender gender is not significant in regression analysis (not shown).

Finally, is there a gender interaction on trusting or trustworthy behavior? To examine the interaction between the genders (H3a and H3b), we look at decisions made in the condition where both names are revealed. For both amount sent and proportion returned, the interaction is not significant (not shown).

² We choose this measure of trustworthiness for a number of reasons. First, it makes the second-mover's decision comparable to decisions in the related dictator game and allows us to compare behavior by the responder in these games to behavior by senders in those games, as suggested by Cox (2004). Second, it allows us to include in our analysis dyads where the amount sent is zero (5% of observations in our study). Third, this measure allows for the possibility that the responder returns more than was received (2% of observations in our study). Finally, this is the measure used in a number of our previous studies, including the gender-specific ones (Croson and Buchan, 1999; Buchan et al., 2006). For a discussion of the question of the appropriate measure of trustworthiness and a comparison of measures by previous literature, see the paper by Song et al. (2007).

Table 4
Trustworthy behavior: proportion returned (S.D.)

Condition and sender	Responder		
	Male	Female	Total
Both number	23.8 (19.0)	32.2 (17.6)	28.4 (18.5)
Sender number, responder name	29.6 (16.9)	36.5 (15.1)	33.0 (16.3)
Sender name, responder number			
Sender male	26.0 (19.8)	28.2 (26.1)	27.1 (22.8)
Sender female	17.8 (17.0)	36.6 (16.2)	26.9 (19.0)
Both names			
Sender male	32.5 (20.0)	35.9 (16.9)	34.2 (18.6)
Sender female	32.9 (20.3)	29.0 (17.0)	30.9 (18.7)
Total	28.8 (19.4)	33.2 (18.0)	31.0 (18.8)

In summary, our results demonstrate that men are more trusting than women and that women are more trustworthy than men, consistent with previous literature. The data do not show any biases toward men or women. Neither gender is trusted more (although women are more trustworthy), and to neither gender are people more trustworthy (although men are more trusting). Finally, we find no interactions across genders, indicating that men are just as trusting and trustworthy toward women as toward other men, and women are just as trusting and trustworthy toward men as toward other women.

4.2. Possible explanations

The behavioral results just analyzed tell us what men or women did in the trust game. To gain a better understanding of why men and women behaved this way, we turn to an analysis of subjects' attitudes. Below we discuss possible motivations for behavior in the trust game and the attitudinal measures that were included in questionnaires given to subjects, which will help clarify the role of these motivations in behavior.

Recent research in negotiation and economics suggests that a crucial factor in prompting gender differences in trusting behavior will be what is expected in return. Babcock et al. (2003) and Riley and Babcock (2002) demonstrate that males have more optimistic aspirations in negotiation than females and that aspirations partially mediate gender differences in negotiation performance. This research implies that men may trust more (send more money) because they expect to receive more in return. In two experiments by Eckel and Wilson (2003, 2005), expected return helped to explain the decision to extend trust. In our questionnaire, we ask senders what they expect to receive in return to determine whether there is a gender difference in expectations and whether this difference influences the level of trust displayed.

A possible motivation for trustworthiness is suggested by a growing literature concerning the influence of norms on trustworthy or reciprocal behavior. Ostrom (2003, p. 40) defines norms as internal valuations (positive or negative) that an individual attaches to a particular type of action. We focus on the social and moral norms of trustworthiness that, because they are internalized, "operate directly in the motivations of people" (Hardin, 2002b, p. 49). Specifically, participants are asked how obligated they felt to send money to their partners. Although our question does not separate whether the feeling of obligation is prompted by a participant's own morality or by social pressure, it does address the extent to which such an obligation exists.

Interestingly, norms have been used more often to explain reciprocal (or responder) behavior in one-shot games than to explain the first-mover's trust. The reason for this is summed up by Hardin: "the truth here is that first mover cooperation in one-shot games is a mystery" (Hardin, 2002a, p. 98). We pose the question of obligation both to senders and to responders

Table 5
Analyses of proportion returned: coefficient (standard error) ($N = 376$)

Variable	Model 1	Model 2	Model 3
Constant	0.34 (0.02)***	0.07 (0.03)*	-0.15 (0.03)***
Responder gender (0 = female, 1 = male)	-0.05 (0.02)*	-0.04 (0.02)*	-0.03 (0.02)*
Condition (name condition omitted)			
Both number	-0.05 (0.04)	-0.03 (0.03)	-0.02 (0.03)
S number, R name	-0.01 (0.03)	-0.02 (0.02)	-0.02 (0.02)
S name, R number	-0.06 (0.03)*	-0.07 (0.02)**	-0.06 (0.02)**
Amount sent (dollars)		0.04 (0.003)***	0.04 (0.003)
Obligation (1 = low, 7 = high)			0.04 (0.004)***
LR Chi ²	11.82	169.33	245.38

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 6
Analyses of amount sent by gender: coefficient (standard error)

Variable	Model 1 males	Model 2 males	Model 1 females	Model 2 females
Constant	11.09 (0.91) ^{***}	4.75 (1.04) ^{***}	6.98 (0.53) ^{***}	3.58 (0.74) ^{***}
Condition (name condition omitted)				
Both number	−0.74 (1.85)	−1.38 (1.55)	−0.22 (1.27)	0.83 (1.16)
S number, R name	0.58 (1.45)	−0.28 (1.23)	1.24 (0.92)	0.44 (0.84)
S name, R number	−1.25 (1.42)	−0.69 (1.19)	1.61 (0.96) ⁺	1.64 (0.86) ⁺
Proportion expected return		4.61 (0.69) ^{***}		2.71 (0.47) ^{***}
LR Chi ²	1.42	49.84	4.14	36.43

^{***} $p < 0.001$.

⁺ $p < 0.10$.

in this experiment in order to understand whether that norm may be influencing trusting behavior as well as trustworthy behavior.

4.3. Questionnaire results—expectations and obligations

We first analyze the proportion senders expect to receive back from responder. Senders responded to this question by providing the absolute amount expected in return. To control for the fact that the more money is sent, the more one can possibly receive back and to make this measure comparable to our measure of trustworthiness, we have converted the absolute numbers into proportion expected in return.³ Expected return varies from zero (for those who expected no return) to 5.23, with a mean of 1.36.

Consistent with the findings of Babcock and colleagues, the expectations of male senders are somewhat higher than those of female senders. Male senders expect in return 1.41 times more than was sent, while females expect 1.32 times more than was sent; however, this difference is not significant in regression analysis controlling for condition. There is no evidence that gender identification differentially influences the proportion expected in return from either gender (e.g., men do not expect more back from females than males); an analysis of the interaction of sender and responder gender in the name condition and the responder name asymmetric condition is not significant.

Senders were also presented with the question “To what degree did you feel obligated to send money to the responder?” with “1 = feel no obligation,” and “7 = feel very obligated”. There was a strong influence of gender on the degree of obligation, with females feeling higher levels of obligation than males (mean 3.63 vs. 2.85, $p < 0.001$ in t -test). In regression analysis, gender influenced the degree of obligation felt ($p < 0.001$), but condition did not. Responders also were asked the degree of obligation they felt to return money to the senders. Again, females felt a somewhat greater obligation than males (mean 5.45 compared to 5.14, $p = 0.11$ in t -test). In regression analysis, the effect of gender was weakly significant ($p = 0.10$), and no effect of condition is apparent.

4.4. Relationship between questionnaire measures and behavior

Having analyzed the influence of gender on these measures, we now ask whether these attitudes may account for the differences across genders in trust and trustworthy behavior in our Investment Game. We begin by examining the behavior of senders, and specifically why males were more trusting than females. Models 2 and 3 in Table 3 show results from our regressions on amount sent that incorporate motivations for trust.

What is the relationship between trusting behavior and what one expects in return? The correlation between proportion expected in return and amount sent is $r = 0.47$, $p < 0.01$. This result led us to test for a mediating influence of expectations on amount sent (Baron and Kenny, 1986). Model 2 in Table 3 demonstrates the highly significant influence of the proportion expected in return on actual amount sent ($p < 0.001$). The more one expects in return, the greater the trust behavior. As seen in Model 2, once proportion expected return is added to the model, the influence of sender gender decreases. The proportion expected in return thus partially mediates the influence of gender on amount sent; males expect to receive more in return and thus send more initially.

An even more detailed picture of the influence of proportion expected return on gender differences is gained by comparing models of amount sent for each gender (Table 6). Although the influence of proportion expected in return is highly significant for both males and females, the variable has a greater influence on the amount sent by males than by females. A Chow test confirms that the difference in coefficients in these two models is significant ($p < 0.001$). Furthermore, when comparing Models 1 and 2, we see that the R^2 increases by 24 percentage points for men when proportion expected is included in Model 2, but only 17 points for women. Men are thus more instrumental in their approach to this economic exchange than are women, lending support for social role theory. Males seem to trust more *because* they expect more in return.

³ Proportion expected in return is calculated as Amount Expected divided by Amount Sent.

These results leave open the question of whether men send more because they are better able to predict the amounts returned than are women; that is, if men are better predictors, they can be more certain about the level of return and therefore send more. An analysis of the correlations between amounts expected in return and amounts actually returned demonstrates that across genders and all conditions, the correlation is quite high, $r = 0.51$. In general, both men and women are quite good at predicting the amounts returned. Furthermore, tests comparing the correlations between amounts expected in return and amounts actually returned demonstrate that there are no significant differences in predictive ability between genders, or among gender pairings and experimental conditions. The Fisher's Z -transformation compares independent correlation coefficients through evaluation of the Chi-square statistic. The correlation between expected return and actual return for men was $r = 0.48$ and for women was $r = 0.52$; these correlations are not statistically different from one another ($\chi^2 = 0.418$, $p = 0.518$). Correlations across the four gender pairings (within the name condition) ranged from $r = 0.45$ to $r = 0.53$; these correlations are not statistically different from one another ($\chi^2 = 0.607$, $p = 0.895$). Finally, the type of condition also did not influence the ability to predict; correlations across the four conditions ranged from $r = 0.43$ to $r = 0.57$ but were not statistically different from one another ($\chi^2 = 2.56$, $p = 0.465$). Therefore, these results suggest that men sent more not because they were better able to predict how much they would receive in return, but rather because they expected greater amounts in return.

A final result concerning the motivations for amounts sent appears in Model 3 of Table 3. The degree to which senders feel obligated to send something has a significant negative influence on amount sent ($p < 0.05$). This result may seem paradoxical; female senders felt significantly higher levels of obligation than did male senders, yet male senders sent significantly more than female senders.

What might explain this counterintuitive behavior? We find that the feeling of obligation affects the *propensity* to send in the way one would expect; those who feel obligated are more likely to send something. This statement is supported by a logitistic regression (not shown) in which feeling of obligation (ranging from 1 to 7) is used to predict whether a person sends something versus nothing. The coefficient estimate is positive and significant ($p = 0.002$) and the pseudo R^2 is 0.11.

However, greater obligation is associated with sending *less*. A dummy variable for obligation was constructed comparing the least obligated third of participants to the most obligated third, omitting the middle third. Among the 94 percent of proposers who chose to send a positive amount of money, those with low levels of obligation sent an average of \$7.75, and those with high levels of obligation sent an average of \$6.88 ($p < 0.05$ in t -test). We conducted a Chow test comparing regressions of amount sent on obligation run separately for men and women. The separate regressions yield very similar constants for both men and women. At the lowest level of obligation, participants of both genders sent about \$7.00. However, for men, higher levels of obligation do not affect amount sent (the coefficient is virtually zero). That is, men were consistent in their amount sent regardless of their levels of obligation. For women however, higher levels of obligation reduce amount sent. The Chow test reveals that the two slopes are significantly different from each other ($p = 0.003$). It would seem that women are displaying a classic reactance effect. That is, the greater degree of obligation felt by females imposed a limit on the range of behavioral options perceived as open to them, prompting females to "react" in opposition to the obligation (Brehm, 1966). Thus, the more obligated females felt, the less money was sent.

What are the motivations for trustworthy behavior? Models 1 and 2 in Table 5 contain the basic results cited above. The highly significant influence of amount sent means that responders are rewarding greater trust with increasing proportions of wealth returned ($p < 0.001$). Next, supporting the literature connecting norms and trustworthiness, we demonstrate that the degree of obligation to reciprocate is indeed a significant motivation for trustworthy behavior. The influence of obligation in Model 3 of Table 5 is highly significant ($p < 0.001$). Furthermore, a test of mediation (Baron and Kenny) reveals that the degree of obligation felt partially mediates the influence of gender on percent returned. Female responders felt greater obligation to return money than did men, as discussed in the analysis of questionnaire responses. Furthermore, obligation is significantly correlated with proportions returned ($r = 0.37$), and the influence of responder gender on proportions returned (as shown in Model 2) decreases once obligation enters the model (in Model 3). This result along with the fact that women returned more in these experimental exchanges suggests that women viewed the economic exchange communally and empathically, in line with social role theory and as has been noted in gender research in economics by Eckel and Grossman (2008). When approached with cooperative behavior, females felt obligated to respond with cooperative behavior in return.

5. Discussion

This research deepens our understanding of the influence of gender on trusting and trustworthy behavior in economic exchange and provides insight into possible motivations for gender differences in these behaviors. First, using an experimental game that clearly distinguishes trusting from trustworthy behavior, we demonstrate significant differences across males and females in an exchange. Our results are in accordance with what would be expected given prior empirical experimental economic research and lend support to two propositions suggested by the social role theory of gender differences.

First, males in our experiment acted instrumentally and were more trusting in the exchange. Unlike in other forms of exchange such as public goods provision, where an individual may increase one's assets through free-riding, in the Investment Game the only option a sender has to increase personal wealth is to send money to the responder. Therefore, trusting in this situation can be an instrumental response. Indeed, Orbell et al. point out the instrumental nature of trust in stating that one trusts in the expectation of receiving positive treatment in return.

One could argue that trusting in the Investment Game is also a communal behavior (the sender could help out the responder by sending money) and that women too would have strong inclinations toward trusting behavior. However,

somewhat counterintuitively, the general conclusion in the literature on gender differences in helping behavior is that men tend to display more helping behavior than women. The meta-analysis of gender and helping by Eagly and Crowley (1986) demonstrates that male helping is more pronounced in shorter, anonymous situations whereas female helping occurs in longer term contexts within close relationships. The economic exchange in the Investment Game is short term and occurs with a stranger. Therefore, this is not a context in which women will express their communality through greater amount sent.

Second, females behaved more communally and were more trustworthy toward partners in reward for the trust shown to them. In the Investment Game, there is no instrumental reason for the responder to return money to a sender. No wealth can be gained, and because this situation is not repeated, there is no reputation to be protected. The only possible motivation to be trustworthy is a communal one (an empathic response, perhaps the need to live up to expectations, for the partner) and a desire for equality and harmony in the relationship. Even in this one-shot, anonymous context, we believe that when sent money, female responders consider that the sender has expressed trust and feel obligated to live up to that trust (as suggested by expectations of the communal female social role) (Eisenberg and Lennon, 1983).

What are the motivations for these gender differences in trusting and trustworthy behavior? Our results suggest that what one expects in return is a powerful motivation to trust someone. This motivation (the correlation between amounts sent and expected return) is stronger for males, who tend to view tasks agentically or instrumentally, than for females who tend to view interactions (especially those of a longer term or more intimate nature) communally. However, there is an alternative explanation suggested by Dawes et al. (1977); people's expectations about others may depend on their own choices rather than the reverse.

Our results also demonstrate that the norm of obligation is a significant motivation behind trustworthiness and that the degree of obligation felt (and more is felt by women than men) mediates the influence of gender on trustworthy behavior. Finally, we have made a step toward demonstrating the influence of a norm of obligation not only on trustworthiness (which had already been proposed by Hardin, 2002b and Ostrom, 2003 among others), but surprisingly, on trusting behavior as well. However, this influence is complex. Obligation positively impacts the probability of sending any positive amount, and while it does not affect the amount sent by men, it *decreases* the amount sent by women.

What is also noteworthy in this research is what we did not find. First, we found no influence of the interaction of genders. Males and females in our experiment did not demonstrate a bias toward a given gender when the gender of the partner was revealed relative to when it was not. Thus, our results do not lend support for any existing theories of gender interaction.

Second, expectations are a key aspect of social theory, and participants in our experiment had incorrect expectations. Females felt more obligation to be trustworthy and, indeed, were more reciprocal; however participants from neither gender expected greater reciprocation from women. This suggests that, at least in this exchange, females' norm of obligation was manifested more internally within female senders than externally in the expectations of others.

This research begins to clarify the mixed evidence regarding the cooperative behavior of men and women found in other domains. Specifically, our results suggest that whether the task is more clearly instrumental or communal will influence the level of cooperation extended by either gender. For example, Eckel and Grossman (2008) review a number of economic experiments and suggest that in risky economic contexts, differences in the behavior of men versus women are unpredictable, although in riskless contexts, women are more likely to be interpersonally oriented. Our results suggest that in a risky context such as the Investment Game, men and women are equally skilled in predicting how much they will receive in return, but because men have higher predicted amounts returned, they send more. Furthermore, our results are consistent with (and provide an explanation for) those of Andreoni and Vesterlund (2001) who show that men (acting instrumentally) are more altruistic when it is cheap to do so, but women (acting communally) will be altruistic even when it costs them to share with another player. Finally, our results suggest support for Kray et al. (2002) who demonstrate that women outperform men in negotiations when stereotypically masculine (instrumental) traits are linked to poor negotiation performance, and men outperform women in the reverse situation.

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