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The Impact of Empowering Investors on Trust and Trustworthiness

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Abstract

This paper uses laboratory mechanism design in a investment environment to examine the impact of empowering investors with the right to veto the investee's profit distribution decision on the level of trust and trustworthiness. One of the key findings is that the empowerment of investors through both costless and costly vetoes significantly increases trust by over 30% in both cases. Interestingly, we observe a comparable pattern when the power to veto is removed. Analyses of veto decisions indicate that empowering investors increases both trust and trustworthiness without an undue abuse of the power to veto and that the veto decisions are largely driven by unfair responses, consistent with the theory on inequity aversion.

The Impact of Empowering Investors
on Trust and Trustworthiness

1. Introduction

Trust is an important driver of investment decisions at the micro level, especially in bargaining environments such as those related to investments in early stage business ventures and loosely connected business alliances, where contracts are generally between small numbers of agents and are inherently incomplete and difficult to monitor and enforce (Chan et al., 1997). At the macro level, Arrow (1974) accentuates the role of trust as the foundation in every economic transaction and stresses that trust helps to mitigate transaction costs. He postulates that higher rates of investment and growth are positively associated with higher levels of trust. More recently, Carlin et al. (2009) model the evolution of trust and its interplay with regulation and economic growth noting its positive relationship between 'public trust' and financial investment.

In the entrepreneurial finance literature, trust has been identified as a major catalyst which is essential for cooperation to arise (Harrison et al., 1997). Simons (2002) emphasizes the importance of trust, and demonstrates the gain from increasing trust. He reports an increase in trust by one-eighth point (on a five point scale of measuring trust) increases the profits of firms in his sample by 2.5% (an average of $250,000).

Shiller and Akerlof (2009) argue that in addition to trust, the perceived fairness of the terms of the exchange is also important for successful exchanges. The realization of fair outcomes is ultimately related to the relative power that could be exercised by the parties.[1] The more balanced the power of the agents to affect the ultimate outcome, the

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[1] However fair may be defined.

more likely it is for the venture to succeed. Rabin (1993) noted the presence of fairness equilibrium outcomes wherein individuals expressed displeasure by hurting those who have hurt them and expressed support for those who provided rewards.

Consequently, an important question that should be addressed in the investment literature is: are there mechanisms which can be used to enhance the level of trust and trustworthiness by assuring that the potential power of the parties of a business transaction is balanced, particularly in situations where business contracts are incomplete and one of the parties has complete control over the decision on the distribution of profits?

The current study proposes and empirically examines two explicit mechanisms for empowering [2] an investor in a simple repeated investment game. The purpose of these mechanisms is to increase the level of cooperation between the two parties of business interactions (i.e., increase the level of trust and trustworthiness).[3] The first cooperation enhancing mechanism is a costly veto (the rejection of the amount returned by the receiver) and the second is a costless veto. With the costly veto, rejection results in both receiver and sender receiving a payoff of zero. With the costless veto, rejection results in

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[2] This is in contrast to Karlan et al, (2009) who examine the impact of informal social networks as empowerment mechanisms.

[3] In this two-person game, attributed to Berg et al. (1995), an investor sends some amount of a resource endowment to a receiver. The investment is grossed up, to capture the return to the investment in the receiver's hands, and then the receiver sends resources back to the investor. The proportion of the endowment that is sent can be interpreted as a measure of the investor's trust. The proportion of the grossed-up investment that is returned can be interpreted as a measure of the receiver's reciprocity, trustworthiness or fairness. We later define trustworthiness and fairness within the context of the reciprocity measure. Throughout the text we use the terms investor and sender interchangeably. Similarly, we use the terms investee and receiver interchangeably.

the receiver realizing a payoff of zero, but the investor will retain the initial investment[4].

The vetoes permit the investor to reject the receiver's decision and deny the receiver any

income in the round in which the receiver's response is vetoed. The introduction of the

veto into a repeated game environment can be seen as a mechanism designed to restore

what Kramer (2009) describes as the presumptive trust that was tempered (lost) through

negative experience.[5] By trying to account for possible learning effects by reversing the

order of our treatments, we are also able to study the loss of trust and reciprocity when

the power to punish is withdrawn.

Our laboratory environment closely relates to the challenges faced by investors

and informal venture capitalists in early stage ventures. The individual investors place

trust in the entrepreneurs to manage the new ventures in the collective interest of all

parties, and expect the managers to reciprocate their trust with high returns. However,

due to the nature of effort in new high-risk ventures (often complex, non-routine and

unobservable independent work) traditional monitoring and incentive mechanisms are

less effective in disciplining managers, resulting in lower trust and related investment

levels. This experiment also captures, in a controlled laboratory environment, the

organizational forms of alliances and joint ventures described by Chan et al. (1997).[6] In

particular, our experiment resembles a business context of a simple two-partner alliance

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[4] Please note that the costless veto is not necessarily without cost, as an investor may reject an amount that may be greater than what was invested, but less than what the investor believes is appropriate. In this case there is a cost to the veto, but it is less costly than the costly veto treatment.

[5] This is comparable to permitting contributors in a public good game to punish non-contributors as a means to promote cooperation.

[6] Strategic alliances bring together otherwise independent firms to share resources in product design, production, marketing, and/or distribution so as to generate synergy. Such alliances are becoming prevalent as competitive pressures force firms to adopt flexible and more focused organizational structures (Chan et al., 1997). Mutual cooperation in alliances is not automatic because, in the absence of trust, individual firms may be guided by their self-interest both before and after joining an alliance.

with a dominant partner (who is the receiver in our experiment and decides on the profit-sharing rule). The other partner's contribution to the alliance is similar to the investment game's sender (who provides resources to the dominant partner). The synergy from an alliance relationship is captured by the tripling of the investment in our experimental design.

We focus on the effects of three treatments on a measure of trust and a measure of reciprocity derived from an investment game originally introduced in Berg et al. (1995). Treatment 1 is a repeated game, during which the participants' roles as investors or receivers did not change and the individuals with whom the participants were paired did not change. Treatment 2 is a repeated game with a costly veto and treatment 3 is a repeated game with a costless veto.

A key finding of this study is that empowerment significantly increases trusting behavior. Empowerment of senders as implemented (by both the costly and the costless veto) contributes to a substantial increase in trust (over 30% in each case). More specifically, the trust (level of investment) increased from 71.2% for repeated games to 94.7% for repeated games with costless veto. Interestingly, we observe a comparable pattern when the power to punish is withdrawn, i.e., there is a substantial drop in trust, providing some insights into factors driving lost trust. The consistent results for empowerment of senders (increased trust) and for the withdrawal of the sender's power to punish (similar level of lost trust), indicates that the empowerment findings are not a result of participant learning, but a result of incentives inherent in empowerment. Our results for reciprocity are mixed. Average reciprocity is significantly greater when

empowerment is costly than when the veto is not permitted. However, there is no difference in the level of reciprocity between the costless veto and the costly veto.

In additional analysis, we explore the determinants and the patterns of vetoes cast in our experiment. Although the participants in this experiment had 378 opportunities to cast a veto following the response of a receiver, interestingly vetoes were cast only 44 times (less than 12% of possible vetoes). This indicates that empowering investors increases both trust and reciprocity without an undue abuse of the power to veto (without overly destroying social surplus). In the analysis of the determinants of the veto, not surprisingly, the estimated probability of casting a veto is significantly greater under the costless veto than under the costly veto. Additionally, trust of the sender and the interaction of the sender's trust and the receiver's reciprocity are highly significant. The risk attitude of the sender is also significant. The significant interaction between trust and reciprocity displayed by the regression results indicate that when reciprocity is low, individuals who display more trust are more likely to cast a veto than are individuals who are less trusting. Analysis of individual responses to when or why participants choose to cast a veto sheds more light on "untrustworthy" responses that trigger the vetoes. The punitive sentiments are largely driven by unfair responses, consistent with the theory on inequity aversion (Fehr and Schmidt, 1999).

The implication of our results is that empowerment of investors in contexts such as early stage ventures and simple business alliances will increase investment levels. The data also supports the notion that empowerment is important in enhancing trust in an environment where trust has been destroyed and that the implications of regulatory

actions, such as Sarbanes-Oxley Act of 2002, which stipulate enhanced enforcement by creating countervailing power, will have a positive impact on the level of investments.

2. Literature Review and Research Expectations

Trust is defined by Robbins and Langton (2003) as the "positive expectation that another will not – through words, actions, or decisions – act opportunistically". Reciprocity is an echo of trust by the party that was trusted. The significance of this two-way interaction on business transactions has been tested extensively in the experimental economics literature in a one-shot game relationship. More recently, some studies (see, Bohnet and Huck, 2004; Cochard et al., 2004; Kanagaretnam et al., 2009) have tested this interaction in a multi-period environment as an indirect means of empowering investors and inducing higher levels of cooperation by investees so as to enhance the total output of a business relationship.

2.1. Empowerment and Trust

Arrow (1974) postulates that higher rates of investment and growth are positively associated with higher levels of trust. Karlan et al. (2009) show the positive and nuanced impact of informal social networks as empowerment devices in promoting investment. In the two-person investment game, however, the trusting behavior is constrained by the uncertainty involved in sending a positive amount that may or may not be reciprocated by the receiver. In particular, trust is an action taken by an agent to an economic transaction with the anticipation that the other party of the transaction will not behave opportunistically, i.e., will not exploit the vulnerability that the agent has created for himself or herself by taking the action with an uncertain outcome (James, 2002). This is especially so in a one-shot investment relationship where there is no opportunity for the

investor to retaliate or for the entrepreneur to build reputational capital. In this environment, the individual investors place trust in the entrepreneurs to manage the new ventures in the collective interest of all parties, and expect that managers will behave in a cooperative and non-exploitative ways (Cook and Cooper, 2003). However, in the absence of an effective monitoring mechanism in these incomplete contractual relationships, investors may hesitate to fully invest in these projects due to the fear of being exploited by the entrepreneur. This study conjectures that if investors in these environments are empowered with the right to punish the entrepreneurs if they abuse their trust, this would increase the levels of trust and trustworthiness which in turn would lead to a higher rate of investment.

One way of introducing empowerment into this environment is to move from a one-shot game to a repeated game. In a repeated interaction environment, investors can retaliate by reducing their future investments in response to a low level of reciprocity. In this case, one's reputation may be an effective a priori control on ex-ante opportunism. We expect that in a repeated multi-period investment game, subjects may attempt to create incentives that induce the other party to cooperate. Sending credible signals to their counterparts is likely to influence them to adopt strategies that enhance cooperation and lead to Pareto-superior outcomes (see Kreps et al., 1982; Fudenberg and Maskin, 1986; Fudenberg and Levine, 1992; Eckel and Wilson, 2003). This reputation building mechanism (the repeated interaction), is expected to encourage the sender to trust more in order to influence the receiver to acknowledge the increased trust with greater reciprocity. However, there are no direct punishment mechanisms to correct exploitative behaviors in the repeated games and they are also subject to end-game behaviors.

Another way of empowering senders is to permit them the opportunity to exhibit their disapproval of what is returned to them in the investment game by vetoing the response and cancelling the contract. This veto could be costly to only the receiver (costless veto) or to both the receiver and the sender (costly veto).[7] This is comparable to permitting contributors in a public good game to punish non-contributors as a means to promote cooperation. Results reported by researchers such as Fehr and Gächter (2000a) have demonstrated that punishment in public goods environments has been successful in promoting cooperation. Also, prior research on the ultimatum game has shown that responders do not maximize monetary payoffs by accepting every offer; they typically reject unfair offers (see Camerer, 2003, Chapter 2).[8]

With the ability to punish, senders should feel a greater willingness to trust the receiver to return an acceptable amount of the grossed-up investment. The opportunity to retaliate or punish possible self-regarding behavior by the receivers will constrain receivers from exploiting investors. Therefore trust exhibited by empowered investors in the veto treatments will be greater than trust under repeated game. As the cost of punishment falls with the sender being guaranteed a payoff at least equal to the initial endowment, senders should feel an even greater willingness to trust the receiver to return an acceptable amount of the grossed-up investment. Consequently, we expect that the costly veto power will likely increase the level of investors' trust relative to those

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[7] Costly vetoes are possible in the presence of inequity aversion. According to Fehr and Schmidt (1999) inequity aversion means that people resist inequitable outcomes; i.e., they are willing to give up some material payoff to move in the direction of more equitable outcomes.

[8] These effects occur even when there will be no future interactions with the partner suggesting that fairness is important to the responders.

exhibited in the repeated interaction setting. We further conjecture that the costless veto will result in higher level of trust than those exhibited under the costless veto.

2.2. Empowerment and Reciprocity

The veto grants investors an opportunity to retaliate or punish possible self-regarding behavior by the receivers. The fear of retaliation by senders may increase the propensity to reciprocate by the receivers, i.e., with the sender acquiring an ability to punish, receivers should be more likely to return a greater portion of the grossed-up investment. Therefore, the level of reciprocity under a costly veto will be greater than the level of reciprocity under repeated games. As the cost of punishment falls, the receiver may expect the sender will be even more likely to veto an unacceptable return. Therefore, the level of reciprocity under a costless veto will be greater than the level of reciprocity under costly veto. Consequently we expect that the level of reciprocity will be at its highest level of under a costless veto followed by a higher level of reciprocity under a costly veto relative to level of reciprocity under a repeated game.

2.3. Exercising the Veto

Adding a veto to the trust game transforms the second and third phases into an ultimatum game. Generally, rejection frequencies are high when less than 30% of the sender's endowment is offered to the receiver (Camerer, 2003, Chapter 2). Within the context of the trust game, we would expect the grossed-up investment would be comparable to the sender's endowment in the ultimatum game. We would expect rejections to be highest when reciprocity is less than 0.33, which is the reciprocity measure for which the amount returned is equal to the amount invested. It is also possible that senders may view an equal sharing of the social surplus to be a fair return

and they might veto reciprocity values below 0.67, which, within this context, are unfair. Within the context of a repeated trust game, a veto is likely to induce increased reciprocity in the subsequent round much as punishment in public goods games leads to increased contributions. Consequently, we conjecture that the likelihood of a rejection will increase as reciprocity falls (reciprocity in excess of 0.67 is unlikely to be vetoed and reciprocity less than 0.33 is most likely to be vetoed). Furthermore, we expect that following the casting of a veto, reciprocity increases.

3. Experimental Protocol and Design

A total of 86 subjects are recruited from undergraduate business classes at a medium-sized university. During the recruitment phase, students were told that the experiment involves simple decision-making, and that the details would be given to them during the session. In addition, they were told that they were required to participate in two separate sessions. Each session would be conducted on a different day and each session would last no more than two and one-half hours. They were also informed that during the course of the sessions they would earn money that would be paid to them in cash at the conclusion of each session.[9]

In the first session, we elicited subjects' social value orientations and risk attitudes. This allows us to isolate intrinsic individual characteristics rather than assume that our subjects are risk-neutral, non-cooperative profit maximizers.[10]

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[9] The average payout for the sessions in which subjects participated in the value orientation game and the risk attitude lotteries was $24. The average payout for the sessions in which subjects participated in the trust game was $34.

[10] A detailed description of the risk attitude measure and the social value orientation measure used in this analysis closely follows Kanagaretnam et al. (2009a). Instructions used to elicit risk preferences and value orientations are available from the authors upon request.

The second session consisted of twenty decision rounds of an investment game similar to that used by Berg et al. (1995) in which senders and receivers are endowed with 100 Francs. Senders make an investment of an amount of their choosing from zero to 100 Francs. This investment is grossed up twice the investment made by the sender and the receiver receives an amount that is three times what was sent.[11](Please see Figure 1).

The three treatments described in the introduction are studied in two sequences, a forward sequence and a backward sequence. The first treatment is a repeated game. The second treatment is a repeated game in which a sender can veto the receiver's response and impose a payoff of zero Francs on both sender and receiver (the costly veto). The third treatment is a repeated game in which a sender can veto the receiver's response and the sender retains the initial endowment of 100 Francs as payoff and the receiver gets a payoff of zero Francs (the costless veto).

In the "forward" sequence, half of the participants first play a one-shot investment game as a sender (receiver) and then play a second one-shot game, re-matched with a different person as a receiver (sender). This same pattern is repeated for two sets of 4 rounds of treatment 1, two sets of 3 rounds of treatment 2 and two sets of 2 rounds of treatment 3. Participants do not know how long they will remain in a particular role or what will be the next treatment. In the "backward" sequence, participants first play a

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[11] The basic structure of the experimental setting is a variant of the trust game developed by Berg, Dickhaut and McCabe (1995). The resolution of this game is simple. In the one-shot version of the game, the receiver should not send any money back knowing that the game ends immediately thereafter. The sender, anticipating the receiver's decision, should send no money to the receiver in the first place. However, Berg et al. (1995), Croson and Buchan (1999) and several other studies have shown that the actual behavior is quite different from the one predicted above. The senders send on average a significant positive sum to the receiver, thus exhibiting some "trust" in the receiver. The receiver reciprocates this trust by sending some money back. By sending money back to the original sender, the receiver exhibits positive "reciprocity".

one-shot investment game and then play 2 rounds of treatment 3, 3 rounds of treatment 2 and finally, 4 rounds of treatment 1. The same reversal of roles is used in the backwards sequence as in the forward sequence.

In the "forward" sequence, there are 60 participants in treatments 1 and 2 and 17 participants in treatment 3. In the "backward" sequence there are 26 participants in each of the three treatments. The trust index used in this analysis for each participant in each treatment is the mean of the trust indices for an individual over the rounds of the treatment. The reciprocity index used in each treatment in the analysis is computed in a similar way for each participant.

The data are analyzed by running OLS regressions for each of the outcomes (trust and reciprocity). We accommodate the within-subjects design that uses repeated observations for each individual across each game treatment by clustering on individual identification numbers. Robust standard errors are computed. The independent variables are the categorical variables *treatment* (3 levels described above), *sequence* (2 levels described above), *order* (2 levels described below) and all of their interactions.

Order identifies the order in a session in which a participant took the role of an investor. Every participant recruited for the experiment had the opportunity to participate as a sender and a receiver. When roles were changed, participant pairings were reassigned. Individuals were never re-matched during a session and this was made clear to participants in the instructions. The variable *order* was introduced to identify when a participant played the sender role: before or after playing the receiver role.

4. Results

4.1. Trust

As stated earlier, trust is measured as the ratio of the amount sent or invested by the sender to the endowment of resources in the sender's control. This investment in turn is multiplied three-fold to become the appreciated investment. The receiver or reciprocator then returns a portion of this appreciated investment to the sender. The greater the amount invested by the sender, the greater the trust we attribute to the sender. Because there is no requirement that the reciprocator return anything to the sender, trust must be great if the sender is to keep nothing back for himself or herself as insurance against no return to his or her investment. Table 1 presents the results of an OLS regression for trust which includes game treatments, sequence, order and their interactions. Data are clustered by individual identification numbers and robust standard errors are estimated.

In Table 1, the repeated game, the repeated game with a costly veto and the repeated game with a costless veto are identified as rg, v1 and v2. Sequence and Order each take two levels. Sequence is either the forward sequence (repeated game, costly veto and costless veto) or the backward sequence (costless veto, costly veto and repeated game). Order has either the subject playing the sender role first or the receiver role first.

The regression results reported in Table 1 indicate only the coefficients for repeated game without veto (rg), the game with the costly veto (represented by the regression constant) and the game with the costless veto (v2) are statistically significant. None of the coefficients for Sequence, Order and the interaction terms are statistically significant. A test of the joint significance of Order and all of the terms including Order permits us to maintain the null hypothesis that there is no order effect ($F(6, 85) = 0.99$, p

= 0.438). Accordingly, the trust data are pooled across Order. Table 2 presents the results of a regression for the restricted model of trust which includes game treatments, sequence and their interactions with observations pooled across Order. The data are clustered as before and robust standard errors are estimated. Table 3 presents mean measures of trust by game treatment for the forward sequence and backward sequence sessions with data pooled across Order. Figure 2 summarizes the Table 3 data.

The regression results in Table 2 permit us to test the significance of the differences in trust between the repeated games with veto options. In the forward sequence, trust under the costless veto is significantly greater than trust under the costly veto ($t = 3.93$, $p = 0.000$).   In the backward sequence, the difference is also statistically significant ($F(1, 85) = 4.41$, $p = 0.020$).   When trust under either of the empowerment treatments is compared with the repeated games without a veto option, the level of trust exhibited in the absence of empowerment is statistically lower than when some sort of empowerment is available independent of the sequence in which the games are played (t-test, F-tests, $p < 0.005$ for all four cases). The consistency between the backward sequence sessions and the forward sequence sessions provide support for a claim that the greater trust observed in the empowerment treatments in the forward sequence sessions is not a result of participant learning (following participation in a repeated game without empowerment), but a result of the incentives inherent in the treatment. In particular, there is no statistical difference between the average trust exhibited under the costless veto in the forward and backward sequences ($F(1, 85) = 0.51$, $p = 0.478$) and no statistical difference between the average trust exhibited under the repeated game without veto in the forward and backward sequences ($F(1, 85) = 0.12$, $p = 0.728$).

The changes in trust that we observe across the three game treatments of the forward sequence sessions shows an increase of more than 30% in trust as participants move from the repeated game without veto power to the repeated game with a costless veto. This same proportion of difference in trust between the costless veto and no veto environments is observed when participants experience the costless veto before the repeated game without veto. The empowerment of senders as implemented in this environment contributes to a substantial increase in investment and ultimately the amount of trust that we observe. These results are consistent with our conjecture in section 2.1.

4.2. Reciprocity

Reciprocity is measured as the ratio of the amount returned to the sender by the receiver to the tripled investment made by the sender. The greater the amount returned by the receiver, the more trustworthiness we attribute to the receiver. Without any recourse by the sender, within the context of a one-shot game, there is no reason to expect the receiver to return anything to the sender. Moving from a one-shot to a repeated game without re-matching across rounds induces increased trust and reciprocity (see Bohnet and Huck, 2004; Cochard et al., 2004; Kanagaretnam et al., 2009b). Table 4 presents the results of a regression for reciprocity which includes game treatments, sequence, order and their interactions. The data are clustered by subject identification number and robust standard errors are estimated.

The regression results reported in Table 4 indicate that although the model accounts for a significant amount of the variation in the average reciprocity measure ($F_{(11, 85)}$ 2.24, $p = 0.019$), none of the coefficients (other than the constant) are statistically significant. A test of the joint significance of Order and all of the terms

including Order permits us to maintain the null hypothesis that there is no order effect

$(F(6, 85) = 0.48, p = 0.822)$. Accordingly, the reciprocity data are pooled across Order.

Table 5 presents the results of a regression for the restricted model reciprocity which

includes game treatments, sequence and their interactions with observations pooled

across Order. The data are clustered as before and robust standard errors are estimated.

Table 3 presents mean measures of reciprocity by game treatment for the forward

sequence and backward sequence sessions with data pooled across Order. Figure 2

summarizes the Table 3 data.

The regression results in Table 5 permit us to test the significance of the

differences in reciprocity between the repeated games with veto options. In the forward

sequence, reciprocity under the costless veto is not significantly different from reciprocity

under the costly veto $(t = 0.80, p = 0.573)$, where our expectation was that it would be

greater. In the backward sequence, the difference between reciprocity with the costless

veto and the costly veto is statistically significant $(F(1, 85) = 3.02, p = 0.043)$. From

Figure 2, it is clear that average reciprocity falls when the game treatment changes from

v2 to v1, which is what we described as our expectation in section 2.2.

Average reciprocity is significantly greater when empowerment is costly than

when the veto is not permitted. For the forward sequence $F(1, 85) = 5.37$ and $p = 0.012$,

while for the backward sequence $F(1, 85) = 2.94$ and $p = 0.045$. The consistency between

the backward sequence sessions and the forward sequence sessions provide support for a

claim that the greater reciprocity observed in the empowerment treatments in the forward

sequence sessions is not a result of participant learning (following participation in a

repeated game without empowerment), but a result of the incentives inherent in the

treatment. In particular, the difference between the average reciprocity exhibited under the costless veto in the forward sequences and backward sequences (0.636 versus 0.700) and the difference between the average reciprocity exhibited under the repeated games without veto in the forward and backwards sequences (0.593 versus 0.562) are not significant at the conventional 5% level ($F(1, 85) = 2.57$, $p = 0.089$ for the costless veto and $p = 0.560$ for the repeated game without a veto).[12]

The changes in reciprocity that we observe across the three game treatments of the forward sequence sessions show an increase of about 7% in reciprocity as participants move from the repeated game without veto power to the repeated game with a costless veto. A larger proportion of difference in reciprocity between the costless veto and no veto environments is observed when participants experience the costless veto before the repeated game without veto. The empowerment of senders as implemented in this environment contributes to a significant increase in investment and ultimately a significant increase in reciprocity.

4.3. Veto Incidences

The 86 participants in this experiment had 378 opportunities in their role as a sender to cast a veto following the response of a receiver. Vetoes were cast 44 times. Thirty individuals cast vetoes, 19 of them cast a veto only once. Nine cast two vetoes, one person cast three and one person cast four vetoes. The data are summarized in Table

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[12] Note that all of the tests which compare different treatments within a sequence are one-tail tests. The tests which compare the same treatments across sequences are two-tail tests.

6, which presents the results of a probit regression whose dependent variable is whether or not a veto was cast.[13]

The independent variables include all of the experimental design variables (game treatment, the sequence in which the games were played and the order in which participants played the different roles) and their interactions and the behavioral variables trust (as revealed by the sender), reciprocity (as revealed by the receiver), the risk attitude of the sender (the more risk-seeking, the more likely the sender may cast a veto in an attempt to change the behavior of the receiver in a following decision period) and the social value orientation of the sender (the more pro-social the sender, the less likely the sender may be to reduce the social surplus by casting a veto).

The interaction of trust and reciprocity is also included. This is included because how a sender responds to the degree of reciprocity, which may be viewed as a measure of fairness exhibited by a receiver, may depend upon how trusting the sender is. Less trusting people may not expect as much from others as would more trusting people.

The results of the regression presented in Table 6 show that the treatment variable, trust of the sender and the interaction of the sender's trust and the receiver's reciprocity are highly significant. The risk attitude of the sender is also significant. None of the other variables have coefficients with p-values below 10%. A test on the null hypothesis that all of these variables together do not account for a significant proportion of the variation in the dependent variable indicates that the null can be maintained (χ^2 (8) = 12.06, p = 0.1487). Neither sequence, order nor value orientations account for a

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[13] The repeated observations in the costly and costless veto treatments and the within subjects design with regard to the two treatments are accounted for in the regression by creating a variable that is the interaction of subject and treatment. We then cluster on this variable and estimate robust standard errors.

significant proportion of the variation in the decision to cast a veto. Accordingly, a restricted model containing variables for the game treatment, trust, risk attitude and the interaction of trust and reciprocity is estimated and reported in Table 7. This model is used to estimate probabilities of casting a veto given different measures of reciprocity from the receiver and trust displayed by the sender. These estimates are presented in Figures 3 and 4 for the costly veto and costless veto treatments. The relationships displayed in Figures 2 and 3 would be shifted up (down) as the individual becomes more risk seeking (averse) indicating that greater risk seeking results in a greater likelihood of casting a veto, all other things constant. For these estimates, the average sample risk attitude measure of 14.5 is used (the range of the risk attitude measure runs from highly risk averse, with a risk attitude measure of 0, to highly risk seeking, with a risk attitude measure of 24).

Given the level of trust, the estimated probability of casting a veto is significantly greater under the costless veto than under the costly veto (Table 7, $p = 0.005$). Under the costly veto, the sender can reject a responder's offer to share the appreciated investment and both the sender and responder will receive nothing for that decision round. Under the costless veto, the sender can reject the responder's offer, imposing a gain of zero on the responder, but guaranteeing himself or herself a return equal to his or her initial endowment. The result we obtain is not surprising as it would be expected that more vetoes would be cast if they were less costly. Vetoes cast by round and treatments are summarized in Table 8 and the individuals who cast the vetoes are identified in Table 9.

The significant interaction between trust and reciprocity displayed by the regression results is clearly shown in Figures 3 and 4. When reciprocity is high,

individuals who display more trust are less likely to cast a veto than less trusting individuals. However, when reciprocity is low, more trusting individuals are more likely to cast a veto than less trusting individuals. The more trusting individuals are more likely to reward high levels of reciprocity than less trusting individuals and more likely to punish low levels of reciprocity than are less trusting individuals.

4.4. Individual Responses

The probit results do not provide insights about when or why individuals choose to cast a veto. Because there are only 30 individuals who cast vetoes, it is not difficult to look at the decisions made by each of these individuals and attempt to make some inferences from their choices. Before reporting on this review, consider the following categorization of reciprocity responses. If the reciprocity measure (the proportion of the grossed up investment that is returned to the sender) exceeds one-third of the grossed up investment, the sender will receive back more than what was sent to the receiver. Call reciprocity which exceeds 0.33 a *trustworthy* response. If one-third or less of the grossed up investment is returned, the response is *untrustworthy*. Although a response may be viewed as trustworthy, it may not be viewed as fair. Fairness is subjective, but for our purposes of categorizing responses, we will consider two possibilities. If at least one half of the grossed up investment is returned to the sender the response may be fair. Returning two-thirds of the grossed up investment guarantees that the sender and the receiver have an equal share of the total social surplus (each receives the same payoff from that round's interaction). This may be a reasonable upper bound on the fair responses. A reciprocity measure exceeding two-thirds could be described as *supra-fair*, for the sender enjoys a greater share of the social surplus. Figure 5 presents distributions

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of the reciprocity types by game treatment represented by all of the responses by treatment made by receivers during this experiment. It is clear that there are more fair responses under the veto treatments than under the no veto treatments. Similarly, there are more untrustworthy responses when there is no veto. Empowering senders induced about a 25% increase in fair responses by receivers (from 76% of all responses with no veto to 92% of all responses for the veto treatments).

Typically, the decision to cast a veto is made following a receiver's decision to respond in a less trustworthy way than the sender anticipated. Twenty-five of the 44 vetoes were cast during rounds 2 and 3 of the costly veto treatment and round 2 of the costless veto treatment. For 18 of those 25 vetoes, the receiver's trustworthiness fell from the previous round. This seems to have precipitated the veto. Fair responses were rejected only 6% of the time (11 of 181 opportunities) under the costly veto, but 14% of the time (12 of 86 opportunities) under the costless veto. Supra fair responses were never rejected under the costly veto (out of 50 opportunities) and only 3 times under the costless veto (out of 28 opportunities). Two of the three vetoes were cast by the same individual (who even chose to reject a response that returned more than 90% of the gross investment). When responses were not fair, 52% were rejected under the costly veto (13 of 25 opportunities) and 83% were rejected under the costless veto (5 of 6 opportunities). Two-thirds of untrustworthy responses were rejected (8 of 12 opportunities).

Vetoes were cast 32 times during rounds 1 and 2 of the costly veto treatment and round 1 of the costless treatment veto. These were all rounds that provided an opportunity for the receiver to respond to a rejection by increasing reciprocity. The veto was successful in increasing reciprocity 28 of these 32 times. Twice there was no change

in reciprocity and twice reciprocity fell (by 14% and by 3%). Of the 28 positive

responses, all were fair responses and 6 (21%) were supra fair.

Generally, empowering the senders by giving them the opportunity to sanction

receivers by rejecting the receivers' responses leads to increased trust and increased

reciprocity. Vetoes are cast infrequently, and these are cast more often when they are less

costly and when responses may be viewed as unfair.

5. Conclusion

The contribution of this paper lies in its demonstration, in a controlled

environment, of how empowerment in a simple investment setting can affect trust and

trustworthiness and increase the returns to the participants in the investment activity. In

particular, our study examines how the empowerment of investors to retaliate against

agents, who do not reciprocate as they would like, can increase the levels of trust and

reciprocity in an economic exchange.

In further analysis, we identify some of the determinants and the patterns of

vetoes cast in our treatments. Although the participants in this experiment had 378

opportunities to cast vetoes following the response of a receiver, vetoes were cast only 44

times (less than 12% of possible vetoes). This indicates that empowering investors

increases both trust and reciprocity without an undue abuse of the power to veto. The

estimated probability of casting a veto is significantly greater under the costless veto than

under the costly veto. Additionally, trust of the sender and the interaction of the sender's

trust and the receiver's reciprocity are highly significant. The risk attitude of the sender

is also significant. Analysis of individual responses to when or why individuals choose to

cast a veto sheds more light on "untrustworthy" responses that trigger the vetoes. The punitive sentiments are largely driven by unfair responses, consistent with the theory on inequity aversion.

Our results provide some insights on the effect of empowering investors in simple investment settings such as informal investments in early stage ventures and a business context of a simple two-partner alliance. The results support the notion that empowering investors is important in eliciting trust and reciprocity in loosely connected organizational forms. This is important as the literature is sparse on the examination of the impact of empowerment on trust and reciprocity in a controlled laboratory environment.

Our results are also related to research on effects of international institutional factors on investment activities. Recent research on international finance shows that strong country-level institutions can reduce consumption of private control benefits by insiders (LaPorta et al., 1998; Dyck and Zingales, 2004; Haw et al., 2004). For example, strong legal systems protect outside investors by giving them the rights to discipline insiders and to enforce contracts. LaPorta et al. (1998) use the rule of law index and the efficiency of the judicial system as proxies for legal enforcement. They find that the protection investors receive determines their readiness to finance firms, thus, corporate finance may critically depend on these legal rules and their enforcement. Our results on the micro-level effects of empowerment on the level of investments are consistent with the macro-level studies on the benefits of empowering investors and other market participants.

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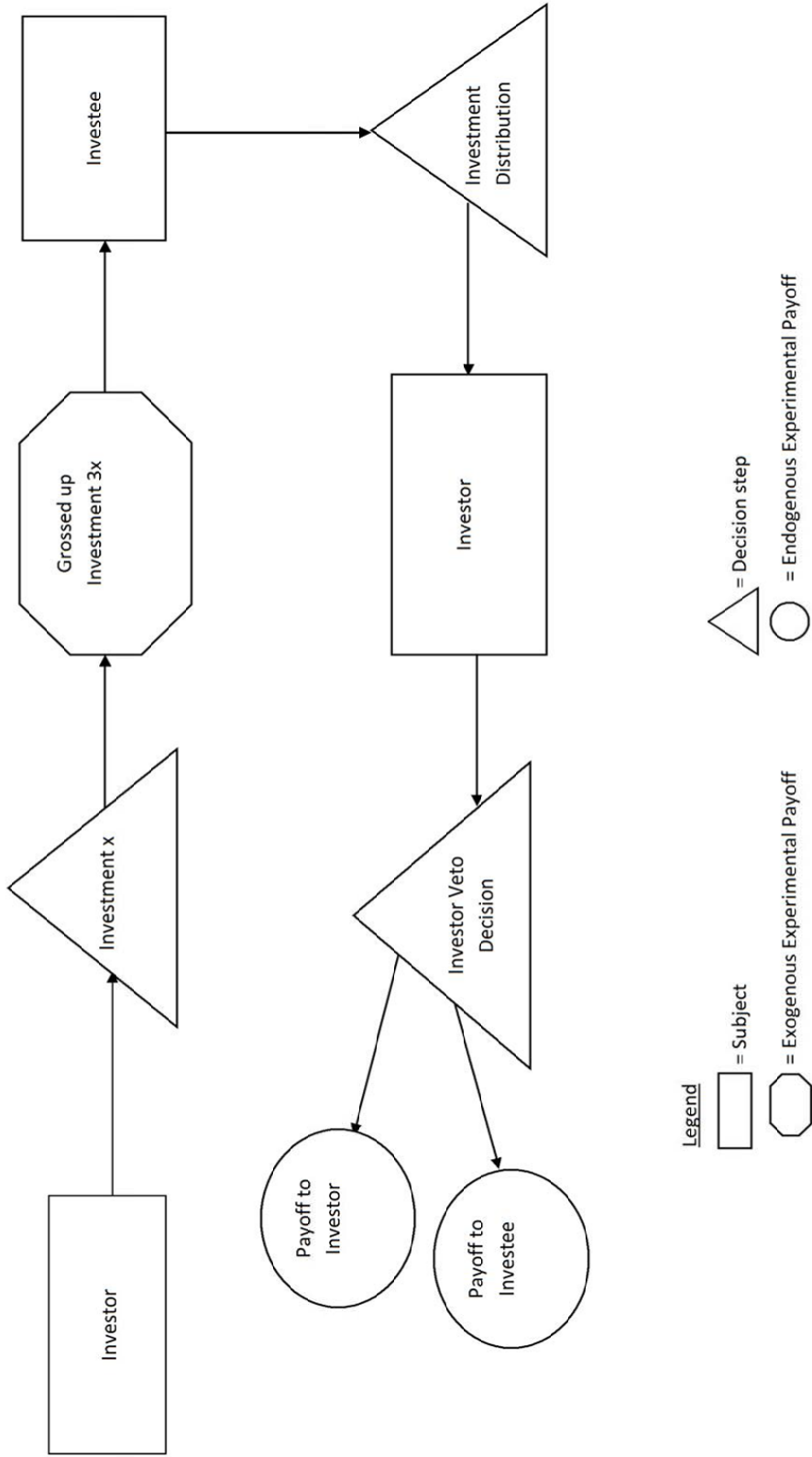
Figure 1. Sequence of steps in the Investment game (One-shot and Repeated)

Legend

☐ = Subject

⬡ = Endogenous Experimental Payoff

▷ = Decision step
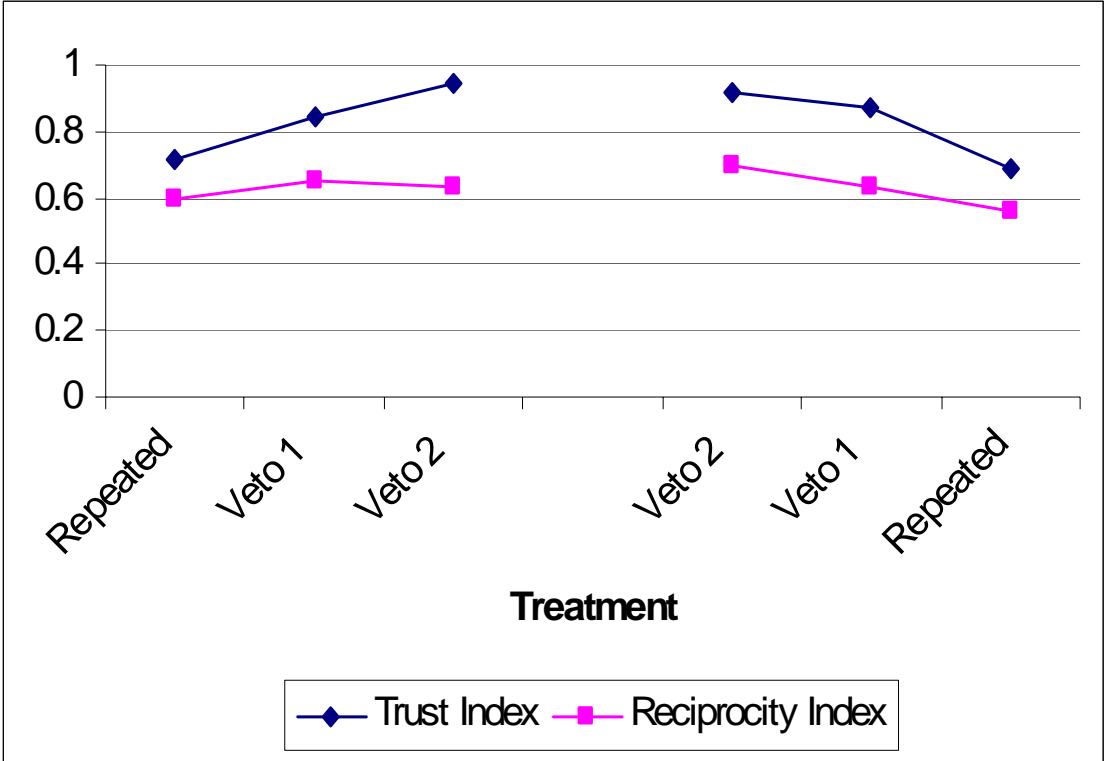
◯ = Exogenous Experimental Payoff

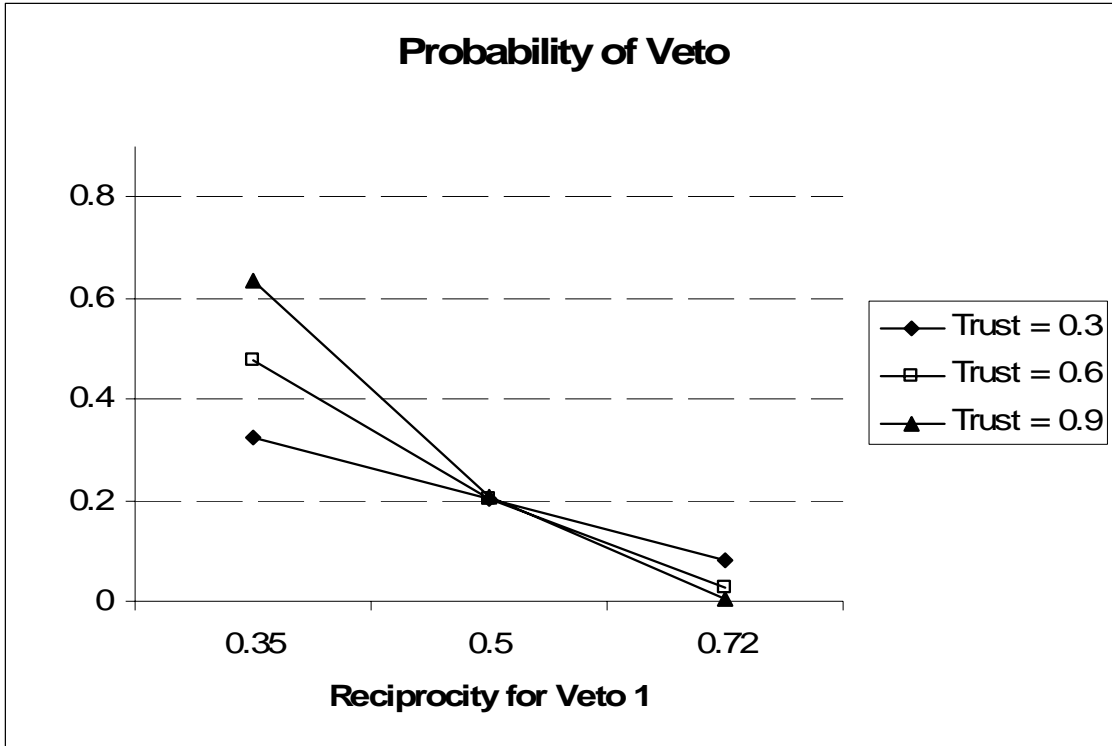Figure 2.   Trust and Reciprocity by Game Type and Sequence

Figure 3. Estimated Probability of a Sender Casting a Costly Veto Given Sender's Trust
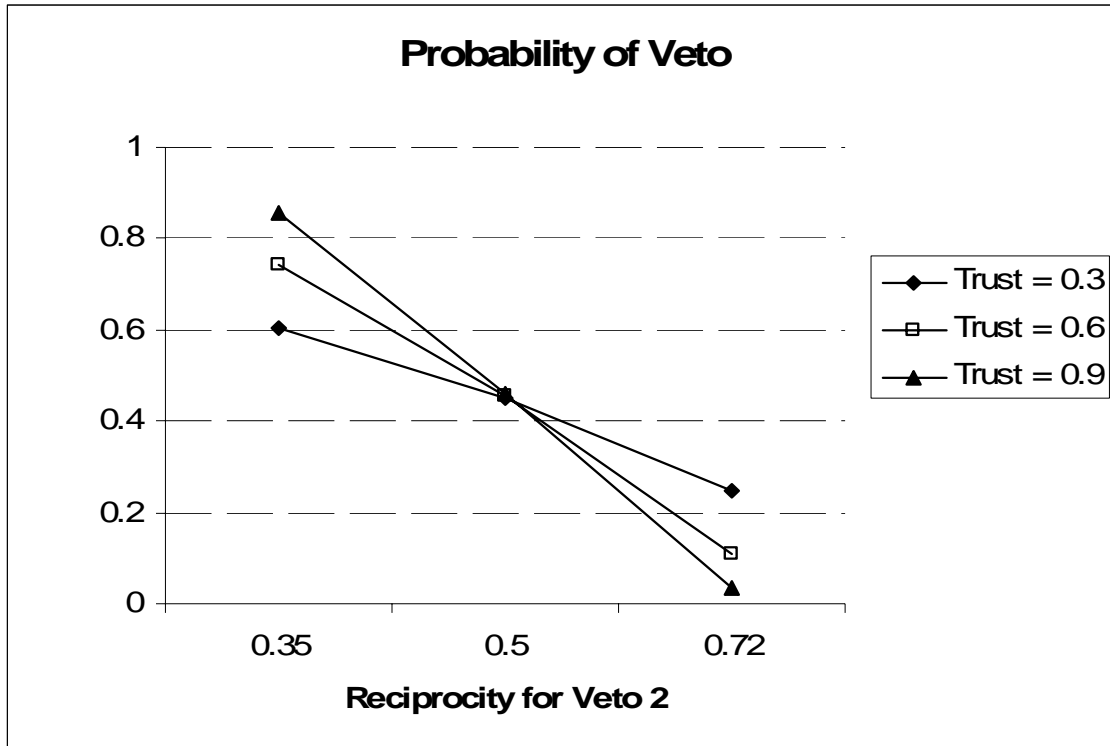and Receiver's Reciprocity

Figure 4. Estimated Probability of a Sender Casting a Costless Veto Given Sender's Trust and Receiver's Reciprocity
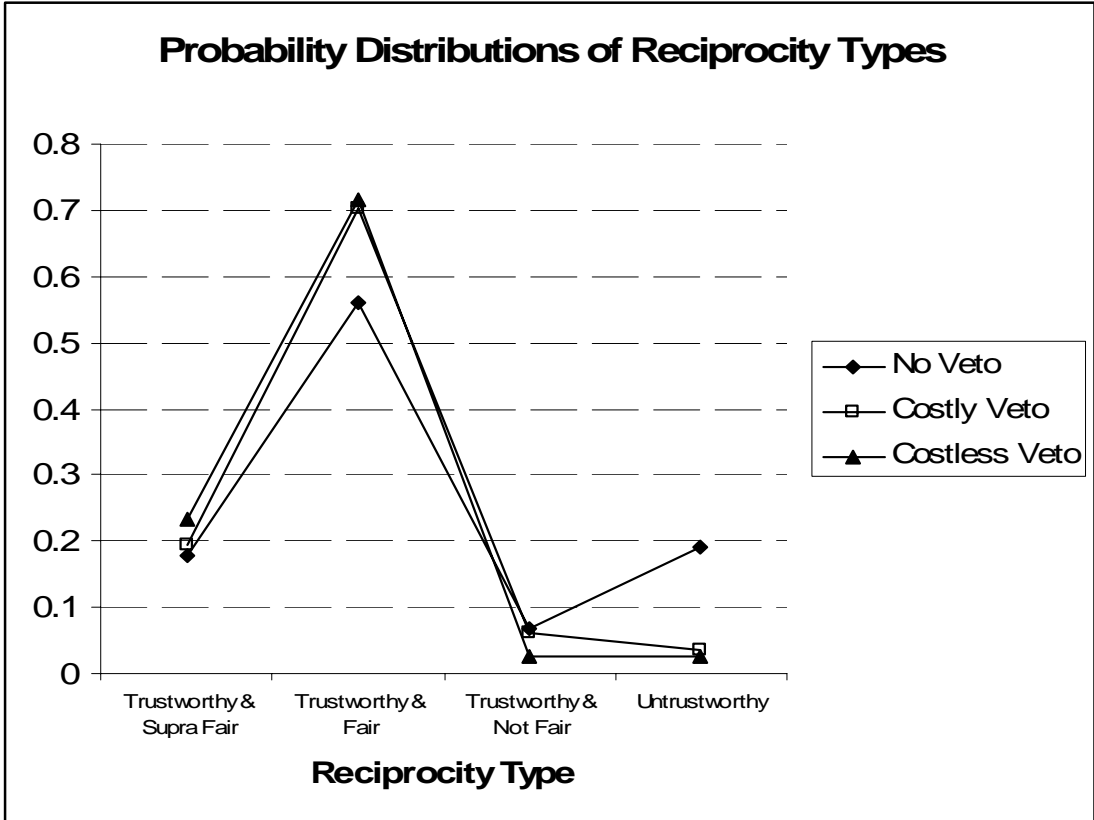
Figure 5. Distributions of Reciprocity Types Pooled across Sequence and Order

Table 1. Regression for Mean Trust Data by Treatments, Order, Sequence and all
Interactions

Variables	Coefficient	Robust Standard Error	p-value
rg	- 0.142	0.030	0.000
v1	dropped		
v2	0.082	0.040	0.045
Sequence	- 0.051	0.090	0.569
Order	0.050	0.044	0.258
rgS	dropped		
v1S	0.022	0.086	0.795
v2S	- 0.019	0.092	0.838
rgO	- 0.023	0.070	0.743
v1O	- 0.044	0.054	0.416
v2O	dropped		
SO	0.055	0.139	0.694
rgSO	dropped		
v1SO	0.052	0.136	0.705
v2SO	0.024	0.136	0.861
constant	0.840	0.035	0.000

Number of clusters (ID) = 86
Number of observations = 232
$F(11, 85) = 8.56$
Prob > F = 0.000
R-squared = 0.1741
Root mean square error = 0.22291

Note: rg is the repeated game, v1 is the costly veto, v2 is the costless veto, rgS, v1S and
v2S are the interactions between rg, v1, v2 and Sequence, rgO, v1O and v2O are the
interactions between rg, v1, v2 and Order, SO is the interaction between Sequence and
Order, rgSO, v1SO and v2SO are the third order interactions of treatments, Sequence and
Order.

Table 2. Regression for Mean Trust Data by Treatments, Sequence and all Interactions

Variables	Coefficient	Robust Standard Error	p-value
rg	- 0.131	0.021	0.000
v1	dropped		
v2	0.104	0.027	0.000
Sequence	- 0.024	0.069	0.728
rgS	dropped		
v1S	0.048	0.067	0.473
v2S	- 0.007	0.067	0.918
constant	0.843	0.025	0.000

Number of clusters (ID) = 86
Number of observations = 232
$F(5, 85) = 14.86$
Prob > F = 0.000
R-squared = 0.1540
Root mean square error = 0.22258

Note: Variables are defined in Table 1.

Table 3.   Summary of Average Trust and Reciprocity by Sequence and by Game

Game	Total Forward (R, V1, V2)		Total Backward (V2, V1, R)	
	Trust	Reciprocity	Trust	Reciprocity
	Mean (Obs) St. Dev.	Mean (Obs) St. Dev.	Mean (Obs) St. Dev.	Mean (Obs) St. Dev.
Repeated	0.712 (60) 0.247	0.593 (52) 0.180	0.688 (26) 0.312	0.562 (26) 0.231
Veto 1	0.843 (60) 0.191	0.649 (60) 0.092	0.867 (26) 0.252	0.633 (26) 0.139
Veto 2	0.947 (34) 0.128	0.635 (34) 0.094	0.916 (26) 0.191	0.700 (26) 0.175

Note: There were 52 rather than 60 observations for the reciprocity measure in the forward repeated game because eight senders sent nothing to the receivers with whom they were paired.

Table 4. Regression for Mean Reciprocity Data by Treatments, Order, Sequence and all Interactions

Variables	Coefficient	Robust Standard Error	p-value
rg	- 0.050	0.040	0.218
v1	0.014	0.028	0.617
v2	dropped		
Sequence	- 0.010	0.080	0.896
Order	0.045	0.050	0.372
rgS	dropped		
v1S	0.003	0.069	0.969
v2S	0.078	0.092	0.401
rgO	dropped		
v1O	- 0.013	0.049	0.786
v2O	- 0.014	0.062	0.827
SO	- 0.004	0.076	0.959
rgSO	- 0.034	0.116	0.769
v1SO	- 0.013	0.087	0.879
v2SO	dropped		
constant	0.619	0.025	0.000

Number of clusters (ID) = 86
Number of observations = 224
F(11, 85) = 2.24
Prob > F = 0.0194
R-squared = 0.0741
Root mean square error = 0.1531

Note: The variables are defined in Table 1.

Table 5. Regression for Mean Reciprocity Data by Treatments, Sequence and all Interactions

Variables	Coefficient	Robust Standard Error	p-value
rg	- 0.042	0.031	0.178
v1	0.014	0.018	0.427
v2	dropped		
Sequence	- 0.030	0.052	0.560
rgS	dropped		
v1S	0.014	0.048	0.771
v2S	0.095	0.057	0.100
constant	0.635	0.016	0.000

Number of clusters (ID) = 86
Number of observations = 224
$F(5, 85) = 2.99$
Prob > F = 0.0155
R-squared = 0.0637
Root mean square error = 0.15182

Note: Variables are defined in Table 1.

Table 6. Probit Regression for Casting a Veto using All Design Variables and their Interactions plus Behavioral Variables Trust, Reciprocity, Risk Attitude, Value Orientation and the interaction of Trust and Reciprocity

Variables	Coefficient	Robust Standard Error	p-value
veto	1.235	0.349	0.000
Sequence	0.494	0.389	0.203
Order	0.016	0.346	0.964
vO	- 0.535	0.549	0.330
vS	- 0.687	0.643	0.285
OS	- 0.736	0.659	0.264
vOS	- 0.225	1.190	0.850
Trust	5.753	1.253	0.000
Rec	1.492	1.382	0.280
Risk	0.038	0.019	0.049
VO	0.419	0.287	0.144
TR	- 11.693	2.191	0.000
constant	- 2.285	1.032	0.027

Number of clusters (IDF) = 146
Number of observations = 378
Wald chi2 (12) = 76.28
Prob > chi2 = 0.0000
Pseudo R-squared = 0.3900
Log pseudolikelihood = -82.9421

Note: 6 failures and 0 successes completely determined. veto is 1 if the veto is costless, 0 if costly. vO is the interaction of veto and Order, vS is the interaction of veto and Sequence, OS is the interaction of Order and Sequence, vOS is the third order interaction of veto, Order and Sequence. Trust is the measure of the sender's trust, Rec is the measure of the receiver's reciprocity, Risk is a measure of the risk attitude of the sender (takes on values from 0 to 24 with higher values indicating greater risk-seeking), VO is the social value orientation measure (the slope of the resultant vector derived from a series of income allocation choices with a potential range from $-\infty$ to $+\infty$), and TR is the interaction of Trust and Rec.

Table 7.   Restricted Probit Regression for Casting a Veto

Variables	Coefficient	Robust Standard Error	p-value
veto	0.736	0.262	0.005
Trust	4.281	0.803	0.000
Risk	0.033	0.019	0.083
TR	- 8.898	1.184	0.000
constant	- 1.131	0.461	0.014

Number of clusters (IDF) = 146
Number of observations = 378
Wald chi2 (4) = 57.86
Prob > chi2 = 0.0000
Pseudo R-squared = 0.3392
Log pseudolikelihood = -89.8509

Note: Variables defined in Table 6.

Table 8.   Rejection Ratios (Rates) by Round in Empowerment Treatments

	Costly Veto	Costless Veto
Round 1	9/86 (0.10)	14/60 (0.23)
Round 2	6/86 (0.07)	6/60 (0.10)
Round 3	9/86 (0.10)	Not Applicable
Total Vetoes/Opportunities	24/258 (0.09)	20/120 (0.17)

Table 9. Rejections by Round, Treatment and Subject ID

	Costly Veto	Costless Veto
Round 1	402,507,702,708,712, 1103,1113,1120,1125††	708†,711,712†,803†,804,811†,813,814,820†, 1105,1109,1115,1123,1125
Round 2	702*,706,820,1104, 1115†,1120*	704,803†*,814*, 1116,1119,1125*
Round 3	507*,511,506,802,803,805,811, 1114,1125††*	Not Applicable

Note: An asterisk (*) indicates that the subject has cast 1 veto previously in this treatment. A dagger (†) indicates that the subject has cast 1 veto previously in the other treatment. Two asterisks or daggers indicate two previous vetoes. There were 86 participants in the experiment. 44 vetoes were cast throughout the experiment by 30 different subjects. 19 subjects cast 1 veto, 9 subjects cast 2 vetoes, 1 subject cast 3 vetoes and 1 subject cast 4 vetoes.