CENTRE DE RECHERCHE
SUR LES STRATÉGIES ÉCONOMIQUES

# In Gov We Trust: Voluntary compliance in networked investment games

Natalia BORZINO, Enrique FATAS and Emmanuel PETERLE

April 2016

**Working paper No. 2016 –4**

CRESE
30, avenue de l'Observatoire
25009 Besançon
France
http://crese.univ-fcomte.fr/



UNIVERSITÉ DE FRANCHE-COMTÉ

# In Gov We Trust:
# Voluntary compliance in networked investment games


Natalia BORZINO[a]

Enrique FATAS[b]

Emmanuel PETERLE[c]



***Abstract***

We conduct a controlled laboratory experiment to investigate trust and trustworthiness in a networked investment game in which two senders interact with a receiver. We investigate to what extent senders and receivers comply with an exogenous and non-binding recommendation. We also manipulate the level of information available to senders regarding receiver's behavior in the network. We compare a baseline treatment in which senders are only informed about the actions and outcomes of their own investment games to two information treatments. In the reputation treatment, senders receive *ex ante* information regarding the average amount returned by the receiver in the previous period. In the transparency treatment, each sender receives *ex post* additional information regarding the returning decision of the receiver to the other sender in the network. Across all treatments and for both senders and receivers, the non-binding rule has a significant and positive impact on individual decisions. Providing senders with additional information regarding receiver's behavior affects trust at the individual level, but leads to mixed results at the aggregate level. Our findings suggest that reputation building, as well as allowing for social comparison could be efficient ways for receivers to improve trust within networks.



**Keywords**: Experimental economics; Taxation; Trust; Information; Investment game

**JEL**: C72; C91; D03; H26



[a] University of East Anglia, n.borzino@uea.ac.uk
[b] Corresponding author, University of East Anglia, e.fatas@uea.ac.uk
[c] CRESE EA3190 Univ. Bourgogne Franche-Comté F-25000, Besançon, France, emmanuel.peterle@univ-fcomte.fr

# 1. Introduction

Trust is an essential component of most social and economic interactions. Because of trust, agents are willing to exchange, even in situations where standard theory would predict no exchange at all. For that reason, trusting behaviors have been extensively documented in the economic literature. The most popular experimental game used to address this issue is without doubt the two player investment game (Berg et al., 1995). This experimental setting allows the investigation of trust – and trustworthiness – in a bilateral relationship between a single sender and a single receiver. However, there are many examples of economic interactions in which several senders interact with the same receiver and where the information available to the actors involved is not complete, but partial. This is the case of private agents interacting with a government. One example in which trust is involved in the relationship between agents and authorities is the payment of taxes. Private agents decide to give part of their earnings in the forms of voluntary or involuntary taxes, expecting to receive efficient and fair benefits from the system in return (Andreoni et *al.*, 1998; Feld and Frey, 2002; Hofmann *et al.*, 2008; Li et al., 2011). The trusting decision of private agents is directly related to economic and non-economic factors, which determine the behavioural relationship between them and the government (Feld and Frey, 2007; Torgler, 2007). One of the most evident economic factor would be the presence of tax legislation that sets exogenous rules to both tax payers and tax authority. Another factor would be that agents could access information regarding the outcome of previous interactions between the government and other agents.

Recent networked extensions of the trust game have indeed demonstrated the comparative nature of trust: one's decision to trust may be affected by the experience of others (Barrera and Buskens, 2009; Buskens et al., 2010; Cassar and Rigdon, 2011). In this current study, we address two important features that may affect trusting behaviors in a three player networked investment game with two senders and one receiver. First, we manipulate the amount and the nature of information that the senders have about the performance of the receiver. Second, we investigate to what extent the implementation of an exogenous, non-binding and weakly framed rule influences both trust and trustworthiness.

Some recent experimental studies have addressed the impact of information flows on trust and trustworthiness in network embedded settings. Buskens et al. (2010) analyse an investment game where two senders repeatedly face the same receiver. Cassar and Rigdon (2011) also implement repeated three player investment games with a stranger matching protocol. Both experimental settings compare two information conditions. In the first condition each sender only observes the actions and outcomes of her own investment game, resulting in a situation comparable to the standard two player investment game. In the full information condition, additional information is provided to senders: the amount invested by the other sender, as well as the amount returned to the other sender. The availability of complete information on third-party interaction has a dramatic impact on cooperation. Both trust and trustworthiness tend to increase with full information. Real-life examples involving complete information over interactions in a network are however not so common. Most of the time, one could expect to face situations where the information is only incomplete. In our study, we investigate the impact on minimal additional information on trust and trustworthiness. More precisely, in the different treatments, we provide to the senders the minimal information about the decisions of the receiver − the amount returned or the average amount returned to both senders − in previous interactions within the network, without revealing the actions of fellow senders.

In this study, we also address voluntary compliance to exogenous norms. This research question is directly related to the recent experimental literature investigating cheating and lying behaviors (Serra-Garcia et al., 2011; Erat and Gneezy, 2012; Rosaz and Villeval, 2012; Fischbacher and Utikal, 2013; López-Pérez and Spiegelman, 2013; Gneezy et al., 2013; Cappelen et al., 2013; Reuben and Stephenson, 2013; Xiao, 2013). Experimental studies have shown that individuals may be willing to bear monetary cost to display honest behaviors, suggesting the presence of aversion to dishonesty (Gneezy, 2005; Sanchez-Pages and Vorsatz, 2007; Hurkens and Kartik, 2009; Lundquist et al., 2009; Fischbacher and Heusi, 2013). There exists a direct relationship between trust and rule compliance. To follow-up with our previous example, empirical studies have shown that trust in authority is positively and significantly related to − voluntary − tax compliance (Torgler, 2002 and 2003; Torgler and Schneider, 2004 ; Halla, 2010; Li et al, 2011; Doerrenberg and Peichl, 2013). This finding suggests that by increasing the level of trust, authorities could find an efficient and effective way to ensure tax compliance and limit the use of costly enforcement actions like audits (Listokin and Schizer, 2012; Luttmer and Singhal, 2014). By analyzing trust, we explore one of the major components of tax morale, which is defined as the intrinsic motivation of paying taxes, and helps to deter tax evasion.

In this work, we investigate the interaction between trust, trustworthiness, and the presence of an exogenous, non-binding rule which is fair and efficient for both senders and receiver. We implement a repeated three-player investment game where two senders face the same receiver. Participant in the role of sender chooses a proportion of her endowment to forgo. This amount is multiplied and received by the receiver. The receiver decides then how much to return to the sender. In our experimental setting, both senders and receivers face a random suggested rule regarding the proportion to send, or to send back to the partner. The rule is a non-binding signal which is also private information and weakly framed in the instructions. We are interested in how participants in our experiment follow the norm suggested by the signal, making compliance explicit.

Besides, by implementing three different treatments (information conditions), we want to examine the effect in the level of senders′ trust and receiver trustworthiness when the available information changes, and how different policies alter performance, using as proxies the level of effort and the level of trust.

In the baseline treatment, at the end of each period, participants are informed of the outcome of their own interaction only. The participants play twenty periods, in the same role following a partner matching protocol at a cohort level. To the baseline, we add two additional treatments that provide senders with new information. In the reputation treatment, senders get ex ante information regarding receiver′s trustworthiness before choosing an amount to send. This information consists in the average amount send back by the receiver to both of the senders associated to her in the previous period; in a sense, this is the minimal informational that a sender may get about the past performance of receiver. In the transparency treatment, we aim to analyze how perception of equity and fairness affects trust after knowing ex-post the amount of resources sent by the receiver to each sender in the group in that period; again, this is the minimal ex-post information senders may get about their receiver′s current performance.

Our paper is closely related to Buskens et al. (2010) and Cassar and Rigdon (2011) that also investigate trust and trustworthiness in a three player networked investment game. Our experimental framework differs however from these studies in several aspects. First, both senders and receivers face a rule or signal, which is fair and efficient relative to the equilibrium of the game, suggesting the amount to send or to return. This allows us to investigate voluntary compliance to exogenous norms. Second, while previous experiments have examined the impact of full information flows across network, we only provide senders with partial information regarding the outcome of previous interactions within the network.

To anticipate our results, we observe that both *ex ante* and *ex post* information on receiver's behavior significantly impact sender's investment decision at the individual level. Results are however mixed at the aggregate level. The average level of trust is higher in the transparency treatment compared to the baseline and the reputation treatment. This finding suggests that in our experimental framework, allowing for *ex post* social comparison is more effective than providing *ex ante* information on receiver's level of trustworthiness. Contrasting with the previous literature, we do not observe any impact of the provision of additional information on trustworthiness. Finally, individual decisions from both senders and receivers are significantly affected by the presence of a non-binding exogenous recommendation.

The rest of our paper is organized as follows. Section 2 describes our experimental design and procedures. Section 3 reports the experimental results. Finally, section 4 conclude this paper.

## 2. Experimental design and procedures

### 2.1. The three players trust game

The standard trust game first introduced by Berg et al. (1995) concentrates on interactions in a two-node network. One node is occupied by a first mover or sender, and the other node by a second mover of receiver. In the first stage, the first mover decides how much of her endowment to send to the second mover. The second mover receives that amount multiplied by a factor k, with k>1. In the second stage, the second mover decides how much to send back to the first mover. We implement a three-node networked investment game that has already been addressed in the literature (e.g. Buskens *et al.*, 2010; Cassar and Rigdon, 2011). Two senders interact with the same receiver (see figure 1). The game consists of two simultaneous trust games. The two senders decide of a proportion of their endowment to invest. The receiver receives separately these amounts multiplied by four and decides for each receiver of a proportion to send back. Both trust games are separable in the sense that the decision of the receiver for one sender is conditioned only by the amount received from this sender. The presence of a networked structure therefore does not directly affect the outcomes of the trust games. However, in some treatments senders can receive information regarding actions across the network.

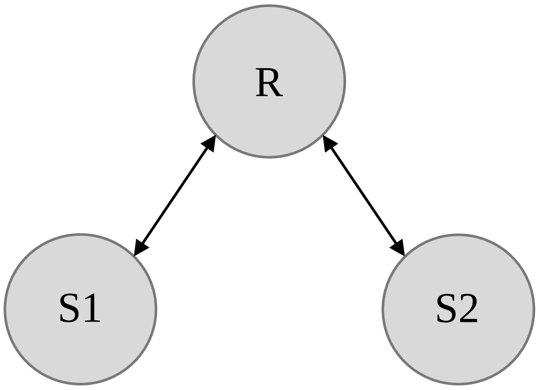


*Figure 1: The three-node network of two senders (S1 and S2) and one receiver (R).*

At the beginning of the experiment, all participants are randomly assigned to a role (sender or receiver) and a cohort of 6 participants. This cohort includes four senders and two receivers. Along the twenty rounds of the experiment, participants keep their role. At the beginning of each round, two three-node networks are formed in the cohort. The four participants in the role of sender are randomly matched with one of the two participants in the role of receiver. Because the matching process is applied within and not between cohorts, each cohort corresponds to an independent observation. The game is repeated over twenty rounds. Each round consists of five different stages. Table 1 displays the basic sequence of the game.

**Table 1**
Proceeding of an experimental round

| 1st stage: Senders | 2nd stage: Senders | 3rd stage: Senders | 4th stage: Receiver | 5th stage: Receiver |
|---|---|---|---|---|
| Real-Effort Task | Signal 1: die | Trust<br>(X) | Signal 2: die | Trustworthiness<br>(Y) |

*1st stage – Real effort stage*: At the beginning of each round, senders perform in a real-effort task for one minute. This task is implemented so that participants earn their own endowment before investing it in the trusting decision[1]. It consists in adding two-digit numbers for one minute. For each addition correctly solved, sender's endowment increases by 2 ECU. An upper limit is defined, so that endowment cannot exceed 10 ECU. Receivers do not participate to this task and receive a fixed endowment of 5 ECU.

*2nd stage – Signal for sending decision*: Each *S*ender throws a virtual die and get a non-binding signal (see section 2.2) about the proportion of endowment she should send to the receiver.

*3rd stage – Sending decision*: Each sender j decides of a proportion $X_j$ of her endowment to send to the receiver. She can choose a proportion to send in {0%; 20%; 40%; 60%; 80%; 100%}. The amount sent is multiplied by four and received by the second mover.

*4th stage – Signal for returning decision*: The receiver observes both amounts received from the senders she is matched with. She then throws for each sender a virtual die and get non-binding signals (see section 2.2) about the proportion of endowment she should return to each sender.

*5th stage – Returning decision*: The receiver decides for each sender j of a proportion $Y_j$ from the amount received from j to return. She can choose a proportion to return in {0%; 20%; 40%; 60%; 80%; 100%}.

At the end of the period, participants are informed of the outcome of the game. The receiver observes information on both trust games, whereas senders are only displayed the actions and outcomes from the trust game they have played.

The game described above corresponds to our baseline treatment. In two other treatments, additional information is provided to senders. We further describe both information treatments in section 2.3.

## 2.2. The Signal

In our experimental framework, both senders and receivers face a non-binding recommendation before taking their decisions. The level of recommendation S is determined by the outcome D of a virtual six-sided die (see *table 2*). The value of the signal is then defined as:

$$S = 0.2 \cdot (D - 1)$$

[1] See Houser and Xiao (2014) for a discussion of "house money effects" in trust games.

The signal therefore follows a discrete uniform distribution: S ~ DU(6, 0, 0.2). The distribution of the recommendation S is known to every participants from the beginning of the experiment.

**Table 2**
Outcome of the die and corresponding recommendation

| Outcome of the die: | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| % to keep | 100% | 80% | 60% | 40% | 20% | 0% |
| % to send to the receiver<br>or<br>% to send back to the sender | 0% | 20% | 40% | 60% | 80% | 100% |

Assuming that players are rational and only aim at maximizing own profit, the inclusion of a non-binding recommendation does not alter theoretical predictions. The subgame perfect Nash equilibrium can be solved by backward induction. Receiver maximizes her profit by keeping for herself the full amount received from the sender. Considering this, the sender does not invest any amount. The equilibrium is therefore characterized by an absence of interaction, and payoffs equal initial endowments for both players.

Let's consider the situation where both sender and receiver fully comply with their respective signal. The realized recommendation S takes value $S_k \in \{0\,;\ 0.2\,;\ 0.4\,;0.6\,;0.8\,;1\}$ with fixed probability $p_k = \frac{1}{6}$. The expected value of the exogenous recommendation is then 50%:

$$E[S] = \sum_{k=1}^{6} p_k \cdot S_k = \frac{1}{6} \cdot \sum_{k=1}^{6} S_k = 0.5$$

Let *e* be the initial endowment of the sender. In a situation of full compliance, i.e. the decisions from the sender (X) and from the receiver (Y) are fully conditioned on the outcome of the die, E[X]=E[Y]=0.5. The expected profits of the complying sender ($\pi_S^c$) and the complying receiver ($\pi_S^c$) can therefore be expressed as:

$$E[\pi_S^c] = E[e - Xe + 4Xe \cdot Y] = 1.5e$$

$$E[\pi_R^c] = E[(4Xe) \cdot (1 - Y) + 5\,] = e + 5$$

Endowment $e$ is earned by senders at the beginning of each period through a real-effort stage. The implementation of this stage only aims at avoiding windfall money effect, i.e. individual decision being influenced by the fact that senders do not consider the money they invest as theirs. We set an upper limit to the endowment corresponding to a performance of five additions or more in the real-effort task. This threshold has been implemented to limit heterogeneity in sender's endowment. Indeed, a large majority of the participants to the addition task manage to reach this threshold within a minute[2]. Interestingly, in the presence of a maximal endowment, the expected profits of a complying sender and a complying receiver are equal:

$$E[\pi_S^c|e = 10] = E[\pi_R^c|e = 10] = 15$$

The exogenous rule could therefore be considered as fair, in the sense that the expected profit of both parties are equal, provided that they perfectly comply to the rule over all periods. Furthermore, the resulting outcomes would be significantly higher for both parties than those implied by the Nash equilibrium where for which is displayed.

## 2.3. Information treatments

In this experiment, we manipulate the information available to the senders across three different treatments. In the *baseline treatment*, senders do not receive information on receiver's past behavior in previous rounds before taking their investment decision, and only receive feedback regarding their own trust game at the end of the period. This experimental framework is close from the "partial information" condition investigated in Cassar and Rigdon (2011). In two other treatments, we provide to the senders additional information regarding senders' behavior within the network. Unlike previous experimental studies that concentrate on situations of full information, we investigate the role of partial information on trust and trustworthiness.

In the reputation treatment, senders receive additional information before reaching their investment decision. This *ex ante* information regarding the receiver's reputation corresponds to the average proportion returned in the previous round by the receiver they are matched with in

[2] In our data, across all treatments and periods, senders earn the maximal endowment of 10 ECU in 96.94% of the cases.

that round[3]. Senders do not get separate information regarding both amounts received and returning decisions taken by the receiver in the previous round. We therefore consider this information as minimal.

In the transparency treatment, senders receive additional information at the end of each round. This *ex post* information corresponds to the outcome of the other trust game in the network. More precisely, each sender observes the proportion that the receiver returned to herself, but also the proportion returned to the other sender. This information is minimal in the sense that they do not observe how much the other sender invested.

## 2.4. Procedure

All the experimental sessions were conducted at ESSEXLab in the University of Essex. We electronically recruited 108 participants, mainly business and economics undergraduate students, all inexperienced in trust games. For each treatment, we collected data from six independent observations of six participants. On average, a session lasted 100 minutes, including initial instructions, quiz, trial phase, final questionnaire and payment of the subjects. The average payment was around £12.50, including a show up fee of £5. The instructions were read aloud. The only difference in the instructions was the information available to them according to each treatment. The experiment was computerized using Z-TREE (Fischbacher, 2007).

# 3. Results

## 3.1. Trust and trustworthiness across treatments

### *3.1.1 Descriptive statistics*

Table 1 reports summary statistics regarding average decisions of both senders and receivers. Throughout this paper we define “trust” as the proportion of endowment sent by the first mover and “trustworthiness” as the proportion of the received amount returned by the second mover. Wilcoxon Mann-Whitney tests are run on independent observations (cohorts) to test for significant differences between treatments.

[3] Assume that a receiver returned 20% to one sender and 40% to the other sender in the first round. At the beginning of the second round, the two senders that will be associated to that receiver will observe a reputation of 30% before making their investment choice.

**Table 1**
Descriptive Statistics

| | Trust – (Proportion X sent by senders) | | | |
|---|---|---|---|---|
| | Proportion sent (Including X=0) | Proportion sent (X>0 only) | Proportion of X=0 | Average profit of sender (in £ / $) |
| *Total* | 0.3879<br>(0.3213) | 0.5093<br>(0.2715) | 23.84% | £4.50 / $7.36<br>(2.26) (3.69) |
| Baseline | 0.3795<br>(0.3206) | 0.5050<br>(0.2707) | 24.84% | £4.66 / $7.63<br>(2.52) (4.12) |
| Reputation | 0.3454<br>(0.3165) | 0.4848<br>(0.2700) | 28.75% | £4.46 / $7.31<br>(1.98) (3.23) |
| Transparency | 0.4388 **<br>(0.3206) | 0.5345<br>(0.2720) | 17.92% * | £4.35 / $7.14<br>(2.24) (3.66) |

| | Trustworthiness – (Proportion Y returned by receivers) | | | |
|---|---|---|---|---|
| | Proportion returned (Including X=0) | Proportion returned (X>0 only) | Proportion of Y=0 (X>0 only) | Average profit of receiver (in £ / $) |
| *Total* | 0.2518<br>(0.2839) | 0.3305<br>(0.2825) | 24.98% | £6.07 / $9.94<br>(3.99) (6.54) |
| Baseline | 0.2833<br>(0.3156) | 0.3767<br>(0.3118) | 24.10% | £5.80 / $9.50<br>(4.15) (6.79) |
| Reputation | 0.2288<br>(0.2697) | 0.3211<br>(0.2692) | 25.44% | £5.57 / $9.12<br>(3.61) (5.91) |
| Transparency | 0.2433<br>(0.2613) | 0.2964<br>(0.2596) | 25.38% | £6.84 / $11.20 *<br>(4.10) (6.54) |

Notes : Standard deviations are displayed in parentheses ; Stars report significance level from Wilcoxon Mann-Whitney tests run on independent observations (cohorts of 6 participants) to confirm differences with the baseline treatment.
* 90% significance ** 95% significance *** 99% significance

The upper panel of table 1 displays outcomes for senders in total and for each treatment. The first column displays the average proportion sent. Trust is in average higher in the transparency treatment than in the baseline treatment (p=0.0372) and the reputation treatment (p=0.0483). There is no significant difference between the proportion sent by first movers in the baseline and the reputation treatments (p=0.2461). The second column considers only the positive proportions, excluding all interactions where the first mover decided to send nothing. Senders' decisions do not significantly differ between treatments in this case. This finding suggests that the higher level of trust observed in the transparency treatment compared to both other treatments is mainly lead by a lower share of senders showing no trust at all.

The third column of table 1 confirms this assertion as the proportion of interactions where no trust is displayed – no amount sent – is lower in the transparency treatment (17.92%) than in the baseline treatment (24.84%) and the reputation treatment (28.75%). Furthermore, we observe large differences between treatments in the occurrence of situations where receivers face no choice at all, i.e. both senders do not send anything in the same period. This situation occurs for 7 out of 240 observations (2.92%) in the transparency treatment. This figure is larger in the baseline treatment with 15 out of 240 observations (6.25%) and much larger in the reputation treatment with 32 out of 240 observations (13.33%).

The lower panel of table 1 reports returning decisions from the receivers. Considering only the interactions for which receivers made a decision (X>0), the proportion returned in the transparency and the reputation treatments tends to be lower than in the baseline treatment. These differences are however not statistically significant (p=0.3367 and p=0.1495 respectively).

Result 1: *Senders make positive offers more often in the transparency treatment than in the baseline and reputation treatments. There is no significant difference across treatments regarding the returning decision of receivers.*

Senders make offers more often in the transparency treatment, even though receivers do not return more (and return even less, although not significantly). For that reason, the average payoff of senders do not differ across treatments, whereas the payoff of receivers is about 18% higher in the transparency treatment than in the baseline treatment (p=0.0782).

Result 2: *In average, receivers earn higher profits in the transparency treatment. The average profit of senders does not significantly differ across treatments.*

*3.1.2 Trust*

Figure 1 displays for each treatment the average proportion of endowment sent by first movers across periods. It suggests that previously observed treatment differences in trusting behavior are mainly lead by differences in dynamics. Trust tends to decrease over time in the baseline treatment (Spearman's Rho=-0.3860, p=0.0928) and in the reputation treatment (Spearman's Rho=-0.5017, p=0.0242). This is not the case for the transparency treatment in which trust does not significantly vary over time (Spearman' Rho=0.2012, p=0.3950).

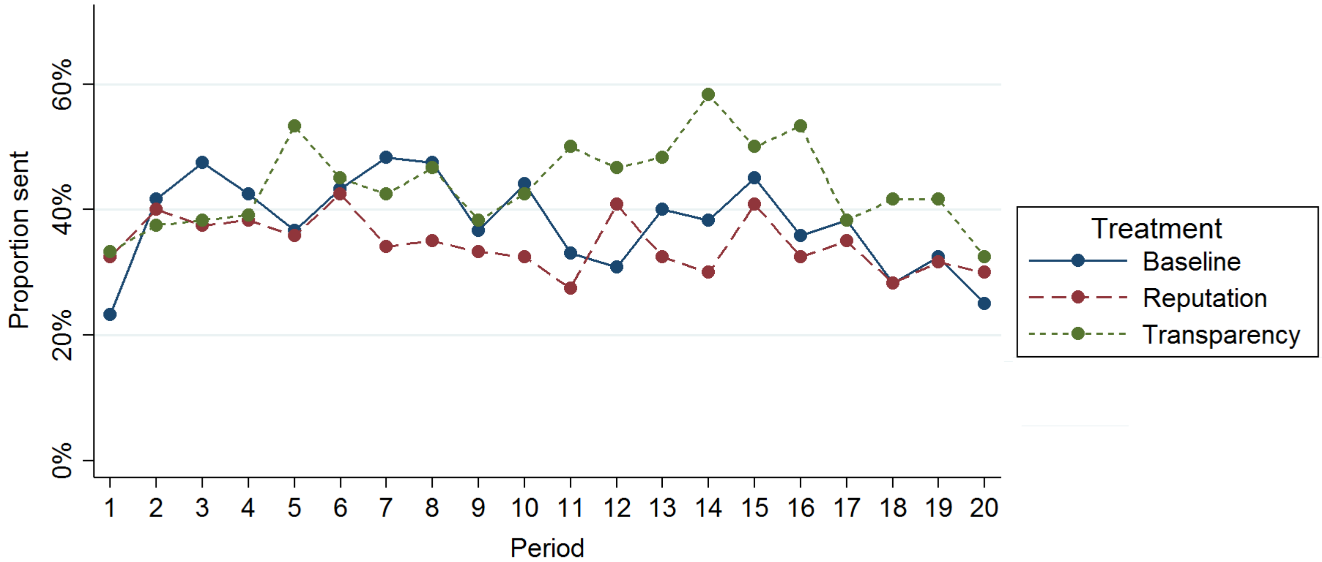


*Figure 1 – Proportion of endowment sent (Trust) across periods*

Consistent with Result 1, treatment differences in the level of trust merely reflect differences in the proportion of senders keeping their whole endowment. Figure 2 displays these proportions for the first 10 periods and the last 10 periods of the game.

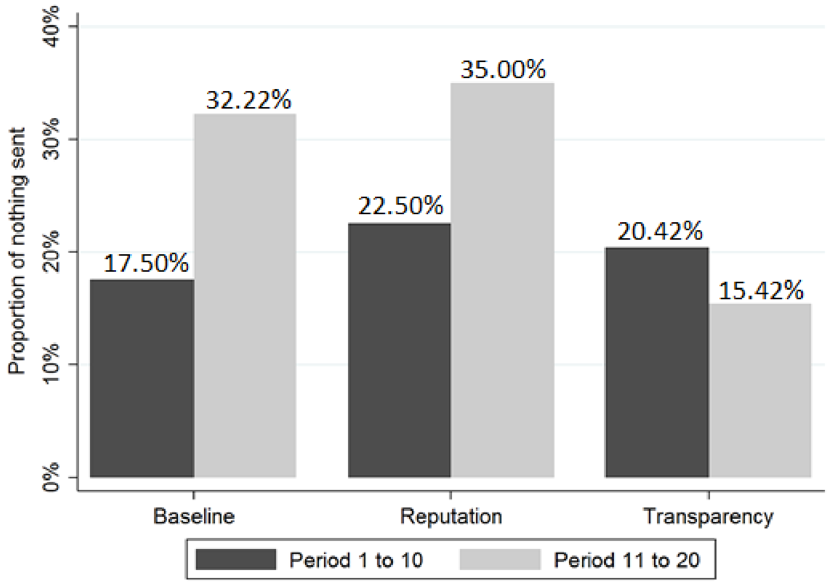


*Figure 2 – Proportion of situations with no trust at all*

It appears that the share of senders showing no trust tends to increase over time in the baseline (Spearman's Rho=0.6739, p=0.0011) and in the reputation (Spearman's Rho=0.7855, p=0.0000) treatments. This share tends to decrease over time in the transparency treatment, although not significantly (Spearman's Rho=-0.2843, p=0.2244).

Result 3: *Trust does not vary over time in the transparency treatment, whereas it decreases in the baseline and reputation treatments.*

Table 2 reports estimates of the determinants of trust[4] at the individual level. Controlling for amounts sent and received in previous period, outcome of the die, time trend and demographic variables, we observe in column (1) that trust is larger in the transparency treatment than in both the baseline and the reputation treatment. Sender's trust tends to increase with the proportion received back in t-1 and to decrease over time. We also observe that the outcome of the die is a significant determinant of the amount sent by first movers. Compliance to the rule is discussed in further details in section 3.3.

[4] Senders could send between 0% and 100% of their initial endowment with increments of 20%. Given the discrete nature of the corresponding variable, we decide to run random-effect ordered probit rather than standard random-effect regression.

**Table 2**
Random-effects ordered probit regressions for trust - pooled sample

| | Proportion $X_{it}$ sent by sender | |
|---|---|---|
| | (1) | (2) |
| Lag Proportion Sent ($X_{it-1}$) | 0.811***<br>(0.206) | 0.836***<br>(0.198) |
| Lag Proportion Received ($Y_{it-1}$) | 0.638***<br>(0.088) | 0.566***<br>(0.099) |
| Die Outcome (Rule) | 0.138***<br>(0.032) | 0.143***<br>(0.033) |
| Baseline Treatment | *Ref.* | *Ref.* |
| Reput. Treatment | -0.063<br>(0.208) | -0.388*<br>(0.243) |
| Reput. Treatment × Reputation of the receiver | - | 1.298**<br>(0.559) |
| Transp. Treatment | 0.303**<br>(0.125) | - |
| Transp. Treatment × Received as much as other sender | - | 0.154<br>(0.115) |
| Transp. Treatment × Received less than other sender | - | 0.286**<br>(0.122) |
| Transp. Treatment × Received more than other sender | - | 0.140<br>(0.131) |
| Period Number | -0.016**<br>(0.007) | -0.015**<br>(0.006) |
| Female | -0.237<br>(0.178) | -0.272<br>(0.167) |
| Age | 0.041<br>(0.033) | 0.039<br>(0.030) |
| British | -0.066<br>(0.204) | -0.081<br>(0.197) |
| # observations | 1366 | 1366 |
| # individuals | 72 | 72 |
| Log pseudo-likelihood | -2089.7483 | -2065.1954 |

Standard errors (in parentheses) are clustered on the independent observation level (cohorts of six individuals)
* 90% significance ** 95% significance *** 99% significance

To reach a better understanding of treatment differences in the level of trust, we include additional control in column (2) of table 2. Although trust in the reputation treatment is in aggregate not different than in the baseline treatment, regression results suggest that the reputation of the receiver matters. The *reputation treatment* dummy variable is associated to a negative and significant coefficient, whereas the coefficient associated to the interaction variable *reputation treatment* × *reputation of the receiver* is significantly positive. This finding suggests that when facing a receiver with low reputation, participants send in average less than senders in the baseline treatment. Sender's trust increases however dramatically with the reputation of the receiver. Because of heterogeneity in receivers' reputation, we do not observe in aggregate any significant difference in trust between baseline and reputation treatments. These findings are discussed in subsection 3.2.1. Column (2) of table 2 also emphasizes the role of social comparison in the transparency treatment. Only participants who received back in previous period a lower proportion than the other sender tend to send more than in the baseline treatment. Further investigation of the role of information in the transparency treatment is provided in subsection 3.2.2.

### *3.1.2 Trustworthiness*

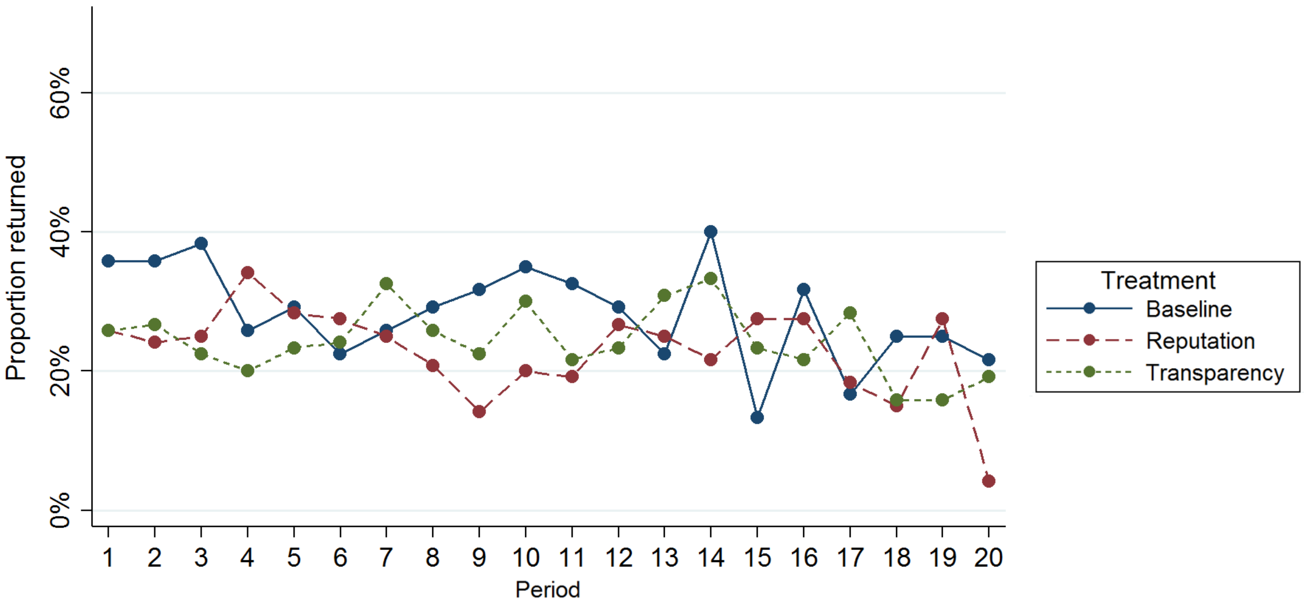


*Figure 3 – Proportion returned (Trustworthiness) across periods*

Figure 3 displays for each treatment the proportion of amount received that senders return in average over time. Consistent with result 1, we do not observe any treatment difference in average return. Trustworthiness decreases significantly over time in the baseline treatment (Spearman's Rho=-0.5260, p=0.0172) and does not significantly vary overtime in both reputation (Spearman's Rho=-0.3190, p=0.1704) and transparency (Spearman's Rho=-0.3054, p=0.1904) treatments.

Column (1) of table 3 reports estimates of the determinants of trustworthiness at the individual level across treatments. We do not observe any difference in receiver's individual decision between treatments. The variables *Lagged total proportion sent* and *Lagged total proportion returned* correspond to the sum of the outcomes of both interactions in previous period. Considering all treatments, we observe reciprocity from the receiver, in the sense that the proportion returned increases with the amount received. The coefficient associated to the lagged total amount returned is positive and significant, suggesting that trustworthiness builds over time. As it was the case for senders, the recommended rule associated to the die plays a positive and largely significant role in receiver's returning decision.

Columns (2) – (4) displays results of within-treatment regressions. We do observe that determinants of trustworthiness vary between treatments. Reciprocity, i.e. a positive effect of the amount returned on the proportion returned, appears only in the reputation and transparency treatments. Consistent with the *comparative trust hypothesis* formulated in Cassar and Rigdon (2011)[5], we observe that in the reputation treatment that returning decision to one sender is affected by the other sender's investment decision. A lower amount invested by a receiver would make the offer of the other receiver look more generous. Returning decision would then be based on the relative, rather than the absolute investment decision of senders. However, we do not find support for this hypothesis in the baseline and the transparency treatment. In all treatments, the outcome of the die plays a significant role in returning decisions.

Result 4: *Although we do not observe aggregate difference in trustworthiness between treatments, we observe reciprocity in the information treatments only. In the reputation treatment, reciprocity is based on comparative trust.*

[5] In a networked trust games with two senders and one receiver, Cassar and Rigdon find evidence that the return decisions by receivers depend in part on the investment behavior along the other link in the network.

**Table 3**
Random-effects ordered probit regressions for trustworthiness – Treatment-specific samples

| | Proportion $Y_i$ returned by receiver | | | |
|---|---|---|---|---|
| | (1)<br>Pooled | (2)<br>Baseline | (3)<br>Reputation | (4)<br>Transparency |
| Proportion sent by sender | 0.411*<br>(0.219) | -0.037<br>(0.393) | 0.755***<br>(0.170) | 0.671*<br>(0.376) |
| Proportion sent by other sender | 0.016<br>(0.122) | 0.137<br>(0.193) | -0.477**<br>(0.230) | 0.176<br>(0.147) |
| Lag. Total Proportion Sent | 0.044<br>(0.100) | -0.124<br>(0.192) | 0.303***<br>(0.101) | -0.019<br>(0.196) |
| Lag. Total Proportion Returned | 0.156**<br>(0.066) | 0.160*<br>(0.084) | 0.213<br>(0.170) | 0.176<br>(0.147) |
| Die Outcome (Rule) | 0.220***<br>(0.029) | 0.164***<br>(0.043) | 0.225***<br>(0.043) | 0.283***<br>(0.064) |
| Baseline Treatment | *Ref.* | - | - | - |
| Reput. Treatment | -0.205<br>(0.326) | - | - | - |
| Transp. Treatment | -0.256<br>(0.238) | - | - | - |
| Period Number | -0.016**<br>(0.007) | -0.006<br>(0.005) | -0.031***<br>(0.006) | -0.019<br>(0.021) |
| Female | 0.390<br>(0.324) | 0.645<br>(0.689) | 0.937<br>(0.735) | -0.288<br>(0.064) |
| Age | 0.025<br>(0.022) | -0,019<br>(0.032) | 0.159<br>(0.273) | 0.101<br>(0.108) |
| British | -0.272<br>(0.317) | 0.427<br>(0.513) | -0.701<br>(0.750) | 0.067<br>(0.504) |
| # observations | 1041 | 342 | 323 | 376 |
| # groups | 36 | 12 | 12 | 12 |
| Log pseudo-likelihood | -1540.9140 | -548.3909 | -443.7712 | -518.6968 |

Standard errors (in parentheses) are clustered on the independent observation level (cohorts of six individuals)
* 90% significance ** 95% significance *** 99% significance

## 3.2. The role of partial information in investment decisions

### *3.2.1 Reputation of receivers*

In the reputation treatment, senders observe the reputation, i.e. the average proportion returned in previous period, of their receiver before proceeding to their investment decision. We observe that the average proportion of endowment invested in the reputation treatment is not significantly different than in the baseline treatment. Preliminary regression analysis (see column (2) of table 2) however suggests that additional information provided in the reputation treatment has a significant impact on individual decision.

Column (2) of table 4 reports estimates of the determinants of trust in the reputation treatment. Unlike for the baseline and the transparency treatment, amount sent in the previous period does not play a significant role, suggesting low persistence over time. Both the amount received back in the previous period and the outcome of the die affect positively and significantly the investment decision of senders. We take into account the situations for which no reputation was displayed, i.e. the receiver did not receive any amount from senders in previous period. Displaying no reputation does not appear to have any significant impact on trust in the reputation treatment.

The reputation of the receiver appears to be a critical determinant of trust. The probability to observe no trust (X=0) decreases significantly with the reputation of the receiver. Table 5 reports for each potential reputation the frequencies and the predicted probabilities to observe respectively no trust and a total trust. Our model predicts that the probability for a sender to send nothing is reduced by more than half when the receiver has a reputation of 50% rather than 0%. In the same way, the probability for the sender to invest her whole endowment increase dramatically with the reputation, from 3.56% (Reputation of 0) to 23.57% (Reputation of 1).

**Table 4**
Random-effects ordered probit regressions for trust - Treatment-specific samples

| | Amount sent by sender $S_i$ | | |
|---|---|---|---|
| | (1) Baseline | (2) Reputation | (3) Transparency |
| Lag Amount Sent | 1.279*** (0.234) | 0.239 (0.363) | 0.870** (0.395) |
| Lag Amount Received | 0.651*** (0.083) | 0.399* (0.205) | 0.736*** (0.170) |
| Die Outcome (Rule) | 0.101* (0.056) | 0.167*** (0.046) | 0.163** (0.066) |
| Reputation of the receiver | - | 1.196** (0.542) | - |
| Receiver with no reputation [a] | | -0.663 (0.538) | |
| Received less than other sender | - | - | 0.298** (0.138) |
| Received more than other sender | - | - | 0.090 (0.142) |
| Period Number | -0.032*** (0.009) | -0.012 (0.012) | 0.000 (0.003) |
| Female | -0.163 (0.256) | -0.477 (0.350) | -0.290 (0.240) |
| Age | 0.013 (0.036) | 0.055 (0.057) | 0.021 (0.034) |
| British | -0.196 (0.315) | -0.180 (0.311) | 0.193 (0.434) |
| # observations | 454 | 456 | 456 |
| # groups | 24 | 24 | 24 |
| Log pseudo-likelihood | -667.1874 | -663.9358 | -720.8006 |

Standard errors (in parentheses) are clustered on the independent observation level (cohorts of six individuals)
* 90% significance ** 95% significance *** 99% significance
[a] Receivers that did not receive any endowment in previous period could not make any choice and therefore did not build any reputation. As such, senders were only informed that the receiver could not make any choice.

One could argue that the impact of reputation could reflect the interaction dynamics within the cohort and not the effect of the display of reputation to senders at the beginning of the period. We compare the impact of the reputation displayed to the senders in the reputation senders, and the reputation not displayed to senders in the baseline and transparency treatment. We observe that trust is positively correlated to the reputation of the receiver in the reputation treatment (rho=0.2453, p=0.0000), whereas it does not affect trust in the baseline treatment (rho=0.0683, p=0.1568) or the transparency treatment (rho=0.0527, p=0.2692). Even more striking, the average profit of a receiver is positively correlated to her average reputation over the 20 periods (rho=0.2863, p=0.0000). In the opposite, in the baseline and the transparency treatment, the average proportion returned in previous period affects negatively profits (rho=-0.7712, p=0.0000 for baseline; rho=-0.6245, p=0.0000 for transparency). Because reputation is not displayed to senders in these treatments, returning more does not pay off.

**Table 5**
Distribution of receivers' reputation and predicted trust

| Reputation | Frequency | Predicted probability for no trust (X=0) | Predicted probability for full trust (X=1) |
|---|---|---|---|
| 0% | 33 | 0.3178*** | 0.0356* |
| 10% | 30 | 0.2798*** | 0.0450** |
| 20% | 36 | 0.2440*** | 0.0562** |
| 30% | 27 | 0.2109*** | 0.0696*** |
| 40% | 28 | 0.1805*** | 0.0852*** |
| 50% | 28 | 0.1530*** | 0.1034*** |
| 60% | 9 | 0.1284*** | 0.1243*** |
| 70% | 3 | 0.1067** | 0.1479*** |
| 80% | 2 | 0.0877* | 0.1744*** |
| 90% | 2 | 0.0713 | 0.2037*** |
| 100% | 0 | 0.0574 | 0.2357*** |

* 90% significance ** 95% significance *** 99% significance

Note: The reputation of the receiver is displayed to two senders, but reported only once in this table. Predicted probabilities are computed for average values of every variable except *reputation of the receiver* and *no reputation*

Result 5: *In the reputation treatment, sender's investment decision is directly related to receiver's reputation. Although building reputation could be an efficient way to increase profit, only few receivers do so. As such, trust and profits in the reputation treatment are not different than in the baseline treatment.*

*3.2.2 Social comparison*

In the transparency treatment, the sender observes both the proportion returned to her and the proportion returned to the other sender by the receiver at the end of each round. We have observed so far that the level of trust in the transparency treatment is higher than in the baseline and the reputation treatments (see result 1 and 2). Furthermore, estimates reported in column (2) of table 2 suggest that this difference is mainly lead by senders that received less than the fellow sender.

In average in the transparency treatment, the investment decision of a sender that received back a lower proportion that the other send increases by about 6 percentage points. In the opposite, senders who observed to be above in terms of received proportion decrease in average their investment by about 5 percentage points. One should however be careful when interpreting these figures, as three main effects may be at stake. First, provided that sender's investment decision and receiver's returning decision are strongly correlated, these variations could merely reflect a "regression to the mean" phenomenon[6]. Second, we have observed that trust is positively related to the proportion received in previous period. As such, one could expect senders that receive more to increase their investment in further decisions. Third, senders have the opportunity to compare proportions received in the transparency treatment. A sender that received less than the other sender could see in this position an encouragement to invest more.

Column (3) of table 4 reports estimates of the determinants of trust in the transparency treatment and allows isolating the effect of the displayed information on both proportions returned by the receiver in previous period. As for all other treatments, the proportion received in the previous interaction positively affects sender's trust. Controlling for this effect and for the previous investment decision, we observe that those who receive less than the other sender in the previous

[6] Considering the investment decision as partly stochastic, one could expect participants who send more (resp. less) than the mean to decrease (resp. increase) their investment decision in the subsequent period.

round invest more than senders who receive an equal or larger proportion. This effect might explain the higher trust level in the transparency treatment compared to the baseline and the reputation treatments. Inequality between senders in the returning decision of receivers could then be an efficient way to increase the total trust in the network[7].

The average absolute differential between proportions returned to both senders by a sender in the transparency treatment is about 22.5 percentage points. This figure is not significantly different than the average absolute differential observed in the reputation treatment (21.75 percentage points, p=0.8169). It is however significantly lower than in the baseline treatment (29 percentage points, p=0.0487). It appears then that receivers in the transparency treatment do benefit from the fact that return inequalities increase trust and profits, without increasing the level of relative inequality in the network.

Result 6: *In the transparency treatment, providing information on both returning decisions from the receiver affects positively the trust of senders that are disadvantaged. As a result, trust is larger in the transparency treatment than in the baseline and reputation treatments.*

## 3.3. Compliance to the rule

### *3.3.1 Compliance from the senders*

Previous regression analysis has shown that the outcome of the die, corresponding to a suggested proportion to send, has a systematic impact on investment decisions. This effect is positive and significant, suggesting that the higher the exogenous recommendation, the higher the amount invested by the sender. In table 6, it is reported the descriptive statistics for the compliance by the senders. Overall, we do not find evidence for treatment difference in compliance to the rule. The proportion of investment decision for which the sender has followed the rule is 30.00% in the baseline treatment, 33.13% in the reputation treatment and 30.00% in the transparency treatment[8]. We do not observe any significant treatment difference when we evaluate the average proportion of times that senders send more and less than less, also reported in table 6.

---

[7] Although we have implemented a stranger matching mechanism, i.e. participants are rematched every round in networks, the relatively small size of our cohorts enhances the effect of information on trust dynamics.

[8] We also do not find significant difference between treatments when conditioning the decision to follow the rule on the outcome of the die.

**Table 6**
Compliance to the rule- Descriptive statistics for the senders

| Proportion of senders FOLLOWING the rule | | | |
|---|---|---|---|
| *Total* | Baseline | Reputation | Transparency |
| 31.05%<br>(0.4628) | 30.00%<br>(0.4573) | 33.12%<br>(0.4711) | 30.00%<br>(0.4587) |
| **Proportion of senders SENDING MORE than the rule** | | | |
| *Total* | Baseline | Reputation | Transparency |
| 24.09%<br>(0.4278) | 24.30%<br>(0.4297) | 21.25%<br>(0.4095) | 26.60%<br>(0.4426) |
| **Proportion of senders SENDING LESS than the rule** | | | |
| *Total* | Baseline | Reputation | Transparency |
| 44.86%<br>(0.4975) | 45.62%<br>(0.4986) | 45.62%<br>(0.4986) | 43.33%<br>(0.4960) |

Notes : Standard deviations are displayed in parentheses ; Stars report significance level from Wilcoxon Mann-Whitney tests run on independent observations (cohorts of 6 participants) to confirm differences with the baseline treatment.

*90% significance ** 95% significance *** 99% significance

Figure 4 reports the distribution of investment decisions for each outcome of the die. We observe that participants tend to follow the rule as long as the rule is not too high. The proportion suggested by the die is the modal outcome when this suggestion lies between 0% and 60%. However, when the outcome of the die suggests sending 80% or 100% of sender’s endowment, the modal investment decision is to send 0%. This observation echoes previous experimental findings (e.g. Dale and Morgan, 2010) that show in the context of public good games that non-binding recommendations could affect individual decisions, provided that they are seen as “reasonable”.

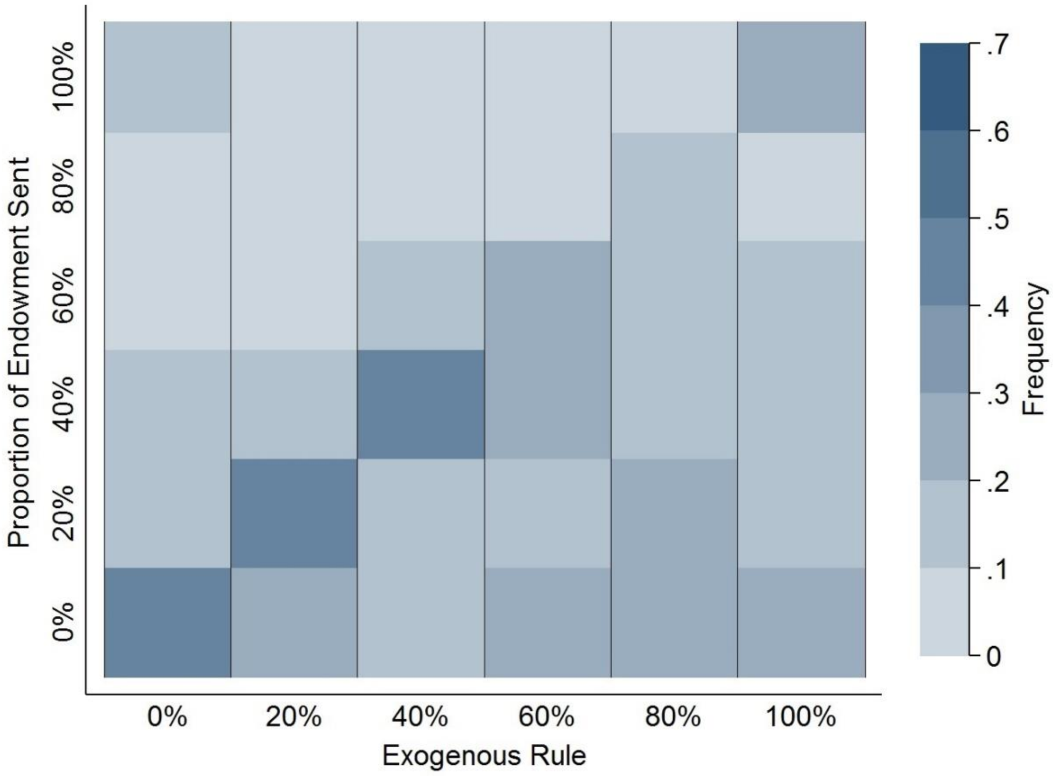


*Figure 4 – Frequencies of investment decisions regarding exogenous rule*

Column (1) of table 6 reports estimates of the determinants of compliance decision from the senders. Consistent with previous observation the higher the proportion suggested by the rule, the lower the probability that sender complies with it. Regression results also suggest that compliance slightly decreases over time. We observe a negative and significant correlation between period and compliance with the rule (Spearman's rho=-0.1017, p=0.0538). Here again, we do not find evidence of difference in compliance between treatments.

**Table 7**
Random-effect probit regression for compliance (following the suggested rule)

| | Individual decision corresponds to the rule suggested by the die | |
|---|---|---|
| | (1)<br>Senders | (2)<br>Receivers |
| Baseline Treatment | *Ref.* | *Ref.* |
| Reputation Treatment | 0.066<br>(0.102) | -0.004<br>(0.208) |
| Transparency Treatment | -0.017<br>(0.133) | 0.062<br>(0.199) |
| Outcome of the die | -0.801***<br>(0.159) | -1.384***<br>(0.103) |
| Proportion Received | - | 0.006<br>(0.241) |
| Period | -0.015**<br>(0.007) | -0.012<br>(0.009) |
| Female | 0.091<br>(0.124) | 0.265<br>(0.200) |
| Age | -0.053**<br>(0.025) | -0.030<br>(0.022) |
| British | -0.064<br>(0.121) | -0.068<br>(0.306) |
| Constant | 1.066*<br>(0.561) | 0.791<br>(0.555) |
| # observations | 1440 | 1096 |
| # individuals | 72 | 36 |
| Log pseudo-likelihood | -841.3950 | -616.5934 |

Standard errors (in parentheses) are clustered on the independent observation level (cohorts of six individuals)
* 90% significance ** 95% significance *** 99% significance

### *3.3.1 Compliance from the receivers*

Such as sender's investment decision, previous regression analysis has shown that receiver's returning decision is positively and significantly affected by the outcome of the die (see table 3). Table 6 displays the descriptive statistics for the compliance of the receivers. The proportion of returning decision for which the rule have been followed by the receiver is 29.58% in the baseline treatment, 29.37% in the reputation treatment and 32.29% in the transparency treatment. No significant difference between treatments is observed in the decision to comply with the suggested rule.

**Table 8**

Compliance to the rule- Descriptive statistics for the receivers

| **Proportion of receivers FOLLOWING the rule** | | | |
|---|---|---|---|
| *Total* | Baseline | Reputation | Transparency |
| 30.41%<br>(0.4602) | 29.58%<br>(0.4568) | 29.37%<br>(0.4559) | 32.29%<br>(0.4680) |
| **Proportion of senders SENDING MORE than the rule** | | | |
| *Total* | Baseline | Reputation | Transparency |
| 13.95%<br>(0.3466) | 17.50%<br>(0.3803) | 13.33%<br>(0.3402) | 11.04%<br>(0.3137) |
| **Proportion of senders SENDING LESS than the rule** | | | |
| *Total* | Baseline | Reputation | Transparency |
| 55.62%<br>(0.4969) | 52.91%<br>(0.4996) | 57.29%<br>(0.4951) | 56.66%<br>(0.4960) |

Notes : Standard deviations are displayed in parentheses ; Stars report significance level from Wilcoxon Mann-Whitney tests run on independent observations (cohorts of 6 participants) to confirm differences with the baseline treatment.

*90% significance ** 95% significance *** 99% significance

We also report in table 8, the percentage of cases in which receivers returned less than the rule and more than the rule. We do not find any significant difference between the treatments and the baseline.

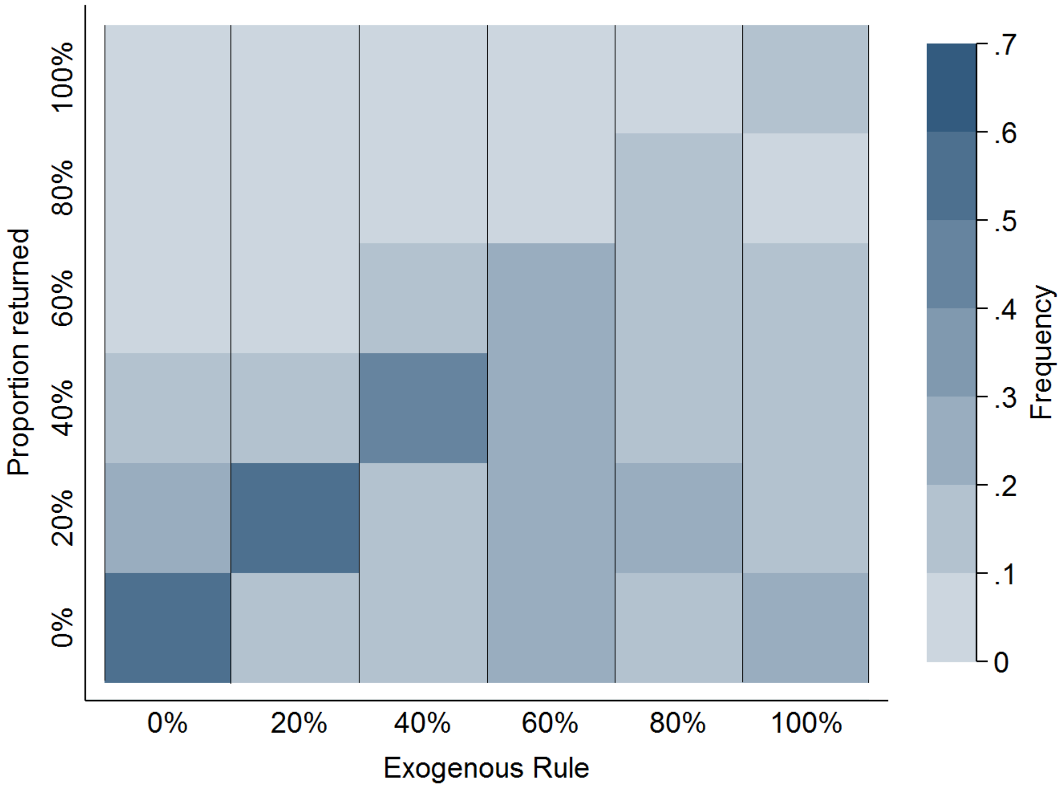


*Figure 5 – Frequencies of returning decisions regarding exogenous rule*

Figure 5 reports for each outcome of the die the distribution of receivers' returning decisions. Whereas suggestions of relatively small return are often followed, only few receivers comply with rule suggesting a return above 50%. It should however be noted that the rule significantly improves returning decision, even if it suggests a high return. When the outcome of the die suggests to return the whole amount received, receivers do so in about 14.87% of cases. Considering other rules, receivers decide to return the whole amount received in only 2.55% of cases. Column (2) of table 6 reports estimates of the determinants of compliance decision from the receivers. It appears that only the outcome of the die has a significant and negative impact on the probability to follow the rule.

Result 7: *For both senders and receivers and across all treatments, the non-binding rule suggested by the die has a significant and positive impact on individual decisions. Compliance to the rule tends to decrease as the amount suggested by the rule increases.*

## 4. Conclusion

We implement a controlled laboratory experiment to investigate trust and trustworthiness in a networked investment game in which two senders interact with a receiver. Previous studies using a comparable framework (Buskens et al., 2010; Cassar and Rigdon, 2011) have shown that providing full information regarding actions and outcomes across the network could increase both trust and trustworthiness. We compare a baseline treatment in which senders are only informed about the actions and outcomes of their own investment games to two information treatments.

In the reputation treatment, senders receive *ex ante* information regarding the average amount returned by the receiver in the previous period. In average, neither the level of trust nor the level of trustworthiness is affected by the introduction of additional information in this treatment. Receiver′s reputation however significantly affects sender′s investment decision at the individual level. Introducing reputation allows trustworthy receivers to benefit from higher investment. In the opposite, it disadvantages receivers with low reputation. Although receivers face strong incentives to build reputation, we do not observe any increase in trustworthiness compared to the baseline treatment. For that reason, despite a significant effect of reputation at the individual level, the level of trust does not increases at the aggregate level.

In the transparency treatment, each sender receives *ex post* additional information regarding the returning decision of the receiver to the other sender in the network. Sender′s investment decision significantly increases in the transparency treatment, despite the fact that receivers returning decision does not vary in average. As a result, receiver′s profit is in average higher in the transparency treatment than in the baseline and reputation treatments. Receivers, in the transparency treatment, benefit from social comparison between senders. A sender who has been disadvantaged tends to trust more in the following round, whereas no change in trust is observed for those who received an equal or larger proportion than their counterpart. In contrast to Cassar and Rigdon (2011), we do not observe evidence of comparative trust, i.e. returning decisions depending on the investment decision in the other link in the network. In their experimental setting, senders face full disclosure regarding the amount sent and the amount returned along the other ling of the network. Receiver′s returning decision could therefore be used as a hint to promote trust. Senders in our experimental design only face partial information, and do not observe the other sender′s actions. The incentive for receivers to reward trustful senders might then appear less attractive than in a full information setting. Although inequalities in return could be used as a lever to increase trust within the network, we observe than these inequalities are significantly lower than in the baseline treatment.

Another novelty in our experimental design lies in the provision of an exogenous, non-binding and private recommendation to participants before they reach their sending or returning decision. For both senders and receivers, this non-binding rule has a significant and positive impact on individual decisions. This finding is observed across all treatments, suggesting that additional information does not substitute for the rule as a determinant of individual decision. The fact that participants voluntarily comply with the rule echoes previous experimental results on aversion to dishonesty (e.g. Gneezy, 2005; Sanchez-Pages and Vorsatz, 2007; Hurkens and Kartik, 2009; Lundquist et al., 2009; Fischbacher and Heusi, 2013). Data also suggest that compliance to the rule significantly decreases as the amount suggested by this rule increases. This finding is consistent with Dale and Morgan (2010) that have shown in the context of a public good game that non-binding recommendations could affect individual decisions, as long as they are seen as reasonable.

Overall, our experimental study offers precious insight on the role of information in network embedded trust games. So far, trust has been mainly addressed in the context of bilateral interactions in the experimental literature. There are however many examples of economic interactions for which trusting decision could be affected by network effects. For instance, empirical studies have shown that trust in the governing institutions is a significant determinant of (voluntary) tax compliance (e.g. Scholtz and Lubell, 1998; Torgler, 2003). In this context, it appears particularly relevant to consider how the diffusion of information regarding governments' actions across social networks could impact individuals' trust. Our findings suggest for instance that reputation building, as well as allowing for social comparison could be efficient ways to improve trust within networks.

## References


Andreoni, J., Erard, B., & Feinstein, J. (1998). Tax compliance. *Journal of economic literature*, 818-860.

Barrera, D., & Buskens, V. (2009). Third-party effects. *eTrust: Forming Relationships in the Online World*, 37-72.

Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behavior*, *10*(1), 122-142.

Buskens, V., Raub, W., & Van der Veer, J. (2010). Trust in triads: An experimental study. *Social Networks*, *32*(4), 301-312.

Cappelen, A. W., Sørensen, E. Ø., & Tungodden, B. (2013). When do we lie? *Journal of Economic Behavior & Organization*, *93*, 258-265.

Cassar, A., & Rigdon, M. (2011). Trust and trustworthiness in networked exchange. *Games and Economic Behavior*, *71*(2), 282-303.

Dale, D.J., & Morgan, J. (2010). Silence is golden: Suggested Donations in Voluntary Contribution Games. University of California, Berkeley, USA.

Doerrenberg, P., & Peichl, A. (2013). Progressive taxation and tax morale. *Public Choice*, *155*(3-4), 293-316.

Erat, S., & Gneezy, U. (2012). White lies. *Management Science*, *58*(4), 723-733.

Feld, L. P., & Frey, B. S. (2002). Trust breeds trust: How taxpayers are treated. *Economics of Governance*, *3*(2), 87-99.

Feld, L. P., & Frey, B. S. (2007). Tax compliance as the result of a psychological tax contract: The role of incentives and responsive regulation. *Law & Policy*, *29*(1), 102-120.

Fischbacher, U., & Föllmi-Heusi, F. (2013). Lies in disguise—an experimental study on cheating. *Journal of the European Economic Association*, *11*(3), 525-547.

Fischbacher, U., & Utikal, V. (2013). Disadvantageous lies in individual decisions. *Journal of Economic Behavior & Organization*, *85*, 108-111.

Gneezy, U. (2005). Deception: The role of consequences. *American Economic Review*, 384-394.

Gneezy, U., Rockenbach, B., & Serra-Garcia, M. (2013). Measuring lying aversion. *Journal of Economic Behavior & Organization*, *93*, 293-300.

Halla, M. (2012). Tax morale and compliance behavior: First evidence on a causal link. *The BE Journal of Economic Analysis & Policy*, *12*(1).

Hofmann, E., Hoelzl, E., & Kirchler, E. (2008). Preconditions of voluntary tax compliance: Knowledge and evaluation of taxation, norms, fairness, and motivation to cooperate. *Zeitschrift für Psychologie/Journal of Psychology*, *216*(4), 209.

Houser, D., & Xiao, E. (2014). House money effects on trust and reciprocity. *Public Choice*, 1-13.

Hurkens, S., & Kartik, N. (2009). Would I lie to you? On social preferences and lying aversion. *Experimental Economics*, *12*(2), 180-192.

Li, S. X., Eckel, C. C., Grossman, P. J., & Brown, T. L. (2011). Giving to government: Voluntary taxation in the lab. *Journal of Public Economics*, *95* (9), 1190-1201.

Listokin, Y., & Schizer, D. M. (2012). I Like To Pay Taxes: Taxpayer Support for Government Spending and the Efficiency of the Tax System. *Tax Law Review*, *66*, 179.

López-Pérez, R., & Spiegelman, E. (2013). Why do people tell the truth? Experimental evidence for pure lie aversion. *Experimental Economics*, *16*(3), 233-247.

Lundquist, T., Ellingsen, T., Gribbe, E., & Johannesson, M. (2009). The aversion to lying. *Journal of Economic Behavior & Organization*, *70*(1), 81-92.

Luttmer, E. F., & Singhal, M. (2014). Tax Morale. *Journal of Economic Perspectives*, *28*(4), 149-68.

Reuben, E., & Stephenson, M. (2013). Nobody likes a rat: On the willingness to report lies and the consequences thereof. *Journal of Economic Behavior & Organization*, *93*, 384-391.

Rosaz, J., & Villeval, M. C. (2012). Lies and biased evaluation: A real-effort experiment. *Journal of Economic Behavior & Organization*, *84*(2), 537-549.

Sánchez-Pagés, S., & Vorsatz, M. (2007). An experimental study of truth-telling in a sender–receiver game. *Games and Economic Behavior*, *61*(1), 86-112.

Serra-Garcia, M., van Damme, E., & Potters, J. (2011). Hiding an inconvenient truth: Lies and vagueness. *Games and Economic Behavior*, *73*(1), 244-261.

Torgler, B. (2002). Speaking to theorists and searching for facts: Tax morale and tax compliance in experiments. *Journal of Economic Surveys*, *16*(5), 657-683.

Torgler, B. (2003). Tax morale, rule-governed behaviour and trust.*Constitutional Political Economy*, *14*(2), 119-140.

Torgler, B. (2007). *Tax compliance and tax morale: a theoretical and empirical analysis*. Edward Elgar Publishing.

Torgler, B., & Schneider, F. (2002). *Does culture influence tax morale? Evidence from different european countries*. Wirtschaftswissenschaftliches Zentrum (WWZ) der Universität Basel.

Xiao, E. (2013). Profit-seeking punishment corrupts norm obedience. *Games and Economic Behavior*, *77*(1), 321-344.