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TRUST AND FINANCIAL TRADES: LESSONS FROM
AN INVESTMENT GAME WHERE RECIPROCATORS
CAN HIDE BEHIND PROBABILITIES

RADU VRANCEANU, ANGELA SUTAN, DELPHINE DUBART

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- DR 10007 -

Trust and Financial Trades: Lessons from an Investment Game Where Reciprocators Can Hide Behind Probabilities

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May 2010

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Trust and Financial Trades: Lessons from an Investment Game Where Reciprocators Can Hide Behind Probabilities

ABSTRACT:

In this paper we show that if a very small, exogenously given probability of terminating the exchange is introduced in an elementary investment game, reciprocators play more often the defection strategy. Everything happens as if they "hide behind probabilities" in order to break the trust relationship. Investors do not seem able to internalize the reciprocators' change in behavior. This could explain why trades involving an exogenous risk of value destruction, such as financial transactions, provide an unfavorable environment for trust-building.

Key-Words:

- Experimental Economics
- Financial Transactions
- Investment Game
- Objective Risk
- Trust

RESUME :

L'article propose une étude expérimentale d'une variante originale du jeu de l'investissement. On introduit une probabilité objective de disparition du lien entre investisseur et récepteur. Le dernier pourra prétexter cet événement objectif pour jouer sa stratégie égoïste, ce que nous appelons "se cacher derrière les probabilités". Ce phénomène pourrait bien caractériser les échanges financiers.

Mots-clés :

- Confiance
- Économie expérimentale
- Finance
- Jeu de l'investissement
- Risk objectif

JEL classification: C90, D81, G00

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INVESTMENT GAME WHERE RECIPROCATORS CAN HIDE
BEHIND PROBABILITIES**

Radu Vranceanu*, Angela Sutan†, Delphine Dubart‡

Abstract

In this paper we show that if a very small, exogenously given probability of terminating the exchange is introduced in an elementary investment game, reciprocators play more often the defection strategy. Everything happens as if they "hide behind probabilities" in order to break the trust relationship. Investors do not seem able to internalize the reciprocators' change in behavior. This could explain why trades involving an exogenous risk of value destruction, such as financial transactions, provide an unfavorable environment for trust-building.

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Keywords: Trust, Financial transactions, Experimental economics, Investment game, Objective risk.

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1 Introduction

From Aristotle to present times, philosophers and political thinkers keep on claiming that there is something rotten in the realm of financial trades. For instance, Solomon (1992), a highly respected moral philosopher, pointed out that there is huge difference between the quest for profit of the traditional producer of goods, and the "abstract greed" of financial intermediaries. These days, many journalists, political leaders and even academics claim the "mother of all crises" of 2007-2009 was brought about by "unleashed greed" of main players in the financial market. For instance, if we listen to a political speech delivered by Laurence Summers, a US President economic advisor, during this crisis "an abundance of greed and an absence of fear led some to make investments not based on the real value of assets, but on the faith that there would be another who would pay more for those assets" (Summers, 2009). If such criticism is getting stronger, there are not many convincing explanations of why trades in financial assets should be more prone to this kind of egoistic behavior than trades in any other goods.

In this paper we bring empirical evidence in favor of the assumption according to which, by contrast with many other markets, financial transactions do not support trust building. As pointed out by many scholars, trust is one important lubricant of a social system where resource allocation is based on voluntary exchange (e.g., Arrow, 1974; McKean, 1975; Noreen, 1988). Dasgupta (2000, p.50) emphasizes that: "Trust is of much importance precisely because its presence or absence can have a strong bearing on what we choose to do and in many cases what we *can* do. The clause concerning the inability to *monitor* others' actions in my definition of trust is crucial. If I can monitor what others have done before I choose my own action, the word 'trust' loses its potency". When, for one reason or another, the trust relationship is broken, transaction costs increase dramatically and markets might not perform in a smooth way their role of allocating resources.

There is no reason to assume that all markets generate the same amount of trust. In particular, one distinguishing element of all financial transactions is *risk*. Indeed, the buyer of a financial asset will exchange a known amount of resources against a promise to get more resources in the

future. As is the case for all promises, there is an element of uncertainty about the ability or the willingness of the seller of the asset to keep his word. In general, the value of a financial asset at a future time will depend on the state of the nature. Hence, the price the buyer pays for the asset builds on the mathematical expectation of the discounted utility connected to all possible outcomes, including the outcome that the asset will worth nothing.

We argue that the trust relationship between participants to exchange is deeply undermined when such objective risk of default is part of the transaction. In particular, we posit that those playing the role of the asset seller (or trustee) will be more tempted to break the trust relationship if they can "hide behind probabilities", i.e., invoke "bad luck" when they have actually implemented their selfish defection strategy. They might do so because, ex-post, those acting in the buyer's role (or trustor) can no longer distinguish whether the adverse effects are due to the trustee's decision to break the trust relationship or to the external event. In general the trust relationship builds on a mutual assessment of what "good behavior" is. We expect trustees to care about the opinion of the trustors, even if they do not know each other. Since there is no enforcement mechanism at work, this tie is fragile. If a good *pretext*¹ offers to them, some trustees would compromise with moral norms and behave in the most selfish way.

In order to test for this theory, we develop an original variant of the traditional investment game (Berg, Dickhaut and McCabe, 1995). The latter has extensively been used to study the trust relationship. In the standard setup, an investor A decides whether to transfer or not an amount of money to a reciprocator B. Before reaching B, the transferred amount is augmented by the experiment administrator. Then the reciprocator decides whether or not to return some of the sum to A. Analyzing the problem as a one-shot, non-cooperative, sequential game, the dominant strategy for the reciprocator is to take all the money, thus the dominant strategy for the investor is not to transfer. However, in standard experiments, all the three possible strategies are systematically observed: the rational, selfish one where A does not send money, the partial trust strategy where A sends the money and B does not return a dime, and the mutual trust

¹ *Pretext* : a purpose or motive alleged or an appearance assumed in order to cloak the real intention or state of affairs (Merriam-Webster Dictionary, 2010).

strategy where A sends money to B and the later returns at least the amount sent. The mutual trust strategy maps well the solution to the cooperative game, since both players are better-off as compared to the non-cooperative equilibrium. In the framework of the investment game, trust can be interpreted as a (moral) value-driven way of building ties between participants to an exchange. Trust sets a natural limit on inefficient selfishness and brings about the Pareto-dominant cooperative outcome.

We slightly modify the original set-up by introducing an element of randomness that disconnects the outcome *observed* by the investor from the action of the reciprocator. Like in the standard set-up, the investor A decides whether or not to send a (fixed) amount to the reciprocator. If he transfers the money, a third party called Nature can decide whether to terminate the trade and (the invested amount is then lost) or to continue it. Nature's move is random, the probability to terminate the relationship is common knowledge. If the trade continues, the administrator multiplies the invested amount by a predetermined factor and gives it to the reciprocator B. The later decide whether to keep all the money, or send back to A a predetermined sum (larger than the sum initially sent by A).

Thus, the only difference between this game and the traditional one consists in introducing the external risk of terminating the exchange. Given that we want to make sure that changes in players' behaviors are induced by an alteration of the trust relationship and not by a reevaluation of the expected payoff, the external probability of termination must be very small. In the presence of this objective risk, when the sender sees no money forthcoming, he cannot say without ambiguity whether this is due to "bad luck" or to the reciprocator's "greed". Since the investor's assessment of the reciprocator's behavior is "blurred", the later's feelings of shame for not "behaving well" might fade away. Our experimental results corroborate this main assumption. The frequency of reciprocators who play the selfish strategy increases dramatically once that we introduce the objective risk. To the contrary, for a small risk, investors do not seem to anticipate the change in reciprocators' behavior and continue to play their trust strategy. This asymmetry is removed for a larger objective risk.

If the trust relationship becomes more fragile when the "commodity" is a contingent claim

with an explicit or tacit probability of failure, this would explain why financial transactions do not provide a very supportive environment for trust building.

The paper is organized as following. The next section presents the context and the experimental design. Section 3 presents and analyzes the main results. The last section is the conclusion.

2 Context and design of the experience

2.1 Related work

There is a huge literature on trust in experimental games, such as surveyed for instance by Harvey (2002) and Tazdaït (2008). Some of these papers have also analyzed the interaction between trust and objective risk. For instance, Houser, Schunk and Winter (2009) study how the personal interaction in an investment game is modified when the reaction of the reciprocator is subject to induced randomness. Firstly they measure the risk aversion of the players. Then, they made subjects play four times a trust game, where the investor is a human, while the reciprocator is either a human without known history of moves, or a human with move history, or a random computer, or a computer replicating human history of moves. Results put forward that risk attitude is an important explanatory variable in games against the computer (objective risk), but not in the trust game (between humans). Camerer and Weigelt (1988) analyzed the trust behavior in a finite horizon repeated game, with uncertainty about the "type" of the trustee, who can be more or less trustworthy. Investors upgrade their beliefs by observing the moves of trustees. When playing the game several times, players tend to discover the sequential equilibrium, although some biases subside (people tend to cooperate more often than expected).

A significant change in interpersonal interactions induced by external randomness has already been observed by Dana, Weber and Kuang (2007) in the framework of the dictator game. Under the "known" rule, the dictator can choose between the bundle (6 for him, 1 for the receiver) or the bundle (5 for him, 5 for the receiver). Students play the game several times and reach the standard outcome [i.e. many people are "generous", they prefer (5, 5) to (6,1)]. Under the "unrevealed" rule, bundles can be either (6,1) and (5,5) or, a new combination, (6,5) and (5,1). At the outset of the game, the dictator sees only his own gain from choosing a bundle (6 or 5); he does not see

the gain of the receiver. In order to find out the latter, he must push on a button. What the experiments have shown is that in general players do not press the button, and choose more often the bundle that provides them the largest payoff. Not only they "hide behind risk" in order to get the largest payoff, but they do not want to remove this risk.

Several scholars have analyzed the contract game between a principal and an agent where the outcome depends on both the agent's effort and Nature's random draw. In presence of such objective uncertainty, if a project fails due to low effort, the agent can claim that he exerted the high effort, but he had bad luck. Keser and Willinger (2000; 2007) defined this situation as a "hidden action". They show that the standard theoretical hypothesis according to which the agent would accept the contract provided that his expected utility is slightly above zero does not hold in an experimental setting; indeed, in this context, agents require a "fair share" of the surplus in order to participate. Charness and Dufwenberg (2006) analyze a similar contracting game. One main result from their experiment is that pre-contractual communication limits the agent's recourse to "hidden actions". They argue that human sentiments such as shame and guilty could play an important role in containing opportunistic behavior.

Other scholars have investigated the specificity of the trust relationship in financial markets. In a paper that combines experiments and observation of actual behavior, Karlan (2005) shows that persons identified as "trustworthy" in experimental games are less likely to default on loans in real life. Guiso, Sapienza and Zingales (2008) provide a theoretical and empirical analysis of trust as pertaining to the decision to buy shares. They notice that: "in determining whether to invest in a stock an individual has to assess not only what is the 'true' distribution of returns, but also what is the possibility that the company is just a scam, that the manager steals all the proceeds, or that the broker absconds with the money instead of investing it" (Guiso et al., 2008: p. 2563). Trust is then modelled as the subjective probability that investors assign to emergence of these "extreme bad events" that drive to zero the firm value, captured by the catch-all situation "the firm cheats". Using Dutch and Italian micro data, they put forward that less trusting individuals are less likely to buy stock, and if they buy, they buy less. At difference with these papers that analyze the impact of trust on financial transactions (volume, diversification,

investment strategies), our paper focuses on the reverse causality: how (financial) risk influences the quality of the trust relationship.

2.2 Structure of the game

The experience was cast as a one-shot sequential game between an investor (player A) and a reciprocator (player B). The two players do not know each other; the rule of the game and structure of payoffs is common knowledge.

The sequence of decisions is the following:

- At the outset of the experience, player A gets 2 euros. He can decide to keep them or to transfer 1 euro to B. If he keeps them, the game is over.
- If he transfers the one euro, a third party called Nature decides with a probability $p \geq 0$ whether to terminate the interaction or to continue it. Both players know this probability. If the interaction is terminated, the investor loses the investment and the reciprocator gets nothing.
- If the interaction is continued, the administrator multiplies the one euro amount by five and gives them to B.
- Player B has the choice between taking the whole amount, or keeping 3 euros for himself and returning two euros to A, who thus gets a payoff of 3 euros. The game ends.

Figure 1 presents the decision tree.

The setting is standard by many of its dimension. The original contribution of the paper as compared to a standard investment game is the introduction of Nature, a player that can terminate the trust relationship with a known probability p . This setting allows to analyze the consequences of reciprocators hidden actions on investors' internalized beliefs, and the decision of reciprocator to take the selfish option under the veil of objective uncertainty.

2.3 Optimal and actual strategies; behavioral implications

- The reciprocator (player B)

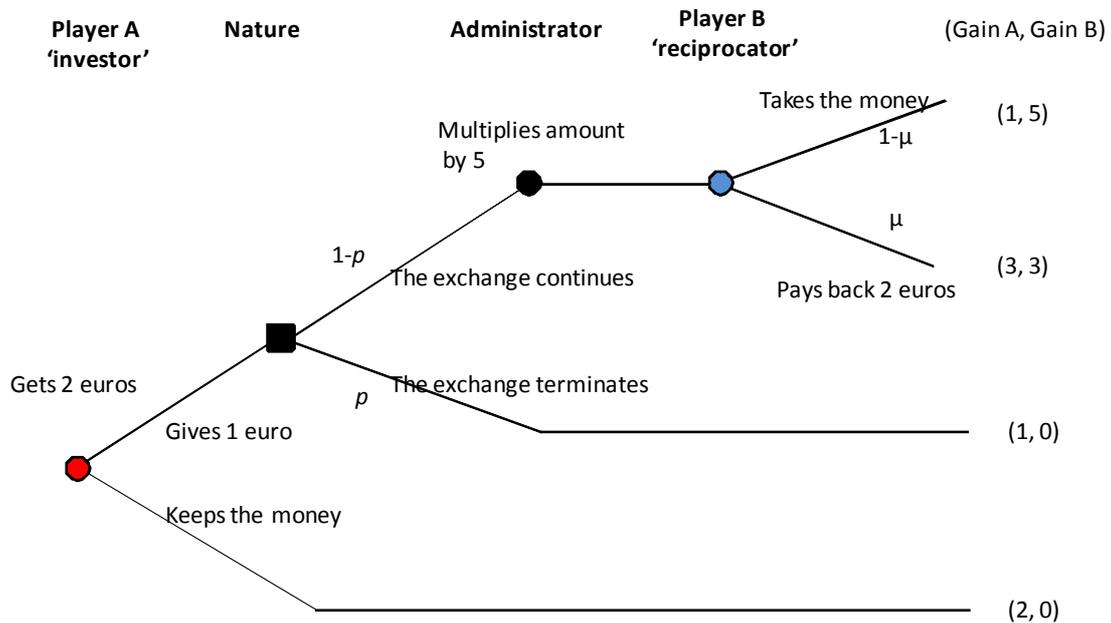


Figure 1: Decision Tree

For $p = 0$, the former game is identical to the elementary investment game. Under the elementary definition of rationality, the dominant strategy for the reciprocator B is to take the money and leave. The traditional result in experimental economics according to which a majority of subjects choose the return strategy has been interpreted as trustworthiness.

Notice that for $p > 0$, since the reciprocator B plays *after* Nature, his dominant strategy (under textbook rationality) is the same as before, i.e. "take the money and leave". Thus any observed change in the reciprocator's behavior can be directly related to the way how sender A will interpret defection. Notice that for $p > 0$ the sender who sees no money forthcoming can no longer identify the reason of this outcome: either the reciprocator has betrayed him, or bad luck occurred. B is aware of this uncertainty, and might take advantage of this "wigggle room" in order to implement the selfish strategy.² If we follow Charness and Dufwenberg (2006), the presence of an objective risk (no matter how small) provides the reciprocator with a good pretext to pursue a hidden action, probably because his sentiments of shame or guilt are watered down to some extent.

² This possibility has been documented by Dana et al. (2007) in the framework of a dictator game.

We can thus introduce a more specific hypothesis to be tested:

H.1. The frequency of reciprocators playing the selfish strategy must be higher for $p > 0$ than for $p = 0$, even if p is very small.

- The Investor (player A)

Taking the same elementary definition of rationality, since the optimal strategy of the reciprocator is defection, the optimal rational strategy of the investor is not to invest. Yet in experimental settings a majority of investors send the money, which has been interpreted as trust in B. Following Gambetta (2000) and Guiso et al. (2008), we can define trust as the positive subjective probability μ assigned *by an investor* to the event that B will return the investment. Furthermore, since people differ in their ability to trust the others, investors' own μ should follow a statistical distribution of p.d.f. $f()$ and c.d.f. $F()$; the support of these distributions is $[0, 1]$. The shape of the distribution itself depends on the settings of the problem, and mainly on p ; it is reasonable to assume that it is single-peaked.

Since the investor A must decide whether to transfer the money *before* the realization of the objective risk, a large objective probability of default might dissuade him to play the trust strategy merely because for a given μ , the expected gain declines. Thus, before moving to our empirical analysis, we must analyze the relationship between the objective probability and the trust decision.

We can state:

Proposition 1 *Changes in the frequency of investors that follow the selfish strategy depend in a significant way on whether changes in p prompt investors to revise their beliefs about the reciprocator's behavior.*

Proof. We follow Holt and Laury (2002) and assume that, for small payoffs, players are risk neutral. The expected gain of the investor who plays his "trust" strategy (i.e., invest the 1 euro) is:

$$E[g_A|trust] = (1 - p)[(1 - \mu) \times 1 + \mu \times 3] + p \times 1 = 1 + 2\mu(1 - p) \quad (1)$$

A prefers to transfer the euro to B if the expected gain from the trust strategy is larger than the payoff from the selfish strategy. This can occur if the objective probability of default is smaller

than a threshold that depends on the subjective probability μ :

$$E[g_A|trust] > [g_A|selfish] \Leftrightarrow 1 + 2\mu(1 - p) > 2 \Leftrightarrow 2\mu(1 - p) > 1 \quad (2)$$

Condition (2) allows to determine, for a given p , which is the critical subjective probability $\hat{\mu}(p)$ below which an investor does not engage in the trust strategy:

$$\hat{\mu}(p) = \frac{1}{2(1 - p)} \quad (3)$$

with $\frac{d\hat{\mu}}{dp} = \frac{1}{2(1-p)^2} > 0$. For $p = 0$, we have $\hat{\mu}(0) = 1/2$. In this context, investors that play the trust strategy in the elementary game ($p = 0$) are characterized by $\mu > 1/2$. Notice that for $p = 1/2$, we have $\mu = 1$: in this game, if the objective risk is bigger than 0.5, nobody can play the trust strategy.

For a given p , the frequency of investors that follow the selfish strategy is $\Pr[\mu < \hat{\mu}(p)|p] = F(\hat{\mu}(p); p)$. If investors can internalize the possible change in reciprocators' behavior, than more investors become mistrustful if p moves from 0 to a positive value. Formally, the distribution $F(\mu; p > 0)$ dominates the distribution $F(\mu; p = 0)$, that is $F(\mu; p > 0) > F(\mu; p = 0) \forall \mu \in [0, 1]$. Let us denote the partial derivatives $F_\mu(\mu, p) = \frac{\partial F(\mu, p)}{\partial \mu} = f(\mu, p) > 0$ and $F_p(\mu, p) = \frac{\partial F(\mu, p)}{\partial p} \geq 0$. Thus the total variation in the frequency F is:

$$dF(\mu, p) = \left[\frac{f(\mu, p)}{2(1 - p)^2} + F_p(\mu, p) \right] dp \quad (4)$$

For an initial $p = 0$, we can write:

$$[dF(\mu, p)]_{p=0} = [0.5f(0.5; 0) + F_p(0.5, 0)] dp \quad (5)$$

■

Corollary 2 *If changes in p do not prompt investors to revise their beliefs about the reciprocator's behavior, small variations $dp > 0$ in the neighborhood of $p = 0$ should entail even smaller changes in the frequency of investors that follow the selfish strategy.*

Proof. If investors do not revise their beliefs about the reciprocator's behavior when p changes, the partial derivative $F_p(0.5, 0) = 0$, then Eq. (5) becomes $[dF(\mu, p)]_{p=0} = [0.5f(0.5; 0)] dp$. With $f(0.5; 0) < 1$, it turns out that $[dF(\mu, p)]_{p=0} < 0.5dp$. ■

For instance, if starting from $p = 0$ we have $dp = 0.01$, then $[dF(\hat{\mu})]_{p=0} < 0.005$; for $dp = 0.1$, we have $[dF(\hat{\mu})]_{p=0} < 0.05$. For sure, if the initial p is larger than zero, changes in p should have a much more significant impact on F .

We can introduce another testable assumption:

H.2. If moving from $p = 0$ to a small positive p does not induce a substantial change in investors' behavior, this implies that the latter do not anticipate subsequent changes in the reciprocator's behavior.

Corollary 3 *If changes in p prompt investors to revise their beliefs about the reciprocator's behavior, small variations $dp > 0$ in the neighborhood of $p = 0$ may entail large changes in the frequency of investors that follow the selfish strategy.*

Proof. Trivial. If $F_p(0.5, 0) = \alpha$, with $\alpha > 0$, then $[dF(\mu, p)]_{p=0} > \alpha dp$ ■

The testable assumption is thus:

H.3. If moving from $p = 0$ to small positive p induces a substantial change in investors' behavior, this implies that the latter anticipates subsequent changes in the reciprocator's behavior.

2.4 Experimental design

The experiment included a total of 112 students from two French Business Schools (ESC Dijon and ESSEC) and were conducted in the Experimental Laboratories of the two institutions in April and Mai 2010. All the subjects were recruited from the student population of the schools, who answered to a call for paid decision experiments. The experimental design was presented via computer interface and all interactions were computerized. The programme was written in Z-tree³. Instructions were common knowledge. Experiments last for less than 30 minutes. Half of the students played the role of the investor, called player A in the experiment, half of the students played the role of the reciprocator, called player B. Participants were randomly and anonymously paired as strangers. They were asked to play the game three times, for $p = 0$, $p = 0.01$ and $p = 0.1$. The order of the sessions was random. Nature's random move (continue/terminate relationship) was computerized, and the draw respected the displayed probability.

³ Z-tree was developed by Urs Fischbacher. See www.iew.uzh.ch/ztree/index.php.

Payoffs are exactly those indicated in the former tree and were paid in cash at the end of the experiment. Table 1 indicates the location, time and number of subjects for each session.

	Time	Number of subjects
Session 1: Dijon	March, 18, 2010	22
Session 2: Cergy	April, 13, 2010	22
Session 3: Cergy	April, 14, 2010	24
Session 4: Cergy	Mai, 5, 2010	44 (2*22)

Table 1. The organization of the experience

Two pretests were performed on March, 5 2010 in Dijon with 30 students where we experimented with three variants of the game: the unframed fixed payment form, an unframed variable payment form (amounts transferred were allowed to vary) and a framed form. In the latter form, the game was presented as a decision to invest in a firm; in a second step, Nature decides on the firm's survival; in a third step, the firm decides whether to reimburse investors. We finally decided to carry on with the unframed version with fixed payments that allows to isolate the best the impact of the objective risk.

3 Results and discussion

Tables 2 and 3 summarize the main results. The first table presents the investors' decision, the second table presents the reciprocators' ones.

	Number of pairs	Number of transfers to B	Percentage of transfers
$p = 0$	56	34	61%
$p = 0.01$	56	33	59%
$p = 0.10$	56	25	45%

Table 2. Strategies played by investors (players A)

	Nature	Number of paybacks possible	Number of actual paybacks	Percentage of paybacks
$p = 0$	0	34	18	53%
$p = 0.01$	0	33	10	30%
$p = 0.10$	6	19	8	42%

Table 3. Strategies played by reciprocators (players B)

In addition, Figures 2 and 3 show the frequencies with which the two players have followed their trust strategies (transfer money for the investor, and pay back for the reciprocator). It should be emphasized that these frequencies apply to groups of different sizes.

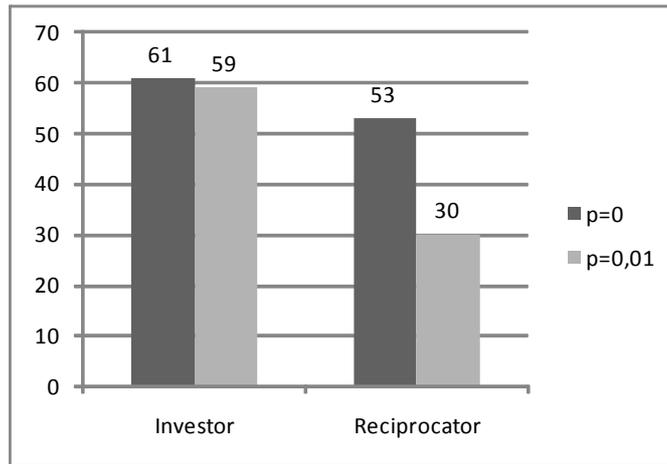


Figure 2: Investors playing the trust strategy; reciprocators playing the refund strategy, for $p = 0$ and $p = 0.01$, in percent of total possible moves.

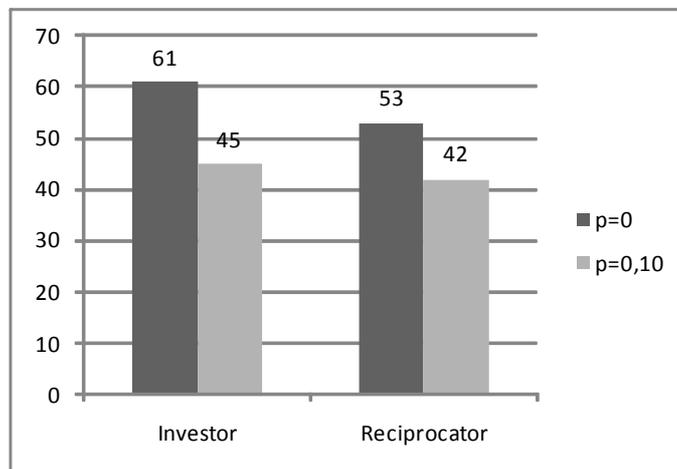


Figure 3: Investors playing the trust strategy; reciprocators playing the refund strategy, for $p = 0$ and $p = 0.10$, in percent of total possible moves.

- **Results of the elementary game ($p = 0$)**

R0. These results are quite standard. Of the 56 pairs, investors adopted the trust strategy (send money to B) for 34 times, that is 61%. The reciprocator B paid back 18 times and defected

16 times; they thus chose the defection strategy in 47% of the moves (16/34).

- **Results of the test with a small probability of termination:** $p = 0.01$.

R1. When such a small objective default probability was introduced, the reciprocator paid back in only 10 cases (instead of 18 cases in the $p = 0$ game); the frequency of the reciprocator defection raised from 47% to 70% (23/33). The change in the reciprocator's strategy is by no doubt substantial (incremental rise in defection: 13%). (A test as demanding as the McNemar Chi-squared indicates that the probability that there is no statistical difference between the two situations is of 0.18%.)

R2. However, despite the change in the reciprocator behavior, the investor did not altered in a substantial way their behavior, as if they were not been able to anticipate the change in behavior. Indeed, the number of transfers to B was almost constant from one case to another (34 and respectively 33).

- **Results of the test with a large probability of termination:** $p = 0.10$.

It is important to notice that for $p = 0.10$, not only investors play less often the no trust strategy (only 25 investors out of 56 continue to transfer), but also in our experiment Nature have terminated the relationship in 6 cases. Thus the number of actual transfers to the reciprocator is much smaller in the $p = 0.10$ case than in both the $p = 0$ and $p = 0.01$ case.

R3. In this case too, the reciprocator played the defection strategy more often than in the $p = 0$ case (the defection strategy is played in 58% of the cases, i.e. 11/19) (see Figure 3).

R4. This time investors reacted by strongly reducing the number of transfers, from 61% (34/56) in the $p = 0$ case to 45% (25/56), i.e. a reduction by 16 percentage points (The McNemar Chi-square test is significant at 6%). This response is stronger than required by the plain evaluation of the objective risk by risk-neutral investors, such as indicated by Equation (5).

- **The Synthesis**

a) R1 and R3 corroborate H1: When an objective risk is introduced, reciprocators hide behind probabilities and more of them implement the selfish strategy. This raise in opportunism in

presence of an objective risk that allows players to invoke bad luck while they actually play their selfish strategy has already been revealed by Dana et al. (2000) in a different experimental set-up (dictator game).

b) R2 corroborates H2. For a small objective probability, investors do not anticipate reciprocators' change in behavior. We contend that investors should put in practice a higher degree of introspection in order to work out the best response of the reciprocators; therefore, they might not be able to internalize reciprocators' change in behavior.

c) According to R3, investors would correct their "error" for a larger probability of terminating the relationship.⁴ In this case (large probability), the trust relationship is the most affected, with a smaller proportion of reciprocators behaving in a generous way, and less investors adopting the trust strategy.

4 Conclusion

This paper provides new evidence on the effect of external risk on the trust relationship between two parties to a trade. In particular, we have shown that if a very small and exogenously given probability of terminating the exchange is introduced into an elementary investment game, reciprocators play more often the defection strategy. In other words, reciprocators will use the objective risk as a pretext in order to carry out hidden selfish actions. In our experiment, investors do not seem able to internalize this change in behavior, at least not for a small objective risk. The fact that subjects were young students, with a natural tendency to trust their colleagues, might have induced a bias. It would be interesting to run the experiment with more experienced players.

For sure, situations captured by such a simple experimental framework cannot pretend to provide a comprehensive explanation for the extremely individualistic behavior observed in financial markets. In particular, financial transactions are both impersonal and not necessarily repeated. Then, as transaction costs theory points out, incentives for the players to build reputation are weak (Milgrom and Roberts, 1992). Yet this argument does not explain why, during the last crisis, many banks that pretend to build long term-relationships, have betrayed their clients and took

⁴ Risk aversion can induce a similar response. Yet, for small gains it is highly probable that players are risk neutral.

on their books excessively high amounts of risk (Diamond and Rajan, 2009).⁵

Our alternative explanation for this selfish attitude emphasizes the relationship between risk and trust. Indeed, an objective probability of default is a built-in feature of all financial transactions. Thus, when the value of an asset collapses, no one can tell whether this happened because the asset was poorly managed or because of mere bad luck. According to the results of our experiment, the trust relationship is deeply undermined if the seller of the asset can "hide behind probabilities". He will resort more often to the selfish non-cooperative strategy, what has been interpreted as excessive greed as compared to sellers' behavior in markets where risk plays a much smaller role. Unfortunately, explaining this situation does not necessarily provide the tools to change it.

References

- Arrow, Kenneth, J., 1974, *The Limits of Organization*, Norton, New York.
- Berg, Joyce, Dickhaut, John and Kevin McCabe, 1995, Trust, reciprocity and social history, *Games and Economic Behavior*, 10, pp. 122–142.
- Camerer, Colin and Keith Weigelt, 1988, Tests of a sequential equilibrium reputation model, *Econometrica*, 56, 1, pp. 1–36.
- Charness, Gary and Martin Dufwenberg, 2006, Promises and partnership, *Econometrica*, 74, 6, pp. 1579–1601
- Dana, Jason, Roberto A. Weber, Jason Xi Kuang, 2007, Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness, *Economic Theory*, 33, 1, pp. 67–80.
- Dasgupta, Partha, 2000, Trust as a commodity, in Gambetta, Diego (ed.), *Trust: Making and Breaking Cooperative Relations*, University of Oxford, chapter 4, pp. 49–72.
- Diamond, Douglas W. and Raghuram G. Rajan, 2009, The credit crisis: Conjectures about causes and remedies, *American Economic Review: Papers and Proceedings*, 99, 2, pp. 606–610.
- Guiso, Luigi, Paola Sapienza and Luigi Zingales, 2008, Trusting the stock market, 63, 6, pp. 2557–2600.
- Gambetta, Diego, 2000, Can we trust? In: Gambetta D., (Ed.), *Trust: Making and Breaking Cooperative Relations*, Oxford University Press, pp. 213–237.
- Holt, Charles A. and Susan K. Laury, 2002, Risk incentives and effects in lottery choices, *American Economic Review*, 92, pp. 1644–1655.

⁵ The Goldman Sachs scandal produced by the bank's participation in packaging and selling a pool of dubious mortgage loans on request by a hedge fund manager who bet against this pool of loans is illustrative for these ethical dilemmas. For years Goldman has claimed to be concerned with the long-term interest of its clients and partners (see "Greedy until proven guilty", *The Economist*, April 24th, 2010).

- Houser, Daniel, Schunk, Daniel and Joachim Winter, 2009, Distinguishing trust from risk: an anatomy of the investment game, Forthcoming *Journal of Economic Behavior and Organization*.
- Harvey, James S. Jr., 2002, The trust paradox: a survey of economic inquiries into the nature of trust and trustworthiness, *Journal of Economic Behavior and Organization*, 47, 3, pp. 291–307.
- Karlan, Dean S., 2005, Using experimental economics to measure social capital and predict financial decisions, *American Economic Review*, 95, 5, pp. 1688–1690.
- Keser, Claudia and Marc Willinger, 2007, Theories of behavior in principal–agent relationships with hidden action, *European Economic Review*, 51, 6, pp. 1514–1533
- Keser, Claudia and Marc Willinger, 2000, Principals’ principles when agents’ actions are hidden, *International Journal of Industrial Organization*, 18, 1, pp. 163–185.
- McKean, Roland N. 1975, Economics of trust, altruism and corporate responsibility, In: Phelps, E. S. (Ed.), *Altruism, Morality and Economic Theory*, Russel Sage Foundation, New York, pp. 29–44.
- Milgrom, Paul and John Roberts, 1992, *Economics, Organization and Management*, Prentice-Hall, Englewood Cliffs, UK.
- Noreen, Eric, 1988, The economics of ethics: A new perspective on agency theory, *Accounting, Organisations and Society*, 13, 4, pp. 359–369.
- Solomon, Robert E., 1992, *Ethics and Excellence*, Oxford Economy Press.
- Summers, Lawrence H., 2009, *Responding to an Historic Economic Crisis: The Obama Program, Remarks at the Brookings Institution*, March 13, 2009, Online at: www.whitehouse.gov.
- Tarik Tazdaït, 2008, *L’Analyse Economique de la Confiance*, De Boeck, Bruxelles..

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