How Institutions Shape Preferences: Experimental Evidence from a Large-Scale Property Rights Reform Implemented as Randomized Control-Trial

By Marco Fabbri*

I investigate how a major institutional reform of property rights over land affects cooperation and trust preferences in a society where agricultural land is the main households' asset. The reform took place in hundreds of West African villages in Benin and consists in registering customary tenure rights over agricultural land that are traditionally characterized by collective property and informal possession. With the reform, registered plots acquire a new legal status akin to private ownership, making it possible to claim property in court and sell or use them as collateral. Identification capitalizes on the randomized control-trial implementation of the reform that used a public lottery to select villages who had the reform implemented. Those villages not selected as of today maintain the customary land tenure. As of today, this is the only example of large scale land rights reform implemented as a randomized control-trial. Seven years after the reform implementation, I performed two studies conducting lab-in-the-field experiments to collect data on cooperation and trust choices from a total of 546 participants in 32 villages. The results of the first study, conducted in a densely populated province where villagers are richer, more educated and live closer to markets and paved roads compared to other country's rural areas, show that the formalization of land rights significantly increases participants' contribution in a public good game (+40%) and trustor's transfer in a trust game (+35%). The second study replicates the first one but it is conducted in a different rural area that experienced the same reform and shares the same set of formal institutions as the province in the first study, but that is characterized by markedly different socio-economic characteristics – the lowest population density, income, education levels and highest distance from paved roads in the country. In contrast with the first study, for participants belonging to the least market integrated and socio-economic developed villages, the reform determines a reduction of cooperation and it has no effects on trust levels.

JEL: D02; D04; K11
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Research shows that interpersonal trust and ability to cooperate are major determinants of economic growth (Fernandez and Fogli, 2009; Giuliano, 2007; Gorodnichenko and Roland, 2016; Granovetter, 2005; Guiso, Sapienza and Zingales, 2006; Zak and Knack, 2001). Understanding which factors influence these pro-social preferences is therefore an important goal for societies' prosperity. Among the factors potentially affecting cooperation and trust, scholars are devoting increasing attention to empirically investigating the relationship between formal institutions and preferences.(Alesina and Giuliano, 2015)

The topic has been studied using different approaches. A branch of the literature studies the effects of individuals' preferences on the way formal institutions are shaped (Alesina et al., 2015; Greif and Tabellini, 2010; Nannicini et al., 2013; Qian et al., 2015). A second type of contributions recognizes the co-determined nature of preferences and formal institutions, thus focusing on the co-evolution process affecting them (Acemoglu and Jackson, 2014; Murrell and Schmidt, 2011; Pacheco et al., 2010; Tabellini, 2010).

This paper contributes to a third wave of studies that attempts to isolate the univariate causal effects of formal institutions on individuals' preferences. A set of studies in this literature exploits natural experiments to overcome endogeneity issues. These studies look at institutional shocks exogenous to the preference evolution of affected agents and verify whether the institutional change has an impact on preferences. Examples of institutional shocks that have been considered in this literature are political events (Alesina and Fuchs-Schündeln, 2007; Botticini and Eckstein, 2007), wars (Voors et al., 2012), changes in regulations (Gruber and Hungerman, 2008), economic crisis (Fisman, Jakiela and Kariv, 2015), and unexpected modifications of states borders (Becker et al., 2016). Results from all these works suggest significant and persistent institutional effects on trust and cooperation levels.

A second set of studies uses experiments to achieve identification. Some contributions use laboratory games to compare the behaviour of subjects living in different institutional settings (Bigoni et al., 2016; Gneezy, Leibbrandt and List, 2016; Henrich et al., 2001a; Herrmann, Thöni and Gächter, 2008). Others observe subjects' behavioural reactions to exogenous manipulations of the institutions characterizing the laboratory games (Bó, Foster and Putterman, 2010;

2

Rodriguez-Sickert, Guzmán and Cárdenas, 2008; Sutter, Haigner and Kocher, 2010). These studies also suggest that differences of the institutional framework are key determinants of behavioral norms of pro-sociality.

Both the natural experiment approach and the laboratory experiments are subject to methodological problems. On the one hand, the natural experiment approach (particularly studies using political or policy changes as identification strategy) has been criticized for potential endogeneity biases. According to these criticisms, rather than representing an exogenous shock the institutional changes considered by these studies reflect the preferences of the institutions builder (Alesina and Giuliano, 2015). On the other hand, the major limitation of the experimental approach is that it casts doubts on the external validity of results. First, most of what we learn from the experimental literature comes from the study of so-called 'WEIRD', 20-years old college students, who are far from being a representative sample of the general population (Henrich, Heine and Norenzayan, 2010). Moreover, the rules and features that are manipulated in the experimental games differ from real-world institutions. Therefore, it is an open question of to what extent results derived in this context can be generalized outside the laboratory (Loewenstein, 1999).

I contribute to the literature investigating the univariate effects of institutions on culture by studying how a major property rights reform affects agents' levels of trust and cooperation. The reform, whose institutional details are provided in the next section, consists in formalizing customary tenure over land by releasing legally-recognized land certificates that provide rights akin to ownership. As argued in the next section, the formalization of customary tenure rights constitutes a major institutional shock for the villagers experiencing the reform since land is the only asset for most Beninese rural villagers. The backbone of the empirical design consists in the unique process of implementing the reform. The paper studies the first case of a large-scale reform of property rights over land implemented in hundreds of Beninese villages as a randomized control-trial. Identification is based on the random assignment through a public lottery of eligible villages to a "treatment" group for which the reform is implemented and a "control" group for which there is no reform. To measure villagers' cooperation and trust preferences, I perform lab-in-the-field experiments running a public goods game and a trust game and collecting information on risk preferences and socio-demographic controls in a sample of 546 participants in 32 villages belonging to the lottery pool.

The paper provides two contributions to existing studies investigating the univariate effects of institutions on culture. First, the empirical design studying the effects of an institutional shock on pro-social preferences addresses endogeneity concerns intrinsic to non-experimental identification strategies, as assignment to treatment and control groups is unquestionably random. At the same time, the external validity of the results is less exposed to some important issues that characterize laboratory experimental approaches, as the institutional shock deter-

mines a major change of the property rights architecture of a society, and the pool of experiment participants consists of a sample of the villages' adult population taking decisions that involve substantial stakes.

The second contribution provided by this paper is to test whether the effects of an institutional shock on pro-social preferences varies according to the socio-economic characteristics of the affected society. Several studies have found that the level of market integration and proximity to paved roads strongly correlate with a society's level of pro-sociality (Henrich et al., 2001b, 2005; Jakiela, 2015). However, we still know little with respect to the question whether changes in pro-social preferences in response to an institutional shock are influenced by a society's level of socio-economic condition. To shed light on this issue, the paper reports results of two identical studies conducted respectively in two rural areas of Benin. On the one hand, these areas share the same institutional and political settings and have been interested by the contemporaneous implementation of the same reform. However, on the other hand, the two areas are characterized by antithetical socio-economic conditions. As explained in detail in the next section, the first study took place in villages in the south-west province of Coffou. This area of Benin is characterized by a high population density, income, and education levels, and by proximity to markets and paved roads compared to other provinces of rural Benin. Conversely, the second study was conducted in two adjacent provinces in the north of the country, Alibori and Borgou, where population density is among the lowest in Benin, villages are more distant from markets and paved roads compared to the south, and income and education levels are the lowest in the country.[1] Comparing the changes in pro-social preferences registered in villages subject to the tenure reform in the two regions will make it possible to shed light on the question whether the effects of an institutional shock on cooperation and trust levels depends on the stage of socio-economic development characterizing a society.

The contribution most related to this project is Di Tella, Galiant and Schargrodsky (2007).[2] The authors study the consequences of a law change that determined the allocation of land titles to Argentinian squatters illegally occupying plots of peri-urban land. Identification is based on the observation that some, but not all, of the original landowners opposed the law in court, thus preventing the release of land titles to squatters for the contested land parcels. The authors exploit this arguably random assignment of formal land titles to study the effects of formalization of property rights on trust and pro-market beliefs. Results show that individuals who become legally entitled property owners soon develop beliefs favoring individualism and market support.

The main difference between the present study and the contribution of Di Tella, Galiant and Schargrodsky (2007) consists in the process of random allocation to

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[1] I am deeply indebted with Deo-Gracias Houndolo for helping with the rural-sociological research necessary to identify the research areas.

[2] Galiani and Schargrodsky (2010) study the same event, however the authors focus on non-cultural variables (e.g. housing investment) and on education attained by offspring of people receiving land titles.

treatment. Indeed, while authors provide some evidence that the land plots for which original landowners opposed the law have similar characteristics compared to non-contested parcels, nonetheless it is not possible to exclude that systematic differences were present. Instead, in the Beninese land tenure reform the assignment of land rights is carried over by a public lottery and so it is unquestionably random. Moreover, my study complements Di Tella, Galiant and Schargrodsky (2007)'s results by i) additionally focusing on cooperation as a measure of pro-sociality; ii) gathering choice data using high-stake incentivized experiments instead of self-reported survey questions.

The paper is structured as follows. In the next section, I describe the institutional framework in which the study takes place. Section II discusses the experimental design and procedure and section III states the hypothesis. Section IV describes the results obtained and section V concludes.

I. Institutional Framework

A. *Customary Land Rights and the* Plans Fonciers Ruraux *in Benin*

While systems of formal land ownership registration have been introduced in virtually any African state, customary land rights still represent the predominant land tenure arrangement in most rural areas, including in Benin. Customary land rights are characterized by a complex set of tenure principles and regulatory mechanisms, usually defined at the village or local level. While a variety of diverse customary arrangements exists, it is possible to identify a set of common features (Delville et al., 2000).

Customary rights consist of a set of socially-determined land-use rules, where access to land is an integral part of the social structure and tenure is determined by socio-political relationships. Governance and enforcement of principles governing this system are implemented by customary authorities, who are entities legitimated by previous occupancy or religious customs. The distribution of land rights is based on the socio-political local structure and on family relationships.

The system implies that rights held by individuals are the result of a social and political process of negotiations arbitrated by customary local authorities. This enforcement process has an inherently procedural nature. Rules governing customary arrangements do not provide a precise codification of each landholder's rights, instead they only state procedures by which an individual obtains access to the land (Chauveau, Bosc and Pescay, 1996). Therefore, the informal nature of customary rules prevents upfront the possibility of establishing a set of well-defined land property rights.

Population growth and the consequent increasing pressure on natural resources create serious concerns for the functioning of informal customary arrangements. Scholars notice that the absence of written documentation regarding land use gave rise to increasing conflicts over inheritance and disputes over land use (Deininger and Castagnini, 2006). In Benin, the policy response to problems due to tenure
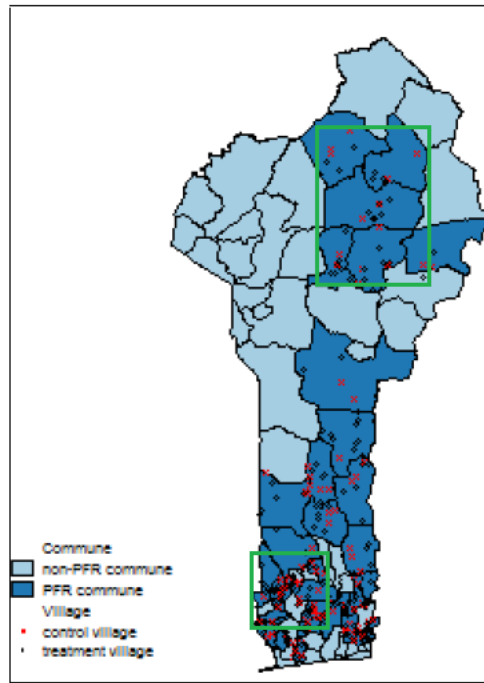
FIGURE 1. VILLAGES IN THE *Plan Foncier Ruraux* INCLUDED IN THE LOTTERY POOL.

Note: The green square indicate the area where the fieldwork for this study took place.
Source: Goldstein et al. (2016).

insecurity has been a land tenure reform known as the Plans Fonciers Ruraux (PFR). The reform consists of socio-land surveys at the village level to identify rights holders, their rights, and parcels boundaries. The process allows for public objection to the proposed registration of rights and requires that rights holders and neighbors publicly sign survey records (Delville, 2006).

While certificates of registration do not directly confer legal ownership, nonetheless registered plots acquire a new legal status and can be transformed into land titles.[3] Moreover, certificates award presumption of ownership recognized by courts and make it possible to sell or use registered plots as a collateral. Given these characteristics, *de facto* in Benin PFR confers rights similar to ownership (Goldstein et al., 2016). Thus, PFR represents a major change in the institution of property rights over land, in particular considering that land is the only asset for most rural villagers.

PFR has been piloted in Benin since 1993. However, due to a lack of resources,

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[3]The Rural Land Act 2007-003 introduced the "Certificat Foncier", land certificates registered in the context of PFR. The new Rural Land Law 2013-01incorporates the "Certificat Foncier" and requires their registration to assign land ownership titles ("Titre Foncier").

the reform interested only a small number of villages until 2006, when the Millennium Change Account subsidized a five-year PFR implementation program. The peculiarity of PFR in Benin is that implementation followed a randomized control-trial process involving hundreds of rural villages. In fact, this is the first case of a land tenure reform implemented as a large-scale randomized control-trial.

The objective of the five-years program for implementing the PFR reform was to deliver land certificates in 300 rural villages across 40 communes.[4] In the preliminary phase of the project, rural villages in the communes interested were informed about the PFR reform and were invited to apply in order to participate to the lottery. As a second step, each application received was examined to verify whether the village responded to certain eligibility criteria.[5] Among the 1,235 villages that applied for participating into the PFR lottery, 576 were judged to be eligible.

Once identified this lottery pool, a subsample of 300 villages was selected via public lottery, and in these villages PFR was actually implemented.[6] Non-selected villages did not receive any intervention and, as of today, continue to have customary land rights. Figure I.A shows a map of communes and villages interested by PFR.

B. Heterogeneous Levels of Market Integration and Socio-Economic Development Across Rural Provinces

The fieldwork was conducted in two rural areas that are characterized by different stages of social and economic development. In Figure I.A the two rectangular boxes contain the areas selected for this project.

As suggested by the visual impression, the southern region is more densely populated and villages lie closer to each others compared to the northern region. The southern area where the first study took place is a three hours drive from Cotonou, Benin largest city and main commercial venue, and from the political capital Porto Novo, both located further south facing the Ocean. The area chosen for fieldwork in the south is also characterized by the proximity with the largest University in the country, University of Abomey-Calavi, and by active commercial relationships both with the capital and with the richer confining country of Togo. Conversely, villages in the north are on average more isolated and distant from paved roads, reducing the possibility of connection with Parakou, the nearest city offering higher education and a sizeable market activity.

Descriptive statistics from our sample of villages and participants – summarized

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[4]Communes are institutional units similar to counties. Benin counts 77 communes. The communes that were excluded from the possibility to participate in the PFR lottery are those where NGOs and other organizations were engaging in other programs of land governance at the time of the PFR design.

[5]The criteria for eligibility are: poverty index, potential for commercial activities, regional market integration, local interest in promoting gender equality, infrastructure for economic activities, adhesion to the PFR application procedure, incidence of land conflicts, and the production of main crops.

[6]Since 4 selected villages refused to complete the program implementation, the treated sample is composed of 296 villages.

	North (n=328)	South (n=218)	Diff (p-value)
age	38.0	38.8	.49
yearsinvillage	32.8	33.3	.71
male	.56	.58	.73
married	.89	.89	.98
income	8,931	14,464	<0.01
education	.99	1.4	<0.01
village population	2,421	1,708	.12
distanceroad	12.5	3.6	<0.01

Note: Observations are collected in 19 villages in the north and 13 in the south. The Diff (p-value) column reports results of a t-test for comparison of means across treatments when the variables are continuous and a chi-squared test when the variables are dummies.

in table 1 – indeed reflect the differences between north and south Benin. The samples of participants in the two studies conducted in the northern and southern regions are on average similar with respect to age, gender composition, years of residence in the village of origin, and marital status. Similarly, the selected villages have on average similar population size.

However, as expected participants belonging to the sample of southern villages have significantly and substantially higher income and education levels compared to participants in the north. Moreover, southern villages in our sample are located on average four times closer to a paved road compared to villages in the north.

II. The Experiment

Games Design. The paper focuses on two measures of pro-sociality: cooperation and trust. To elicit these behavioral traits, a public goods game (PGG) and a trust game (TG) were employed. The games were one-shot and no feedback regarding games outcome was provided until the end of the session.

In the PGG, subjects were divided in groups of three and the identity of the other group members remained unknown. Each subject received an initial amount of 1,000 XOF (approximately $ 1.5) in 10 coins worth 100 XOF each. The subject could then divide the 10 coins between a 'private envelope'and a 'common envelope'. The coins placed in the private envelope became part of the subject's endowment. Coins in the common envelope were instead increased by 50% by the experimenter and then equally divided among the three group members. Given these parameters, contributing nothing to the public good is the dominant strategy, however contribution increases the group earnings.

In the TG, players were divided in pairs and randomly assigned either the role of trustor or trustee.[7] Each player was initially endowed with 5 coins of 100 XOF

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[7]Due to a mistake, in one session each of the 12 participants, after being informed that the only payoff-relevant decision are those taken in the role randomly assigned at a later stage, took decisions

each. In the first stage of the game, the trustor had the possibility to send some or all of her coins to the trustee. For each coin sent, the experimenters added 2 coins. In the second stage of the game, the trustee decided then how many coins to send back. To maximize data collection, the trustee's decision was elicited using the strategy method.[8]

Notice that, unlike the trustees' choices, the decisions made by the trustor and the decision in the PGG were blind to the experimenter on site. Indeed, participants were privately dividing the coins between two envelopes of different colors in a separate room, and then placing them in a box marked by a code. Data on participants' risk preferences both in the domain of gains and losses were collected following a lottery choice task similar to (Voors et al., 2012).[9]

Experimental Procedure. The data collection in the first study conducted in the southern villages consisted of 13 experimental sessions for a total of 218 participants, with one session per village, and took place between December 2016 and January 2017. The 13 villages were randomly selected from the whole list of villages included in the lottery pool for the Coffou region. The second study was conducted in the northern villages and consisted of 19 experimental sessions for a total of 328 participants, with again one session per village, and took place between February and March 2017. The 19 villages were randomly selected among the pool of villages participating to the PFR lottery for the Alibori and Borgou provinces.

The experimental procedure was identical in the two studies. Approximately 18 subjects took part to each session.[10] The selection of participants within each village proceeded as follows. The day before the experiment, a member of the research team informed the local authority (village chief) that the following day a team of researchers would come to the village to perform the research and recruited participants among the villagers. Nine male and nine female residents in the village were requested to convene at the established time. Selected participants must be older than 18 years old and at maximum one member per household was allowed to take part in the experiment.

No participant took part to an economic experiment before. In each session,

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as a trustor and subsequently as trustee. The exclusion of data from this session leaves the results qualitatively unchanged.

[8]The experimenter asked to each trustee to state her decision for each of the 6 possible transfer levels received from the trustor.

[9]Each subject had to make six choices between participating to a lottery or gaining/losing a certain amount. In the initial three choices, participants could either play a lottery where with probability 3/10 they win 500 XOF and with probability 7/10 they win 0. The certain equivalent gain in the three lotteries was respectively 100, 150 and 200 XOF. In the last three choices, participants decided whether to play a lottery that implies losing 500 XOF with probability 3/10 or losing 0 with probability 7/10, or incurring a certain loss of 100, 150 and 200 XOF. Notice that the maximum loss of 500 XOF is equal to the show up fee received and that by design in none of the games participants can earn negative payoffs). In order to facilitate comprehension of the choice alternatives, the experimenter used colored balls to be withdrawn from a bag for representing the probability of gains and losses and determine the outcome. A dice was then thrown to determine which of the six lotteries was paid.

[10]Most of the sessions were completed by exactly 18 participants, however there is some variation in the number of participants, registering a minimum of 16 subjects and a maximum of 22 subjects.

participants completed a brief socio-demographic survey and took decisions in the two games described above as well as in other experimental tasks.[11]

To verify whether migrations between control and treated villages creates selection concerns, we collected from participants information on how long have they be residing in the village and, eventually, the reasons why they had migrated. In our sample, moving out from the village of origin is a rare event, and the reason for the few migrations registered is almost exclusively connected to marriage.

The procedures for administering the survey, game instructions and the order in which the game were played was identical in each session. Sessions took place in a public space (usually a school or a religious building), composed of a large common room and a separate room where subjects took decisions in private. Upon arrival, participants were then randomly assigned a number identifier and completed a brief socio-demographic questionnaire. Participants were then informed that they earned a participation fee equal to 500 XOF and that they had the opportunity to gain additional money by participating in a series of tasks. To avoid potential income effects, we also communicated that only income generated in 4 out 7 games played during the session would be actually paid out, and that the 4 games would be randomly determined at the end of the session through a lottery extraction.

Since the majority of the participants are illiterate, experimental instructions for each game were administered orally in public by the experimenter.[12] We took several precautions to minimize the risk that participants would not fully understand the instructions. First, the experimenter used real coins and envelopes as a visual support during the game explanation. Second, several examples for each game were provided. Third, before having the possibility to enter the decision room, each participant had to answer correctly control questions posed in private by the experimenter. In case the participant failed to provide the correct answer, the experimenter repeated the explanation to the subject until he/she was able to answer all the control questions.

A session in a village lasted approximately 3 hours. Participants received on average Euro 6 as final payment, the equivalent of 4 days wage for subjects in our sample. Considering that the fieldwork took place during the dry season, when agricultural production is suspended, and that virtually all subjects in our sample are farmers, the low opportunity cost of participation made the monetary incentive even more salient.

III.   Hypothesis

A review of the literature investigating the effects of different institutional structures on behavior makes it possible to advance two opposite predictions regarding the effects of PFR on trust and cooperation. A set of studies comparing different

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[11]The data presented in this paper are part of a larger research project in which other behavioural measures have been collected. The incentivized games played during a session are the following: PGG; TG; dictator game; coordination game; risk elicitation in both losses and gains domains; donation.

[12]A translation in English of the instructions is included in the appendix.

countries reports a positive correlation between trust and cooperation levels and the degree of property rights protection (see for instance Johnson, McMillan and Woodruff, 2002; Knack and Keefer, 1997; Zak and Knack, 2001). The aforementioned study of Di Tella, Galiant and Schargrodsky (2007) suggests a direction for the causal link. Indeed, the authors show that receiving formal land titles has the effect of increasing generalized trust levels. For the specific case of PFR in Benin, an early impact evaluation of Goldstein et al. (2016) shows that for women who receive land certificates (but not for men) the amount of investments in long-term crops is significantly higher compared to villagers belonging to the control group. The authors suggest as a likely explanation for this result an increase in trust levels and tenure security for women who benefited from PFR. Since the formalization of property rights in Benin aims at reducing uncertainty regarding land access and ownership, consistently with results of the study from Di Tella, Galiant and Schargrodsky (2007) discussed above the first hypothesis is that formalizing land rights produces an increase in the level of pro-sociality.

This prediction contrasts with results put forward by a set of studies investigating the effects of previous land tenure reforms in Africa and with the literature on crowding-out effects. In contrast with predictions of economic theory, studies and impact evaluations on the effects of land rights formalization programs in Africa report mixed evidence regarding the effectiveness of these reforms to secure land tenure and promote investments (for a review of the literature, see Deininger and Feder, 2009). Some authors advanced a behavioral explanation for this lack of effectiveness of land tenure reforms in Africa (Platteau, 1996). According to this view, informal customary rights are a deep-rooted institution in the continent that cannot be replaced by alternative arrangements without producing discontent. Villagers might negatively perceive attempts to modify the customary institutional setting in small communities that are used to informal fiduciary interactions. These negative reactions can manifest as a reduction of interpersonal trust and cooperation levels.

These conclusions are in line with the literature on motivational crowding-out. The PFR reform introduces a formal mechanism based on third-party legal enforcement that substitutes for informal norms and institutions based on personal ties, trust, and reciprocity. Replacement of these informal rules might crowd out pro-social behavior (Bowles and Polania-Reyes, 2012; Ostrom, 2005). For instance, Rodriguez-Sickert, Guzmán and Cárdenas (2008) report the results of a public goods experiment where the presence of a punishment institution is manipulated. The authors show that the unilateral introduction of a punishment mechanism against which participants had previously voted generates levels of cooperation lower than the no-punishment condition. Similar results registering a decrease in contributions due to crowding-out are obtained by Reeson and Tisdell (2008). The case of PFR in Benin partly differs from these examples, since to enter the PFR lottery pool the political representatives of a village had to voluntarily submit an application in response to the government's call. Nonetheless,

11

it is still possible that part of the village population would react negatively to the reform, for instance because the decision to apply for PFR was taken unilaterally by the political leaders without consulting the village population. Therefore, the alternative hypothesis is that the introduction of PFR in Benin generates a reduction in the average levels of cooperation and interpersonal trust because of the negative reaction against the dismissal of traditional institutional arrangements and because of the crowding-out of informal norms of civic cooperation.

Finally, one of the objectives of this study is to test whether the effects of the PFR reform on behavior varies according to the socio-economic characteristics of the population affected by the institutional shock. It is likely that replacing customary land tenure encounters the strongest resistance the more the society is traditional, its members are isolated and have less exposure to social change and innovation processes. Considering the socio-economic and geographical characteristics shared by the villages that took part to data collection in the two studies performed, the hypothesis is that the formalization of land rights will increase the average level of pro-sociality less (or it will trigger a stronger negative reaction, hence decreasing pro-sociality more) in villages belonging to the northern province of Benin, where the population lives more distant to markets and paved roads and villagers are on average poorer and less educated.

IV. Results

Study 1 – Southern Villages

Table 1 in the appendix reports descriptive statistics relative to socio-demographic characteristics of participants in the 13 southern villages. The sample is well balanced between treated and control villages in terms of observables. A series of t-test comparing the mean of the variables report in no cases statistical differences across treatments, with the exception of the dummy *christian* equals 1 when the participant reports Christianity to be the religion practice in combination with the animistic Vodoo cult. [13]

We begin the analysis on our measures of pro-sociality by focusing on the PGG results. Figure 2 reports the average contribution to the public good across treatments. Participants belonging to villages where PFR was implemented contribute substantially more than subjects in control villages.

A Mann-Whitney test rejects the hypothesis of equality of distributions across treatments (p-value<1%). A t-test for equality of means rejects the null hypothesis that the means of the two samples are equal (p-value<1%). Focusing on subjects who contribute the full endowment to the public good, a comparison across treatments reports overwhelming evidence that the fraction of full cooperators is larger among treated participants(Chi-square test, p-value < 1%).

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[13]Vodoo is the main religion in Benin and it is practiced by virtually any participant in our sample. However, some villagers reported that they also combine Animism rituals with Christian or Muslim practices.
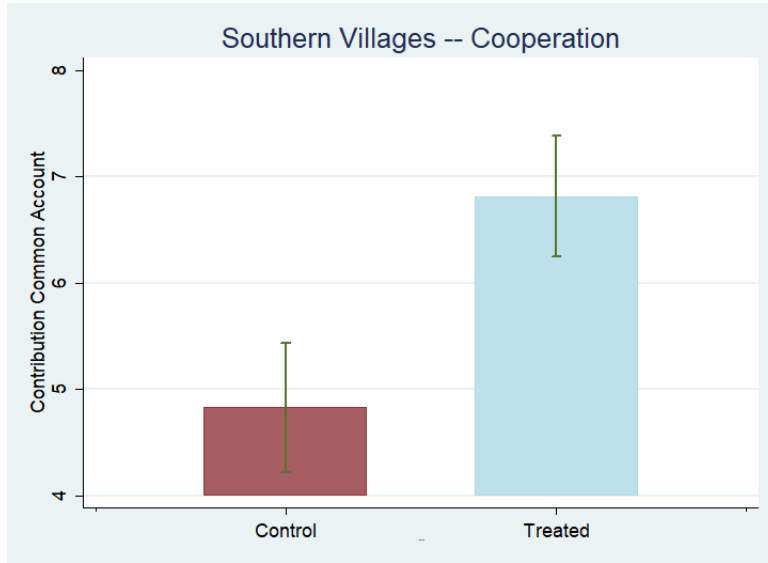
FIGURE 2. COOPERATION

Note: Coins contributed to the public good in treated and control groups.

We then incorporate a right-censored Tobit regression to take into account the point mass accumulation at contribution equal to 10 coins (censored by design). We regress the amount of contribution to the public good controlling for risk preferences and a set of socio-demographic controls.[14] Results are reported in Table 2.

Model 1 uses robust standard errors clustered at subject level. The coefficient of the dummy *treated* is positive and statistically significant at the 1% level. The point estimate suggests that subjects in southern villages where the PFR reform was implemented contribute to the public good on average 3 coins more (equivalent to a 40% increase) than control participants.

In model 2 we account for possible within-village correlation by clustering standard errors at the village level. Results confirm that the coefficient of the *treated* dummy is statistically significant different than zero at the 1% level.[15] Model 3, where we use block-bootstrapped standard errors with 999 repetitions, confirms the results at the conventional level of significance.

We then turn the attention to participants' choices in the TG. Figure IV reports the average number of coins sent by the trustor in the first stage of the trust game. Villagers who experienced the PFR reform on average send more coins

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[14]The controls include: age, gender, household income, three dummies for religion (Christian, Muslim or Animist), marital status, a dummy equal to one if the subject is monogamous, education, years spent in the village, measures of risk in the loss and in the gains domains, distance of the village from the paved road and the village population.

[15]Obviously the point estimate is identical than that in model 1.

Table 2—Cooperation in Southern Villages

	(1)	(2)	(3)
treated	3.011***	3.011***	3.011**
	(0.53)	(0.91)	(1.48)
population	-0.001*	-0.001**	-0.001
	(0.00)	(0.00)	(0.00)
distanceroad	-0.518***	-0.518***	-0.518**
	(0.09)	(0.18)	(0.26)
age	0.008	0.008	0.008
	(0.04)	(0.03)	(0.04)
education	0.128	0.128	0.128
	(0.18)	(0.19)	(0.19)
income	-0.000	-0.000	-0.000
	(0.00)	(0.00)	(0.00)
male	0.071	0.071	0.071
	(0.72)	(0.78)	(0.80)
riskloss	0.006	0.006	0.006
	(0.29)	(0.34)	(0.34)
riskgain	-0.011	-0.011	-0.011
	(0.35)	(0.39)	(0.40)
christian	-0.624	-0.624	-0.624
	(0.57)	(0.57)	(0.61)
_cons	8.154***	8.154***	8.154***
	(1.57)	(2.25)	(2.80)
sigma			
_cons	3.699***	3.699***	3.699***
	(0.23)	(0.29)	(0.29)
N	218	218	218
pseudo R^2	0.060	0.060	0.060

* $p<0.10$, ** $p<0.05$, *** $p<0.01$

Note: Right-censored Tobit model. Dependent variable: amount of coins contributed to the public good. Robust standard error clustered at subject level (model 1), at village level (model 2), block-bootstrapped standard errors clustered at the village level (model 3).

Figure 3. Trust

Note: Coins sent by the trustor in the Trust Game.

than control villagers. The results is confirmed by a t-test for comparison of means (p-value<1%) and by a Mann-Whitney test for comparison of distributions (p-value=1%). Results from a Tobit regression reported in table 3 confirm the results. We regress the amount of coins sent by the trustor on the dummy *treated* and a the set of controls specified above.

In model 1 standard errors are clustered at individual level. The coefficient of *treated* is positive and statistically significant at the 1% level, suggesting a 35% increase in contribution for subjects that experience PFR compared to control subjects.

Also in model 2, where standard errors are clustered at the village level for taking into account within-village correlation, the coefficient associated to treated subjects in the south remains statistically significant at the 1% level. Model 3 implements block-bootstrapped standard errors with 999 repetitions clustered at the village level and confirms the result at the 5% level of significance.

Finally, we look at participants' trustworthiness choices. The average amount of coins returned by the trustee is higher in treated villages for each possible level of trustor's initial transfer. However, an Hotelling T-square test for equality of treated and control mean amounts of coins sent back by the trustees suggests no statistically significant differences between treatments.

While it is of course possible that, in contrast with cooperation and trust, trustworthiness levels were not significantly affected by the implementation of the land tenure reform, nonetheless it should be noticed that the methodological peculiar-

TABLE 3—TRUST IN SOUTHERN VILLAGES

	(1)	(2)	(3)
treated	1.357***	1.357***	1.357**
	(0.30)	(0.38)	(0.62)
population	0.001**	0.001***	0.001
	(0.00)	(0.00)	(0.00)
distanceroad	-0.227***	-0.227***	-0.227**
	(0.05)	(0.06)	(0.10)
age	-0.010	-0.010	-0.010
	(0.03)	(0.04)	(0.04)
education	-0.204*	-0.204***	-0.204***
	(0.11)	(0.06)	(0.08)
income	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)
male	0.402	0.402*	0.402
	(0.49)	(0.24)	(0.30)
riskloss	0.187	0.187	0.187
	(0.18)	(0.19)	(0.22)
riskgain	-0.398*	-0.398*	-0.398*
	(0.22)	(0.22)	(0.24)
christian	-0.240	-0.240	-0.240
	(0.34)	(0.34)	(0.35)
_cons	3.175***	3.175***	3.175**
	(0.94)	(0.93)	(1.24)
sigma			
_cons	1.478***	1.478***	1.478***
	(0.11)	(0.16)	(0.17)
N	108	108	108
pseudo R^2	0.111	0.111	0.111

* p<0.10, ** p<0.05, *** p<0.01

Note: Right-censored Tobit model. Dependent variable: amount of coins sent by the trustor in the first stage of the Trust Game. Robust standard error clustered at subject level (model 1), at village level (model 2), block-bootstrapped standard errors clustered at the village level (model 3).

ities characterizing the elicitation of trustworthiness measures in the experiment might have diluted the incentives effects. First, for eliciting trustworthiness, the 'cold', less salient strategy method has been used. Second, while trust and cooperation decisions were blind to the experimenter on site, participants revealed trustworthiness decisions to the experimenter collecting them, hence reducing the sense of anonymity and possibly generating demand effects.

The findings of the first study can be summarized as follows:

RESULT 1:   *In the sample of villages selected within the country's province where socio-economic indicators report the highest level of development and market integration, the introduction of formal, the reform formalizing land rights determined an increase of 30% - 40% in villagers' average levels of cooperation and trust.*

Study 2 – Northern Villages

Table B2 in the appendix reports descriptive statistics relative to socio-demographic characteristics of participants in the 19 northern villages. The sample is well balanced with respect to the observable characteristics we collected, except for participants in the treated villages who are on average slightly older and less likely to be monogamous than those in control. We begin by comparing the level of trust and cooperation displayed by participants in northern and southern villages that belong to the respectively control groups. Indeed, considering that these participants have not experienced the reform formalizing land rights, the comparison provides an indication of how levels of cooperation and trust would be had the land rights reform not taken place. Figure IV plots the average amount of coins contributed to the public good by each participant (left panel) and the average amount of coins sent by the trustor in the trust game (right panel) by participants in control groups respectively in the north and south samples. Participants in northern and southern villages belonging to the control group display similar levels of trust and cooperation. A Wilcoxon rank-sum test confirms that neither the amount of coins contributed to the public good nor the amount of coins sent by the trustor are statistically significantly different at the conventional level across geographical regions in control villages where the land rights reform was not implemented. Regression results from a Tobit model, reported in tables B and B, confirm that average levels of cooperation and trust are not statistically different for participants belonging to control villages in the north and in the south of the country who did not experience the formalization of land rights.

We then compare levels of pro-sociality displayed by treated and control groups in the sample of northern villages. Figure IV shows the average amount of coins contributed to the common account by participants in the public goods game. Participants in the control group contribute on average .6 more coins to the common account. This difference is statistically significant at 1% level (Wilcoxon rank-sum test, two sided).

Results of a Tobit regressions reported in models 1-3 of Table 4 confirm that participants belonging to villages in the north where the land rights formalization

17

FIGURE 4. COOPERATION (LEFT PANEL) & TRUST (RIGHT PANEL) IN CONTROL VILLAGES ACROSS GEO-GRAPHICAL REGIONS

took place contribute less to the common account compared to those in control villages.[16]
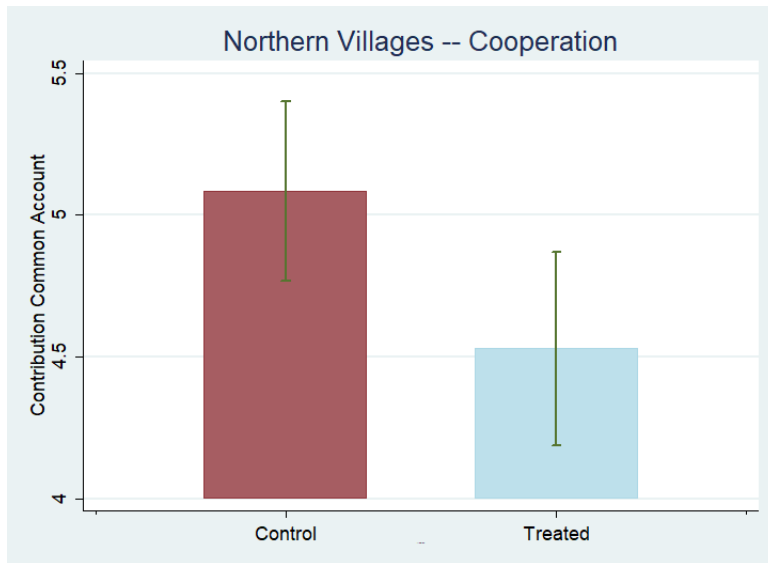
FIGURE 5. COOPERATION IN NORTHERN VILLAGES

Note: Coins contributed to the common account in the Public Goods Game.

Figure IV suggests that the average amount of coins sent by the trustor in

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[16]In model 1 standard errors are clustered at subject level. In model 2 we cluster standard errors at the village level and the coefficient of the dummy *treated* becomes weakly statistically significant. Model 3 reports uses block-bootstrapped standard errors and the coefficient of *treated* becomes not significant.

TABLE 4—NORTHERN VILLAGES – COOPERATION

	(1)	(2)	(3)
treated	-0.918***	-0.918*	-0.918
	(0.30)	(0.52)	(0.64)
population	0.000**	0.000	0.000
	(0.00)	(0.00)	(0.00)
distanceroad	-0.026	-0.026	-0.026
	(0.02)	(0.02)	(0.03)
age	-0.008	-0.008	-0.008
	(0.02)	(0.02)	(0.02)
education	-0.028	-0.028	-0.028
	(0.08)	(0.06)	(0.07)
income	0.000**	0.000**	0.000**
	(0.00)	(0.00)	(0.00)
male	0.505*	0.505*	0.505*
	(0.29)	(0.28)	(0.28)
riskloss	-0.124	-0.124	-0.124
	(0.14)	(0.16)	(0.16)
riskgain	0.122	0.122	0.122
	(0.16)	(0.12)	(0.13)
christian	0.163	0.163	0.163
	(0.44)	(0.58)	(0.59)
_cons	5.332***	5.332***	5.332***
	(0.69)	(1.01)	(1.06)
sigma			
_cons	2.176***	2.176***	2.176***
	(0.11)	(0.11)	(0.12)
N	328	328	328
pseudo R^2	0.021	0.021	0.021

* p<0.10, ** p<0.05, *** p<0.01

Note: Right-censored Tobit model. Dependent variable: amount of coins contributed to the public good. Robust standard error clustered at subject level (model 1), at village level (model 2), block-bootstrapped standard errors clustered at the village level (model 3).

19

the trust game does not differ between control and treated villages. A Wilcoxon rank-sum test (p=.98) and a t-test (p=.91) confirm that the difference is not statistically significant across treatments. Results from the regression analysis reported in table 5 confirm that the coefficient of the dummy *treated* is not statistically different from zero in any model specification.

FIGURE 6. TRUST IN NORTHERN VILLAGES

Note: Coins sent by the trustor in the Trust Game.

Finally, we look at data on trustworthiness for villagers in the north in treatment and control groups. An Hotelling T-squared test suggests that participants in control villages are on average significantly more trustworthy than participants who experienced the formalization of land rights (F=6, 166; p=.04).

Results from the second study can be summarized as follows:

RESULT 2: *Contrary to what happened in the most developed and market-integrated region of rural Benin, the formalization of property rights over land in the country's region characterized by the poorest market integration and worst socio-economic indicators caused a significant reduction in the level of cooperation and trustworthiness and did not increase villagers' level of trust.*

V. Discussion

In this paper, I study the effects of a major institutional reform of property rights over land on pro-social preferences. The reform formalizes customary tenure characterized by collective and informal possession, and releases land certificates

20

TABLE 5—NORTHERN VILLAGES – TRUST

	(1)	(2)	(3)
treated	0.092	0.092	0.092
	(0.17)	(0.20)	(0.27)
population	-0.000***	-0.000***	-0.000**
	(0.00)	(0.00)	(0.00)
distanceroad	-0.012	-0.012	-0.012
	(0.01)	(0.01)	(0.01)
age	0.012	0.012	0.012
	(0.01)	(0.01)	(0.02)
education	0.009	0.009	0.009
	(0.05)	(0.04)	(0.05)
income	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)
male	-0.193	-0.193	-0.193
	(0.16)	(0.13)	(0.14)
riskloss	0.087	0.087	0.087
	(0.08)	(0.06)	(0.07)
riskgain	-0.032	-0.032	-0.032
	(0.08)	(0.06)	(0.07)
christian	-0.396*	-0.396**	-0.396*
	(0.24)	(0.19)	(0.23)
_cons	2.834***	2.834***	2.834***
	(0.44)	(0.26)	(0.33)
sigma			
_cons	0.913***	0.913***	0.913***
	(0.06)	(0.12)	(0.11)
N	170	170	170
pseudo R^2	0.052	0.052	0.052

* p<0.10, ** p<0.05, *** p<0.01

Note: Right-censored Tobit model. Dependent variable: amount of coins sent by the trustor in the first stage of the Trust Game. Robust standard error clustered at subject level (model 1), at village level (model 2), block-bootstrapped standard errors clustered at the village level (model 3).

that guarantee land rights akin to private ownership. The identification strategy capitalizes on the uniqueness of the design used for implementing the institutional reform: the land rights reform is the first case of a large scale property rights reform implemented as a randomized control-trial. I capitalize on the random allocation to treatment and control villages to elicit cooperation and trust preferences by conducting lab-in-the-field experiments consisting in a public goods game and a trust game.

The study also aims at testing whether the impact of the institutional shock on agents' preferences varies according to socio-economic characteristics of the population. I conduct two identical studies in two regions of the country that, on the one hand, share the same set of formal institutions and experienced the same reform, but on the other hand are characterized by profound differences in the levels of market integration and socio-economic development. The first study collects data from 222 participants belonging to 13 villages in the rural area of Benin characterized by the highest levels of income, education, and market integration country-wise. The second study involved 332 participants in the northern area of the country that is characterized by the lowest level of market integration and socio-economic indicators.

Results from a public goods game and trust game experiments suggest that in villages characterized by highest level of market integration and socio-economic indicators the institutional reform determines a significant increase in the order of 30% - 40% of levels of cooperation and trust. In these villages, while the overall amount of trustworthiness in the trust game was also on average increasing, I did not find a significant difference in the levels of trustworthiness across treatments. Conversely, for villagers participating to the second study and belonging to the region characterized by the lowest level of market integration and socio-economic development country-wise, the institutional reform did not improve the levels of trust and significantly lowered the level of cooperation and trustworthiness.

Results from the two studies suggest two messages. First, they provide evidence that the structure and organization of formal institutions is a key determinant in shaping agents' preferences. Considering that I measure the effects of the land rights formalization seven years after the reform, results suggest that a sizable impact of institutional changes can be observed even after a relatively short time period. These findings are in line with results reported by contributions reviewed in the introduction, thus reinforcing the idea that there is a univariate causal effect of institutions on preferences.

Second, a comparison of results obtained in the two studies shows that that the same institutional shock could have opposite effects on agents' levels of prosociality depending on socio-economic characteristics of the agents affected. In the framework of this paper, the finding is even more surprising if we consider that the property rights reform has been implemented exactly at the same time and that all villages and provinces participating to the studies share the same set of formal institutions. These results support the findings of a burgeoning line of research

that suggest how a deeper understanding of human behavior requires to broaden the economic paradigm by importing insights from sociology and anthropology (Hoff and Stiglitz, 2016).

Moreover, these results draw the attention to the role that socio-economic conditions and informal institutions have in determining the success of attempts to reform formal institutions. They contribute to understand why different societies might prefer choosing different institutional structures and why formal institutions that proved to be successful in certain societies might not be transferred to other contexts. This has implications for the program design of land tenure reforms that several developing countries worldwide are currently implementing. Considering the relevance of pro-social preferences for economic development and long-term growth, it is important that evaluations of a reform's effects take into account also the consequences of important institutional changes on behavioral traits of the populations involved.

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APPENDIX A: EXPERIMENTAL INSTRUCTIONS

English translation of experimental instructions *available in the on-line Appendix.*

APPENDIX B: BALANCE OF OBSERVABLES

TABLE B1—SUMMARY STATISTICS OBSERVABLES – SOUTHERN VILLAGES

	Treated (n=114)	Control (n=104)	Diff (p-value)
age	39.41	38.19	.52
education	1.60	1.22	.13
yearsinvillage	33.4	33.2	.94
income	13587	15500	.69
male	.62	.54	.23
married	.88	.90	.59
monog	.68	.60	.21
christian	.52	.36	.02
population	1655	1736	.39
distanceroad	4.2	2.8	.49

Note: Average measures of observables used as controls. The Diff (p-value) column reports results of a t-test for comparison of means across treatments.

TABLE B2—SUMMARY STATISTICS OBSERVABLES – NORTHERN VILLAGES

	Treated (n=175)	Control (n=157)	Diff (p-value)
age	39.2	36.6	.04
education	.95	1.03	.66
yearsinvillage	33.9	31.7	.17
income	9745	8017	.19
male	.56	.56	.99
married	.88	.89	.71
monog	.35	.45	.06
christian	.26	.28	.70
population	2861	1932	.17
distanceroad	9.5	15.8	.12

Note: Average measures of observables used as controls. The Diff (p-value) column reports results of a t-test for comparison of means across treatments.

TABLE B3—CONTROL VILLAGES – COOPERATION

	(1)	(2)	(3)
south	-0.660	-0.660	-0.660
	(0.49)	(0.75)	(1.43)
population	0.001***	0.001**	0.001
	(0.00)	(0.00)	(0.00)
distanceroad	-0.038	-0.038	-0.038
	(0.02)	(0.03)	(0.09)
age	-0.007	-0.007	-0.007
	(0.03)	(0.03)	(0.03)
education	-0.022	-0.022	-0.022
	(0.12)	(0.13)	(0.13)
income	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)
male	0.277	0.277	0.277
	(0.39)	(0.36)	(0.37)
riskloss	-0.190	-0.190	-0.190
	(0.20)	(0.20)	(0.20)
riskgain	0.161	0.161	0.161
	(0.23)	(0.20)	(0.20)
christian	-0.358	-0.358	-0.358
	(0.50)	(0.66)	(0.70)
_cons	5.211***	5.211***	5.211**
	(0.99)	(1.15)	(2.55)
sigma			
_cons	2.734***	2.734***	2.734***
	(0.16)	(0.33)	(0.33)
N	254	254	254
pseudo R^2	0.010	0.010	0.010

* $p<0.10$, ** $p<0.05$, *** $p<0.01$

Note: Right-censored Tobit model. Dependent variable: amount of coins contributed to the public good. Robust standard error clustered at subject level (model 1), at village level (model 2), block-bootstrapped standard errors clustered at the village level (model 3).

TABLE B4—CONTROL VILLAGES – TRUST

	(1)	(2)	(3)
south	-0.229	-0.229	-0.229
	(0.31)	(0.53)	(0.75)
population	-0.000	-0.000	-0.000
	(0.00)	(0.00)	(0.00)
distanceroad	-0.030**	-0.030	-0.030
	(0.01)	(0.02)	(0.03)
age	0.027	0.027	0.027
	(0.02)	(0.02)	(0.03)
education	-0.047	-0.047	-0.047
	(0.07)	(0.05)	(0.07)
income	-0.000***	-0.000***	-0.000***
	(0.00)	(0.00)	(0.00)
male	0.125	0.125	0.125
	(0.24)	(0.29)	(0.32)
riskloss	-0.017	-0.017	-0.017
	(0.12)	(0.09)	(0.09)
riskgain	-0.108	-0.108	-0.108
	(0.14)	(0.12)	(0.13)
christian	-0.122	-0.122	-0.122
	(0.28)	(0.19)	(0.23)
_cons	3.173***	3.173***	3.173***
	(0.72)	(0.86)	(1.12)
sigma			
_cons	1.087***	1.087***	1.087***
	(0.08)	(0.10)	(0.10)
N	126	126	126
pseudo R^2	0.042	0.042	0.042

* $p<0.10$, ** $p<0.05$, *** $p<0.01$

Note: Right-censored Tobit model. Dependent variable: amount of coins sent by the trustor in the first stage of the Trust Game. Robust standard error clustered at subject level (model 1), at village level (model 2), block-bootstrapped standard errors clustered at the village level (model 3).