Topics

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Religious Participation, Trust and Reciprocity: Evidence from Six Latin American Cities

Abstract: Using data on a trust game played in six Latin American cities, we estimate the relationship between religious participation with trust and reciprocity. We find no association with trust but we do find a statistically significant relation with reciprocity. Individuals more active in religious organizations tend to reciprocate more than individuals who participate less, even though their trustiness on others is about the same as that of less religiously active people.

Keywords: religion, behavioral economics, game theory

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1 Introduction

Authors from different disciplines have suggested that religious beliefs may determine commitments within groups which affect cooperative behavior (represented by attitudes of trust and reciprocity), which may in turn influence collective action, e.g. signaling theory.¹ Outside signaling theory, other researchers have also suggested a possible positive link between cooperative behavior (i.e. trust and reciprocity) and religious participation mainly among members of a community.² The ultimate effect on collective action may in turn affect social

1 Starting from the seminal work of Spence (1973), Economists have been studying how market outcomes may be affected by (credible) signals in the context of asymmetric information. Religious participation and religious practices can be seen as signals towards others.

2 For a review of references, see Sosis (2005).

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behavior and economic outcomes (Weber 1930), mental health, marital stability and other social issues (Iannacone 1998).³

Although there appears to be consensus on the existence of some theoretical link between religious beliefs and attitudes toward trust and reciprocity, there is no such clear consensus on at least two issues: the sign of the relation between religiousness and behavior and the measurement of cooperative behavior.

First, is the link positive or negative? The positive relation arises from the postulates of different religions. Just to cite a few, Christians' Golden Rule, based on Luke 6:31 says: "Do unto others as you would have them do unto you"; the Islam, through Mohammed asserts: "Hurt no one so that no one may hurt you": in Judaism, Leviticus 19:34 commands: "The stranger who resides with you shall be to you as one of your citizens; you shall love him as yourself, for you were strangers in the land of Egypt". All these statements suggest that religious icons encourage cooperative behavior with other (different) individuals. On the other hand, people for whom religion is important may trust others less, suggesting that different religions may represent some sort of club where cooperative behavior is enhanced among members but it may nevertheless diminish toward non-members (Alesina and La Ferrara 2002). This may be in line with the argument that although religion and cooperation show a positive relation at the individual level, results at the aggregate level may differ.

On the empirical side, experimental and survey studies show mixed results on the association between religion and behavior, as discussed in the next section. Moreover, the definition of trust and the way it is measured remains controversial.

This paper investigates on the relation between measures of religious participation, trust and reciprocity, using data from a complete experimental study in six Latin American cities comprising more than 3,100 individuals. As explained in more detail below, participants engaged in four types of activities aimed at measuring trust and reciprocity and different types of risk aversion. Additionally, socio-economic data were collected through surveys.

We find that our measures of religious participation are significantly associated with reciprocity but not trust. Results are robust to different controls which include measures of risk aversion, homophily and socio-economic characteristics.

³ Some studies have also linked religion with improved economic growth (Barro and McCleary 2003) through its effect on the accumulation of social capital (Putnam 2000), the latter being measured either as cooperative behavior, participation on voluntary associations or voluntary giving.

2 Empirical literature review and our contribution

First, there is debate on the appropriate measures of cooperative behavior. Studies on this topic can be classified as survey-based and experimentally based. Survey-based studies use self-reported information on cooperative behavior. The World Value Surveys (worldwide) and Latinobarómetro (for Latin America) are two commonly used databases that allow for international comparison. Cooperative behavior is associated with self-reported trust on others (horizontal trust) and/or self-reported trust on different types of organizations (vertical trust). In their review of the literature, Fehr et al. (2003) argue that the usefulness of survey data in measuring trust and trustworthiness is limited by measurement error and by the questionability of their behavioral relevance. To our knowledge, survey-based studies do not provide information about self-reported reciprocity.

Experimentally based studies attempt to overcome some of the difficulties of studies based on self-reported data but may suffer from other problems such as self-selection biases and homogeneous pools measures (Fehr et al. 2003). The main methodological difference with the previous studies is that cooperation data are derived from the behavior of individuals in laboratory experiments, which means that in a certain sense it is based on the revealed preference axiom. Trust is represented not by what people say but what people do. Our paper falls in this second category.

Several studies analyze the relation between religion and cooperative behavior (Anderson, Mellor, and Milyo 2010). For example, in a series of Prisoner Dilemma experiments in two American cities that differed markedly with respect to their religion characteristics (Mormons and Secular), Orbell et al. (1992) could not find any statistically significant relation between religion and cooperative behavior. They find, however, some evidence of the relevance of contextual effects, such as the religious composition of the city, which may boost cooperative behavior among members of their own faith.

In their trust game experimental study for rural Bangladesh, Johansson-Stenman, Mahmud, and Martinsson (2009) find no statistically significant effect of religious differences on trust behavior and trustworthiness (reciprocity) among Muslims and Hindus, the two major religions in Bangladesh. Johansson-Stenman et al., however, do not focus their study on the analysis of the differences in behavior between individuals of different religions.

These last two studies compare differences in cooperative behavior within members of the same religion, thus failing to compare the attitudes toward trust of religious versus non-religious individuals, which limits the possibility of obtaining more general conclusions.

On the other hand, working with a small sample of 47 students who were asked about their religious beliefs and to play standard dictator and ultimatum games, Tan (2006) finds that although a general measure of religiosity does not significantly affect social behavior, certain dimensions of religiosity do have a significant effect.⁴ Following the same methodology, Tan and Vogel (2008)⁵ investigate the relationship between trust (cooperative behavior), religiosity and reciprocity. Controlling for gender effects, they find that trust and reciprocity increase with religiosity.

As said, Tan (2006) and Tan and Vogel (2008) consider only samples of students which by definition are not representative of country or even urban populations. Our study considers much more representative samples with the same age-sex-education and social stratum relative sizes as in each of the six Latin American cities which allow us to derive more general results on the relation between religion and cooperative behavior.

Finally, Ruffle and Sosis (2007) conduct a set of public good games among members of religious and secular kibbutzim in Israel. They find that orthodox (more religious) males make more contributions to other orthodox men than orthodox women do and more than secular males contribute to other secular men. The authors point that there are certain “costs” to be in a religious kibbutz like daily prayers that can act as signaling devices of cooperative behavior. The authors conclude that religiosity tends to favor in-group cooperation (i.e. trust) but is unable to assert the effect of religiosity on other individuals of a different group. In this sense, religiosity is like being a member of any club.

The other papers in the literature which study the relation between religion and cooperative behavior use self-reported measures of trust. As part of their study of the effect of trust on growth and using data from the World Value Surveys for 41 countries, Zak and Knack (2001) (which replicates Zak and Knack 1998) test the relation between self-reported religion preferences and religion heterogeneity on self-reported trust. They find a negative effect of religion (being a catholic) on trust,⁶ which means that religious affiliation may be detrimental

⁴ Tan distinguishes among three dimensions of religiosity: belief, experience and ritual. The first consists on statements of faith about the existence of a divine being. The spiritual dimension measures the extent to which individuals perceived themselves as to have had encounters of a religious content. The ritual dimension measures involvement in religious practices.

⁵ The characteristics of the sample are not specified. They worked with a sample of 48 individuals, of whom 60.4% are women. The survey was distributed via e-mail and the experiment took place at the European University Viadrina, Germany.

⁶ The primary focus of their study is the amount of financial services produced in the presence of moral hazard problems between brokers and clients. Higher levels of trust reduce transaction costs and increase the amount of financial services produced in the economy.

to growth, similar to the conclusions reached by Putnam (2000). However, Zak and Knack (2001) also point to the problem of causality between trust and social homogeneity: “treating formal institutions and social distances proxies as endogenous, would require finding instruments for them that are otherwise unrelated to trust, which is quite difficult.”

On the other hand, Guiso, Sapienza, and Zingales (2003) use World Value Survey data to test the relation between vertical and horizontal trust and cooperation, and its impact on economic growth. Contrary to Zak and Knack (2001), they find a positive relation between both trust indicators and religion, while being a Christian is associated with attitudes that might have a positive effect on growth.

Finally, using data from Latinobarómetro, Brañas-Garza, Rossi, and Zaclicever (2009) find that being a Catholic and attending religious services are positively associated with horizontal trust and some measures of vertical trust (e.g. trust on governments and the police), although they also claim that environmental conditions (i.e. a majority of the population being catholic) may be affecting results. They also find that religion affiliation and attendance positively affect individuals’ attitudes toward the market, while religious attendance has positive effect on individuals’ perceptions of the economic system.

The database used in this paper has previously been used in applied research. Cárdenas, Chong, and Ñopo (2008) is probably the closest in spirit to our paper. They use trust and reciprocity as dependent variables and regress them on socio-demographic characteristics of players and their expectations about the other player’s behavior. The main difference with our paper is that they include a measure of Pro-social attitude as an explanation for trust and reciprocity. This pro-social index measures the percentage of pro-social affirmations accepted by the participant (an example of this affirmation is “People should worry about other people’s wellbeing”). Cárdenas, Chong, and Ñopo (2008) is not concerned with nor includes controls for religion, religiosity or religious participation.

Cárdenas, Chong, and Ñopo (2009) analyze the effect on trust and reciprocity of socio-demographic characteristics of participant and matched player including homophily. Their principal objective is to analyze the effect of experimental variables on trust, namely participant’s risk aversion and participant’s expectations about the amount of money to be received back (in the regressions on trust) and the effective amount received from player 1 (in the regression on reciprocity). No measure of religiosity is included as an explanatory variable in any of the regressions. The work of Calónico et al. (2008) also deals with the relation among behavioral outcomes such as trust and reciprocity and other variables. Their paper, however, mainly rely on the findings of Cárdenas, Chong, and Ñopo (2008) cited above and does not include any statistical analysis that differentiates from the latter. Finally, Cárdenas and Carpenter (2013) analyze the

relation between risk attitudes and economic well-being (measured through an experimental game).

Our work improves over the existing literature in several dimensions. Among those studies that use experimental data, some of them consider the behavioral consequences of belonging to different religions. Therefore, it may be that their findings are due to a type of club effect and is not related to religiosity. In our study, trust is measured in a game where players might be of the same or different religions but this is unknown to them.

Like most of this literature, we are not able to implement a bullet proof identification strategy that could account especially for the problem of reverse causation. As stated by an anonymous referee “it could be that people with a taste for religion also have a taste for the outcome variable.” Therefore, we refer to our results as association between variables and avoid causality language.

Two other improvements relate to the database (see next section). First, other experimental studies use limited samples (e.g. university students) which preclude the discussion of general conclusions for the population as a whole. In our paper, we work with more than 3,100 players, a sample built to empirically reproduce the socio-demographic structure of the six cities considered.

Finally, our data come from lab experiments in six Latin American cities. None of the studies about religiosity and religious participation based on experimental settings employ Latin American subjects and neither uses cross country data. To our knowledge, the only study that includes Latin American individuals is Brañas-Garza, Rossi, and Zalcivever (2009), which is based on self-reported measures of trust and religion derived from the Latinobarómetro survey.

We introduce our setting in the next section. We describe the econometric methodology in Section 4. Section 5 discusses the results and Section 6 concludes.

3 Data

The data for this paper were collected for a research project on Social exclusion in Latin America financed by the Inter-American Development Bank (IADB).⁷ The IADB project was based on a set of experimental games (a bilateral one-shot

⁷ The database is publicly available. A full description of the experimental setting and survey is found in Cárdenas, Chong, and Ñopo (2008), and Candelo and Polanía (2007). Our paper uses the same database used in Cárdenas, Chong, and Ñopo (2008, 2009, 2013). To our knowledge, Cárdenas, Chong, and Ñopo (2009) is the first published paper where these data have been used.

trust game, a public good game, and a risk taking game) on six Latin American cities and a posterior survey.

The goal of the experiments was to explore the social interactions and preferences that are behind the formation of local institutions and the norms for building social capital. The six cities were Bogotá, Buenos Aires, Caracas, Lima, Montevideo and San José (Costa Rica). The individuals were selected based on convenient samples aimed at obtaining empirical distributions as close as possible to those of the populations of each city. In total, more than 3,100 individuals participated in 148 sessions.

The field work of the IADB research project was in hands of a team of researchers with experience in survey and field methods. To guarantee homogeneity in the application of experimental protocols, those researchers in charge of each city participated in a training workshop at the launching of the project that took place in Bogota in January 2007. In this workshop, researchers agreed on a uniform approach to implement the fieldwork, i.e. sampling procedures, timing of actions and the construction of questionnaires. Sampling quotas were assigned with the goal of mimicking the population of each city in four dimensions: age brackets, gender composition, education (less than completed secondary, completed secondary education, more than completed secondary education) and socio-economic stratum (proxied by neighborhood of residence). About 25 sessions were targeted in each city. For each session 30 individuals were invited. This was done under the assumption of a no-show rate of one third.⁸ Thus, the targeted number of participants per session was 20.

The invitation to participate was done several days before the scheduled sessions. In order to avoid differences in the recruitment between cities, the same invitation letter was used in all cities carrying the same information and requesting prospective participants' basic demographic questions. This information was used by the researchers in charge of each country field to control how sampling quotas were being completed. This was revised every day after the games were concluded. Prospective participants were promised a minimum show up fee and were informed of the expected monetary gains from participation. Reminders were made the day before the session either by phone or home visit and if necessary transportation was provided. Upon arrival to the place where the activities would take place, participants were welcomed by experimental teams and conducted to the rooms assigned to them for the first activity (the trust game).

⁸ As pointed by an anonymous referee, the no-show rate might be associated with the cooperative spirit of individuals and as such might induce a certain bias in the measures of cooperative behavior. This critic affects almost all this literature since participation in experimental games is in general, non-mandatory.

After completing the games, all participants were surveyed to collect additional information including socio-demographic information, beliefs about social exclusion and religious participation. To minimize problems of reading comprehension, the surveys were administered by research assistants trained for that purpose. After the surveys were completed, participants were paid based on the results of one of the experiments which were randomly selected in front of them.

Table 1 taken from Cárdenas, Chong, and Ñopo (2009) shows basic demographic characteristics and characteristics of the games in each city.

Table 1: Demographic characteristics of the participants in the experiments

Descriptive statistics	Bogotá	Buenos Aires	Caracas	Lima	Montevideo	San José
Average age	37	40	35	37	41	37
Percent of female population	55	53	51	52	55	54
Percentage with public education	72	82	73	83	90	89
Percentage working in the public sector	10	14	25	11	17	21
Percentage with social security	89	66	40	26	78	59
Parental relationship (percentage)						
Household head	44	43	25	38	45	38
Wife/husband	22	25	26	24	20	23
Son/daughter	25	27	32	20	25	24
Other	9	4	17	8	10	14
Marital status (percentage)						
Single	34	34	44	36	30	40
Formal/informal Union	48	52	50	51	47	45
Divorced, widow	18	14	7	13	23	14
Educational level (percentage)						
Secondary incomplete or less	43	52	55	31	60	59
Secondary complete	27	20	24	36	15	16
Tertiary complete or incomplete	30	28	20	33	25	25
Socio-economic level (percentage)						
Low	47	52	34	59	22	27
Middle	38	27	52	25	55	50
High	15	20	14	17	23	23
Sessions						
Number of participants	567	498	488	541	580	415
Number of sessions	28	25	25	25	28	17
Size of the group for the smallest session	12	14	14	14	14	10
Size of the group for the largest session	29	30	28	32	30	39
Average size per session	21	20	20	23	22	27

Source: Cárdenas, Chong, and Ñopo (2009).

In this paper, we take into account the result of one activity, namely the Trust Game, where participants were assigned to pairs. Half played the role of player 1 and half played the role of player 2. Players never met, but were informed about some of the other player's characteristics: age, sex, education level and neighborhood of residence (as a proxy of socio-economic background). This information was provided to test how some characteristics that are easily observable in the real-world affect social interaction. Both players were given an endowment in local currency (approximately \$5). Player 1 was asked to decide how much to send to player 2. The options given were \$0, \$1.25, \$2.5, \$3.75 or \$5 corresponding respectively to 0%, 25%, 50%, 75% or 100% of his endowment. The amount chosen by player 1 was trebled and sent to player 2. In a separate room, player 2 was asked to decide how much to return to player 1 for each possible offer from player 1.⁹ After making the decision, both players were asked to predict the decisions made by the other player.

This game allows us to measure trust and reciprocity. The sub-game perfect Nash equilibrium of this game is that neither player sends anything to the other. Player 2 has no incentive whatsoever to send to player 1. Anything that he sends to player 1 is less money that he keeps. A rational player 1, reasoning by backward induction will therefore send nothing to player 2. On the other hand, if player 1 and player 2 were close friends who planned to share the earnings of the game or if there existed a commitment device to equally sharing the joint payoffs it would be in the best interest of both players that player 1 would send his whole endowment to player 2. Comparing the Nash equilibrium with the players' social optimum, it follows that higher initial offers (by player 1) are interpreted as signals of more trust and higher returns by player 2 are interpreted as signals of more reciprocity.

The literature has been discussing how good are trust games with respect to obtaining measures of trust and reciprocity and whether other motives (not trust) could influence the decision of the trust games. One such possibility is that what is really driving players' decisions is their different degree of risk aversion. If this is true, we may be confounding higher levels of trust with lower levels of risk aversion. In order to avoid this problem, in our empirical estimates we control for risk aversion that is elicited using data from a specific risk game.

Altruism has been signaled as an alternative motivation that could introduce noise in the interpretation of the trust game. Cox (2004) proposes a

⁹ The strategy method followed here asks player 2 for the full strategy of behavior instead of responding to the actual offer of player 1. The benefit of this procedure is that it provides much more information. On the other hand, some people may find it more difficult to think in these terms.

three-game design to identify trusting and reciprocating behavior and to differentiate it from altruistic or inequality-averse other-regarding preferences. Our experimental design does not allow for this and we follow the most traditional literature in the interpretation of the outcomes of the one-shot trust games as measures of trustiness and reciprocity. In our empirical exercises, we control for a variety of socio-economic and demographic characteristics that could capture motives like altruism (e.g. we include controls for homophile between players where altruism is likely to be higher). The post-games survey allows us to build several measures of religious participation. Participants were asked if they participate in several groups or organizations. One of them was religious organizations. After that they were asked if they go to the organization's meetings and how many hours per month they dedicate to this organization.¹⁰ Based on these three questions, we construct our three proxies for religious participation: (i) whether an individual is a *member* of a religious organization, (ii) if he participates in *meetings* of the religious organization and (iii) how many *hours* a month he dedicates to religious activities. There were two other questions regarding being a religious leader and if the individuals took part of the decisions of the religious organizations. We discarded these two variables because very few of the respondents were leaders or took part of decisions.

4 Econometric specification

Our econometric setting is defined by the following model:

$$Y_{ij} = \alpha \text{Rel}_{ij} + \beta X_{ij} + \sum_j \gamma I_j + v_j + \varepsilon_{ij} \quad [1]$$

where j indexes the city and i the individual within the city. y_{ij} is the outcome of interest (Trust or Reciprocity), X_{ij} are observable characteristics that might influence the outcome variable, I_j are dummy variables to capture city fixed effects, v_j is an error term that is constant within cities and ε_{ij} is an individual specific error term. Trust and Reciprocity describe the behavior of individuals when deciding how much money to transfer from player 1 to player 2 and vice versa during the Trust Game.

¹⁰ The exact wording in Spanish for the three questions was “¿Participa en alguno de los siguientes grupos u organizaciones?”, “¿Va a las reuniones?” and “Habitualmente, ¿Cuántas horas al mes dedica a asistir a este grupo u organización?”.

We compute Trust as the percentage of money that player 1 initially transfers to player 2. Player 1 is given the chance to transfer nothing, 25%, 50%, 75% or 100% to player 2, without knowing how much money player 2 will transfer back. Thus, our measure of Trust takes values 0, 0.25, 0.50, 0.75, or 1.

We compute Reciprocity for every possible initial transfer from player 1, as the money player 2 is willing to return to player 1 expressed as a percentage of the total amount of money received by player 2 (including the initial endowment received at the start of the game). For each player 2, reciprocity is a variable that takes values from 0 (when player 2 does not return money to player 1) to 1 (when player 2 returns to player 1 the entire amount of money player 2 received, including his initial endowment). For instance: if player 1 sends 0 then player 2 has only his initial endowment and is given the chance to send to player 1 \$0, \$1.25, \$2.5, \$3.75 or \$5 corresponding to 0%, 25%, 50%, 75% or 100% of the money he has available. If player 1 send \$2.5 (50% of his endowment), player 2 ends up with \$12.5 ($\$5 + \2.5×3). He is giving the chance to send back to player 1 \$0.00, \$1.25, \$2.50, \$3.75, \$5.00, \$6.25, \$7.50, \$8.75, \$10.00, \$11.25, \$12.50 corresponding respectively to 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90% or 100% of the money he has available. Since we are using the strategy method player 2 gives five different reciprocity answers, one corresponding to each hypothetical amount player 1 might have sent him.

Our main explanatory variable reflects different dimensions of religiosity. The survey does not enquire about religious beliefs but about religious participation. The three variables of religious participation are: *Member* (a dummy variable taking the value 1 for members of religious organizations and 0 otherwise), *Meetings* (a dummy variable taking the value 1 for those that attend regular meetings or their religious organization and 0 otherwise) and *Hours* (the average amount of monthly hours dedicated to the religious organization) participation.

In the estimation, we control for several socio-demographic characteristics including age, gender, education, marital status and socio-economic level which may be associated with trust but also with religiosity. Psychological studies affirm that older individuals trust other individuals more than younger individuals (Stolle 1998). In our estimation, education is defined as the number of years of formal education. Education might have a positive effect on trust since more education may allow individuals to better assess market conditions (i.e. reduce information externalities, for example) and personal characteristics of other individuals and groups of individuals, leading to higher levels of social capital (Putnam 2000). Marital status has been reported to affect psychological well-being across an extensive array of measures (Marks 1996). We disaggregate marital status in single, married, free union, divorced and widowed. The omitted

category in the regressions is married. Socio-economic level is also a categorical variable taking three values: low, medium and high. In our estimations, low socio-economic level is the omitted category. Individuals' socio-economic level is assigned according to the neighborhood of residence.

The characteristics of the partner might also influence trust and reciprocity behavior of individuals. As explained, information on age, educational background, sex and neighborhood of residence (as a proxy of socio-economic background) was given to each player before they make their decision. In our estimations, we control for possible homophily, i.e. the possibility that individuals tend to behave nicer to those that are more similar to them. For the first two characteristics, we include a variable which is the difference in years of age or years of education between both players. For socio-economic level, we include a dummy taking the value 1 whether the other player was of a lower socio-economic level and another dummy taking the value 1 whether the other player was of a higher socio-economic level. The omitted category is precisely when both players are of the same socio-economic level. Finally, with respect to gender we include three dummy variables: whether both players are men, both are women or if the player making the decision (player 1 in the trust decision and player 2 in the reciprocity decision) is a man and the other player is a woman. The omitted category is when the player receiving the money (player 2 in the trust decision and player 1 in the reciprocity decision) is a woman and the other player is a man.

When analyzing the determinants of trust and reciprocity, it is necessary to control for the expectations of different players since what a player expects to receive may condition the amount he intends to send (or send back). Both players were asked how much they expect to receive from the other player. The expectation variable takes values from 0% to 100%.

Finally, trust is conditioned on the degree of risk aversion to minimize the risk of confounding trust with low risk aversion. The degree of risk aversion is computed on the results of a Risk Game in which each player makes individual decisions to choose over a set of six 50/50 lotteries that go from a sure low payoff to an all-or-nothing higher expected payoff. Choosing lotteries with lower average payoffs and lower variance of the payoffs is interpreted as greater risk aversion. Based on those decisions, the risk aversion level of the participant is categorized as low, medium or high. Our results are robust to alternative implementations of the risk aversion variable.

One limitation of our database is that it does not allow us to differentiate between religious denominations and therefore we cannot control for them. This might be important since some religious beliefs, such as Post-Vatican II Catholicism are critical about trusting other individuals outside their own beliefs, while the opposite effect occurs with Protestantism which foster

attitudes leading to a more positive trustworthy attitude toward others (Putnam 1993; Daniels and von der Ruhr 2010).

According to the CIA World Fact book, the vast majority of habitants of the countries under study are Catholic Christians. Uruguay is the country with the lower percentage of Christians and the larger percentage of agnostic individuals. Costa Rica, Peru and Colombia have important non-Catholic Christian groups that account between 10% and 15% of their population. Among individuals with some religious participation, the degree of it might be dependent on the particular religious denomination of each one (rituals and religious duties vary among religious denominations) and in our exercise we cannot control for this. Fortunately, two of our religious participation variables are not affected by this since they are dummy variables whether the individual is a *member* or *attends* the meetings of a religious group. These variables do not have variation on the intensive margin (how much they participate per unit of time). On the other hand, *hours* as a measure of how intensive is religious participation could be affected by differences in denomination among individuals. To avoid problems due to the difference religious structure of the cities, we include city fixed effects to capture community city traits. Therefore, the identification of the religious participation coefficient is due to variation within cities in trust/reciprocity-religious participation and not due to between city differences.

5 Results

Table 2 reports average religious participation according to our three measures. On average, 16% of Latin Americans are members of religious organizations. In our sample, Montevideo is the city with the lowest religious institutional affiliation (8.9%) while San Jose shows the highest institutional affiliation (23.1%). About 15.6% of individuals attend regular meetings. On average, individuals in

Table 2: Dimensions of religiosity (averages)

	Bogotá	Buenos Aires	Caracas	Lima	Montevideo	San José	Average
Member of religious organization	20.6%	14.8%	8.9%	14.5%	8.9%	23.1%	16.0%
Attending meetings of religious organization	20.2%	14.4%	8.8%	14.1%	8.3%	21.4%	15.6%
Hours spend in religious activities per month	2.9	1.6	3.4	1.9	0.9	3.1	2.2

our sample dedicate slightly more than 2 hours per month to activities related to religious organizations.

Table 3 shows that players’ 1 sent, on average, 44.6% of their endowment to players’ 2 and they were reciprocated with 23.7% on players’ 2 endowment. Clearly players do not play the sub-game perfect Nash equilibrium and act in a more cooperative way. On average, trusting resulted in a good investment since players 1 receive about 24% more of what they sent. These statistics are similar to others reported in the literature as summarized by Cárdenas and Carpenter (2008). For instance: Berg, Dickaut, and McCabe (1995) working with American students reports that first movers sent on average 52% of their endowments while players 2 send back 30% of what their receive. In this study, players 1 received only 90% of what they sent. Fehr and List (2004) working in Costa Rica report that students send on average 40% of their endowment and reciprocate with 32% of what they receive. In this game, trust is also not a good investment since players 1 receive back about 96% of what they send. Burks, Carpentener, and Verhogen (2003) report similar deviation from the Nash equilibrium and find on average, as we do, that trusting does pay. Players 1 sent on average 65% of their endowment while players 2 reciprocated with 40% of what they received. As a result, on average players 1 received about 20% more than what they sent.

Table 3: Trust, reciprocity and religious participation (mean difference tests)

Variable		Total	Member of religious organization		Mean diff
			Yes	No	
Trust	Mean	44.6%	44.9%	44.6	−0.3%
	Observations	1,518	222	1,296	
Reciprocity	Mean	23.7%	25.89	23.35	−2.54%***
	Observations	7,824	1,075	6,749	

Notes: *Significant at 10%; **Significant at 5%; ***Significant at 1%.

Table 3 also disaggregates trust and reciprocity statistics among those that belong to a religious organization and those that do not. On average, members of religious organizations trust and reciprocate more than non-members but the difference is only statistically significant for reciprocity according to a *t*-test of mean differences.

Table 3 is not able to control for other variables that might be correlated with religious participation and the outcome variables. We proceed then to estimate pooled regressions that are reported in Tables 4 and 5. Since we control

Table 4: Religiosity and trust (decision made by Player 1)

	Membership	Meetings	Hours
% expected by Player 1	0.003 (0.001)***	0.003 (0.001)***	0.003 (0.001)***
Mid risk aversion	0.065 (0.033)*	0.065 (0.033)*	0.064 (0.033)*
High risk aversion	0.005 (0.031)	0.006 (0.031)	0.006 (0.031)
Age	0.004 (0.004)	0.004 (0.005)	0.004 (0.005)
Age squared	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Years of education	0.010 (0.005)**	0.009 (0.005)**	0.009 (0.005)**
Middle socio-economic level	-0.022 (0.030)	-0.022 (0.030)	-0.022 (0.030)
High socio-economic level: high	0.018 (0.036)	0.019 (0.036)	0.020 (0.036)
Marital status: single	-0.027 (0.036)	-0.027 (0.036)	-0.026 (0.036)
Marital status: free union	-0.076 (0.036)**	-0.076 (0.036)**	-0.075 (0.036)**
Marital status: widow	0.039 (0.055)	0.037 (0.055)	0.037 (0.054)
Marital status: divorced	-0.043 (0.040)	-0.043 (0.040)	-0.041 (0.040)
1 if both Players are men	-0.037 (0.032)	-0.039 (0.033)	-0.039 (0.033)
1 if both Players are women	-0.021 (0.032)	-0.023 (0.032)	-0.024 (0.032)
1 if Player 1 is a man, Player 2 is a women	-0.068 (0.034)**	-0.070 (0.034)**	-0.071 (0.035)**
Age difference	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Schooling difference	-0.002 (0.004)	-0.002 (0.004)	-0.002 (0.004)
If participant is at lower socio-economic level	-0.002 (0.031)	-0.001 (0.031)	-0.000 (0.032)
If participant is at higher socio-economic level	0.043 (0.028)	0.044 (0.028)	0.044 (0.028)
Membership	-0.011 (0.034)		
Meetings		-0.006 (0.035)	
Hours			0.000 (0.001)
Constant	0.255 (0.109)**	0.254 (0.109)**	0.247 (0.110)**
Observations	1465	1463	1461
R ²	0.144	0.144	0.144

Notes: Robust standard errors in parentheses. *Significant at 10%; **Significant at 5%; ***Significant at 1%.

Table 5: Religiosity and reciprocity (decision made by Player 2)

	Membership	Meetings	Hours
% of money expected by player 2	0.186 (0.014)***	0.186 (0.014)***	0.186 (0.014)***
Age	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
Age squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Years of education	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)
Middle socio-economic level	0.008 (0.009)	0.008 (0.009)	0.008 (0.009)
High socio-economic level	0.016 (0.014)	0.017 (0.014)	0.016 (0.014)
Marital status: single	0.005 (0.012)	0.005 (0.012)	0.005 (0.012)
Marital status: free union	-0.008 (0.011)	-0.008 (0.011)	-0.008 (0.011)
Marital status: widow	-0.018 (0.022)	-0.018 (0.022)	-0.019 (0.022)
Marital status: divorced	-0.014 (0.012)	-0.014 (0.012)	-0.013 (0.012)
1 if both players are men	-0.034 (0.011)***	-0.035 (0.011)***	-0.035 (0.011)***
1 if both players are women	-0.038 (0.009)***	-0.038 (0.009)***	-0.038 (0.009)***
1 if Player 2 is a women and Player 1 is a man	-0.045 (0.010)***	-0.045 (0.010)***	-0.045 (0.010)***
Age difference	-0.006 (0.003)*	-0.006 (0.003)*	-0.007 (0.003)**
Schooling difference	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
If participant is at a lower socio-economic level	0.003 (0.010)	0.003 (0.010)	0.004 (0.010)
If participant is at a higher socio-economic level	-0.003 (0.010)	-0.003 (0.010)	-0.003 (0.010)
Membership	0.021 (0.009)**		
Meetings		0.019 (0.009)**	
Hours			0.001 (0.000)**
Constant	0.123 (0.036)***	0.124 (0.036)***	0.114 (0.037)***
City fixed effects	Yes	Yes	Yes
Observations	7,686	7,676	7,651
R ²	0.173	0.172	0.173

Notes: Robust standard errors in parentheses (clustered at individual level). *Significant at 10%; **Significant at 5%; ***Significant at 1%.

for common city characteristics, the estimated coefficients are not due to differences in average city religiosity, rather its association with trust and reciprocity is captured through within city variation.¹¹

A potential problem in interpretive positive association between religiosity and trust is that it might be argued that people with a taste for religion also have a taste for trust. If this is indeed true trusting others can lead to more religious participation and not the other way round. This precludes the interpretation of a significant effect as being the product of a causal relation since the estimations might be biased in favor of finding a positive relation. This critique is especially strong for studies based on self-reported trust measures where there are “socially expected” answers related to trusting and participation in social organizations. In our case, this problem is ameliorated (but not eliminated) due to the use of experimental data. Despite this potential problem related to causality, we do not find any significant effect of any of our three dimensions of religiosity on trust. In contrast, we find that the three measures of religiosity are statistically significant associated with reciprocity.

Table 4 shows that trust (the percentage transferred by player 1 to player 2) is positively and significantly associated with the percentage of money player 1 expects to receive back from player 2. In other words, the more one expects to receive back, the more one is willing to give. Interestingly, while individuals showing the highest level of risk aversion are not willing to transfer more than less risk-averse individuals, those with an intermediate level of risk aversion, indeed do trust other individual more. While we find no significant differences according to age or socio-economic level, more education is associated with higher levels of trust. Married individuals (the omitted marital status category) trust others more than individuals living with partners out of wedlock as shown by the negative sign of the coefficient on free union. According to Table 5 reciprocity is significantly and positively associated with the amount of money players expect to receive from the other person. Older individuals reciprocate more than younger individuals but we do not find a statistically significant relation between years of education or socio-economic level with reciprocity.

¹¹ We also run regressions for each city and for each amount sent by Player 1. Dividing the dataset in this manner lowers considerably the statistical power and as a result in many cases we miss statistical significance. In the Appendix, we present the results for one of the cities, Bogotá. Regressions by city level are available as supplementary material in the web page of the first author. <http://docentes.ort.edu.uy/perfil.jsp?docentId=827>

In our estimations, we control for homophily in age, education, gender and socio-economic level. The trust regression of Table 4 reports a statistically significant coefficient when player 1 is a man and player 2 is a woman with a negative sign suggesting that men tend to trust women less than other men, a form of homophily. Table 5 shows age homophily in the reciprocity estimation: as the age difference is larger the amount sent by player 2 to player 1 decreases. Also it shows that all three dummy variables for gender homophily are negative and statistically significant. The negative coefficient when player 2 is a woman and player 1 is a man implies that males reciprocate to females more than to other males suggesting a type of chivalry. Considering the size of the coefficients, the order of reciprocity by gender pairs is as follows (more to less reciprocity): male to females, males to males, females to females and finally females to males. Without consideration to the gender of the partner males reciprocate more to females do. Our results on homophily are similar to those reported by Cárdenas, Chong, and Ñopo (2008).

Cárdenas and Carpenter (2013) study the effect of various socio-economic and demographic variables on risk attitudes. Given that we find that trust is affected by risk aversion it could be argued that trust is itself a function of the determinants of risk aversion. We test the robustness of our results by including a variety of additional controls including ethnic heritage, measures of wealth (e.g. number of bedrooms in household, number of income earners in household) and measures of exclusion (e.g. individual's access to credit and access to political activities during the past 5 years). The effects previously reported on both trust and reciprocity are qualitatively the same and quantitatively almost not affected.

6 Conclusions and discussion

Using evidence from experimental trust games from six Latin American cities (Bogotá, Buenos Aires, Caracas, Lima, Montevideo and San Jose), we test the association of three self-reported dimensions of religious participation on attitudes reflecting trust and reciprocity elicited through an experimental game. The three dimensions of religious participation include being a *member* of a religious organization, attending religious *meetings*, and the number of monthly *hours* dedicated to religious activities.

We do not find any significant association of religious participation on attitudes toward trust. Since we analyze the effects of religiosity on generalized trust, our finding is in line with Guiso, Sapienza, and Zingales (2003) who find a significant and positive effect of religiosity on trust toward fellow religious members but not to seculars. Since we use revealed measures of trust, we suggest that our results are stronger should we have used self-reported measures of trust, which might be affected for the “socially expected” answer. More religious people, people with more religious participation, are probably socially expected to trust more others than less religious people.

On the other hand, we do find that religious participation is positively correlated with reciprocity in our three proxy variables. Individuals more active in religious organizations show higher probability of giving money back to their partners regardless of the amount received in the first place.

The different association of religious participation with trust and reciprocity is somewhat puzzling. Although we do not have a definitive answer, we conjecture that the key difference in our results might be due to the reciprocity decision being taken conditional on a previous action of the first player. That is to say, the second player decides how much to send back to the first player assuming a certain level of cooperation from the first player. In that sense, the individual playing the reciprocity decisions has more information on his partner than the individual playing the trust decision. The socio-demographic information provided to both players previous to their decisions gives a noisy signal on who the partner is. The decision of player 1 (even if it is an assumed decision by player 2) better informs the second player on how cooperative his partner actually is.

The literature has signaled that religion may induce more trust within a specific religious group (the group effect). Our results suggest that the effect does not generalize to the population as a whole. The signal observed before the reciprocity decision may work as a group effect: more religiously active individuals tend to show higher appreciation of the trustiness deposited in them by the first player and as such reciprocate more. The converse of this interpretation is that without a signal of the other side individuals with more religious participation behave no different than secular individuals.

The latter point may lead us to think about the reciprocity effect found in this paper in terms of what is commonly known as conditional cooperators (Fischbacher, Gächter, and Fehr 2001) or strong reciprocators (Bowles and

Gintis 2011) in the public goods literature.¹² Individuals, as conditional cooperators or reciprocators, may contribute to the public game based on their beliefs about the contributions of others. Furthermore, conditional cooperators may create norms which perpetuate contributions to the public good and religious individuals may incorporate many different types of norms with the same consequences (perpetuate contributions to the public good).

Also, many other forms of social life may have an impact on trust and reciprocity. For example, experimental studies in the field of microfinance show that individuals who meet more frequently are more willing to pool risk with other members (Feigenberg, Field, and Pande forthcoming). Moreover, they were less likely to default on loans. In other words, socialization appears to affect trust independently of religious beliefs. We do not delve into socialization issues because we want to keep the focus on our paper on the effect of different measures of religiosity. Another example of many aspects of social life affecting human behavior is contained on the literature coined as “religious pro-sociality” (Norenzayan, Henrich, and Slingerl and 2013). These authors claim that some contextual socio-historical environments affect the link between some religious practices and social interaction (behavior) measured as the amount of charitable donations and the participation in volunteer activities, and cooperation levels in public goods games.

Last but not least, some authors working on behavioral economics (e.g. Adan Ariely at <http://danariely.com/>) have suggested that the link between religion and religiosity may act as moral reminder that may lead individuals to adopt more collaborative (i.e. trusting) attitudes. Ariely supports his conclusions on experimental research: individuals (either religious or atheists), when exposed to the reading of the 10 Commandments tend to cheat less than those individuals not exposed. He explains: “our experiments showed that people became more honest when we got them to think about the Ten Commandments, swear on the Bible (which, interestingly, worked for atheists too) or even just sign their name first on a document. But our experiments were a one-shot exercise, and we don’t have data about what would happen if we repeated them over time.”

¹² The method used in this literature is a variant of the strategy method we used in this paper. In other words, subjects are requested to indicate how much they are willing to contribute to the public good *for each average contribution level of other group members* As explained in footnote 8, we compute the amounts sent back for every amount sent by the first player.

Appendix

Table 6: Religiosity and reciprocity in Bogota (decision made by Player 2 conditional on amounts send by Player 1)

	Player 1 sends nothing			Player 1 sends 25%			Player 1 sends 50%			Player 1 sends 75%			Player 1 sends 100%		
	Membership	Meetings	Hours	Membership	Meetings	Hours	Membership	Meetings	Hours	Membership	Meetings	Hours	Membership	Meetings	Hours
% of money expected by player 2	0.208 (0.054)***	0.207 (0.054)***	0.210 (0.054)***	0.201 (0.041)***	0.201 (0.041)***	0.203 (0.041)***	0.193 (0.036)***	0.194 (0.036)***	0.196 (0.037)***	0.147 (0.037)***	0.147 (0.037)***	0.152 (0.039)***	0.156 (0.038)***	0.156 (0.037)***	0.161 (0.037)***
Age	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Years of education	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.005)	0.001 (0.004)	0.001 (0.004)	0.001 (0.004)	0.005 (0.004)	0.005 (0.004)	0.005 (0.004)	0.001 (0.004)	0.001 (0.004)	0.000 (0.004)	0.006 (0.004)*	0.006 (0.004)	0.005 (0.004)
Middle socio-economic level	-0.050 (0.052)	-0.052 (0.053)	-0.072 (0.049)	-0.004 (0.035)	-0.004 (0.035)	-0.013 (0.035)	0.011 (0.040)	0.013 (0.040)	0.002 (0.039)	0.017 (0.031)	0.015 (0.031)	0.004 (0.029)	0.014 (0.043)	0.014 (0.043)	0.002 (0.041)
High socio-economic level	-0.010 (0.070)	-0.012 (0.070)	-0.034 (0.067)	0.019 (0.047)	0.019 (0.047)	0.010 (0.047)	0.046 (0.055)	0.048 (0.055)	0.035 (0.053)	0.027 (0.047)	0.026 (0.047)	0.013 (0.047)	0.051 (0.054)	0.051 (0.054)	0.037 (0.052)
1 if both players are men	-0.040 (0.039)	-0.042 (0.038)	-0.042 (0.038)	-0.027 (0.037)	-0.028 (0.037)	-0.029 (0.037)	-0.001 (0.032)	-0.003 (0.032)	-0.004 (0.032)	0.028 (0.031)	0.026 (0.030)	0.025 (0.031)	0.005 (0.032)	0.002 (0.032)	0.002 (0.032)
1 if both players are women	-0.021 (0.039)	-0.022 (0.038)	-0.025 (0.039)	-0.054 (0.033)	-0.055 (0.033)*	-0.056 (0.033)*	-0.043 (0.027)	-0.045 (0.027)	-0.046 (0.028)*	-0.008 (0.025)	-0.009 (0.025)	-0.012 (0.025)	-0.010 (0.028)	-0.012 (0.028)	-0.015 (0.029)
1 if Player 2 is man, Player 1 is a woman	-0.021 (0.039)	-0.023 (0.039)	-0.030 (0.039)	-0.058 (0.032)*	-0.059 (0.032)*	-0.061 (0.033)*	-0.042 (0.028)	-0.042 (0.029)	-0.045 (0.029)	-0.045 (0.023)*	-0.047 (0.023)**	-0.049 (0.023)**	-0.046 (0.023)**	-0.048 (0.024)**	-0.050 (0.023)**
Age difference	0.015 (0.016)	0.015 (0.016)	0.015 (0.016)	-0.022 (0.012)*	-0.023 (0.012)*	-0.023 (0.012)*	-0.019 (0.012)	-0.019 (0.012)	-0.019 (0.012)	-0.008 (0.011)	-0.008 (0.011)	-0.008 (0.011)	-0.025 (0.011)**	-0.025 (0.011)**	-0.026 (0.011)**
Schooling difference	-0.002 (0.004)	-0.002 (0.004)	-0.001 (0.004)	-0.003 (0.003)	-0.003 (0.003)	-0.003 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	-0.003 (0.003)	-0.003 (0.003)	-0.003 (0.003)

(continued)

Table 6: (Continued)

	Player 1 sends nothing			Player 1 sends 25%			Player 1 sends 50%			Player 1 sends 75%			Player 1 sends 100%		
	Membership	Meetings	Hours	Membership	Meetings	Hours	Membership	Meetings	Hours	Membership	Meetings	Hours	Membership	Meetings	Hours
1 if participant is at a lower income level	0.053 (0.053)	0.055 (0.053)	0.074 (0.05)	0.003 (0.035)	0.002 (0.035)	0.01 (0.035)	-0.007 (0.042)	-0.009 (0.042)	0.001 (0.04)	0.016 (0.035)	0.017 (0.035)	0.027 (0.034)	-0.017 (0.045)	-0.019 (0.045)	-0.007 (0.043)
1 if participant is at higher income level	-0.142 (0.079)*	-0.142 (0.079)*	-0.150 (0.079)*	-0.070 (0.065)	-0.070 (0.064)	-0.074 (0.064)	-0.047 (0.038)	-0.047 (0.037)	-0.052 (0.037)	-0.060 (0.043)	-0.059 (0.043)	-0.065 (0.043)	-0.050 (0.049)	-0.049 (0.049)	-0.056 (0.050)
Membership	0.050 (0.037)			0.036 (0.03)			0.047 (0.031)			0.063 (0.029)**			0.074 (0.035)**		
Meetings		0.052 (0.037)			0.031 (0.031)			0.033 (0.031)			0.061 (0.029)**			0.062 (0.035)*	
Hours			0.003 (0.001)***			0.001 (0.001)**			0.002 (0.001)**			0.002 (0.001)***			0.002 (0.001)***
Constant	0.202 (0.085)**	0.203 (0.085)**	0.214 (0.086)**	0.104 (0.074)	0.107 (0.074)	0.114 (0.074)	0.064 (0.064)	0.07 (0.064)	0.078 (0.064)	0.111 (0.060)*	0.114 (0.060)*	0.129 (0.060)**	0.024 (0.061)	0.03 (0.061)	0.045 (0.061)
Observations	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282
R ²	0.119	0.119	0.127	0.177	0.175	0.176	0.202	0.196	0.199	0.170	0.168	0.164	0.173	0.165	0.163

Notes: Robust standard errors in parentheses (clustered at individual level). *Significant at 10%; **Significant at 5%; ***Significant at 1%.

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