Department of Economics
University of Granada
SPAIN

http://www.ener-online.org

http://www.ugr.es/~teoriahe/

Papers on Economics of Religion

PER 06/05

Individual's religiosity enhances trust: Latin American evidence for the puzzle

Pablo Brañas-Garza
Universidad de Granada, España

Maximo Rossi & Dyane Zaclicever
Universidad de la República, Uruguay

Individual's religiosity enhances trust: Latin American evidence for the puzzle*

Pablo Brañas-Garza[+]
Universidad de Granada, Spain

Máximo Rossi & Dayna Zaclicever
Universidad de la República, Uruguay

[+] **Corresponding author:** Departamento de Teoría e Historia Económica, Facultad de CC. Ecónomicas, Universidad de Granada, 18011 Granada, Spain. Tel.: +34-958-246192 (FAX: 9995); pbg@ ugr.es

May 5, 2006

*Special thanks to Masao Ogaki who invited us to explore upon these ideas. Martha Gaustad revised the English grammar. Pablo Brañas acknowledges the financial support received from the Fundación Ramón Areces (2005) and DGCYT (SEJ2004-07554/ECON).

Abstract

This paper explores the effect of religious observance and affiliation to the dominant religion (Catholicism) on trust in institutions, towards others and market attitudes. The analysis is performed using a Latin American database of twenty thousand respondents from 2004 by means of ordered probit models. The most interesting results are:

i) *Trust toward others is positively correlated with religious observance* and *with Catholic affiliation.*

ii) There is a *positive correlation between trust in the government, in the police, in the armed forces, in the judiciary and in the banking system and religious practice* in general. Identical positive results are obtained for *Catholic affiliation.*

iii) Correlations with attitudes toward *the market,* in general, are heterogeneous but *never negative.*

In sum, *individual's level of religiosity crucially affects trust in institutions and toward peers. We also found that Catholicism encourages both trust in institutions and towards others.* Thus, we found a positive effect of "religiosity" on social capital. In fact, we never *found any negative (and significant) effect on the variables considered.*

Keywords: trust in institutions, economic behavior, religious practise, Catholics.

JEL Class.: Z12, Z13.

1 Introduction

In very recent years, and after a long period of neglect, the economic profession has begun to devote increasing attention to religion. This "emerging" discipline, known as the *Economics of Religion*, has two prominent approaches: the economic analysis of religious behavior within an economic model and the study of the consequences of religion and religiosity on economic behavior. This paper falls within the second sphere.[1]

The effect of any *religious frame* on economic behavior is not a trivial issue. Imagine for instance a religion which imposes constraints upon individuals[2] and that this restriction might affect economic behavior. In this case, the whole economic system would then be driven by such an institution. Guiso, Sapienza and Zingales [10] note that there is something intrinsic to certain religions that constrains subjects and inhibits economic growth.

The relationship between religion and education and human capital investment has been the most prominent research topic. In a seminal work, Azzi–Ehremberg [2] used a classical intertemporal choice model to show the negative effect of education on churchgoing according to the *secularization hypothesis*[3], which predicts the negative effect of education on religious activities. However, recent empirical studies show both positive and negative effects of schooling and education on religious activity (and vice versa). A clear example of these controversial results is the work by Shoshana Neuman. In her work on Israelis, Neuman [12] shows a *negative* influence of religiosity on education. Yet with Brañas-Garza [6] for Spaniards, she illustrates just the opposite effect (a positive correlation between education and religion) for Spanish Catholics.

According to Sacerdote and Glaeser [17], there are positive spillover effects of religion on education given that religious participation enlarges networking. Education increases the returns from network participation and other forms of *social capital*[4], thus, more highly educated people participate more

[1] The list is not exhaustive. A third line of research might include the study of religious markets, while a fourth could be related to *Religious Economics* in the normative sense. The most obvious example regarding the latter is *Islamic Economics*, although the Association of Christian Economists (ACE) also follows similar motivations.

[2] An obvious example could be the Koranic precept (al–Qur'an 30:39) which prohibits charging Muslims interest rates (*ghara*) .

[3] See also Rodney Stark and Roger Finke [18], among others, for ideas on secularization.

[4] Although the scope of social capital varies considerably in the literature, a broad definition of the concept refers to "the institutions, the relationships, the attitudes and values

in social church–related activities. Barro and McCleary [3] offer a different explanation based on the idea that both religious belief and scientific analysis require a considerable degree of abstraction. Thus, more highly educated people would also be more able or willing to use such reasoning to support religious beliefs and would therefore be more religious.

Putnam [16] explains economic experiences in Italy by the lack of trust toward others that presumably characterizes the Catholic tradition. Following these ideas, other authors like La Porta *et al.* [13] and Guiso, Sapienza and Zingales [10] (GSZ hereafter) open another window: *the role of individual religious attitudes on social capital.* Based on the idea that subjects' attitudes toward institutions and/or rules affect their (economic) behavior and decisions and therefore affect economic performance in general, GSZ conduct an international analysis for 64 countries in which they explore how beliefs, religious activity and denominations are related to several forms of social capital. Although they found heterogeneous results in this sense, they support a clear link between social capital and religion.

Our goal is to obtain (robust) empirical evidence which supports the notion that *individual religiosity reinforces individual trust attitudes and so reinforces "the economic link"* idea. Thus, we do not try *to test if social capital positively affects economic performance.* On the contrary, we assume the positive spillover of social capital on economic performance to be a given.

We examine the link between subjects' religiosity and *trust in* five key *institutions* (the government, the police, the armed forces, the judiciary and banks) and *trust toward others* (interpersonal trust). We also introduce other variables such as individual's view about the economic system, private firms and markets.

This paper offers evidence for one of the largest and most convulsive markets of religion. The *Latinobarómetro* –a survey that explores social values in Latin America–[5] shows that in 2004 the religious market was basically dominated by the Catholic denomination. From a whole sample of 19,372 individuals, 72% declare themselves to be Catholics, 15% are Evangelical/Protestants, 3% belong to other religions (including: Jehovah's Wit-

that govern interactions among people and contribute to economic and social development" (World Bank [19]) "*by reducing transaction costs, promoting cooperative behaviour, diffusing knowledge and innovations, and through enhancements to personal well-being and associated spill-overs*" (Productivity Commission [15]).

[5]The Latinobarómetro survey has been conducted annually since 1995 by the Latinobarómetro Corporation, a private non-profit organization located in Santiago, Chile.

nesses 0.9%, Adventists 0.6%, Mormons 0.5%, Jewish 0.1%, Afro-American Cults, Umbanda, etc. 0.3%), while 10% have no religious affiliation (including believers1.6%, agnostics/atheists 1.2% and none 7.6%). Among those who declare a religious affiliation, these percentages reach as high as 80% for Catholics and 16.6% for Evangelical/Protestants. These figures are shown in Table 1 below.

Table 1: RELIGIOUS MARKETS IN LATINAMERICA, 2004

Although Catholicism is the dominant religion throughout Latin America, Venezuela, Ecuador, Paraguay, Colombia and Argentina are, in this order, the most predominantly Catholic nations of our sample: more than 80% of all respondents profess this religion (about 90% if we only consider people who declare some religious affiliation). Mexico, Peru and Bolivia also exhibit high levels of Catholic observance in their religion markets. On the other hand, Uruguay, El Salvador and Honduras present the lowest fraction of Catholic people among their population (little more than 50%).

The *evangelical denomination represents an important and increasingly large fraction of the religion market* in Guatemala, Honduras and El Salvador (about 30%), although Catholicism remains the dominant religion. In general, the evangelical churches in the region have experienced a leap in growth in recent decades that has been accompanied by a decline in the number of adherents to the Catholic faith.

Following Barro and McCleary [3], we used the Herfindahl index[6] of adherence to the main religious denominations as a measure of religious concentration. To build this index only three religious denominations were considered : Catholic, Evangelical/Protestant and other religions. When $h_j = 1$ ($j = 1, ..., 18$ countries) the whole population within a country belongs to the same religion (religious monopoly). In contrast, $h_j = 0$ means that each individual practices his own religion (a large number of denominations without any market power).

[6]The Herfindahl index is defined as the sum of the squares of the fractions belonging to each religion and can be interpreted as the probability that two randomly selected persons in a country belong to the same religion. The index was constructed considering only those respondents professing some religion.

The last column in Table 1 shows that Honduras, El Salvador, Guatemala and Nicaragua have the most competitive religious markets in the region due to the important "market share" held by the Evangelical/Protestant denomination. On the other hand, Colombia, Mexico, Venezuela and Paraguay, followed by Ecuador and Argentina –the most predominantly Catholic Latin American countries– exhibit the most concentrated markets, with 10% (or even less) of respondents out of the main club!

In sum, religious markets are always concentrated ($h_j > 0.5 \ \forall j$) and, apparently, any differences in concentration levels are not due to variations in the Catholic share, but mainly arise from the increasing importance of other Christian denominations.

Observation 1 *Catholicism is the dominant religion throughout Latin America in the sense of GSZ.*

The latter observation means that the Catholic religion is the most prominent club within these societies. This is not trivial because networking benefits or pure AE's "consumption motives" arising from religious practice –churchgoing for instance– are much larger within this denomination (see Sacerdote and Glaeser [17]).

Finally, the level of religious practice is also remarkable. Of the 17,579 individuals (90% of the sample) who declared themselves to have some religious affiliation[7], 2,217 (12.6%) are *very observant*; 6,088 (34.6%) are *observant* and 7,155 (40.7%) are *not very observant.* 1,976 subjects (11.2%) declared themselves to be non-observant, while the remaining 143 did not answer or did not know.

Based on the above information, we use two key variables to capture the importance of the religious factor within social capital measurements. On the one hand, *subject's religiosity level* is the answer given by individuals to the question "how observant are you?": very observant ($value = 4$); observant ($value = 3$); not too observant ($value = 2$); not observant ($value = 1$). Observe that our measure is not restricted to any religious affiliation, just to religious practice.

On the other hand, *affiliation to the dominant religion* is captured by a dummy which labels those individuals who declared themselves Catholics.

We explore the Latin American database using ordered probit models. The first part of the analysis uses only the variable *religious practice* while

[7]The remaining 1,793 declared that they had no religious affiliation.

ignoring any religious denomination. We use two types of approaches: a fixed effect panel (model 1) that labels subjects' country and a second analysis which ignores the name of the country (model 2), but includes both the GDP and the Gini Index of the country where the respondent resides.

The second part of the analysis controls *Catholic bias* by using a dummy which labels Catholic affiliations. The most interesting results are summarized as follows:

i) *Trust toward others seems to be correlated with religious practice* (once we control for Catholics). In contrast to other previous literature (see Putnam [16] or La Porta *et al.* [13]), the sign of *Catholic affiliation* is also positive (and significant).

ii) There is a *positive correlation between trust in the government, in the police and in the judiciary and religious practice* in general. Trust in the armed forces and in the banking system depends on the model specification.

iii) Correlations between religious practice (or Catholic affiliation) and attitudes toward the *market system, the role of the market and private firms are heterogeneous but never negative.*

In sum, *individual's level of religiosity crucially affects trust in institutions and is correlated with trust toward others*[8]*. Catholic affiliation gives similar results and it is also correlated with trust toward others. Our collection of variables never shows any (significant) negative effect for religion.*

Hence, this paper shows, at least, the initial pieces of the puzzle which links religion and social capital. Our results are given for religious practice (regardless of religious affiliation) and also controlled for the Catholic denomination. This is important because it separates Catholic bias from pure effects arising from personal involvement in any religion.

2 Hypotheses

The underlying assumption throughout this paper is that subjects' trust in institutions and/or rules affects their (economic) behavior and decisions and therefore affects economic performance in general. Our goal is to obtain empirical evidence which supports the hypothesis that *individual religious attitudes reinforce individual trust attitudes, thus reinforcing the ideas behind this assumption.* Hence, we do not try to test if social capital positively

[8]Insofar as we did not analyze the opposite causality direction, the results reported here should be interpreted as correlations, not as causal effects.

affects economic performance, but, on the contrary, assume that the positive spillover of social capital on economic performance is a given. We impose this assumption as a necessary requirement to continue the paper.

Assumption 2 *Both trust in individuals and institutions positively affect economic performance and growth.*

In line with Guiso *et al.* [10] (GSZ), the aim of this paper is to explore the role of the religious factor on economic behavior. Our objective here is to determine whether more religious subjects (regardless of their religious denomination) are willing to be more trusting than other less religious individuals. In sum, our main goal is to:

Objective 3 (main) *Analyze the effect of individual's level of religious practice on several measures of social capital.*

Independently of the above objective, we also study the effect of religiosity on attitudes toward the market and the economic system.

We use a database which contains information gathered from 19,372 individuals from 18 Latin American countries (see section 3 below, page 10). The use of individual data from several countries allows us to "control" national effects (for instance, subject's trust in a country's government might be affected by the real honest conduct of such a country). In the first part of the analysis we focus our attention on religious practice irregardless of the religious denomination.

In sum, we check if religious practice (which might or might not affect these national considerations) affects social capital indicators. Before continuing, let us define our key concepts.

Definition 4 (Horizontal Trust) *Trust in individuals is the anticipation of reciprocity (Bolle [5]).*

What Bolle refers to in the above definition is that when somebody trusts in another it is because he is anticipating a reciprocal behavior. An individual will help others because he believes others will do likewise in the future. Experimental evidence shows that subjects' trust towards others is *not so great* (see for instance Cox [8]).

Let us now focus on institutional trust. Departing from Bolle's [5] definition, we introduce some modifications in order to achieve the following idea:

Definition 5 (Vertical Trust) *Trust in institutions and rules is the anticipation of institutional good conduct.*

Thus, individuals trust in institutions (and rules) when they expect that these institutions will be honestly driven. Then, we understand this sort of trust as the probability individuals give to honest conduct.

Recall that the key question is to connect religion to economic performance through social capital. For Barro and McCleary [3], the link between religion and economic performance is direct insofar as they claim that both religious belief and scientific work require a considerable degree of abstraction. They consider that more highly educated people would also be more able or willing to use such reasoning to support religious beliefs.

For us, the key idea is not about complex thinking but just beliefs. We suppose that subjects trust in institutions in much the same way as they believe in God. Hence *we link religion to vertical trust.* Assuming that subjects consider the government (or the judiciary or whatever) as the conductor of earthly issues and God as the conductor of celestial issues, then we expect a correlation between both beliefs. It seems sensible to think that an individual who gives a large ex-ante value to the latter will give an analogous value to the former. In other words, supra–worldly feelings and trust in supra–individual institutions might be correlated. Assuming this idea we conjecture that:

Conjecture 6 *More religious subjects are willing to believe in higher and superior abstract authorities.*

Then,

Corollary 7 *There is a positive correlation between vertical (subjects vs. institutions) trust and religious attitudes.*

In sum, we expect that *more religious individuals* will show a *larger vertical trust* (toward institutions).

Following Guiso *et al.* [10], we expect to observe positive correlations between *horizontal trust and subject religiosity.* In fact, when using an international pool, GSZ find the above correlation (religiosity vs. horizontal trust) to be positive.

Thus far we have not mentioned any religious denomination. However, our sample is crowded with practising Catholics so, obviously, this fact must be considered.

In a study on Italian Catholics, Putnam [16] attributes the *prevailing lack of trust toward others* in southern Italy to the country's strong Catholic tradition. Putnam remarks that the Catholic tradition enlarges the vertical bond with the Church by undermining the horizontal bond with fellow citizens. Interestingly, in his cross–country analysis, La Porta *et al.* [13] find some evidence for this theory. Also, GSZ partially support Putnam's ideas by showing that the Catholic group is endowed with a smaller level of horizontal trust as compared to other Christian groups.

Thus, the papers referred to above indicate that *horizontal trust and Catholic denomination* (dummy) must be nearly uncorrelated (GSZ) or, to go even further, must be negatively correlated (Putnam). We will check this fact in the second part of section 4.

In short, throughout the next sections we will explore the effect of individual religiosity on several measures of social capital. Specifically, we will check if individual religiosity affects both vertical and horizontal trust and finally, we will study the Catholic bias.

Objective 8 *Explore the role of Catholic affiliation on social capital.*

This last objective allows us to check the hypothesis proposed by Putnam [16] and revise the results reported in GSZ.

3 Database and Methodology

Our empirical research was conducted using data from 18 Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, El Salvador, Uruguay and Venezuela). The data source was the *Latinobarómetro Survey* (2004) which provides information about individuals' opinions, attitudes, behaviors, values, and socio-demographic characteristics (including religious affiliation and practices).

The social capital measures regarding individuals' attitudes, which are used as dependent variables in our models, were based on the following questions:

- *Horizontal trust*: Generally speaking, would you say that most people can be trusted (1) or that you cannot be too careful in dealing with people (0)?

- *Vertical trust*: How much confidence do you have in each of these institutions (government, police, armed forces, judiciary, banks): a great deal of confidence (4), quite a lot of confidence (3), not very much confidence (2), or none at all (1)?

- *Attitude toward the market system* ("*system*"): Generally speaking, would you say that you are very satisfied (4), quite satisfied (3), not very satisfied (2) or not at all satisfied (1) with how the market economy performs in your country?

- For each of the following statements, can you tell me how much you agree with each (strongly agree (4), agree (3), disagree (2) or strongly disagree (1))?: *i*) *the market economy* ("*market*") is the only system which will lead to the development of the the country; *ii*) private firms ("$firm$") are essential to the country's development.

We also included variables related to the characteristics of individuals and countries:

- *Health*: In the last twelve months, would you say that your physical health has been very good (1), good (2), fair (3), bad (4), very bad (5).

- Socio-demographic variables: *gender, age, marital status, education.*[9]

- *Deprivation index* (dindex) built by considering the ownership of several goods: television, refrigerator, home, computer, washing machine, telephone, car, second home for holidays, drinking water and hot water.

- Country characteristics: *per capita GDP* and *Gini Index.*

- Subject *religious practice*[10] (4 levels as defined on page 6)

[9] Omitted values are Edu1 (illiterate) and Edu2 (incomplete primary education). The remaining values are: Edu3 (primary education); Edu4 (incomplete secondary education), Edu5 (secondary education), Edu6 (incomplete higher education), Edu7 (higher education).

[10] Observe that we use religious practice as a proxy of subject religiousity. Although the transfer seems sensible we must not overlook the fact that recent papers use both attendance to mass and praying as proxies of religiosity (see Brañas–Garza and Neuman, [7]).

Our purpose is to determine to what extent the different characteristics of individuals -in particular, their level of religious observance- affect the formation of horizontal and vertical trust and attitudes towards firms and the market economy. In order to do so we estimate different ordered probit models.

The phenomenon to be modeled is discrete. The latent or unobserved variable is y^*, level of trust/attitude of individuals, which is related to independent observed variables (x_i):

$$y^* = x_i\beta + \varepsilon_i$$

The variable y^* is divided into two, three or four ordinal categories (depending on the question asked):

$$y_i = m \qquad \tau_{m-1} \leq y_i^* \leq \tau_m$$

where $m = 1, 2, 3$ and τ_1 and τ_2 are estimated.

The observed categories are related to the latent variable in the following way:

$$y_i = \begin{array}{c} -\infty \leq y_i^* < \tau_1 \\ \tau_1 \leq y_i^* < \tau_2 \\ \tau_2 \leq y_i^* < \infty \end{array}$$

For instance, given a value of x, the probability of trust or distrust ($y = 2$, in the case of three ranks) corresponds to the distribution region where y^* lies between τ_1 and τ_2:

$$\Pr(y = 2|x) = \Pr(\tau_1 \leq y_i^* < \tau_2|x)$$

The standard formula for the predicted probability in the ordinal models is:

$$\Pr(y = 1|x) = F(\tau_2 - x\beta) - F(\tau_1 - x\beta)$$

Assuming that $F(.)$ is the normal distribution (with errors variance equal to one), ordered probit models are estimated.

The parameters estimated in these models do not provide direct information to understand the relationship between independent and latent variables

(Long y Freese [14]). Generally, substantive interpretations are based on the prediction of probabilities and the functions of those probabilities[11]. These predictions are carried out for different groups of persons and the marginal effects of independent variables are estimated[12].

In our case, we estimate two models for each dependent variable. The first one (model 1) includes country fixed effects using a dummy variable for each one (with the Dominican Republic as the omitted country). In the other estimation (model 2), the dummy variable is substituted by the countries' socio-economic characteristics (per capita GDP and Gini Index).

It is important to note now what contributions this paper makes to the previous literature, mainly GSZ [10]. This paper differs from GSZ in a number of ways: *i*) we use ordered probit models instead of OLS regression; *ii*) we use data arising from a new survey, the Latinobarómetro, carried out in 2004; *iii*) we capture religiosity through religious practice (categorical variable) instead of various religious indicators; *iv*) our variables regarding the market are different (due to the database) and we support evidence for trust in the banking system, and lastly, *v*) we estimate two different specifications regarding the individual country instead of just one.

Our results are shown in the next sections.

4 Religious practice and social capital

In this section we explore the effect of religious practice (regardless of denomination) on social capital measures. Recall that we estimate the determinants of several social capital indicators (trust or satisfaction, see section 3, page 9) and according to our specification, religious practice is just one of the independent variables within the models. Before reporting the results regarding the religious factor, we analyze the set of variables used as the "control". Remember that we use Type 1 models (with countries) -reported in table 2a- and Type 2 models (without country labels but including national GDP and the Gini index) -reported in Table 2b.

Interestingly, GENDER seems to be uncorrelated with both horizontal and vertical trust -with the exception of trust in the judiciary. There is strong evidence suggesting a gender bias towards the judiciary in the sense that

[11] We use the programs developed by Long and Freese [14] and the command mfx.

[12] If the independent variable is binary, the marginal effect will be the shift from not having a certain characteristic to having it.

males clearly support this institution to a much larger degree. Gender is also correlated with attitudes toward the economic system, the market and private firms. The latter indicates that males are more pro-competitive!

AGE shows a significant role in both vertical and horizontal trust, although the effects are not symmetrical. For instance, old individuals trust more in peers and in the government, but they trust less in the armed forces, the judiciary and banks. However, they seem to be satisfied with the market system.

The role of EDUCATION is heterogeneous as well. Generally speaking, education is uncorrelated with horizontal trust and the higher the education, the larger the vertical trust. Nonetheless, there are a number of exceptions: highly educated people trust more in peers; trust in the government is negatively correlated and trust in the police is uncorrelated with education. It is also interesting to observe that when we control for socio-economic variables regarding the country (Table 2b), highly educated subjects display a negative view about the market and the system, but support the role of private firms.

HEALTH is definitely a key factor. In almost all the cases (in both models 1 and 2) bad health translates into a diminishing level of both vertical and horizontal trust, and, also, a negative view about the market! Thus, when a subject suffers health problems his view about everything is rather negative.

SINGLE status also has consequences on trust. Single subjects are more trusting of peers and have a positive view of the economic system. In contrast, single status is nearly uncorrelated with vertical trust.

The DEPRIVATION index is positively correlated with horizontal trust. Hence social status has a negative effect on trust toward others. This index is negatively correlated with the armed forces and, as expected, with the banking system. The GINI index shows similar results to those reported by the deprivation index insofar as the Gini index shows that large polarization decreases horizontal and vertical trust and negatively affects attitudes toward markets. Analogously, larger PER CAPITA GDP increases vertical trust (with the exception of trust in the armed forces and banks) and is uncorrelated with horizontal trust.

Table 2 below shows the complete set of estimations for each social capital measure, including a "religious practice" variable.

insert Table 2a about here

insert Table 2b about here

The results shown in both tables indicate that the role of religious practice is ambiguous in some cases (significant coefficients in model 1 but not in model 2 or inversely). But they also show that there is a number of correlations which consistently appear to be significant regardless of the model. This is the case of trust in the government, the police and the judiciary. The same also applies to satisfaction with the economic system and the role of the market. On the contrary, estimations regarding horizontal trust do not appear to be significant in any model. In sum,

a) *Horizontal trust is not correlated with religious practice* (neither in model 1, nor in model 2).

b) There is a *positive correlation between trust in the government, in the police and in the judiciary and religious practice.*

c) There is a *positive correlation between a positive attitude toward the market system and satisfaction and religious practice.*

d) The correlation between religious practice and trust in the *banking system* and in the *armed forces* and a positive view of *private firms* is only significant when the country label is not considered.

Observe that, as expected, there is a positive correlation between vertical trust and religious practice (corollary 7), but we do not find support for the correlation between horizontal trust and religious practise (regardless of the denomination) shown in GSZ. However, the first idea is partially satisfied because we observe a positive correlation with some, but not all, measures of vertical trust. Interestingly, model 2 indicates that corollary 7 is fully satisfied when the country's label is omitted. The latter might suggest that more religious individuals "achieve" vertical trust when the real performance of their own national institutions –for instance the *banking system*– is not considered. What we observe is that, in some cases, national institutions discourage subjects!

After a preliminary analysis without regard to any religious denomination, we now control for the Catholic affiliation. Although there is a number of denominations in Latin America (see Table 1, page 5), there is a vast

majority of Catholics within the sample. What we will check now is whether the Catholic label (we use a dummy with value 1 for Catholics) varies the results, that is, we will test the *Catholic bias* (very reduced for GSZ [10] and negative for Putnam [16]). For purposes of simplification, we restrict our analysis to the fixed effect models for countries (model 1). Hence, the only difference between Table 3 and the set of estimations reported in Table 2a is the dummy variable which controls the Catholic bias.

insert Table 3 about here

Let us first focus on vertical trust. Surprisingly, we observe that when we control by means of a Catholic dummy, all the vertical trust measures show a positive and significant correlation with religious practice. Hence, when we control affiliation to the dominant religion then all the coefficients regarding vertical trust appear as significant and positive. We may summarize these results as follows:

Result 1: *Vertical trust in the government, the police, the judiciary, the armed forces and banks is correlated* to religious practice.

Result 2: There is positive a correlation between all the measures of *vertical trust and Catholic affiliation.*

Observe that the above results are even stronger than those reported in the previous section. Religious practice is definitely positive for all measures of vertical trust and, under assumption 1, for economic development.

Another interesting result is the *positive sign of the significant coefficients* in all the cases. Thus, we *found no negative effect of religious activity* on any of the measures of social capital considered, regardless of the religious denomination. Identical ideas are applicable to the Catholic denomination. Thus, in a wide sense, individual's religious practice positively affects vertical trust in all the cases.

Remark 9 (conjecture 1) *Corollary 7 is satisfied as there is a positive correlation between religious attitudes and vertical trust.*

We will now check *horizontal trust.* The most prominent ideas we extract from Table 3 are:

Result 3: There is a *positive (but weak) correlation between religious practice* (controlling for Catholics) and *horizontal trust.*

Result 4: There is a *positive correlation between Catholic affiliation and horizontal trust.*

Both results are quite remarkable. On the one hand, we can say that religious practice per se (or the practice of any non-dominant religion) is a positive determinant of horizontal trust. On the other hand, Catholic practice (or membership in a dominant religion) also increases trust toward others. Another salient result is that the *Catholic bias is twice as relevant*, and more significant, than religious practice (0.7 vs 0.3). This means that Catholicism reinforces horizontal trust more than other religions[13]. In contrast to Putnam, we observe a positive effect of Catholic affiliation on horizontal trust. Regarding GSZ we see that the Catholic bias is not minor.

Recall that the latter is true for 18 countries in which the Catholic religion is dominant.

Remark 10 *Catholic affiliation reinforces the link between religiosity and social capital.*

Finally, the effect of religiosity on attitudes toward the market system is heterogeneous. We observe that "market" and "system" are positively correlated with religious practice but "firm" is uncorrelated. The role of Catholic affiliation is even more ambiguous. There is a weak correlation between Catholicism (or individuals belonging to the dominant religion) and satisfaction with the market system. Remember that the weberian thesis neglects the role of the Catholics in economic development. While our result does not support this, nor does it find evidence to the contrary . In sum, we can conclude:

Result 5: The correlation between religiosity and market attitudes is not so evident but is never negative.

Finally, observe that the effect of religiosity (both practice and Catholic denomination) is never negative in vertical or horizontal trust nor in attitudes toward the market.

[13] At this point we must recall the idea of dominant religion. There are no examples of Catholics within a non–Catholic country.

Remark 11 *Religious practice and Catholicism positively affect social capital and thus reinforce the spillover of social capital on economic performance.*

Now we compare our results with those reported by GSZ [10]. We found identical results regarding the *positive effect of religiosity* on *horizontal trust and vertical* trust in the police, the armed forces, governments and the legal system (represented here by the judiciary). However, we also find some discrepancies. In particular, there are two key differences: *i*) whereas GSZ support a small Catholic bias for horizontal trust, we find a "strong" correlation, *ii*) whereas GSZ support a negative effect of religion on attitudes toward competition[14] we do not (recall that we did not find any negative sign of correlation).

Why do we find these differences? They can be explained by two potential sources: the method and the data set. Technically, our method (Ordered Probit) seems to be more appropriate than the method used by GSZ (OLS). However, the data sets are completely incomparable. While GSZ uses the World Values Surveys (a large, well-known database), we use a new data set that only covers Latin American countries and just one wave. This last fact leads us to hypothesize that at least part of the differences arise from the sample, not only from the database. Our survey was conducted at the same time following identical procedures in 18 neighboring countries. We consider that this is an important factor given that the relevant set of variables at hand has a very similar significance in these countries.

5 Conclusions

Following the idea that religion may affect economic performance through its effect on individual's attitudes, we explored the role of religious practice and Catholic affiliation on several attitudes related to social capital that might foster economic growth. The analysis, which was carried out using data from 18 Latin American countries, showed a positive correlation between religion and most of the attitudes considered.

We found that trust toward others (horizontal trust) is positively correlated with religious practice and much more so with Catholic affiliation. As regards trust in institutions (vertical trust), our results show that there is a positive relationship between subjects' level of religiosity and their trust in

[14] Although the competition measure used by GSZ differs from ours.

five key institutions (the government, the police, the armed forces, the judiciary and banks). We also introduced variables related to market attitudes, finding that their correlation with religiosity is not so evident, although it is never negative.

In light of these results, this paper fits the initial pieces into the puzzle linking religion and social capital, and by doing so, demonstrates the connection between religion and economic performance. However, in order to conclude that religion affects social capital and therefore reinforces the spillover of social capital on economic performance, further research is needed. In particular, it would be necessary to investigate the inverse causality direction between religion and the attitudes considered.

References

[1] Alicia Adsera. 2005. "Religion and changes in family size norms in developed countries". *mimeo*, University of Illinois at Chicago.

[2] Corri Azzi and Ronald G. Ehrenberg. 1975. "Household Allocation of Time and Church Attendance", *Journal of Political Economy* 83(1): 27-56.

[3] Robert Barro and Rachel McCleary. 2002. "Religion and Political Economy in an International Panel," NBER Working Paper 8931.

[4] Benjamin Beit-Hallahmi. 1997. "Biology, Density and Change: Women's Religiosity and Economic Development", *Journal of Institutional and Theoretical Economics* 153(1): 166-178.

[5] Friedel Bolle. 1998. "Does trust pay?". Europa-Universität Viadrina Frankfurt (Oder), *mimeo*.

[6] Pablo Brañas-Garza and Shoshana Neuman. 2004. "Religiosity within an Economic Framework: the Case of Spanish Catholics", *Review of Economics of the Household* **2**(1), 5-22.

[7] Pablo Brañas-Garza and Shoshana Neuman. 2006. "Intergenerational Transmission of 'Religious Capital': Evidence from Spain", *Papers on Economics of Religion* 06/02.

[8] Jim Cox. 2004. "How to Identify Trust and Reciprocity", *Games and Economic Behavior*, 46: 260-281.

[9] C. Grootaert and T. Van Bastelaer. 2002. *Understanding and measuring social capital: A Multidisciplinaty tool for practisioners*, Washington, DC.: World Bank.

[10] Luigi Guiso, Paola Sapienza and Luigi Zingales. 2003. "People's Opium? Religion and EconomicAttitudes", J*ournal of Monetary Economics*, 50(1): 225-282.

[11] Laurence R. Iannaccone. 1998. "Introduction to the Economics of Religion", *Journal of Economic Literature*, 36: 1465-1496.

[12] Shoshana Neuman. 1986. "Religious Observance within a Human Capital Framework: Theory and Application", *Applied Economics*, 18(11): 1193-202.

[13] Rafael La Porta, F. Lopez-de-Silanes, Andrei Shleifer and R. Vishny. 1997. "Trust in Large Organizations", *American Economic Review* 87(2): 222-279.

[14] J. S. Long and J. Freese. 2001. *Regression Models for Categorical Dependent Variables Using Stata*, Stata Press.

[15] Productivity Commission. 2003. Social Capital: Reviewing the Concept and its Policy Implications, Research Paper, AusInfo, Canberra.

[16] R. Putnam 1993. *Making Democracy work. Civic tradition in modern Italy.* Princeton University Press, Princeton.

[17] Bruce Sacerdote and Edward Glaeser. 2001. "Education and Religion", NBER working paper 8080.

[18] Rodney Stark and Roger Finke. 2000. *Acts of Faith.* University of California Press.

[19] World Bank. 1998. The Initiative on Defining, Monitoring and Measuring Social Capital, Social Capital Initiative, Working Paper N°2, The World Bank, Washington.

Table 1: Religious markets in Latinamerica, 2004

Country	Catholic	Evangelical/Protestant	Other	No religion	Herfindahl index
Argentina	82.4%	7.8%	1.9%	7.9%	0.809
Bolivia	76.6%	17.7%	2.9%	2.9%	0.656
Brazil	69.8%	19.0%	4.7%	6.5%	0.601
Chile	66.3%	13.9%	1.8%	18.1%	0.683
Colombia	82.8%	2.3%	2.1%	12.8%	0.902
Costa Rica	65.4%	20.7%	2.7%	11.2%	0.598
Dominican Rep.	70.3%	13.4%	4.0%	12.3%	0.668
Ecuador	85.5%	8.2%	1.8%	4.5%	0.810
Guatemala	58.6%	31.8%	2.3%	7.3%	0.518
Honduras	55.1%	32.0%	2.4%	10.5%	0.508
Mexico	79.4%	4.4%	1.3%	14.9%	0.873
Nicaragua	63.6%	25.9%	3.1%	7.4%	0.551
Panama	80.6%	15.4%	2.3%	1.8%	0.698
Paraguay	84.6%	6.0%	2.2%	7.2%	0.835
Peru	79.0%	13.3%	5.7%	2.0%	0.672
Salvador	53.5%	29.0%	2.7%	14.8%	0.511
Uruguay	52.9%	6.4%	3.7%	37.0%	0.720
Venezuela	85.8%	6.1%	2.0%	6.1%	0.840
Total	**71.9%**	**14.9%**	**2.8%**	**10.4%**	**0.673**

Table 2a: Social capital equations (Model 1)

	Horizontal T.	Vertical Trust					Attitudes		
	Toward others	**Govern**	**Police**	**Army**	**Judiciary**	**Banks**	**System**	**Market**	**Firm**
Male	0.049	0.029	-0.011	0.029	0.081	0.029	0.108	0.068	0.096
	(1.72)	(1.50)	(0.58)	(1.48)	(4.09)	(1.48)	(5.12)	(3.22)	(4.73)
Age	0.005	0.004	-0.000	-0.005	-0.004	-0.005	-0.001	0.002	0.004
	(4.11)	(4.96)	(0.17)	(6.29)	(4.58)	(6.29)	(0.88)	(2.24)	(5.00)
edu3	0.014	-0.063	-0.026	0.111	0.031	0.111	-0.017	0.067	0.013
	(0.31)	(2.07)	(0.85)	(3.52)	(0.97)	(3.52)	(0.49)	(2.00)	(0.40)
edu4	-0.022	-0.062	0.015	0.189	0.062	0.189	0.016	0.045	0.019
	(0.47)	(1.92)	(0.45)	(5.77)	(1.89)	(5.77)	(0.45)	(1.30)	(0.57)
edu5	-0.009	-0.042	0.042	0.182	0.025	0.182	0.011	0.046	0.105
	(0.20)	(1.33)	(1.32)	(5.87)	(0.79)	(5.87)	(0.31)	(1.30)	(3.08)
edu6	0.085	-0.006	0.052	0.282	0.099	0.282	-0.001	0.022	0.204
	(1.39)	(0.15)	(1.27)	(6.99)	(2.43)	(6.99)	(0.01)	(0.47)	(4.64)
edu7	0.265	-0.020	0.031	0.313	0.036	0.313	-0.035	-0.067	0.223
	(4.72)	(0.50)	(0.77)	(8.16)	(0.91)	(8.16)	(0.79)	(1.47)	(5.17)
Health	-0.069	-0.110	-0.070	-0.093	-0.060	-0.093	-0.124	-0.014	-0.061
	(3.89)	(9.04)	(5.81)	(7.58)	(4.84)	(7.58)	(9.28)	(1.15)	(4.85)
Religious Practise	**0.024**	**0.063**	**0.067**	**0.016**	**0.055**	**0.016**	**0.037**	**0.021**	**0.003**
	(1.37)	**(5.39)**	**(5.68)**	**(1.38)**	**(4.56)**	**(1.38)**	**(2.92)**	**(1.66)**	**(0.22)**
Married	0.056	0.030	0.034	-0.008	0.010	-0.008	0.098	-0.001	0.039
	(1.21)	(0.88)	(0.98)	(0.23)	(0.29)	(0.23)	(2.63)	(0.02)	(1.11)
Single	0.128	0.056	0.047	0.004	0.038	0.004	0.131	-0.003	-0.033
	(2.39)	(1.40)	(1.17)	(0.09)	(0.97)	(0.09)	(3.03)	(0.07)	(0.80)
dindex	0.138	0.004	0.011	-0.341	0.060	-0.341	-0.012	-0.034	-0.183
	(2.09)	(0.09)	(0.24)	(7.25)	(1.25)	(7.25)	(0.24)	(0.69)	(3.78)
Obs.	16,557	16,866	16,927	16,598	16,571	16,598	15,416	14,843	15,590

Table 2b: Social capital equations (Model 2)

	Horizontal T.	**Vertical Trust**					**Attitudes**		
	Toward others	**Govern**	**Police**	**Army**	**Judiciary**	**Banks**	**System**	**Market**	**Firm**
Male	0.043	0.027	-0.023	0.036	0.070	0.036	0.11	0.067	0.099
	(1.52)	(1.42)	(1.21)	(1.89)	(3.64)	(1.89)	(5.32)	(3.20)	(4.94)
Age	0.005	0.004	0.001	-0.005	-0.003	-0.005	-0.001	0.001	0.003
	(4.32)	(5.11)	(1.86)	(6.54)	(3.75)	(6.54)	(0.70)	(0.66)	(4.34)
edu3	0.078	-0.106	0.036	0.039	-0.016	0.039	-0.062	-0.019	-0.059
	(1.81)	(3.68)	(1.27)	(1.34)	(0.54)	(1.34)	(1.96)	(0.60)	(1.99)
edu4	0.016	-0.13	0.075	0.118	0.012	0.118	-0.038	-0.056	-0.052
	(0.38)	(4.42)	(2.55)	(3.97)	(0.41)	(3.97)	(1.20)	(1.79)	(1.68)
edu5	-0.010	-0.127	0.031	0.153	-0.051	0.153	-0.058	-0.025	0.049
	(0.25)	(4.44)	(1.09)	(5.49)	(1.77)	(5.49)	(1.84)	(0.79)	(1.58)
edu6	0.086	-0.069	0.056	0.236	-0.004	0.236	-0.032	-0.105	0.133
	(1.54)	(1.81)	(1.52)	(6.35)	(0.11)	(6.35)	(0.79)	(2.49)	(3.29)
edu7	0.251	-0.067	0.055	0.292	-0.055	0.292	-0.064	-0.150	0.180
	(5.01)	(1.84)	(1.55)	(8.42)	(1.51)	(8.42)	(1.63)	(3.58)	(4.60)
Health	-0.058	-0.127	-0.078	-0.102	-0.088	-0.102	-0.132	-0.023	-0.075
	(3.37)	(10.68)	(6.66)	(8.64)	(7.43)	(8.64)	(10.04)	(1.85)	(6.25)
Religious Practise	**0.017**	**0.08**	**0.073**	**0.044**	**0.052**	**0.044**	**0.048**	**0.027**	**0.032**
	(1.02)	**(6.99)**	**(6.45)**	**(3.79)**	**(4.46)**	**(3.79)**	**(3.85)**	**(2.20)**	**(2.73)**
Married	0.046	0.061	0.026	0.029	-0.002	0.029	0.093	0.015	0.057
	(1.01)	(1.81)	(0.77)	(0.85)	(0.06)	(0.85)	(2.61)	(0.42)	(1.65)
Single	0.111	0.103	0.059	0.075	0.057	0.075	0.134	0.039	0.026
	(2.10)	(2.66)	(1.51)	(1.89)	(1.48)	(1.89)	(3.27)	(0.94)	(0.64)
pbi_ph203	-0.000	0.000	0.000	-0.000	0.000	-0.000	0.000	0.000	-0.000
	(0.33)	(19.35)	(2.47)	(1.36)	(8.25)	(1.36)	(5.78)	(3.81)	(3.53)
Gini	-2.203	0.371	-0.773	-1.615	1.325	-1.615	-0.006	1.402	-0.670
	(7.97)	(1.82)	(3.96)	(8.21)	(6.71)	(8.21)	(0.03)	(5.83)	(2.87)
Obs	16,789	17,104	17,166	16,828	16,803	16,828	15,631	15,040	15,806

Table 3: Social capital equations controlled by Catholics (model 1)

	Horizontal Trust	Vertical Trust					Attitudes		
Variable	**Toward others**	**Govern**	**Police**	**Army**	**Judiciary**	**Banks**	**System**	**Market**	**Firm**
Male	0.05	0.03	-0.011	0.03	0.081	0.03	0.108	0.069	0.096
	(1.74)	(1.53)	(-0.54)	1.51	(4.11)	(1.51)	(5.13)	(3.23)	(4.72)
Age	0.004	0.004	0.0003	-0.005	-0.004	-0.005	-0.001	0.002	0.004
	(3.97)	(4.65)	(-0.40)	(-6.52)	(-4.69)	(-6.52)	(-0.94)	(2.13)	(5.01)
edu3	0.013	-0.063	-0.027	0.112	0.031	0.11	-0.017	0.067	0.013
	(0.29)	(-2.09)	(-0.86)	(3.51)	(0.97)	(3.51)	(-0.49)	(1.99)	(0.4)
edu4	-0.023	-0.063	0.014	0.188	0.061	0.188	0.016	0.044	0.019
	(0.49)	(-1.95)	(0.42)	(5.74)	(1.87)	(5.74)	(0.44)	(1.28)	(0.57)
edu5	-0.012	-0.045	0.04	0.179	0.024	0.179	0.010	0.045	0.105
	(-0.26)	(-1.42)	(1.24)	(5.78)	(0.75)	(5.78)	(0.29)	(1.26)	(3.09)
edu6	0.081	-0.013	0.047	0.276	0.096	0.276	-0.002	0.019	0.204
	(1.32)	(-0.30)	(1.15)	(6.84)	(2.36)	(6.84)	(-0.04)	(0.41)	(4.65)
edu7	0.26	-0.027	0.025	0.307	0.033	0.307	-0.036	-0.07	0.224
	(4.63)	(-0.66)	(0.64)	(7.99)	(0.84)	(7.99)	(-0.83)	(-1.54)	(5.17)
Health	-0.069	-0.109	-0.07	-0.092	-0.059	-0.092	-0.124	-0.014	-0.061
	(-3.86)	(-8.97)	(-5.75)	(-7.53)	(-4.81)	(-7.53)	(-9.27)	(-1.13)	(-4.86)
Religious Practise	**0.03**	**0.073**	**0.076**	**0.027**	**0.06**	**0.027**	**0.040**	**0.025**	**0.002**
	(1.73)	**(6.18)**	**(6.32)**	**(2.18)**	**(4.87)**	**(2.18)**	**(3.02)**	**(1.96)**	**(0.17)**
Catholic	**0.073**	**0.106**	**0.085**	**0.098**	**0.045**	**0.098**	**0.025**	**0.043**	**-0.006**
	(1.86)	**(4.3)**	**(3.43)**	**(3.93)**	**(1.85)**	**(3.93)**	**(0.95)**	**(1.65)**	**(-0.26)**
Married	0.056	0.03	0.034	-0.008	0.01	-0.008	0.098	-0.001	0.039
	(1.2)	(0.87)	(0.99)	(-0.22)	(0.29)	(-0.22)	(2.63)	(0.03)	(1.11)
Single	0.126	0.054	0.045	0.002	0.037	0.002	0.130	-0.004	-0.033
	(2.35)	(1.34)	(1.12)	(0.05)	(0.95)	(0.05)	(3.02)	(-0.09)	(-0.79)
Dindex	0.143	0.01	0.159	-0.336	0.062	0.046	-0.011	-0.032	-0.183
	(2.16)	(0.23)	(0.34)	(-7.14)	(1.30)	(7.14)	(-0.21)	(-0.64)	(-3.79)
Obs.	16,557	16,866	16,927	16,598	16,571	16,598	15,416	14,843	15,590