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# Generalized Trust and Taxation

A cross-country study

## Abstract

This paper investigates whether generalized trust can help solve the large N social dilemma that financing public goods by taxes entails. Using data for generalized trust from the World Values Survey we examine if the level of generalized trust can explain cross-country variations in tax revenues and in marginal tax rates. Besides controlling for demographics and institutional factors, we also divide our sample by the share of the population belonging to hierarchical religions. Our OLS regressions show that generalized trust has a positive effect on tax revenues in countries where less than 60 % of the population is affiliated with Catholicism or Islam and in countries with already high tax revenues. To circumvent endogeneity and causality issues we use an IV regression with sport organization membership as the instrument. Our IV regression show that generalized trust has a positive effect on the marginal income tax rate in the complete sample. We also conclude that it is plausible that trust does not have an effect on either tax revenues or marginal tax rate in developing countries as they may be stuck in a low trust equilibrium.

*Key words:* Generalized Trust, Social Dilemma, Tax Revenue, Marginal Income Tax Rate, Catholicism, Islam, IV.

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# 1 Introduction

## 1.1 Background

Trust is important to every economic transaction at every level of the economic system. Trusting your counterpart reduces uncertainty and transaction costs. Bjørnskov (2008) shows that trust has positive correlates with a lot of economic indicators such as GDP/capita, economic growth, happiness, education, good governance and strong rule of law. He similarly shows that trust is negatively correlated with the number of violent crimes and corruption.

One channel through which generalized trust could increase tax revenues is by decreasing tax evasion, which is a large problem in developing countries. Orviska & Hudson (2003) state that tax evasion in developed countries often is estimated to approximately 20 % of tax revenues, while for developing countries income tax evasion is sometimes estimated up to 50 %. It is frequently argued that poor countries lack resources, information and formal institutions to enforce tax collection (Bird & de Jantscher, 1992). Richardson (2006) finds income source to be one of the determinants of tax evasion. He concludes that in countries where a large proportion of the population is working in traditional sectors, as is often the case in developing countries, income tax evasion is larger. Another example of the differences between developing and developed countries is that the average tax revenues of the European countries is 34 % of GDP whilst the average revenues of Sub-Saharan countries is only 16 % of GDP. (Index of Economic Freedom 2017) This is in line with Tanzi & Zee (2000) who state that per capita GDP and tax revenue (as a percentage of GDP) often are positively correlated. As Stiglitz (1999) argues, many developing countries use taxes that are not optimal in terms of efficiency because efficient taxes tend to be harder to collect than less efficient taxes. Aizenman & Jinjarak (2009) mention tariffs as a tax that is relatively easy to collect while VAT and income taxes are more difficult. In line with Stiglitz (1999), Tanzi & Zee (2000) note that revenues collected from taxes on trade are significantly higher in developing countries.

There are several reasons for why tax revenues are arguably more important for developing countries. Poverty is often measured by consumption of private goods, thus ignoring that the provision of public goods plays a central role in many people's lives, especially among the poor. Besley & Ghatak (2006) argue that the provision of goods such as clean drinking water, sanitation, transport, law and order, medical care and education are relatively more critical for poor people, who lack the opportunity to choose a private alternative or move to a different area where the goods are provided. Public goods are in the case of uncoordinated, private provision, characterized by their under-supply. This market failure can be corrected by public funding (Gruber, 2011). Another reason is that poorer people often make poorer decisions. Shah, Mullainathan & Shafir (2012) argue that poverty forces the poor to focus too much on "trivial" immediate needs rather than making good long term decisions. Considering that investments in for example education and preventive health care are time inconsistent, with costs today and benefits in the future, it is likely that the risk averse behavior of poor people will lead them to make suboptimal decisions. Lastly, Bird & de Jantscher (1992) argue that having a well working and efficient system for tax collection is crucial for the growth of developing countries.

This research aims to investigate the relationship between generalized trust within a society and taxation in that same society. Ideally we would also want to establish in which way the causality runs. The research question of this paper is: *Can generalized trust help explain the cross-country variation in tax revenues and in marginal tax rates?* We will use a social dilemma framework to analyze the effects of trust on taxation. We will regress trust on tax revenue and on marginal income tax rates using both standard OLS regressions and IV regressions with sport organization membership as an instrument, as higher sport organization participation is highly correlated with trust. We find a causal link between trust and marginal tax rates for the whole sample and causal links between both trust and tax revenue and trust and marginal tax rates for countries with a population of Catholics or Muslims smaller than 60 %. We find the same relationships for countries with tax revenues over 18.4 % of GDP.

The fact that trust is highly persistent (Guiso, Sapienza & Zingales, 2011) and that a temporary upward shock in trust leads to a higher "trust-equilibrium" (Guiso, Sapienza &

Zingales, 2008) indicates that a country which increases its trust possibly could take advantage of more efficient taxes for a long time. Higher trust might enable collecting taxes that are economically better but politically not as viable. If there is a link between trust and tax revenues, increasing trust could be an important policy objective in general and have implications for future aid and policy advice for developing countries in particular.

We will start with discussing previous literature and highlight our contribution in section 1.2. In section 2, we will develop a theoretical framework and derive hypotheses. Section 3 will explain our data. Section 4 will show the results from our OLS and IV regressions and section 5 will discuss the implications of our results. Section 6 will conclude the paper.

## 1.2 Literature Review

There are two variables that influence tax revenue, the tax base and the tax rate. In the trust literature there are a few different types of tax variables that researchers have focused at. The terms are described here: Tax avoidance is the practice of minimizing taxes legally through deductions or tax credits, while tax evasion is defined as illegal ways of reducing taxes, such as underreporting income. Another aspect of tax paying is tax morale, which measures the willingness to pay taxes. A fourth aspect researchers have looked at is tax compliance which describes how much people follow regulation regarding the tax system. All these factors affects the tax base. The association between trust and the tax rate is however less studied.

That higher trust in the government leads to higher tax compliance is well established. Murphy (2004) looked at the connection between trust in authorities and tax avoidance. He saw that higher trust in regulators decreases the tax avoidance. Torgler (2003) came to a similar conclusion, higher trust in public officials increase tax morale. Torgler (2005) confirmed the results of Torgler (2003) using data from Latin America. Wahl, Kastlunger & Kirchler (2010) used a laboratory approached and found that tax compliance increases with increased trust in authorities, thus confirming the above mentioned results.

There are also some previous studies looking at generalized trust and taxation, however often with regard to tax evasion. Slemrod (2002) looked at tax cheating and

“non-government-related trustworthiness”. He found that tax cheating is lower in countries with higher trust. Frey & Torgler (2007) note that trust describes the chance of being cheated on and confirm that people will be more willing to pay taxes if they also believe that others will honestly pay theirs. Scholz & Lubelle (1998) saw a similar effect of trust on tax evasion using US data. Hammar, Jagers & Nordblom (2009) also argue that there is a positive association between the willingness to pay tax and the belief that others pay their taxes. They found that generalized trust has a negative effect on perceived tax evasion for income tax. They also believe that generalized trust should be more relevant for broad based taxes and have a larger effect for taxes that are relatively easy to evade.

The variables that influence the willingness to pay or vote in favor of a higher marginal income tax rate are however less studied. Jensen & Svendsen (2011) argue that countries with higher trust are more likely to accept higher tax payments in order to increase the size of the welfare system. Furthermore, Rothstein & Uslaner (2005) mean that generalized trust reflects a sense of solidarity across different groups and is associated with high social mobility and equal opportunities, achieved through a welfare state. This stands in contrast to a hierarchical society with low social mobility, a strong focus on the interest of the own group and hence a low willingness to pay high tax rates. Nannestad (2008) notes that a higher degree of political trust leads to people being willing to have a higher tax rate.

Since previous studies have found that trust increases both the tax base and the tax rate the combined effect of trust on tax revenue should be positive. Bjørnskov & Svendsen (2013) confirm this by concluding that higher trust enables a larger welfare state. Bjørnskov & Svendsen (2013) measured generalized trust in third-generation immigrants in the US, reasoning that trust is inherited and that it is therefore possible to use immigrants to estimate the level of generalized trust in their grandparents’ home country. Using this approach they control for formal institutions, since all subjects are exposed to the same institutions in the US. The authors argue that trust increases the underlying moral in a society. This reduces free-riding and increases the bureaucratic efficiency, and is essential to sustain a large welfare state. In line with this reasoning they found that higher generalized trust explains the “welfare state”, i.e. higher generalized trust enables higher government spending. Furthermore, they

suggest that the possible effect of trust on tax revenue should be weaker in richer countries as they often have better formal institutions which makes tax evasion more difficult.

Previous research have shown that trust and the effect of trust on taxation differs across religions. If not taken into consideration, the effect of religions might bias the results. In the trust literature, Catholicism and Islam are two commonly studied religions. Among developing economies more than 75 % of the population belong to either religion on average, the corresponding number in developed economies is only 35 % (CIA 2013, UN).

Bjørnskov (2007) argues that religion is a determinant of generalized trust and finds a negative effect of having a large population of Catholics or Muslims on trust. Putnam, Leonardi & Nanetti (1994) argue that hierarchical religions, such as Catholicism and Islam, create “vertical bonds” in society, rather than “horizontal bonds” between people, which reduces cooperation and trust in the societies. Continuing along the same line of reasoning, Shleifer, La Porta, Lopez-de-Silanes & Vishny (1997) studied the impact of trust on the functioning of government across countries. They found a negative association between the ratio of the population confessed to a hierarchical religion and tax compliance. La Porta, Lopez-de-Silanes, Shleifer, & Vishny (1999) found that countries with Catholic or Muslim affiliation are generally more interventionist, have less efficient and more corrupt governments and a smaller public sector. Tsakumis, Curatola & Porcano (2007) also recognize that hierarchical religions are in general less individualistic and argue that it may increase tax evasion. Hierarchical religions also cause uncertainty avoidance to a higher degree, which Tsakumis et al (2007) also argue increases tax evasion.

Previous research have mainly focused on individual taxpaying behavior, while we will extend, and try to generalize, these findings by looking at the total effect of generalized trust on taxation at an aggregate, cross-country level. We do this in a similar way to Bjørnskov & Svendsen (2013) but with cross-country OLS regressions. While their sample consists of mainly stable countries in Europe, this paper uses a more diverse sample with countries from all over the world. We are also able to separate the effect that generalized trust has on tax revenue and on the willingness to redistribute resources via a higher marginal tax rate. This enables us get a more complete picture of how trust affects the ability to collect taxes.

Furthermore, we run IV estimations, with an instrument not previously used. This allows us to test in which way the causality runs with another method than Bjørnskov & Svendsen (2013).



## 2 Theoretical Framework

Financing public goods via taxation can be viewed as large social dilemma where every individual's best strategy is to minimize their taxes while still using all the public utilities provided. As trust can help solve social dilemmas by reducing free-riding, higher trust should have a positive effect on both tax revenues and marginal tax rates. Mannemar & Sønderskov (2011) argue that generalized trust is significantly correlated with cooperation in dilemmas with many subjects ("large-N dilemmas"). Komorita & Parks (1996) state the provision of public goods as a type of social dilemma, where people in a society contribute taxes to together provide a shared public good. Rothstein (2001) also argues that welfare states can be viewed as a social dilemma and generalized trust could therefore help with increasing tax revenues, not only in experiments.

### 2.1 Social Dilemmas

Dawes (1980) describes social dilemmas by two properties: "(1) the social payoff to each individual for defecting behavior is higher than the payoff for cooperative behavior, regardless of what the other society members do, yet (2) all individuals in the society receive a lower payoff if all defect than if all cooperate". The dominating strategy for all players in a social dilemma is to defect. This will create a deficient equilibrium, since all players are worse off than they would have been had they chosen to cooperate.

Thinking of taxpaying as a social dilemma, defecting is to minimize taxes paid. In line with the foregoing paragraph, no taxpayer alone has the incentive to change strategy if others do not change strategy at the same time. This should in theory lead to an equilibrium where very little taxes are collected. This equilibrium is known as the Nash-equilibrium.

When making the decision whether to cooperate or defect people take their expectation of others behavior into mind. Dawes (1980) states two possibilities. First, there could be a free-rider behavior, where a person exploits the opportunity to defect to make a big gain. Free-riding reflects a negative correlation between a cooperating behavior and the belief that others will cooperate. The second possibility is that people defect due to a belief that others

will defect, which can be seen as a positive correlation between cooperation and the expectation that others will cooperate. Komorita & Parks (1996) show two different mechanisms that can cause this positive association. Self-efficacy, the perception about the effect of one's contribution, can be low if one expects other to defect. It can also be due to the "sucker effect", the aversion to be a sucker that finances free-riders' use of a public good. Tyszka & Grezelak (1976), Dawes, McTavish & Shaklee (1977) and Marwell & Ames (1979) all find evidence in favor of a strong positive correlation.

To analyze the effect of trust on social dilemmas we will use a model of a prisoner's dilemma, a two-player positive sum game, introduced by Tucker (1983). The utility from the different choices are demonstrated by symbols within the matrix. The payoff for cooperating when the other player is defecting is normalized to zero.

	Cooperate	Defect
Cooperate	$\alpha, \alpha$	$0, \delta$
Defect	$\delta, 0$	$\beta, \beta$

Where:

$$\alpha > \beta$$

$$\delta > \alpha$$

$$\alpha > 0$$

We will formalize our model using some simple equations.

Cooperation is a positive function of trust. As shown in previous literature, the willingness to cooperate depends on the expectation of others' behavior, where generalized trust has a positive effect on cooperation.

$$Cooperation = f(trust)$$

Seeing taxpaying as a social dilemma, more cooperation will lead to higher tax revenues and higher marginal tax rates. Cooperation will increase tax revenue through higher tax compliance. In line with this, Fischbacher & Gächter (2006) found that conditional cooperation influences tax morale, people are more willing to pay taxes if other also pay. For every additional person who choose to cooperate i.e. comply, the tax revenues will increase.

$$\textit{Tax Revenues} = f(\textit{cooperation})$$

Cooperation can also be expressed as a higher willingness to redistribute resources and sustain the welfare state. Rothstein & Uslaner (2005) and Jensen & Svendsen (2009) both argue that trust might increase the acceptance of higher tax rates to finance the welfare state. The willingness to pay higher marginal tax rate can be seen as a way of cooperating, since more money is contributed to publicly provided goods. Contrary to traditional economic theory, previous research show little evidence for pure free-riding. Voting for high marginal taxes and then avoiding to pay them would be the rational free-riding behavior. In the absence of free-riding, defecting will instead result in voting for a low marginal tax rate and cooperating will result in voting for a high marginal tax rate.

$$\textit{Marginal Tax Rate} = f(\textit{cooperation})$$

As both tax revenues and marginal tax rates increases with more cooperation and cooperation increases with higher trust, higher trust will lead to higher tax revenues and higher marginal tax rates.

It is possible that higher marginal tax rate increase tax evasion as the cost for complying increases. However, the opposite correlation is found by Friedman, Johnson, Kaufmann, & Zoido-Lobaton (2000). They reason that higher taxes improves public goods such as the legal system which gives incentives to act within the formal system. Trust would then, make people more willing to pay higher marginal taxes without evading.

$$\textit{Tax Revenue} = \Lambda \textit{Trust} + U$$

$$\text{Marginal Tax Rate} = \Omega \text{Trust} + E$$

Holding all other factors constant, higher trust or increased effectiveness of trust should therefore increase cooperation and thus raise tax revenues and marginal income tax rates. Trust would then steer society away from the Nash-equilibrium of  $(\beta, \beta)$ .

In practice there are of course more than four equilibriums as the entire working population in some way is a part of the dilemma.

## 2.2 Hypotheses

In order to try this framework we hypothesize the following:

Hypothesis 1:

$$\Lambda > 0$$

$$\Omega > 0$$

Hypothesis 2:

$$\Lambda_{\text{Poor}} > \Lambda_{\text{Rich}}$$

Hypothesis 3:

$$\Lambda_{\text{Small share of Catholics/Muslims}} > \Lambda_{\text{Large share of Catholics/Muslims}}$$

$$\Omega_{\text{Small share of Catholics/Muslims}} > \Omega_{\text{Large share of Catholics/Muslims}}$$

In hypothesis 2 and 3 we also hypothesize:

$$\Lambda \geq 0$$

$$\Omega \geq 0$$

Our first hypothesis is therefore that trust and tax revenues are positively correlated, countries with low levels of generalized trust will collect lower amounts of tax revenue and countries

with high trust will collect more. Countries with higher trust will also have higher marginal tax rates and countries with lower trust will have lower marginal tax rates.

Because it might be easier to avoid tax in developing countries we expect a stronger effect of trust on tax revenue in developing countries. D'Hernoncourt & Meon (2012) found part of this effect when looking at the size of the shadow economy. The effect of trust on the shadow economy is more robust in the sub-sample consisting of the developing economies. However, the opportunity to evade taxes should not lead to a difference in the effect trust has on marginal tax rate. Our second hypothesis is therefore that the effect of trust on tax revenue is stronger in poor countries relative to rich countries.

As discussed in the literature review, we also believe that the effect of trust will be less pronounced in Muslim/Catholic countries. Our third hypothesis is therefore that the effect of trust is stronger in countries with a smaller population of Catholics or Muslims, relative to countries with a larger population of Catholics or Muslims. The effect of trust should be positive for both tax revenues and marginal tax rates.

In case of complete free-riding the expected effect of trust on taxation would be zero. If people were completely rational they would free ride even with higher trust as their incentives to cheat does not change. However, since free riding is not complete there might be room for trust to impact taxes.

## 3 Data

### 3.1 Dependent Variables

#### **Tax Revenue**

The definition of tax revenue is the income gained from all the taxes collected in a country such as income tax, VAT(value-added tax), taxes on profits, tariffs and other taxes (OECD, 2016). Tax revenue is as mentioned previously calculated as a percentage of the GDP. For tax revenue we have used data from the Heritage Foundation's Economic Freedom Index. They collect and compile data from multiple sources such as the OECD, Eurostat, the African Development Bank, IMF, the Asian Development Bank as well as the World Bank. The mean tax revenue in our sample is 20 % of GDP. The lowest tax revenues are 0.95 % and the highest are 45 %. The median tax revenues are 18 %.

We used the data from the Heritage Foundation because it includes a broader definition of tax revenue. The measurement, tax revenue (as a % of GDP) from the World Bank, excluded some compulsory contributions such as most of social security contributions. When comparing the datasets we found that the excluded contributions formed a large part of total tax revenues for many countries. The difference between the datasets were especially large for countries in Europe, of which many are welfare states. Since we are investigating the impact of trust on taxes and the possibility for developing countries to increase taxes in order to provide more public services, we choose to use the more inclusive measure of tax revenue from the Heritage Foundation.

#### **Marginal Tax Rate**

The marginal tax rate variable describes the highest marginal tax rate for income used in the specific country. The marginal tax rate is interesting to include because it has not been researched as extensively as the tax base. Trust might have effects on taxes that don't go through the tax base but instead via the tax rate. Even though few people pay the highest marginal taxes in some countries, especially developing countries, the marginal rate still reflects some type of willingness to have higher taxes and is therefore useful for our analysis.

Marginal tax rate for income has previously been used to proxy welfare states by for example, Bjørnskov, Dreher & Fisher (2008). The mean marginal tax rate in our sample is 29 %. The lowest marginal tax rate in the sample is 0 % (no income tax) and the highest is 57%. The median marginal tax rate is 30 %.

For marginal tax rates we used *Trading Economics* summary of countries' marginal tax rate of the year 2014. The data is based on official numbers, directly from the concerned country.

## 3.2 Independent Variable

The type of trust relevant for this study is generalized trust within a country, which is defined as trust in people whom the person has no information about (Bjørnskov, 2007). This should be differentiated from particularized trust, which is based on historic contacts, specific information and previous transactions, e.g. trust within a family or between friends.

In order to include suitable control variables it is important to examine what variables that previously have been found to be correlated with trust. Bjørnskov (2007) makes an analysis of the cross-country determinants of generalized trust, reviewing previous studies on the subject. Using data from the World Values Survey and complementing with data from the Danish Social Capital Project, Bjørnskov (2007) has a much larger sample than previous researchers. Since trust is highly persistent, he argues that the drivers of trust similarly must be, or include, factors that are persistent over time. Previous studies show that for example, inequality, religious composition, GDP/capita, institutions, education demographics, ideology affect generalized trust.

To construct our variable for trust we have used data from the World Values Survey's sixth wave. The observations of this wave were gathered between 2010 and 2014. The trust question is asked as follows, "*Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?*" The trust variable is calculated as the percentage of people who answered "*Most people can be trusted*" out of the total number who answered "*Most people can be trusted*" or "*You can never be too careful*".

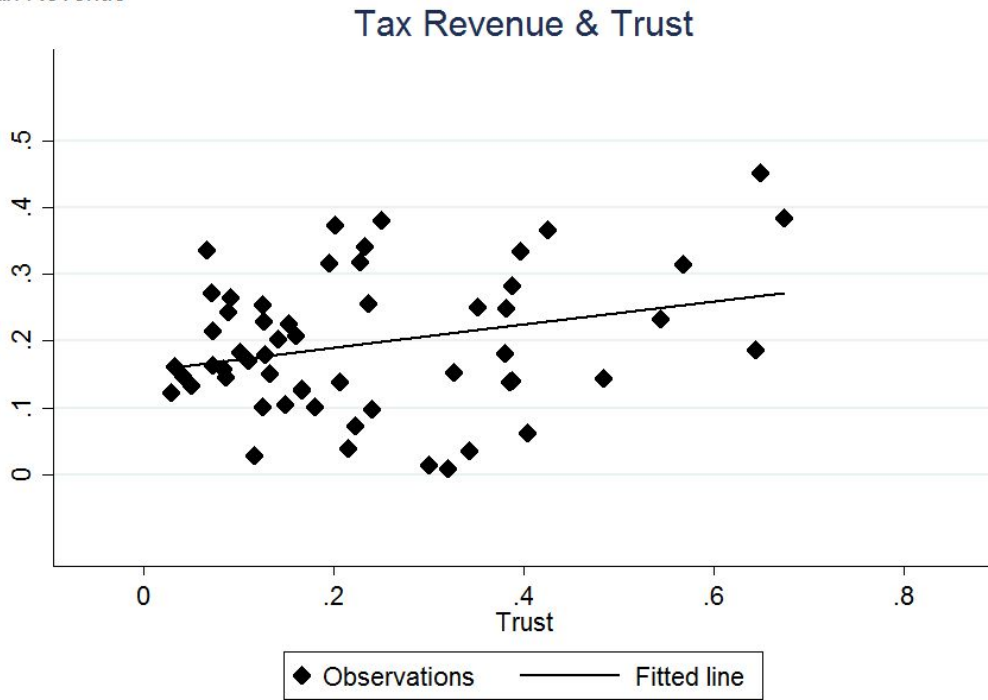
The average trust level in our sample is 24 % with the lowest trust level being 2.8 % and the highest being 67 %. The median level of trust is 20 %.

To examine the robustness of our results we also ran all the regressions with a more conservative measure of trust. We used the percentage of respondents answering “*Most people can be trusted*” of the total number of respondents, including the answer “*I don’t know*”. We included this measurement as answering “*I don’t know*” might be interpreted as a negative answer that the respondent wants to hide from the interviewer. It is at the very least not a positive answer. The results yielded similar coefficients, significance at the same places, with the same signs. These regressions are available by the authors upon request.

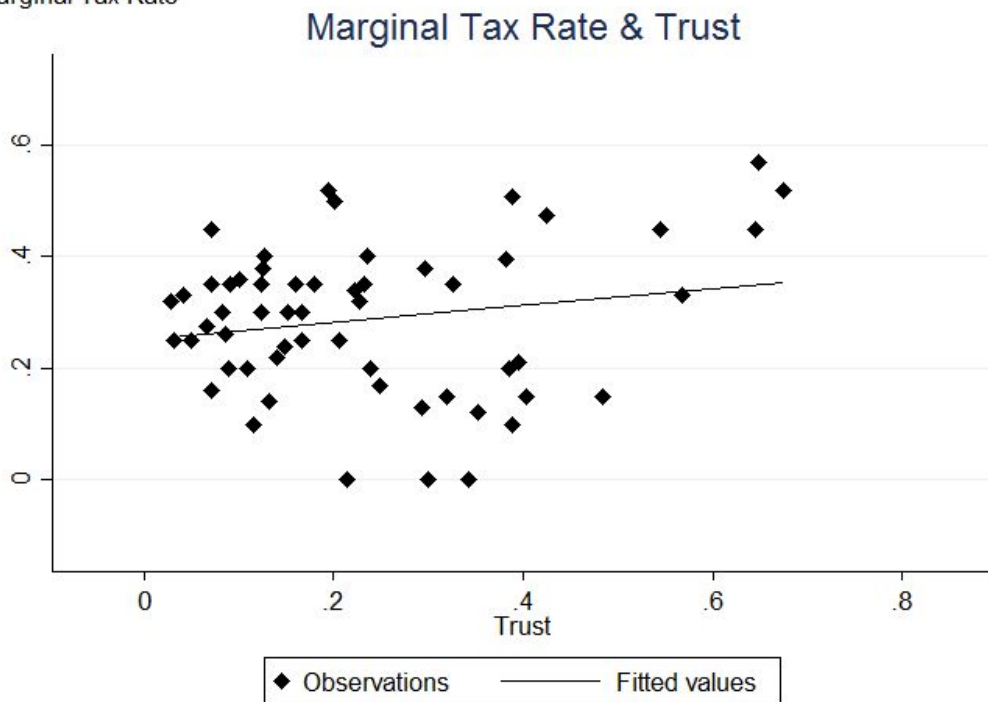


The relationship between the dependent and the independent variables can be seen in the tables below.

Tax Revenue



Marginal Tax Rate



### 3.3 Control Variables

#### **Income Inequality**

Bjørnskov (2007) finds, consistently with previous studies, that generalized trust is strongly driven by income inequality, where higher inequality implies lower trust. We also expect income inequality to correlate negatively with tax revenue and marginal income tax rate. We use the Gini-coefficient from the World Bank to control for the effect of income inequality. The Gini-coefficient is an index between zero and hundred, where a higher number implies higher inequality.

#### **GDP per Capita**

Knack & Keefer (1997), Zak & Knack (2001) and Delhey & Newton (2005) all find significant positive correlations between trust and GDP per capita, but they come to different conclusions regarding what way causality runs. Two arguments in favor of higher GDP/capita leading to higher trust is that rich people are less risk averse (Bjørnskov, 2007) and that as countries get richer, institutions develop that increase trust and reduce the cost of a trusting behavior (Berggren & Jordahl, 2006). As previously mentioned we also expect GDP per capita to be positively correlated with tax revenue, in line with the findings of Tanzi & Zee (2000). To control for GDP per capita we used PPP-adjusted international dollar 2011.

#### **Demographics**

Studies have found that older people generally are more trusting than younger (Putnam, 2001; Guiso, Sapienza & Zingales, 2003) implying that the demographic composition could have an effect on trust. In addition, Feinstein (1991) and Clotfelter (1983) find that people over 65 years old are less likely to evade from taxes, which could have a positive effect on tax revenues. Older citizens also have incentives to vote for higher tax rates as their pension and welfare depend on it.

We have controlled for demographic factors by including old age dependency ratio from UNDP's development data. The old age dependency ratio is defined as the number of people being 65 years and older per 100 people in working age (15-64 years).

## **Ideology**

The elected government will reflect the ideology of the country and a left-wing government is more likely to have more redistributive policies. This could influence both tax and trust levels. Trust might also be affected by left-wing forces, which focus on class and might create polarization when putting interest of different income segments against each other (Bjørnskov, 2007). Thus, the effect of ideology on trust is ambiguous. We have controlled for ideology by using the World Value Survey question on political stance to create a percentage of people who think of themselves as “left” on the political scale.

## **Institutions**

Shleifer et al. (1997), Rice & Sumberg (1997), Knack (2002) and Uslaner (1999) all argue that trust leads to good institutions. Rothstein (2013) on the other hand argues that good institutions create trust. An example is that a better law enforcement could reduce the cost of a trusting behavior (Berggren & Jordahl, 2006). Another institution of interest is corruption, which correlates negatively with trust. Corruption is based on in-group loyalty and it maintains hierarchical structures and reinforces conflicts between groups. (Rothstein & Uslaner, 2005)

A more efficient law enforcement is likely to affect the tax base by making it more difficult to avoid taxes. Corruption could also affect tax revenue since money might be paid to public officials instead of going to the government.

We will control for institutions through the World Bank’s index of Rule of Law. For corruption we will use the Corruption Perception Index published by Transparency International.

## **Trust in Government**

Studies on the relationship between trust in government and generalized trust do not come to unambiguous conclusions. For example Kumlin and Rothstein (2005) and Brehm & Rahm (1997) both mean that there is a positive correlation. However, Brehm (1998) argues that if the government is not considered to consist of ordinary people the relationship might not hold. As mentioned in the literature review, the positive correlation between trust in

government and tax compliance is well established. We will therefore include trust in government as a way to isolate the effects of generalized trust.

The variable is measured as the percentage of people who answers “A great deal of confidence” to the question “Could you tell me how much confidence you have in the government: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?” in the World Values Survey. We also constructed a broader measure of trust in government including the answer “quite a lot of confidence”. This measure is not shown in the regressions but the effect and significance was very similar to the measure used.

### **Education**

Both Knack & Zak (2002) and Putnam (2001) find a positive correlation between trust and education, even though they argue in favor of different causal relationships. Richardson (2006) finds in his cross country study that education is negatively associated with tax evasion, thus higher education should have a positive impact on tax revenues.

We will control for education by using UNDP’s measure of the percentage of the population over 25 years old with at least some secondary education, a similar approach as Bjørnskov (2007).

### **Religious Affiliation**

We control for religious affiliation by using data on the percentage of the population within a country belonging to either Catholicism or Islam from CIA’s, *Central Intelligence Agency*, the World Fact Book. The data is mostly dated between the years 2010-2014, but the dataset also include some older numbers. Considering that religious affiliation is relatively persistent, the use of older data in some cases should not pose a problem.

As mentioned in the literature review, religious affiliation is in theory likely to affect both the level of generalized trust and taxation, where hierarchical religions are believed to have a negative effect on both. Many previous studies have focused on and found empirical evidence

for the impact of Catholicism and Islam. In line with this, we have chosen to delimit our study to only include Catholicism and Islam.

### **Regions**

To control for regional fixed effects we divide our sample according to UNESCO's division of regions in the world. The regions are, The Arab World, Africa (excluding Arab countries), South America and the Caribbean, Asia and the Pacific as well as Europe and North America.

## 4 Method

There are at least three different methods to investigate the effect that trust has on taxes: Cross-sectional, longitudinal and a third approach used by Bjørnskov and Svendsen (2013) using trust of American immigrants as an estimate for the level of trust in their grandparents' home countries. Due to time constraints this paper will investigate the effects using a cross-sectional approach with available data on trust from the sixth wave of the World Values Survey.

### 4.1 Model

The model we are going to estimate is a standard linear OLS model.

#### **OLS Specification:**

$$Y = \alpha + \beta Trust + \gamma X + \varepsilon$$

Where  $Y$  is Tax revenue or Marginal income tax rate and  $X$  is a vector of the control variables discussed in the data section. We use the same control variables for both of the dependent variables.

To account for regional fixed effects we include the regional dummies in the regressions. We aimed to run regressions where each region served as a sub sample. We also aimed to run regressions by dividing the sample by the UN income groups. This is to test for the hypothesis that the effect of trust is higher in poor countries where tax evasion is relatively easier and more widespread. Unfortunately our sample of poor countries was not sufficient to run the regression in a meaningful way. However, we ran regressions with the poorer half of our sample. The median in our sample was 16 320 GNI/capita estimated in international dollars. We used this threshold as there were too few observations to divide the sample by the income groups provided by the UN, where the threshold is 1 035 GNI/capita for low income countries and 12 615 GNI/capita for high income countries. Therefore, we unfortunately include a few high income countries in this sub-sample. Nevertheless we believed this division made more sense than using a sub-sample with even fewer observations.

To account for effects related to religion we will make a subsample of the countries with a lower percentages of Catholic or Muslims. These countries are defined as the countries with a percentage of Catholic or Muslims below the median of our sample, 60 %. We are also going to try if there are any differences between countries with different level of tax revenues. High tax revenues are defined as tax revenues above the world median of 18.4 %.

## 4.2 Threats to Causality

Using this model there are two threats we need to discuss before interpreting the results as the causal effect of trust. The first threat is the risk of omitted variable bias. If we fail to include some variable that is correlated with both trust and tax revenues or marginal tax rate the results from our regressions will be biased. In order to prevent this we include the list of control variables previously discussed in the data section. We run the regressions with the same control variable that has been previously used in the literature to make sure that we are not omitting any significant variables.

The other threat is reversed causality. Guiso et al (2011) shows that trust is highly persistent, at least since the World Values Survey started in 1981, while taxes have been relatively more volatile (Hess, 1993) as they are politically decided. Hence, it's not very likely that a correlation between the two is due to taxes affecting trust, but rather that trust is affecting taxes.

The standard OLS regression can however only be interpreted as the correlation between the variables. In order to try to establish a causal relationship we run IV regressions. Instead of using ethnic fragmentation, which has been previously used by for example D'Hernoncourt & Meon (2012), we use the percentage of people who are active members in a sport organization as an instrument for trust. Ethnic fragmentation is not a very precise instrument as it has been shown to be correlated with for example tax evasion (Chan, Troutman & O'Brian, 2000). The instrument exogeneity assumption then breaks. We will therefore use sport organization membership as this instrument's exogeneity assumption is more plausible. In the following section the regressions and the instrument are discussed.

### 4.3 IV Regression

In order to try to see in which way the causality runs we run an IV-regression. The instrument we are using is the percentage of people who state that they are active members in a sport or recreational organization. The respondents were asked to answer the following question with regards to different types of associations: “Could you tell me whether you are an active member, an inactive member or not a member of that type of organization?”. This measure is calculated as the percentage which answered that they are “active members” in a sport or recreational organization, using answers from the World Values Survey. The mean percentage of people that are active in a sport organization in our sample is about 11 %. The largest percentage is 38.6 % and the lowest is 0.1 %. The median is almost 10 %.

#### **IV Specification:**

*Second Stage*

$$Y = \alpha + \beta Trust + \gamma X + \varepsilon$$

*First Stage*

$$Trust = \pi + \mu Sport + \sigma X + u$$

Where  $Y$  is Tax revenue or Marginal income tax rate and  $X$  is a vector of the control variables. In the first stage Trust is the dependent variable and Sport is the independent variable. The control variables are the same for both stages.

In order for an IV regression to be acceptable the instrument needs to fulfill two requirements, the instrument relevance condition and the instrument exogeneity condition.

$$\text{Instrument Relevance: } Cov(trust, sport) \neq 0$$

$$\text{Instrument Exogeneity: } E[\varepsilon | sport] = 0$$

The instrument relevance condition is easily tested running a regression where the sport variable is regressed on trust. In the full sample the regressions are highly significant for both



tax revenues and marginal tax rates, indicating a strong first stage. The effect of sport organization membership on trust has previously been discussed by De Vylder (2007) who argues that involvement in sport organizations increases trust, using Sweden as an example. Seippel (2006) finds the same correlation between generalized trust and sport organization membership using Norwegian data. Using a cross-country model, Paxton (2007) finds that membership in voluntary associations is significantly correlated with generalized trust.

A rule of thumb proposed by (Staiger & Stock, 1997) for instrument relevance is that the first stage F-statistic should be above 10 in order for the instrument to be strong. An instrument which does not satisfy this condition produces results that may not be trustworthy.

The instrument exogeneity assumption is also plausible as the percentage of active members in sport organization should not affect either tax revenue or marginal tax rate through any other mechanism than trust. A larger welfare state might however subsidize sport organizations to a higher degree than countries with smaller government spending. Through this channel tax revenue and sport organization membership might be correlated. Vos, Breesch, Késenne, Van Hoecke, Vanreusel & Scheerder (2011) however find subsidies from government to have limited significance on the budget of sport clubs and it should therefore also have limited impact on the number of members. Other sources of income for sport organizations such as, sponsorships and member fees may be more important. Wicker (2011) finds that the willingness to pay for membership is much higher than what the average member actually pays. Increasing membership fees therefore would not decrease the number of members.

Wicker & Breuer (2011) find that sport organizations in Germany perceive financial problems smaller than problems with recruiting volunteers. Imagine Canada (2006) further argues that the sport organizations are more financially self-sufficient than other voluntary organizations and are thus much less in need of subsidies compared to other non-profit organizations. Both paper also states however that sport organizations themselves are more likely to report financial problems than other nonprofits. In order to reject the instrument more empirical research is needed.

## 4.4 Limitations

The World Values Survey provides data on trust for 60 countries. It might cause problems as few observations reduces the statistical power, which reduces the probability of getting significant results. We might therefore not see any significant effects in our sample even though there is a true effect on the population. Another risk is that we find an association that only exist among the specific countries in our sample, but that does not hold for the whole world. The number of observations is however not unusual in the trust literature as many studies use data from the World Values Survey.

To ensure the validity of our findings we have used control variables that has been previously proved to be significant in the literature. Comparing our sample of countries to the division of countries made by UNESCO we see some differences in regional representation. In our sample Sub-Saharan countries are underrepresented. Only 10 % of the countries in our sample are Sub-Saharan while 26 % of the world countries are African (excluding arab countries.) The Arab countries on the other hand are overrepresented. 21 % of the countries in our sample are Arab while only 11 % are Arab according to UNESCO. The other differences are small (below 4 percentage points). Another potential threat to the validity of our study is that we use our sample median to compute the subsamples of countries with a small and large population of Catholics or Muslims. Since there is an overrepresentation of Arab countries in our sample, which often has a percentage of Muslims close to 100 %, the cutoff point might be higher than the world median. We can therefore not make any conclusions about the effect of trust in countries with a small or large share of share of Catholics or Muslims relative to the world, but only with regards to our threshold, which is 60 %.

Regarding reliability, Arab countries are overrepresented in our sample which might bias our results as some of them have very low taxes and relatively high trust. This combination should be rare given our theoretical framework and the overrepresentation of Arab states might give them too much influence over the results. Using a larger or more representative

sample might lead to results which are more in line with our expectations, significant and more reliable.

## 5 Results

We will start by running our baseline OLS regressions which we will divide by income, by the population of Catholics or Muslims and by the size of tax revenues. We will then move on to the IV estimations where we run the equivalent regressions with trust instrumented with sport. To allow for heteroscedasticity we run all regressions with robust standard errors.

### 5.1 Baseline Regressions

Tax Revenue and Trust - OLS

*Table 1*

Dependent Variable:	Tax Revenue												
Trust	0.171** (0.082)	0.168** (0.082)	0.145 (0.090)	-0.049 (0.060)	0.201** (0.086)	0.081 (0.075)	0.053 (0.075)	0.208** (0.079)	0.070 (0.078)	0.095 (0.085)	0.128** (0.060)	0.096 (0.102)	0.105 (0.097)
Gini Coefficient		-0.001 (0.001)										0.002 (0.001)	0.002 (0.001)
Log GDP			0.012 (0.018)									-0.020 (0.019)	-0.011 (0.028)
Pop over 65 (% of working pop)				1.094*** (0.145)								0.937** (0.350)	1.011*** (0.301)
Ideology (% left)					0.728*** (0.175)							0.293 (0.206)	0.142 (0.177)
Rule of Law						0.042*** (0.015)						0.065 (0.048)	0.087 (0.064)
Low Corruption							0.002*** (0.001)					-0.003 (0.002)	-0.004 (0.003)
Trust in Government								-0.189*** (0.063)				0.016 (0.063)	0.051 (0.066)
Education ( % with higher education)									0.222*** (0.051)			0.051 (0.062)	0.002 (0.068)
Catholic / Muslim ( % of the pop)										-0.094** (0.036)		0.036 (0.032)	0.052 (0.040)
Asia												-0.135*** (0.024)	-0.068* (0.035)
Arab												-0.192*** (0.032)	-0.052 (0.049)
SouthAmerica												-0.071* (0.038)	-0.023 (0.062)
Subsaharan												-0.112*** (0.031)	0.018 (0.053)
Constant	0.156*** (0.020)	0.191*** (0.068)	0.050 (0.157)	0.063*** (0.021)	-0.087 (0.063)	0.179*** (0.019)	0.072** (0.033)	0.234*** (0.035)	0.030 (0.037)	0.224*** (0.029)	0.263*** (0.027)	0.163 (0.223)	0.224 (0.347)
Observations	56	52	56	54	51	53	54	56	55	55	56	42	42
R-squared	0.076	0.098	0.086	0.645	0.298	0.231	0.251	0.199	0.288	0.176	0.551	0.646	0.705

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Running our baseline standard OLS regression in *Table 1* we see, as expected, a significant positive effect of generalized trust on tax revenue. As generalized trust increases by 1 percentage point, tax revenues increase by 0.17 percentage points. Trust loses significance when controlling for GDP, population over 65, rule of law, corruption, education and for percentage of Catholics or Muslims.

The effect is not significant when adding all control variables and regional fixed effects. The R-squared for the long regression is 0.705. Our model explains roughly 71 % of the variation in tax revenues.

Marginal Tax and Trust - OLS

*Table 2*

<i>Dependent Variable:</i>	Marginal Tax												
Trust	0.153 (0.111)	0.170 (0.108)	0.209* (0.125)	-0.014 (0.133)	0.119 (0.126)	0.052 (0.123)	0.038 (0.119)	0.196* (0.111)	0.132 (0.116)	0.100 (0.118)	0.172 (0.110)	0.145 (0.122)	0.102 (0.139)
Gini Coefficient		0.000 (0.002)										0.000 (0.001)	-0.001 (0.002)
Log GDP			-0.023 (0.025)									-0.030 (0.033)	-0.005 (0.040)
Pop over 65 (% of working pop)				0.902*** (0.257)								-0.039 (0.419)	0.108 (0.386)
Ideology (% left)					0.744** (0.293)							0.390 (0.283)	0.446 (0.338)
Rule of Law						0.048** (0.022)						0.080 (0.076)	0.091 (0.101)
Low Corruption							0.003** (0.001)					0.000 (0.004)	-0.001 (0.004)
Trust in Government								-0.234** (0.092)				-0.072 (0.093)	-0.090 (0.116)
Education (% with higher education)									0.044 (0.076)			-0.076 (0.083)	-0.084 (0.105)
Catholic / Muslim (% of the pop)										-0.061 (0.049)		0.047 (0.049)	0.068 (0.054)
Asia												-0.024 (0.047)	0.041 (0.057)
Arab												-0.141** (0.055)	-0.015 (0.063)
SouthAmerica												0.030 (0.041)	0.035 (0.075)
Subsaharan												0.019 (0.051)	0.132 (0.119)
Constant	0.251*** (0.026)	0.262*** (0.070)	0.458** (0.228)	0.174*** (0.032)	0.019 (0.100)	0.276*** (0.029)	0.162*** (0.040)	0.348*** (0.050)	0.227*** (0.052)	0.296*** (0.041)	0.276*** (0.045)	0.477 (0.338)	0.292 (0.541)
Observations	57	53	57	54	52	53	54	57	56	57	57	42	42
R-squared	0.035	0.052	0.054	0.270	0.156	0.146	0.165	0.144	0.039	0.060	0.238	0.494	0.534

Robust standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

In *Table 2*, we see no significant effect of trust on marginal tax rate. The R-squared is 0.534. The relatively low R-squared of our model of marginal tax rate compared to our model of tax revenues indicate that there are some omitted variable left out of the model. This may cause endogeneity, as later tests will show. For marginal tax rates we therefore suggest to pay more attention to the IV results.

Countries with GNI/Capita below the median of 16320 International dollar (2011) - OLS

*Table 3*

<i>Dependent Variable:</i>	Tax Revenue			Marginal Tax		
Trust	-0.082 (0.102)	-0.092 (0.289)	-0.163 (0.294)	0.025 (0.196)	-0.300 (0.395)	-0.411 (0.531)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.179*** (0.020)	0.259 (0.349)	-0.076 (0.385)	0.282*** (0.032)	0.307 (0.372)	0.031 (0.516)
Observations	29	23	23	28	23	23
R-squared	0.020	0.579	0.715	0.001	0.508	0.534

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

NOTE: Control variables included are the same as in previous regressions, see the data section for detailed information.  
Regional controls are for Asia and the Pacific, South America and the Caribbean, The Arab World and Sub-Saharan Africa.  
The baseline region is Europe and North America.

In *Table 3*, we look at countries with a GNI/capita less than the median in our sample (16 320 International dollar). We see no significant effect of trust on either tax revenue or marginal tax rate in any of the regressions. We are unable to draw any conclusions from this table as the p-values are too high. Neither did we get any significant results for higher income countries (GNI/capita larger than the median in our sample.)

As we have discussed in the literature review, a large number of Catholics or Muslims have a negative impact on generalized trust and might also impact the tax revenues and the marginal income tax rate. We therefore want to divide our sample into countries with a low respectively a high percentage of Catholics or Muslims in the population. The cut-off point we are using is the median in the sample, which is 60 %.

Countries with a share of Catholic or Muslims below the median of 60 % - OLS

<i>Dependent Variable:</i>	Tax Revenue			Marginal Tax		
Trust	0.215** (0.087)	0.098 (0.163)	0.440*** (0.110)	0.285*** (0.102)	0.424* (0.228)	0.508 (0.383)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.171*** (0.027)	0.139 (0.433)	0.486 (0.327)	0.235*** (0.034)	0.438 (0.475)	0.551 (1.028)
Observations	26	20	20	28	20	20
R-squared	0.209	0.727	0.942	0.190	0.590	0.648

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

NOTE: Control variables included are the same as in previous regressions, see the data section for detailed information. Regional controls are for Asia and the Pacific, South America and the Caribbean, The Arab World and Sub-Saharan Africa. The baseline region is Europe and North America.

Table 4 shows that the effect of generalized trust on tax revenues is significant at 1 % even when controlling for all the other variables and regional fixed effects. The sign is positive as we expect. An increase in generalized trust by 1 percentage point, increases the tax revenues by 0.44 percentage points. The R-squared in the long regression is 0.942. The model therefore explains more than 94 % of the variation in tax revenues in these countries. However, when not controlling for regional fixed effects, the coefficient on trust is insignificant.

The effect of trust on marginal tax rate is significant in the first two regressions but insignificant when adding control variables and regional fixed effects. Just as in the full sample, there might be some omitted variable affecting marginal tax rate also in countries with a population of Catholics or Muslims smaller than 60 % of the total population.

The dummy variable for the Arab World in *Table 4* is omitted in the regressions, as there are no countries in our sample in the Arab World with a share of Catholics or Muslims lower than 60 % of the total population.

When running the regressions for countries with a population of Catholics or Muslims larger than 60 % we found no positive effect of trust.

Countries with tax revenue above the world median of 18.4 % - OLS

*Table 5*

<i>Dependent Variable:</i>	Tax Revenue			Marginal Tax		
Trust	0.118 (0.086)	0.167 (0.107)	0.240** (0.090)	0.282*** (0.093)	0.340* (0.165)	0.183 (0.174)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.254*** (0.022)	0.307 (0.436)	1.669*** (0.347)	0.270*** (0.036)	1.542* (0.767)	1.238 (0.684)
Observations	26	24	24	28	24	24
R-squared	0.117	0.453	0.885	0.173	0.601	0.837

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

NOTE: Control variables included are the same as in previous regressions, see the data section for detailed information. Regional controls are for Asia and the Pacific, South America and the Caribbean, The Arab World and Sub-Saharan Africa. The baseline region is Europe and North America.

Regressions only including the countries with a high tax revenue, defined as tax revenues larger than the median tax revenue in the World, 18.4 % (The Heritage Foundation, 2014) in *Table 5* show that trust is positive and significant at 5 % in the full regression. Increasing trust by 1 percentage point increases tax revenue by 0.24 percentage points. This effect is almost half compared to the effect of trust in countries with Catholics or Muslims below 60 % of the population. R-squared for the full regression is 0.885. Almost 89 % of the differences in tax revenues can be explained by the model.

The effect on marginal tax rate is significant in the first two regressions but is insignificant when both control variables and regional fixed effects are included. Again there might be some endogeneity issues with regards to marginal tax rates.

When running the regressions for countries with tax revenues below the world median we found no positive effect of trust.



## 5.2 IV Estimations

In order to circumvent endogeneity and causality issues, we now turn to the IV regressions. In the IV estimations we will not report the R-squared for the second stage as the interpretation is not useful and may confuse the reader.

Full Sample - IV

Table 6

<i>Second Stage:</i>						
<i>Dependent Variable:</i>	Tax Revenue			Marginal Tax		
Trust	0.431*** (0.159)	0.115 (0.147)	0.099 (0.139)	0.805*** (0.290)	0.641*** (0.242)	0.541** (0.215)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.094** (0.044)	0.166 (0.194)	0.220 (0.293)	0.096 (0.072)	0.551 (0.362)	0.562 (0.521)
Observations	56	42	42	57	42	42
<i>First Stage:</i>						
<i>Dependent Variable:</i>	Trust			Trust		
Sport	0.816*** (0.241)	0.971*** (0.276)	1.059*** (0.326)	0.816*** (0.241)	0.971*** (0.276)	1.059*** (0.326)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.150*** (0.031)	-0.139 (0.320)	-0.717 (0.519)	0.150*** (0.031)	-0.139 (0.320)	-0.717 (0.519)
Observations	60	42	42	60	42	42
R-squared	0.188	0.682	0.707	0.188	0.682	0.707
Endogeneity test (p-value)	0.055	0.879	0.959	0.001	0.005	0.014
First stage F-test	11.49	8.33	7.06	11.49	8.33	7.06

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

NOTE: Control variables included are the same as in previous regressions, see the data section for detailed information. Regional controls are for Asia and the Pacific, South America and the Caribbean, The Arab World and Sub-Saharan Africa. The baseline region is Europe and North America.

In *Table 6*, the Durbin–Wu–Hausman test for endogeneity implies that trust is endogenous when we use marginal tax rate as the dependent variable. This can explain the lack of significant results in the previous regressions and justifies the use of an instrumental regression.

In the first stage, sport is significantly correlated with trust at 1 %. The F-statistic for the short regression is above 10 which implies a strong instrument (Staiger & Stock, 1997). When adding control variables and regional fixed effects, the F-statistic falls below 10 which may indicate that the instrument is not relevant as we cannot reject the null hypothesis of joint insignificance at the preferred confidence level.

*Table 6* also shows that the effect of trust on tax revenue is significant in the short regression. When adding control variables and regional fixed effects, the effect however loses significance. IV regressions are less consistent than OLS regression, the result is therefore expected as the OLS regression on tax revenue was also insignificant.

The effect of generalized trust on marginal income tax rate seems to be quite robust to control variables. The effect is positive, as we expect, and significant at 5 % even when controlling for all the control variables and regional fixed effects. Increasing generalized trust in a country by 1 percentage points, increases the marginal income tax rate by 0.54 percentage points.

Countries with GNI/Capita below the median of 16320 International dollar (2011) - IV

Table 7

<i>Second Stage:</i>						
<i>Dependent Variable:</i>	Tax Revenue			Marginal Tax		
Trust	0.169 (0.331)	0.327 (0.778)	1.187 (1.066)	-0.709 (0.520)	-0.177 (0.678)	-0.427 (0.513)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.133** (0.055)	0.079 (0.463)	0.181 (0.498)	0.411*** (0.083)	0.254 (0.419)	0.028 (0.313)
Observations	29	23	23	28	23	23
<i>First Stage:</i>						
<i>Dependent Variable:</i>	Trust			Trust		
Sport	-0.628 (0.371)	-0.442 (0.370)	-0.550 (0.438)	-0.628 (0.371)	-0.442 (0.370)	-0.550 (0.438)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.234*** (0.046)	0.440 (0.300)	-0.195 (0.384)	0.234*** (0.046)	0.440 (0.300)	-0.195 (0.384)
Observations	29	23	23	29	23	23
R-squared	0.086	0.693	0.800	0.086	0.693	0.800
Endogeneity test (p-value)	0.383	0.692	0.175	0.019	0.878	0.986
First stage F-test	2.87	5.41	5.83	2.87	5.41	5.83

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

NOTE: Control variables included are the same as in previous regressions, see the data section for detailed information.

Regional controls are for Asia and the Pacific, South America and the Caribbean, The Arab World and Sub-Saharan Africa.

The baseline region is Europe and North America.

In *Table 7*, we find no significant effect of trust in countries with a GNI/capita less than the median in our sample. The instrument also loses significance in the first stage and the F-statistic is well below 10, indicating that the instrument relevance condition does not hold in this subsample.

We also ran IV regressions for high income countries but the instrument relevance condition was not satisfied, therefore we cannot trust the results from the IV estimation.

Countries with a share of Catholic or Muslims below the median of 60 % - IV

Table 8

<i>Second Stage:</i>						
<i>Dependent Variable:</i>	Tax Revenue			Marginal Tax		
Trust	0.274** (0.135)	0.305** (0.142)	0.571*** (0.105)	0.672*** (0.226)	0.860*** (0.298)	1.044*** (0.243)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.153*** (0.048)	0.083 (0.328)	0.607*** (0.168)	0.118 (0.077)	0.318 (0.466)	1.048 (0.640)
Observations	26	20	19	28	20	19
<i>First Stage:</i>						
<i>Dependent Variable:</i>	Trust			Trust		
Sport	1.025*** (0.287)	1.281*** (0.392)	1.453** (0.550)	1.025*** (0.287)	1.281*** (0.392)	1.453** (0.550)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.158** (0.059)	-0.143 (0.540)	-0.325 (0.665)	0.158** (0.059)	-0.143 (0.540)	-0.325 (0.665)
Observations	28	20	19	28	20	19
R-squared	0.275	0.854	0.934	0.275	0.854	0.934
Endogeneity test (p-value)	0.653	0.089	0.287	0.065	0.070	0.227
First stage F-test	12.78	20.05	11.09	12.78	20.05	11.09

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

NOTE: Control variables included are the same as in previous regressions, see the data section for detailed information. Regional controls are for Asia and the Pacific, South America and the Caribbean, The Arab World and Sub-Saharan Africa. The baseline region is Europe and North America.

Table 8 shows that our hypothesis seems to be plausible for countries with a lower percentage of Catholics or Muslim. The effect is positive and significant for both tax revenue and marginal income tax rate at 1 % when including all control variables and regional fixed effects. Furthermore, the effect seems to be causal for both tax revenue and marginal income tax rate. A 1 percentage point increase in generalized trust will increase tax revenues by 0.57 percentage points and marginal tax rate by 1.04 percentage points. The effect of trust on tax revenues are about 30 % larger here than in the OLS regression and the effect of trust on marginal tax rate is almost twice the size in this sub-sample compared to the full sample regression. Trust turns out to be significant in every regression in the second stage. The dummy variable for the Arab World is again omitted for the same reason as before. In the long regression South America was also omitted.

The high F-statistics indicates that sport is a good instrument in this sub-sample, being above the proposed rule of thumb of 10 (Staiger & Stock, 1997). For the two first regressions with marginal tax rate we can reject the null of trust being exogenous to marginal tax rate. The IV therefore serves its purpose. We can however not reject the null hypothesis in the long regression.

Just like the OLS-regression, we did not find any positive effect of trust for countries with a population of Catholics or Muslims larger than 60 % of the total population.

Countries with tax revenue above the world median of 18.4 % - IV

Table 9

<i>Second Stage:</i>						
<i>Dependent Variable:</i>	Tax Revenue			Marginal Tax		
Trust	0.235** (0.105)	0.279*** (0.105)	0.234** (0.093)	0.605*** (0.199)	0.852*** (0.269)	0.445** (0.224)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.221*** (0.034)	0.344 (0.328)	1.660*** (0.247)	0.177*** (0.064)	1.709*** (0.606)	1.673*** (0.492)
Observations	26	24	24	28	24	24
<i>First Stage:</i>						
<i>Dependent Variable:</i>	Trust			Trust		
Sport	1.085*** (0.226)	1.127*** (0.295)	1.206** (0.479)	1.085*** (0.226)	1.127*** (0.295)	1.206** (0.479)
Control Variables	NO	YES	YES	NO	YES	YES
Regional Fixed Effects	NO	NO	YES	NO	NO	YES
Constant	0.148*** (0.043)	-0.459 (0.605)	-1.699 (1.025)	0.148*** (0.043)	-0.459 (0.605)	-1.699 (1.025)
Observations	30	24	24	30	24	24
R-squared	0.400	0.795	0.863	0.400	0.795	0.863
Endogeneity test (p-value)	0.200	0.289	0.968	0.068	0.014	0.412
First stage F-test	23.06	11.10	9.07	23.06	11.10	9.07

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

NOTE: Control variables included are the same as in previous regressions, see the data section for detailed information. Regional controls are for Asia and the Pacific, South America and the Caribbean, The Arab World and Sub-Saharan Africa. The baseline region is Europe and North America.

In *Table 9*, we see that generalized trust has a significant positive effect on both marginal income tax rates and tax revenues at 5 %. The effect of trust is significant in all regressions, showing the robustness of the results. The effect of trust on tax revenue are about the same size here as in the OLS regression and the effect on marginal tax rate in this sample is about 18 % smaller than in the IV regression on the full sample. The first stage regression also shows sport to be a good instrument. The F-statistic is above 10 in two of the first stage regressions. The long first stage regression has an F-statistic of 9.07 which is just below 10, again indicating that the instrument might be non-relevant.

Just like in *Table 8*, we here reject the null hypothesis of trust being exogenous in the regressions on marginal tax rates in the first two regressions. In the long regression we cannot reject the null hypothesis.

Just like the OLS-regression, we did not find any positive effect of trust for countries with tax revenues below the world median.

## 6 Discussion

Our main findings are: Trust may solve the social dilemma of taxation by increasing cooperation, leading to higher marginal tax rates. In countries where less than 60 % of the population is affiliated with Catholicism or Islam, trust increases tax revenues as well as marginal tax rates. The same is true for countries with tax revenues higher than 18.4 % of GDP. Regarding the existence or magnitude of the effect in developing countries, neither previous research nor our study provide any clear evidence.

We find a similar effect of generalized trust as Bjørnskov & Svendsen (2013). Like them we find that trust does predict the willingness to redistribute resources, although in terms of marginal tax rates instead of government spending. Our finding of the effect of trust on tax revenues in countries with tax revenues above 18.4 % is comparable to Bjørnskov & Svendsen's (2013) result, as they used mostly stable countries in Europe, which have relatively high tax revenues.

Our finding of a positive effect of trust on tax revenue in specific sub-samples and on marginal tax rate in the complete sample confirms previous research that there is no pure free-rider behavior. It is rather a positive correlation between cooperation and the belief that others will cooperate in social dilemmas. If people in general really intended to free-ride, they would benefit from voting for higher taxes and then evade them, regardless of trust levels.

Higher marginal tax rate is sometimes argued to lead to higher tax evasion, as the cost of compliance increases. The existence of such a mechanism could offset part of the positive effect of trust on tax revenue in countries with high marginal income tax rates. However, according to our findings, the positive effect of generalized trust seems to be the dominating effect.

Tax revenues and marginal income tax rates are positively correlated in our sample. Still, we find that trust has a positive effect only on marginal tax rate when including control variables and regional fixed effects. This could be due to higher standard errors of tax revenues than of

marginal tax rate or that we do not have enough statistical power to get a significant result, which can be resolved by using a larger sample. Another possible reason is that we fail to include an important variable. It could obviously also be that we have estimated the true effect. There might not be a significant relationship between trust and total tax revenues but only between trust and tax revenue from taxes that are broad based and relatively easy to evade, such as the income tax. This would explain why we only get significant results in the full sample for marginal income tax rate and not for tax revenues.

One result repeating itself in all tested models is that the effect of trust on our dependent variables is insignificant when controlling for rule of law and corruption separately, while we see no such pattern for any other control variable. This tells us that institutional factors are dominating trust for both tax revenues and marginal tax rate when no other control variables are included. One possible explanation for the dominance of rule of law is that if the enforcement of taxes is weak, trust will have little effect. This might also provide another explanation for why trust does not seem to have any effect on tax revenue in the full sample. In countries with a weak tax-infrastructure and where transactions cannot be monitored, the incentives to pay taxes are low and generalized trust will not make one pay taxes that practically cannot be enforced. However, when the rule of law is stronger, generalized trust might make people less prone to evade taxes. In other words, trust only has an effect for people already paying taxes.

High corruption should be correlated with a distrust in the government. Previous studies have found that trust in government has a positive effect on tax compliance, in addition Hammar et al's (2009) study with Swedish taxpayers find that the negative effect of distrust in the government is even more important. In countries with high corruption the distrust in the government might cause generalized trust to lose importance. Corruption is also a system based on in-group loyalty, which maintains hierarchical structures and reinforces conflicts between groups (Rothstein & Uslaner, 2005). In addition to increased tax evasion, this should further decrease the willingness to redistribute resources via the government and have a negative effect on the marginal income tax rate.



Our results also show that the positive effect of generalized trust only exists in countries which already have relatively high tax revenues. This could imply that trust does not work in countries that have severe problems with tax collection, as many developing countries do, or in countries with a welfare system which is based more on private provision and free markets.

One reason for the effect on tax revenues and marginal tax rate in countries with a population of Catholics or Muslims below 60 %, is that Catholicism and Islam are hierarchical religions, which does not only decrease trust but also impact the country in other ways. As discussed in the literature review, hierarchical religions might affect the tax base negatively, which decreases tax revenues, *ceteris paribus*. A relatively small population of Catholics or Muslims will result in stronger horizontal bonds between people and the willingness to redistribute resources might therefore be larger. This implies higher tax revenues and higher marginal income tax rates. The magnitude of the effect of trust on both tax revenue and marginal tax rate is larger for countries with a population of Catholics or Muslims smaller than 60 %, compared to the whole sample and the subsample of countries with tax revenue countries higher than 18.4 % of GDP.

Regarding both the estimated effect of trust in countries with tax revenues higher than the world median and in countries with a share of Catholics or Muslims below the sample median we should be careful interpreting the results. When we divide an already small sample of 60 countries again to find different effects for different groups we get sample sizes which may be too small to estimate the true effect.

In addition, the limited sample hindered us from studying developing countries in isolation. Neither could we divide our sample by regions. For this reason, we are not able to reject the null hypothesis of zero difference in the effect of generalized trust between rich and poor countries. However, developing countries are more likely to have more than 60 % of the total population affiliated with either Catholicism or Islam (CIA 2013, UN) and are also more likely to have low tax revenues (Tanzi & Zee, 2000). It is therefore possible that the effect of trust on taxation is insignificant in developing countries.

The potential lack of effect of trust in developing countries can be explained by the character of the taxes in these countries. In developing countries, income taxes take a smaller share of total tax revenues than in developed countries. In these countries taxes on for example trade are used more heavily. As tariffs and other similar taxes are not a social dilemma in the same sense as income taxes the effect of trust is likely zero.

A possible explanation for our result, that generalized trust only seems to have an effect on tax revenue in countries less than 60 % of the total population affiliated with Catholicism or Islam and in high tax revenue countries, is provided by Rothstein & Uslaner (2005). They discuss the possibility to change the level of trust in a society. In hierarchical societies with low social mobility the lack of equal opportunities will make it difficult to achieve a higher level of trust. The stickiness of inequality and trust creates a high trust, high equality equilibrium, and a low trust, low equality equilibrium. Once trapped in the low equilibrium it is very difficult to increase trust, and potentially trust-enhancing reforms such as universal welfare programs are difficult to implement due to low generalized trust. Furthermore, they argue that universal welfare programs will create a perception of equal opportunity and increase trust, while means-tested welfare programs create stigmatization and decrease trust. Universal welfare policies are more costly than means-tested, why the authors argue more taxes need to be collected.

Given that trust is persistent and difficult to change, it is probable that countries with low trust will end up in a low trust, low tax equilibrium where trust has little effect on taxation. It is possible that trust solves the social dilemma of taxation only in countries above some threshold of trust. Future research can investigate the validity of this hypothesis and determine what a possible threshold might be.

Future research could benefit from using a longitudinal approach when investigating trust and tax revenues. Furthermore, looking at average tax rate instead of marginal tax rate might give a more representative picture of people's willingness to pay tax, as few people pay the highest marginal tax rate in some countries. Further research could also benefit from using a larger sample, including more developing countries.

## 7 Conclusion

The issues with collecting taxes to finance public goods is of importance because it poses a social dilemma which would produce sub-optimal outcomes if people behaved rationally. Trust might help solve this dilemma and higher trust could therefore produce higher societal utility. This issue is especially important in poor countries as poor people's vulnerability to the lack of public goods are greater than in developed countries. This paper contributes by investigating the effect of generalized trust on tax revenue and marginal tax rates. To elude causality issues we made IV estimations with sport organization membership, a novel instrument. We developed a framework in which higher trust increases the likelihood of cooperating in a social dilemma. Higher cooperation leads to higher tax revenues and higher marginal tax rates. Using this framework we derived three hypotheses which we tested using data on generalized trust from the World Values Survey.

Our first hypothesis, *generalized trust and tax revenues as well as marginal tax rates are positively correlated*, does not seem to hold in the complete sample when adding all our control variables. The relationship between trust and marginal tax is however significant also after adding controls.

Regarding our second hypothesis, *the effect of trust on tax revenues is stronger in developing countries relative to developed countries*, we have not been able to draw any conclusions, due to a limited sample. It is however likely that there is no significant relationship.

Our third hypothesis, *the effect of trust on both tax revenues and marginal tax rates is stronger in countries with a small population of Catholics or Muslims relative to countries with a large population of Catholics or Muslims*, can be confirmed. We conclude that the relationship holds for countries with a population of Catholics or Muslims smaller than 60 % of the total population. The effect of trust in these regressions are also larger in magnitude than in the other regressions. The causal effect seems to run from generalized trust to higher tax revenue and from generalized trust to higher marginal income tax rates.

Answering our research question, *Can trust help explain the cross-country variation in tax revenues and in marginal tax rates?* it seems that trust indeed can help explain some of the variation in tax revenues. In countries with a percentage of the population being Catholic or Muslims below 60 and in countries with tax revenues above 18.4 %, higher trust increases both tax revenues and marginal tax rates. Trust also helps explain the cross-country difference in marginal tax rates in the full sample.

The strongest determinant of trust identified in the literature is inequality. Policies that decrease inequality could therefore increase generalized trust which could augment the tax revenues collected. In line with Rothstein & Uslaner (2005) universal welfare policies, which are not means tested, can be used to increase trust in countries stuck in a low trust equilibrium. It is however difficult to implement these policies in hierarchical or low-trust countries as the willingness to redistribute resources might be low.

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## 9 Appendix

### 9.1 Descriptive Statistics

*Table A1*

*Descriptive Statistics*

Variable	Obs	Mean	Std. Dev.	Min	Max
Trust	60	.24	.16	.028	.67
Tax Revenue	56	.20	.10	.0095	.45
Marginal Tax	57	.29	.14	0	.57
Gini Coefficient	54	.38	10.21	.31	63.73
Log GDP	58	9.67	.93	7.30	11.80
Population over 65 (% of working population)	54	.13	.08	.012	.36
Ideology (% left)	55	.34	.06	.15	.43
Rule of law	54	.08	.99	-1.65	1.96
Low Corruption	54	47.07	20	16	91
Trust in Government	60	.46	.19	.078	.95
Education (% with higher education)	57	.69	.22	.125	1
Catholic or Muslim ( % of population)	57	.51	.38	0	.998
Asia	58	.26	.44	0	1
Arab	58	.21	.41	0	1
South America	58	.13	.35	0	1
Sub-Saharan	58	.10	.30	0	1

Table A2

*Sources and Definitions*

Variable	Source
Gini	Gini-coefficient average over 2004-2014 (World bank)
Lgdp	To control for GDP per capita we used PPP-adjusted international dollar Us dollar 2011 (World Bank)
Pop65	UNDP's development data. Old age dependency ratio is defined as number of people being 65 years and older per 100 people in working age. 15-64 years (2014)
Left	We have controlled for ideology using the World Value Survey question on political stance to create a percentage of people who think of themselves as "left" (World Value Survey. wave 6)
Ruleoflaw	We will control for institutions through the World Bank's index of Rule of law across countries and for corruption by the Corruption Perception Index published by Transparency International (2014)
Lowcorruption	Corruption is measured by the corruption perceptions index published by Transparency International (2014)
Government	The variable is measured as the percentage of people who answers "A great deal of confidence" to the question "Could you tell me how much confidence you have in the government?" (World Values Survey. wave 6)
Education	We have controlled for education by using UNDP's measure on the share of the population over 25 years old with at least some secondary education, similar to Bjornskov (2007). Averaged over the years 2010-2014
Sport	We have controlled for sport organisatoin membership using the World Value Survey question on sport membership to create a percentage of people who are active in a sport organisation (World Value Survey. wave 6)
Catholic/Muslim	The World Factbook 2013-14. Washington. DC: Central Intelligence Agency. (2013)
Asia	= 1 if the country is in Asia or the pacific according to UNESCO.
Arab	= 1 if the country is in the Arab World according to UNESCO.
SouthAmerica	= 1 if the country is in South America according to UNESCO.
Subsaharan	= 1 if the country is in Africa and not in the Arab World according to UNESCO.
	The baseline region is Europe + North America.



Table A3  
Countries Included

	Trust	Tax Revenue	Marginal Tax Rate	Catholics or Muslims > 60 %		Trust	Tax Revenue	Marginal Tax Rate	Catholics or Muslims > 60 %
Algeria	18%	10%	35%	Yes	Morocco	13%	23%	38%	Yes
Argentina	23%	34%	35%	Yes	Netherlands	67%	38%	52%	No
Armenia	10%	18%	36%	No	New Zealand	57%	31%	33%	No
Australia	54%	23%	45%	No	Nigeria	15%	10%	24%	No
Azerbaijan	17%	13%	25%	Yes	Pakistan	24%	10%	20%	Yes
Bahrain	34%	4%	0%	Yes	Palestina	18%	-	-	-
Belarus	35%	25%	12%	No	Peru	8%	16%	30%	Yes
Brazil	7%	34%	28%	Yes	Philippines	3%	12%	32%	Yes
Chile	13%	18%	40%	Yes	Poland	23%	32%	32%	Yes
China	64%	19%	45%	No	Qatar	41%	4%	0%	Yes
Colombia	4%	15%	33%	Yes	Romania	7%	27%	16%	No
Cyprus	9%	26%	35%	No	Russia	29%	-	13%	No
Ecuador	7%	16%	35%	Yes	Rwanda	17%	13%	30%	No
Egypt	21%	14%	25%	Yes	Singapore	39%	14%	20%	No
Estonia	40%	33%	21%	No	Slovenia	20%	37%	50%	Yes
Georgia	9%	24%	20%	No	South Africa	24%	26%	40%	No
Germany	43%	37%	48%	No	South Korea	30%	-	38%	No
Ghana	5%	13%	25%	No	Spain	20%	32%	52%	Yes
Hong Kong	48%	14%	15%	No	Sweden	65%	45%	57%	No
India	22%	7%	34%	No	Taiwan	30%	-	-	-
Iraq	32%	1%	15%	Yes	Thailand	32%	15%	35%	No
Japan	39%	28%	51%	No	Trinidad & Tc	3%	16%	25%	No
Jordan	13%	15%	14%	Yes	Tunisia	16%	21%	35%	Yes
Kazakhstan	39%	14%	10%	Yes	Turkey	12%	25%	35%	Yes
Kuwait	30%	1%	0%	Yes	Ukraine	25%	38%	17%	No
Kyrgyzstan	38%	18%	-	-	United States	38%	25%	40%	No
Lebanon	11%	17%	20%	Yes	Uruguay	15%	23%	30%	No
Libya	12%	3%	10%	Yes	Uzbekistan	14%	20%	22%	Yes
Malaysia	9%	15%	26%	Yes	Yemen	40%	6%	15%	Yes
Mexico	12%	10%	30%	Yes	Zimbabwe	7%	21%	45%	No