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## Tax revenues under World Religions: a Panel Analysis

(draft version, not for publication)

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### **Abstract:**

The aim of paper is to investigate the impact of major religions of the world on collected tax revenues, using a panel-mode approach, with 123 countries, for the period 1996-2010. The paper extends the literature in the field showing how different types of religion influence the level of tax revenues, under an extended set of economic and socio-political control variables. The main finding reveals that collected tax revenues tend to increase under Protestant and Muslim religions.

**Key words:** tax revenues, religion, connections, panel-model, effects

**JEL-codes:** C23, H20, Z12

## 1. Introduction

Religion represents one of the most important determinants of taxation, the religious dogmas heaving a great impact on collected tax revenues through the taxpayers' behaviour. In a sociological framework, the government's tax revenues are the main result of tax compliance, based on tax morale and degree of enforcement (Graetz and Wilde, 1985; Elffers, 1991). In this context, the religion transmits its impulse on collected tax revenues through complex *tax morale - tax compliance* nexus.

As the religious dogmas are not the same for all religions, the intensity of taxpayers' compliance and the level of government tax inputs differ from one religion to other. For major world religions, the dogmas have explicit slogans for taxpayers, based on clear religious norms. Some evidences in this way are pointed out by Eisenhauer (2008), regarding the case of Roman Catholicism (Clough, 1992), Judaism (Tamari, 1998; Cohn, 1998) and Islam (Murtuza and Ghazanfar, 1998). For other religions, the taxation rules derive from general dogmatic framework in no explicit way.

The contributions regarding the religion's implications on collected tax revenues reveal two main research directions: first one, focused on the evidence and intensity of connection, and second one, developed on the religion types' impact on collected tax revenues. Whatever is the theoretical field, the collection of taxes is "compressed" under the concepts of tax compliance, tax fraud or tax evasion. Even so, all concepts determine the same effects on tax revenues: they reduce or rise the level of collected tax inputs.

Tittle (1980) is the main recent exponent of the first theoretical direction regarding the religion's implications on collected tax revenues. The author examines the influence of culture and religion on tax evasion in the case of the U.S. and finds a strong correlation between mentioned variables. Similar results obtain Coleman and Freeman (1997) in the case of Australia, respectively Chan et al. (2000) for Hong Kong and the U.S.

Grasmick et al. (1991) chooses church attendance and individual religiosity in order to capture the religion. Their empirical results are based on a sample of 330 adults (18 and older), from the annual Oklahoma City Survey. The main outputs show a significant negative relationship between two considered religious variables and tax evasion (when church attendance and level of individual religiosity increase, the tax evasion decreases). Torgler (2003) uses the tax compliance concept in his research focused on Canada, with data from the WVS. All three independent variables - trust in government, pride in being a citizen of Canada, and religiosity - have positive effect on tax evasion. Moreover, the effect persists even so a set of control variables is used (e.g. age, income, education, gender, marital status, and employment status)

The relationship between religiosity and tax fraud acceptability is explored by Stack and Kposowa (2006), using a set of 37 countries. The researchers find that 39 percent of variation in religiosity is explained by tax fraud acceptability. Richardson (2008) investigates the tax evasion under impact of culture, religion, legal and political variables. The estimates performed based on a sample of 47 countries illustrate that a low level of religiosity generates high level of tax evasion across countries. Finally, Peñas and Peñas (2010) select a logit estimation method for investigate a sample size with 159 regions and 17 countries. Their results illustrate positive correlation between tax morale and religion, age, income, satisfaction with democracy, trust in politicians and agreement with redistribution, respectively negative correlation in respect to self-employment and education.

The second direction of research focuses on religious types' impact on collected tax revenues. Furnham (1981) performs a very interesting study about protestant work ethic and attitudes towards unemployment, using a sample with 109 subjects took part, 69 males and 40 females. The author finds that high degree of protestant work ethic generates more opposition to taxation. Extending analysis conducts Guiso et al. (2003). The researchers take into account the main world religions and work with the intensity of religious beliefs and economic attitudes. World Values Surveys is the source for data-set, with respondents from 66 independent countries and three main periods: 1981-1984, 1990-1993 and 1995-1997. After checking for country-fixed effects, the conclusion reveals that the Judaism religion has a major negative effect on tax payment, followed in order by Protestant, Catholic, Hindu and Muslim religions.

Torgler (2004) investigates several Asian countries based on a cross-section approach, using the World Values Survey wave 3, for the period 1995-1997. He finds that Christian religion doesn't have any significant influence on tax morale, while for Muslim religion, other religions and no religions there is a great impact. The author attributes low tax morale for the Philippines and high level for Japan, China, and Bangladesh. Two years later, Torgler (2006) extends his work over 32 countries, using a weighted ordered probit estimation. The main findings emphasise that tax morale rises with age under risk aversion, while the religiosity increases tax morale, especially for the Catholics, Hindus, and Buddhists.

The relationship between taxation and religion is confirmed by major part of contributions, with several points of view for both considered research directions. Based on this literature framework, the aim of paper is to investigate the impact of major religions of the world on collected tax revenues, using a panel-mode approach, with 123 countries, for the period 1996-2010. The paper extends the literature in the field showing how different types of religion influence the level of tax revenues, under an extended set of economic and socio-political control variables. The main finding reveals that only the Protestant and Muslim religions have positive impact of collected tax revenues.

The rest of the paper is structured as follows: Section 2 presents the methodology and data. Section 3 shows the results, while Section 4 concludes.

## **2. Methodology and data**

The implications of religions on collected tax revenues are analysed based on an unbalanced large data-set, with 123 cross-sections (123 countries), for the period 1996-2010 (Table 1, in Appendix), using a panel model approach. The relatively short period of investigation doesn't have any problem, because one of the advantage of panel models is that "they can be used to analyze dynamics with only a short time series", as Kennedy (2003) notes. In order to explore the relationship between types of religion and taxation, we consider collected tax revenues as dependent variable, while for interest explanatory variables we perform a set of religion dummy variables.

The dependent variable is collected tax revenues ( $\tau$ ) and measures the level of tax revenues collected by general government in U.S. dollars.

The interest independent variables are the religion dummy variables  $\kappa$ ,  $\pi$ ,  $\sigma$ ,  $\chi$ ,  $\psi$  and  $\omega$  which have value 1 if the considered countries are predominant Catholic ( $\kappa$ ), Protestant ( $\pi$ ), Orthodox ( $\sigma$ ), Muslim ( $\chi$ ), Buddhist ( $\psi$ ) or Hindus ( $\omega$ ), respectively value 0 if not. All dummy variables are

performed based on Matthew's (2008) religion map and capturing all specific religious aspects, such as: dogmas, belief in God, denominations, church authority etc.

As the main hypothesis considers that the types of religion influence the level of collected tax revenues, the basic function has this form:

$$\tau = f(\kappa, \pi, o, \chi, \psi, \omega), \quad (1)$$

where  $\tau$  - the amount of tax revenues in U.S. dollars, and  $\kappa, \pi, o, \chi, \psi, \omega$  - the religion dummy variables.

All other main religion variables are omitted from analysis and absorbed in the constant, according to Noland (2005). In respect to the reverse causality, the endogeneity issue cannot be evidenced because only the direction "religion - taxation" is valid according to the literature.

Using natural logarithmic of variable  $\tau$ , the OLS naïv panel-model 1 has this shape:

$$\ln(\tau_{it}) = \alpha + \beta_0 \kappa_{it} + \beta_1 \pi_{it} + \beta_2 o_{it} + \beta_3 \chi_{it} + \beta_4 \psi_{it} + \beta_5 \omega_{it} + \varepsilon_{it}, \quad (2)$$

where  $\alpha$  - intercept,  $\beta_{0,...,5}$  - slops of interest religion dummy variables,  $i$  - country,  $t$  - time and remainder, and  $\varepsilon_{it}$  - the error term, which varies over both country, and time.

The effects of religion dummy variables are isolated entering three types of control variables: one derived from appropriate tax literature, one inspired by macroeconomic policy, and another one represented by robustness variables. In this case, the extended linear model becomes:

$$\ln(\tau_{it}) = \alpha + \beta_0 \kappa_{it} + \beta_1 \pi_{it} + \beta_2 o_{it} + \beta_3 \chi_{it} + \beta_4 \psi_{it} + \beta_5 \omega_{it} + \sum_{k=1}^n \beta_k X_{k,it} + \mu_i + \lambda_t + \varepsilon_{it}, \quad (3)$$

where  $\alpha$  - intercept,  $\beta_{0,...,5}$  - coefficients of interest dummy variables,  $\beta_k$  - coefficient of control independent variable  $k$  by  $n$  type,  $X$  - control independent variables,  $\mu_i$  - stands for country fixed effects,  $\lambda_t$  - time-specific effect that controls for unaccounted common time-varying factors,  $i$  - country,  $t$  - time, and  $\varepsilon_{it}$  - the error term.

The first set of control variables is originated in the appropriate tax literature and includes: gross domestic product per capita (GDP per capita), size of industrial sector and size of agricultural sector. GDP per capita measure the amount of GDP in US dollars divided by midyear population. Size of industrial sector and size of agricultural sector explain the value added by industrial/agricultural sector as percent in GDP.

The second group of control determinants captures macroeconomic policy variables, such as: inflation rate, balance of trade, government debt, government final consumption expenditures and net foreign direct investments (FDI). The inflation rate represents the percentage rate of change in consumer price level, while the balance of trade quantifies the difference between monetary value of exports and imports of output, as percent of GDP. The government debt captures general government gross debt as percent of GDP. The fourth variable, government final consumption expenditures, reveals the government final consumption expenditure as percentage of GDP. The last macroeconomic policy control variable is the net FDI and illustrates the difference between inward foreign direct investment and outward foreign direct investment as percent of GDP.

The variables for robustness refer to government effectiveness, freedom from corruption, literacy index and democratization level. The first variable explains the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (the level of -2.5 shows a weak governance performance, while the level of 2.5 a strong governance performance one). The second robustness variable, freedom from corruption, shows the corruption intensity (the score 100 means low corruption, while a level of 0 indicates a very corrupt government). Next two variables, level of democratization and political durability, capture political aspects. First one is represented by Polity2 index, with values from +10 (strongly democratic regime) to -10 (strongly autocratic regime), while the second one, political regime durability, shows the number of years since the most recent regime change or the end of a transition period. The last control variable is literacy index, indicates how many adults can read and write in a certain area or nation, as percent in total adult population.

All control variables presented above could have consistent impact on collected tax revenues, as Mutascu (2012) argues. They are treated as elasticity, except the variables with not strictly positive values, such as: inflation rate, balance of trade, government debt, net FDI, government effectiveness, polity2 and regime durability. The descriptive statistics of variables and their sources are illustrates in Table 2, respectively Tables 3 in Appendix.

In our panel-model approach, the model may have heterogeneity in the data. As the investigated sample is unbalanced, we test this propriety only in the case of period fixed-effects model, because the cross-section fixed-effects has singular matrix (the interest variables are dummy variables) and the random effects panel-models are not consistent under unbalanced data-set. In this demarche, F-test permits to choose between pooled model and fixed-effects model. The next section shows the main empirical results of explored function, performing several econometric scenarios (models 1-5), as Table 4, in Appendix, illustrates.

### 3. Results

The most important empirical result, as Table 4 in Appendix reveals, shows that all interest religion dummy variables are significant in all scenarios (only Orthodox dummy variable is insignificant in OLS model 3). The Protestant and Muslim religion dummy variables are positive correlated with collected tax revenues as dependent variable, while the Catholic, Orthodox, Buddhist and Hindu religion dummy variables negative. All control variables also are significant, except the size of agricultural sector, inflation rate and literacy index.

GDP per capita, size of industrial sector, balance of trade, government debt, government final consumption expenditures, government effectiveness, index of democracy and regime durability are positive correlated with dependent variable. Only two control variables are negative corrected with tax revenues: FDI and freedom of corruption.

Further, we initiate the hypothesis tests to choose between pooled model and fixed-effects model. As the sample is unbalanced and the cross-section fixed-effects has singular matrix, only the period fixed-effects is taken into account. The values of F-test and Chi-square for period fixed-effects clearly show that the period fixed-effects model are preferred to the OLS estimations. In this case, all variables are significant, less the size of agricultural sector, inflation

rate and literacy index. The religion dummy variables and control variables confirm the same correlation signs obtained in the OLS models. These results also ascertain the main literature conclusions regarding the signs of collected tax revenues' determinants.

The main empirical outputs, in the case of 123 investigated countries, for the period 1996-2010, indicate that all considered control determinants have significant impact on collected tax revenues (except especially size of agricultural sector, inflation rate and literacy index), but the main finding reveals that the Protestant and Muslim religion dummy variables are significant and positive correlated with dependent variable, while the Catholic, Orthodox, Buddhist and Hindu religion dummy variables significant and negative. In respect to the religion dummy variables, the collected tax revenues tend to increase under Protestant and Muslim religions.

#### **4. Conclusions**

The collected tax revenues have a set of determinants. Some of them are from behavioural type, tax compliance being the most important. In this case, two main elements define it: tax moral and degree of law enforcement. Religion influences the tax revenues through tax moral component, with different intensity from one country to another. The empirical results show that only the Protestant and Muslim religions stimulate the collection of tax revenues, while the rest of religions don't have a positive impact on government inputs. These findings confirm partially the main contributions of Furnham (1981), Guiso et al. (2003) and Torgler (2006).

In the context of tax-policy implications, the study suggests that a significant increase of collected tax revenues, without a major negative reaction of taxpayers, can be easily obtained by public authority situated in Protestant or Muslim countries. The dogmas in these religions have a great importance in tax moral modelling. For the rest of countries, the negative impact of religious dogmas on collected tax revenues should be compensating by strong law enforcement.

We conclude pointing out that the best taxation environment is offered by Protestant and Muslim religions. This research could be a very good starting for an extended investigation over tax burden - religion nexus.

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## Appendix

Table 1: List of analyzed countries

Countries					
Albania	Central African Rep.	Germany	Lao People's Dem.Rep	Niger	Swaziland
Algeria	Chad	Ghana	Latvia	Nigeria	Sweden
Argentina	Chile	Greece	Lebanon	Norway	Switzerland
Armenia	China,P.R.: Mainland	Guatemala	Lesotho	Oman	Tajikistan
Australia	Colombia	Guyana	Libya	Pakistan	Togo
Austria	Costa Rica	Honduras	Lithuania	Panama	Trinidad and Tobago
Azerbaijan, Rep. of	Croatia	Hungary	Macedonia, FYR	Paraguay	Tunisia
Bahrain, Kingdom of	Cyprus	India	Madagascar	Peru	Turkey
Bangladesh	Czech Republic	Indonesia	Malawi	Philippines	Uganda
Belarus	Denmark	Iran, I.R. of	Malaysia	Poland	Ukraine
Belgium	Djibouti	Ireland	Mali	Portugal	United Arab Emirates
Benin	Dominican Republic	Israel	Mauritius	Qatar	United Kingdom
Bolivia	Ecuador	Italy	Mexico	Romania	United States
Botswana	Egypt	Jamaica	Moldova	Russian Federation	Uruguay
Brazil	El Salvador	Japan	Mongolia	Rwanda	Uzbekistan
Bulgaria	Estonia	Jordan	Morocco	Saudi Arabia	Venezuela, Rep. Bol.
Burkina Faso	Ethiopia	Kazakhstan	Mozambique	Senegal	Vietnam
Burundi	Fiji	Kenya	Nepal	Slovak Republic	Zambia
Cambodia	Finland	Korea, Republic of	Netherlands	Slovenia	
Cameroon	France	Kuwait	New Zealand	Spain	
Canada	Georgia	Kyrgyz Republic	Nicaragua	Sudan	

Table 2: Descriptive statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
Tax revenues (US dollars)	130361.00	11955.51	4784971.00	109.70	405733.60	1358.00
GDP per capita (US dollars)	10244.59	3676.30	93156.84	112.52	14272.50	1358.00
Size of industrial sector as % of GDP	30.82	29.13	78.52	10.52	10.46	1358.00
Size of agricultural sector as % of GDP	12.87	8.02	59.72	0.36	12.41	1358.00
Inflation rate as % of GDP	6.37	4.07	132.82	-9.86	8.25	1358.00
Balance of trade as % of GDP	-4.42	-2.46	45.84	-101.73	14.08	1358.00
General government gross debt as % of GDP	52.39	46.09	261.83	0.55	33.79	1358.00
Government final consumption expenditure as % of GDP	15.80	15.65	42.95	2.68	5.73	1358.00
Net FDI as percent of GDP	2.45	1.91	46.50	-22.79	4.59	1358.00
Government effectiveness	0.20	-0.05	2.34	-1.62	0.97	1358.00
Freedom of corruption	43.37	35.00	100.00	10.00	23.43	1358.00
Polity2 index	4.96	8.00	10.00	-10.00	6.07	1358.00
Political regime durability (years)	27.71	15.00	200.00	0.00	32.75	1358.00
Literacy index	0.87	0.94	1.00	0.08	0.19	1358.00

Table 3: Source of data

Variable	Source
Tax revenues (US dollars)	International Monetary Fund online data-base (2011).
GDP per capita (US dollars)	United Nations Conference on Trade and Development (UNCTAD) online data-base (2011).
Size of industrial sector as % of GDP	World Bank online data-base (2011).
Size of agricultural sector as % of GDP	World Bank online data-base (2011).
Inflation rate as % of GDP	International Monetary Fund online data-base (2011).
Balance of trade as % of GDP	International Monetary Fund online data-base (2011).
General government gross debt as % of GDP	International Monetary Fund online data-base (2011).
Government final consumption expenditure as % of GDP	World Bank online data-base (2011).
Net FDI	United Nations Development Programme online data-base (2011).
Government effectiveness	World Bank online data-base (2011).
Freedom of corruption	The Heritage Foundation online data-base (2012).
Polity2 index	Polity™ IV Project Political Regime Characteristics and Transitions, 1800-2010 Dataset (2011).
Political regime durability	Polity™ IV Project Political Regime Characteristics and Transitions, 1800-2010 Dataset (2011).
Literacy index	United Nations Development Programme online data-base (2011).

Table 4: Empirical results of panel regressions

Dependent variable: ln tax revenues (\$)					
Independent variables	Model				
	(1)	(2)	(3)	(4)	(5)
constant	9.081580*** (0.108786)	-1.735915*** (0.300970)	-0.516856 (0.674648)	0.871478 (0.804303)	2.166552*** (0.790907)
Catholic religion dummy	0.203618*** (0.045198)	-0.580461*** (0.034500)	-0.431499*** (0.050371)	-0.451207*** (0.049600)	-0.404427*** (0.048147)
Protestant religion dummy	0.989165*** (0.045838)	0.565599*** (0.045197)	0.693521*** (0.080850)	0.545422*** (0.076933)	0.540859*** (0.075773)
Orthodox religion dummy	-0.350237*** (0.055346)	-0.343276*** (0.045612)	-0.080993 (0.095244)	-0.267476** (0.106446)	-0.280992** (0.112304)
Muslim religion dummy	0.248175*** (0.020903)	0.129474*** (0.022754)	0.114827** (0.055867)	0.100600* (0.058568)	0.123362** (0.058738)
Buddhist religion dummy	0.716225*** (0.047349)	-0.461463*** (0.074263)	-0.447488*** (0.070668)	-0.568022*** (0.051597)	-0.538644*** (0.045822)
Hindu religion dummy	-0.714310*** (0.028302)	-0.938018*** (0.046955)	-0.491976*** (0.057470)	-0.303095*** (0.046925)	-0.359943*** (0.066135)
ln GDP per capita		1.038429*** (0.029741)	0.962284*** (0.043863)	0.873055*** (0.079814)	0.679500*** (0.059202)
ln size of industrial as % of GDP		0.892161*** (0.052207)	0.497175*** (0.066154)	0.685203*** (0.067199)	0.766979*** (0.076865)
ln size of agricultural as % of GDP		-0.066053* (0.039067)	0.007695 (0.077001)	0.043175 (0.077405)	-0.022886 (0.078524)
inflation rate (%)			0.006721 (0.004341)	0.006825 (0.004588)	0.005713 (0.004192)
balance of trade as % of GDP			0.028802*** (0.001966)	0.028390*** (0.002150)	0.032494*** (0.001981)
ln general government gross debt as % of GDP			0.004402*** (0.000489)	0.004379*** (0.000434)	0.006056*** (0.000516)
ln government final consumption expenditure as % of GDP			0.174057** (0.078338)	0.273946*** (0.073644)	0.296052*** (0.083929)
net FDI as % in GDP			-0.038467*** (0.007407)	-0.031476*** (0.007252)	-0.032946*** (0.007456)
government effectiveness				0.276582*** (0.076168)	0.471468*** (0.057087)
ln freedom of corruption				-0.540415*** (0.061764)	-0.539733*** (0.061348)

polity2 index				0.014994*** (0.005376)	0.014940*** (0.005319)
political regime durability				0.007520*** (0.000821)	0.006797*** (0.000869)
ln literacy index				-0.062048 (0.063727)	0.022390 (0.064287)
Type of estimation	OLS	OLS	OLS	OLS	OLS - FE:PE
Model summary					
R-squared	0.021138	0.633653	0.667375	0.67495	0.685044
F-test for fixed effects					3.030745 (0.0001)
Chi-square					42.837238 (0.0001)

(a) (...) denotes the standard error.

(b) PLS represents panel least squares.

(c) FE:PE denotes period fixed-effects.

(d) \*\*\*, \*\*, and \* denote significance at 1, 5 and 10 % level of significance, respectively.