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Article

# Could Religiosity and Religion Influence the Tax Morale of Individuals? An Empirical Analysis Based on Variable Selection Methods

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**Abstract:** When people who adhere to tax morality act in a situation where there is no sense of risk, no acceptance of the government, or no environment conducive to tax compliance, it is easier to see how they are motivated to do so. Tax morality is also known as the ethics of compliance. It is the independent cause that motivates a positive tax behaviour. Employees' religious beliefs may impact their ideas and actions in organizational life, just as individuals' attitudes, values, emotions, abilities, and behaviours influence their thoughts and actions at work. Religion can positively influence a worker's loyalty, morale, and communication. In this context, the research seeks to determine whether religiosity and religion may have an effect on tax morale, examining whether an individual's religiosity reduces tax evasion and increases the degree of tax morale. Using machine learning variable selection techniques appropriate for categorical variables, we have used the dataset of the Joint EVS/WVS 2017-2020 (European Value Survey/World Value Survey), allowing for comparisons of tax morality in more than 79 nations globally (chi-squared and mutual information). The empirical findings showed that the most important aspects of religiosity, such as religious denomination, belief in God, and the significance of God, along with the degree of trust placed in other religions and churches, have a considerable positive impact on the level of tax morale. Another significant conclusion relates to how much people feel the government is responsible, how much they care about their nation, and how satisfied they are with the political system—findings that have been shown to boost employee morale. The following are a person's primary traits that indicate their financial morale: an adult above the age of 25, a full-time worker or retired person, married, and living alone. Therefore, employees that are morally upright, trustworthy, diligent, and committed to the workplace values of justice and decency raise morale generally and improve an organisation's success. A business may enhance its reputation and help to secure its long-term success by establishing behavioural policies.

**Keywords:** tax morale; religion; tax compliance; religiosity; Joint EVS/WVS 2017-2020; variable selection method; work environment

MSC: 62-08; 62J99; 62P99



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## 1. Introduction

Taxes represent, in general, a significant driver in the process of funding public goods and services. It is fundamental to grasp the inducement that could impact compliance behaviour to have the most favourable tax system. Also, promoting self-willed cooperation represents an urgent preoccupation among policymakers.

As Refs. [1,2] already mentioned, the enforcement level must fully clarify compliance. Thus, other potential determinants need to be identified. In this context, tax morale can be explained as a relevant determinant in the equation of tax compliance and hence, the reason for conducting this research.

In order to determine if a person's religiosity reduces tax evasion and raises tax morale, the research looks into the potential effects of religiosity and religion on these variables. Therefore, the research aims to respond to the following questions: Could religiosity at least partially explain the tax morale behaviour? Could people with different religions have a higher level of tax morality in comparison with others? How important is people's faith in fiscal morality, and is it captured within the research? Were politics and government satisfaction important in this context? What is the profile of the fiscal, moral individual? What are the main recommendations that this research can highlight?

In order to respond to all these questions, we have applied two machine learning techniques that rely on the logistic regression analysis using the dataset of EVS/WVS 2017-2020. Considering tax morale as "an intrinsic motivation to pay taxes" [3,4], it would make sense to analyse how religiosity and religion impact tax morale, together with other socio-demographic variables. This phenomenon of religiosity has been captured within the paper through several proxies: religious service attendance, frequency of prayer, frequency of prayer outside of religious services, membership in religious organisations, perceived religiosity, the importance of religion, the level of trust in God, life after death, hell and heaven, the importance of God, and analysing the extent to which specific religious denomination is associated with higher tax compliance.

This paper contributes to the tax morale literature through several approaches. Firstly, the paper aims to fill the literature gap by directing this research to an extensive panel of countries, emphasizing the influence of religiosity on tax morale. Secondly, the religious phenomenon has been multilaterally captured, exploring the central beliefs of individuals together with the religious denomination, the faith in churches and religious organisations, and the intensity of religiosity, adding new valences to fiscal morality. Thirdly, what is relatively new is the identification of tax morale determinants using machine learning techniques specially designed for categorical input and categorical output variables. Fourthly, several categories of determinants of tax morale have been explored, apart from those intended to highlight the religious phenomenon: life perception indicators, politics and society indicators, national identity, as well as socio-demographic indicators.

The paper is structured in six sections, as follows. The literature review section outlines the most relevant empirical studies in the field, the top results, and determining factors of tax morale. The third section introduces the main steps of practical design, briefly offering relevant insights on both feature selection methods. The fourth and fifth sections present and discuss the results obtained and their implications on tax morale and the work environment. The paper ends with conclusions and policy recommendations.

## 2. Literature Review

### 2.1. An Overview of the Most Relevant Studies in the Field

The first model exploring the compliance behaviour of taxpayers is the model of [5] if taxpayers have this objective of maximizing their fiscal outcomes by taking advantage of evasion for its costs. This model has been further developed by [6], who considered fines proportional to the taxes evaded, revealing that detection probability and penalty rate are negatively correlated to tax evasion. [7] proved that some individuals are more willing to pay taxes, particularly with no penalization.

According to the literature, several researchers pointed out the relevance of psychological factors besides the economic ones in explaining the unitary behaviour of the taxpayer regarding social norms [8], tax ethics [9], trust [10], and equity perceptions [8]. Ref. [11] considered that individuals possess civic morality, which could be significantly diminished if the government did not comply with the procedural equity rules. While [10] pointed out the significance of tax officials' respect in increasing taxpayers' compliance, [12] reinforced

the impact of sanctions. It drew attention to the trust in and strength of authorities, stipulating that tax obligations can be reached by striving for power and reinforcing tax morale and trust [13].

According to [14], religion is seen in the literature as an essential determinant of social reinforcement, having the role of “supernatural police”.

As per [15], religion contributes to producing social goods, especially where the central administration is too weak to administer personal property.

Ref. [16] examined the reasons behind the relationship between morality and religiosity, arguing that religiosity projects the faith about proper behaviour that can be divided into correct behaviour as a proper performance or honouring rituals, as well as the secular meaning of what is fair and just.

Several studies in the literature proved that religion could act as an essential factor in reducing illegal behaviour, including [17–20]. Another potential factor could be the sentiment of shame or guilt, as proved by [21,22].

In our paper, we have considered different proxies for religiosity. If religious service attendance, membership in religious organisations, and frequency of prayer in and out of religious services can be quantifiable and imply that individuals dedicate a certain amount of time to these types of actions, then their efforts can be observable in the case of other variables (different beliefs). Therefore, we discuss a relative perception of different proxy variables for religiosity. According to [1], there are many substitutes for religiosity in the literature: church attendance and participation, religious education, trust in the church, religious guidance, and beliefs.

Analysing the impact of religiosity, the studies of [23,24] only managed to prove the existence of an optimistic aspect of general religiosity fidelity on tax compliance, highlighting that 5% of taxpayers were more inclined to pay their taxes and just 4% of them adopted tax conformity attitudes [24].

Refs. [25,26] captured the impact of religious denomination on non-payment of taxes in Australia and Malaysia, pointing out that the people who avoid being compliant with paying taxes belongs to the following religions: Protestants, Roman Catholics, Muslims, Hindus, and Buddhists. Within the paper, besides these variables, the central beliefs in God, hell and heaven, the importance of God, life after death, and their effect on tax morale have been considered.

A relevant contribution brought to the area is the research of [27], who pointed out direct democracy, people involvement, and religiosity as the main determinants of tax morale, while Schneider mentioned that in this equation it is important to take into account the dimension of the shadow economy, and this becomes even more relevant in the context of transition countries struggling with tax evasion [28] suffering from the lack of quality government services, and [29] proved that taxpayer behaviour is related to the regulatory quality in countries with economies in transition.

Ref. [30] pointed out that in the case of the Czech Republic, tax morale was supported through national pride and visiting the church. Besides these, there are also factors such as attitudes towards government and trust in government institutions that cannot be associated with tax compliance [31–33]. An exploration of the main socio-demographic factors of fiscal morality can be highlighted by the literature as follows.

Age was found to have an increasing effect on tax morale; older individuals exhibit much better tax morale because they are no longer subjected to it [34]. Some studies in the literature, such as those written by [34,35], and a year, respectively two years later, [36,37], confirmed the hypothesis according to which tax compliance increases with age, while others [38–41] reported no age impact.

Gender: In this case, even if the traditional point of view pointed out that men were less compliant and more self-sufficient than women [34], today the role of women has changed, and they have become more independent; now, they have a significantly lower tax morale. Therefore, the impact is uncertain.

Marital status: [34] highlighted significant differentiation among the different marital statuses, exposing relevant information for people who are single, separated, or divorced. Age has been proven to be a significant predictor in the equation of deviance and marital status, pointing out that age differences can explain this association since older people are more likely to be married or widowed. Instead, married US taxpayers seem to be the most non-compliant individuals, but the higher taxation of dual incomes can explain this compared to two separate incomes [42,43].

Education: [44] proved that regions with a high proportion of students and educated people, as well as areas with unemployment and high property prices, are characterised by low levels of compliance.

Economic class: The empirical findings are mixed, having either positive [38,41] or adverse effects [36,43–45].

Occupation status: two relevant conclusions can be highlighted: the first one is reporting a negative effect on tax compliance, highlighted in [46], and the second, published in [47], points out that self-employed people are impacted by significantly greater compliance costs.

Besides all these core indicators, we also considered within our analysis the role of citizenship (immigrant or born in the country), type of occupation institution, and household composition.

An overview of the most relevant empirical studies in the field has been presented in Table 1, pointing out the main characteristics of individuals with high fiscal morality.

**Table 1.** An overview of the most relevant empirical studies in the field in the past 20 years.

Authors	Results	Data Source
Alm and Torgler (2004) [9]	Strengthening direct democratic elements can be considered an essential factor that has led to high fiscal morale in the Switzerland and the United States.	WVS
Torgler (2006) [4]	Tax morale is positively impacted by religiosity, considering being in control over variables such as corruption, trustworthiness, economic situation, education, age, gender, marital status, and employment status.	WVS (1995–1997)
Torgler (2006) [3]	Gender statistically impacts tax morale, mentioning that even if females are more compliant than men, the last generations are more independent tend to be less compliant.	WVS (1995–1997)
Lago-Peñas, I., & Lago-Peñas, S. (2008) [48]	Income and profit taxes were considered harmful for tax morale compared to consumption tax or social security payments.	2nd wave (2004–2005) of the European Social Survey
Mohdali & Pope (2010) [23]	Regarding each religious belief and practice, religion impacts people’s personalities. Depending on how religious values, beliefs, and practices are applied daily, religion affects tax compliance.	WVS

Table 1. Cont.

Authors	Results	Data Source
María-Dolores, R., Alarcón, G., & Garre, M. E. (2010) [49]	Socioeconomic variables like age, gender, employment status, and educational attainment significantly impact on tax morale. Other variables also have positive impact, such as tax income return, the belief that immigrants must pay contributions, and considering fraud unjustifiable. Women have a greater level of tax morale. On the other hand, regions with higher GDP per capita, lower employment rate, or more robust construction industries have a lower degree of tax morale.	Survey into the Tax Morale of the Citizenry
Tekeli (2011) [50]	In Turkey, tax morale is positively influenced by pride, religiosity, and trust in government and the legal system. In contrast, negative influence is indicated by pro-democracy, unemployment, reading newspapers, and being a housewife. In Japan, education, gender, and age positively influence tax morale, while self-employment and income negatively impact tax morale.	WVS (2005)
Daude, Gutiérrez and Melguizo (2012) [51]	Tax morale is influenced by socio-economic factors: age, religion, gender, employment status and educational attainment, and instructional variables: trust in government, satisfaction with public services provided, and democracy.	WVS
McKerchar, Bloomquist and Jeff Pope (2013) [52]	Determinants of tax morality: personal integrity, regardless of religious affiliation.	Internal Revenue Service's National Research Program study of individual taxpayers for tax year 2001 (Bennett 2005), U.S. Social Security Administration.
Bilgin (2014) [53]	Spain: age, level of income, and level of education variables have a substantial impact on tax morale. Variables with no effect on fiscal morale are social capital and confidence variables. Turkey: Tax morale is significantly impacted by social capital variables and demographic factors. People are more willing to pay taxes if they trust political entities, with tax morale being positively affected by religion and national pride.	WVS
Strielkowski and Čábelková (2015) [30]	A negative impact on the beliefs of citizens about the state does not encourage the improvement of tax morale. It can be said that taxpayers in the Czech Republic are more motivated by public awareness and beliefs than their politicians. Religiosity is another issue that is often considered concerning tax morale. It was concluded that church attendance strongly affects tax morale positively.	WVS (conducted in 2008)

Table 1. Cont.

Authors	Results	Data Source
Sipos (2015) [54]	Men are more supportive of local self-governments' financial challenges than women because they are not only eager to pay a higher tax burden to increase local revenues, but they also presume self-governments receive higher vehicle tax rates.	Electronic questionnaire (Two categories of respondents: students and officials from the national tax offices, including 120 Hungarian and 60 Romanian individuals.)
Sá, Martins and Gomes (2015) [55]	Portuguese individuals' motivation to pay taxes is influenced by their trust in government, parliament, the judicial system, and by the belief that Portugal's best form of government is democracy. Also, tax morale is significantly impacted by satisfaction in their life, trust in society and individuals, and religiosity.	EVS (2008–2010)
Hosseini Kondelaji, Sameti, Amiri and Moayedfar (2016) [56]	Economic situation and conditional cooperation significantly impact tax morale in Iran, while variables like the importance of politics, religion, sex, and marital status do not have a substantial impact.	WVS
Cyan, Koumpias and Martinez-Vazquez (2016) [57]	It was concluded that the level of education plays an essential role in tax morale. Higher tax morale was observed among educated individuals than those who are illiterate. Moreover, it was concluded that a higher tax morale could be observed in metropolitan areas which are industrialized and accessed by a large number of people. Tax morale on elderly females is lower than on elderly males.	Survey of individual taxpayers for the Federal Board of Revenue of Pakistan (2014)
Benk, Budak; Yüzbaşı and Mohdali (2016) [24]	Voluntary tax compliance is significantly impacted by intrapersonal religiosity. On the other hand, enforced and voluntary tax compliance is not impacted by interpersonal religiosity.	Data collected from self-employed
Jun & Yoon (2018) [58]	Every religion affects vertical equity, while religion and religiosity do not affect the exchange and horizontal equity. Therefore, considering tax evasion and tax morale, religion and religiosity are considered less effective than economic and social incentives.	Financial panel survey conducted by the Korea Institute of Public Finance in 2017
Bejaković & Bezeredi (2019) [59]	In Croatia, a significant impact on tax morale is determined by gender, age, financial situation, region, expected sanctions, and participation in the unofficial economy.	WVS
Pacaldo & Ferrer (2020) [60]	Tax morale can be strongly impacted by trust in the government.	BEEPS

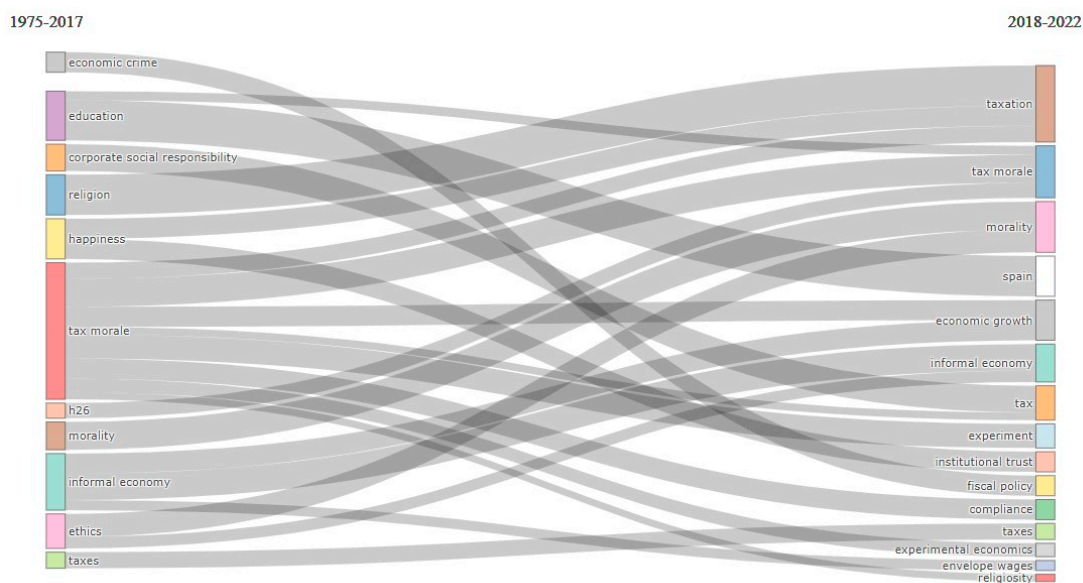
## 2.2. Highlighting the Dynamics of Tax Morale Research Field. An Empirical Approach Based on Bibliometric Analysis Results

In order to better capture the dynamics of the tax morale research field, revealing the trends in the topic and the main evolution, we have investigated a time range of 47 years in the publications of tax morale from the Web of Science (WoS) database, using a sample of 671 publications revealing the most prominent journals, authors, articles, and collaboration





Analysing the dynamic of thematic evolution (Figure 3) during two periods, 1975–2007 and 2008–2022, it can be highlighted that year 2017 was the switching point between both periods. If in the first period most papers tackled tax morale, informal economy, and education, those topics have been translated in the second period into research more related to taxation, tax evasion, institutional trust, and experimental economics, as well as economic growth and religion and religiosity.



**Figure 3.** Thematic evolution.

Therefore, the popularity of the research field has gradually increased in recent decades, incorporating tax compliance, taxation system or institutional trust, and this component of religiosity.

### 3. Materials and Methods

This article aims to investigate the possible influence of religion and religiosity on the degree of tax morale, specifically if people's religiosity reduces tax evasion and increases the amount of tax morale. Therefore, the research aims to respond to the following questions: Could religiosity at least partially explain tax morale behaviour? Could people with different religions have a higher level of tax morale than others? How important is people's faith in the equation of fiscal morality? Were politics and government satisfaction important in this context? What is the profile of the fiscal, moral individual? What are the main recommendations that this research can highlight?

To respond to all these questions, we have applied two machine learning techniques that rely on the logistic regression analysis using the dataset of EVS/WVS 2017–2020 [62].

The European Value Study (EVS) and the World Value Survey (WVS) are two large-scale, cross-national, and repeated cross-sectional survey research programs. The questions on moral, religious, social, political, occupational, and familial values are numerous and have been included in surveys since the early 1980s. Both organisations decided to work together beginning in 2017 to collect data jointly. The EVS questionnaire and methodological guidelines were used in planning and executing surveys in European nations. The WVS questionnaire and methodological principles have been used to prepare and execute surveys in nations outside of Europe. In both waves of the EVS 2017 and WVS7 surveys, five nations (Germany, Romania, Russia, Serbia, and Ukraine) were involved. Both organisations independently created their first-pass master surveys. The joint items define the common core of both questionnaires. The combined WVS and EVS dataset, which included participants 18 years of age and older, was used for the empirical analysis. This dataset is a rich source of data on employment and labour market conditions, national

and cultural identity, religion and values, political behaviour and attitudes, marital status and family life, gender roles, and mass political behaviour. A total of 111,334 people from 79 different societies worldwide are used in the study. Participants in the survey must be at least 18 years old (with no upper age limit). For the WVS 2017–2020, a representative single-stage or multi-stage sampling of the nation’s adult population aged 16 and older was employed. For the 2017 EVS, a representative single-stage or multi-stage selection of adults in the nation who are 18 years of age and older were employed. The Data Archive for the Social Sciences has access to the information [62]. Our key variable (tax morale) has been initially rated on a 10-point category through the statement “Justifiable: cheating on tax if you have the chance”, where 1 is never justifiable and 10 always justifiable, and has been transformed into a dummy variable, coded by 1 with the value 3 as never justifiable, and 0 as an aggregation of the last 7 scores.

In exploring the main determinants of tax morale, we have considered five potential pillars of determinants, as follows: Religiosity and religion-related factors (11 items): religious denomination, the current frequency of religious service attendance, frequency of prayer, prayer to God outside of religious services, self-assessment of religiousness, the importance of religion, beliefs in God, life after death, and hell and heaven, and the importance of God in people’s lives.

- Religious denomination coded with a 10-point scale with 0=do not belong to a denomination to 9=other type.
- Current frequency of religious service attendance coded with a 7-point scale with 1=more than once a week to 7=never, practically never.
- Frequency of praying coded with an 8-point scale with 1=several times a day to 8=never, practically never.
- Praying to God outside of religious services coded with a 7-point scale with 1=every day to 7=never.
- Self-assessment of religiousness coded with a 3-point scale with 1=a religious person, 2=not a religious person, and 3=a convinced atheist.
- Beliefs in God, life after death, and hell and heaven have been codified using dummy variables with 1=yes and 0=no.
- Importance of God in one’s life has been codified based on a ten-point scale with 1=not at all important and 10=very important.
- Importance of religion was rated based on a 4-point scale with 1=very important and 4=not at all important.

Life perception indicators (2 items): membership in religious organisations and membership in humanitarian or charitable organisations.

- Membership in religious organisations has been rated on the report of binary nominal scale with 1=yes, 0=no.
- Membership in humanitarian or charitable organisations has been rated on the report of binary nominal scale with 1=yes, 0=no.

Politics and society indicators (7 items): post-materialist index, political interest, self-positioning in politics, government, confidence in institutions (churches, government, political parties), satisfaction with the political system in the country, the importance of democracy.

- Post-materialist index 4-item has been rated based on a 3-point scale with 1=materialist, 2=mixed, and 3=post-materialist.
- Political interest has been codified based on a 4-point scale with 1=very interested and 4=not at all interested.
- Self-positioning in political scale has been codified using a 10-point scale with 1=left to 10=right.
- Government responsibility has been codified using a 10-point scale with 1=people should take more responsibility and 10=the government should take more responsibility.

- Confidence in institutions (churches, government, political parties) has been codified based on a four-point scale variable with 1=a great deal, 2=quite a lot, 3=not very much, and 4=none.
- Satisfaction with the political system in the country has been codified using a 10-point scale with 1=not satisfied at all and 10=completely satisfied.

Importance of democracy has been codified using a 10-point scale with 1=not at all important to 10=absolutely important. National Identity indicators (2 items): trust in people from various groups (people of another religion), the degree of belonging to these groups.

- Trust in people from various groups (people of another religion) has been codified based on a 4-point scale with 1=trust completely and 4=do not trust at all.
- The respondent feels belonging to their country has been codified using a 4-point scale with 1=very close to 4=not close at all.

Socio-demographic indicators (8 items): gender, age, immigrant status, educational level, employment status, the institution of occupation, marital status, number of people in the household (household size).

- Gender: dummy variable with value 1 for men and 2 for women.
- Age: 6 category variables with 1-15–24 years and value 6 for 65 years and over.
- Immigrant status: dummy variable with 1=born in this country and 2=immigrant to this country.
- Highest educational level has been codified using a 3-point scale with 1=small level, 2=middle level, and 3=upper level.
- Employment status: coded with an 8-point scale with 1=full-time (30 h a week or more), 2=part-time (less than 30 h a week), 3=self-employed, 4=retired/pensioned, 5=housewife (not otherwise employed), 6=student, 7=unemployed, and 8=other.
- Institution of occupation: 3-point scale with 1=public institution, 2=private business, and 3=private non-profit organisation.
- Marital status has been codified using a categorical variable with 1=married to 6=single/never married.
- Number of people in the household (household size) has been codified using a categorical variable with 1=one person to 6=six persons or more.

Two essential feature selection methods have been applied to reveal the main drivers of tax morality worldwide: chi-squared and mutual information. Both have as their main specificity that the output and input variables were categorical. Using the selection of relevant variables provided by these methods, we will check the accuracy of both methods fitting a classification model concerning logistic regression. The chi-squared statistical test uses the contingency table and assumes that the observed frequencies for a categorical feature suit the expected frequencies for the same categorical feature [63]. The basic formula for the chi-square test is:

$$X_c^2 = \sum_{i=1}^R \sum_{j=1}^C \frac{(o_{ij} - e_{ij})^2}{e_{ij}} \tag{1}$$

where “ $o_{ij}$ ” represents the observed cell count in the  $i$ th row and  $j$ th column of the table, “ $e_{ij}$ ” is the expected cell count in the  $i$ th row and  $j$ th column of the table, computed as:

$$e_{ij} = \frac{\text{row } i \text{ total} * \text{col } j \text{ total}}{\text{grand total}} \tag{2}$$

The value  $(o_{ij} - e_{ij})$  is referred to as the residual of  $(i, j)$ , denoted  $r_{ij}$ . The calculated statistic  $\chi^2$  is then compared to the critical value from the  $\chi^2$  distribution appendix with degrees of freedom  $df = (R - 1)(C - 1)$  and the confidence interval it is chosen. If the calculated  $\chi^2$  value > critical  $\chi^2$  value, then the null hypothesis of no association is rejected.

The basic form of the expected value formula is:  $P_{(x)} * n$ , where  $P_{(x)}$  represents probability of an event and  $n$  is how many times the event happened. In predicting the

unknown class of samples, entropy and conditional entropy principles can be used to assess a given feature’s efficiency. The entropy of  $H(X)$  for the values  $\{x_1, x_2, \dots, x_n\}$  can be given as:

$$H(X) = - \sum_{i=1}^n p(x_i) \log_2 p(x_i) \tag{3}$$

where  $p(x_i)$  means probability mass function of  $x_i$ . The conditional entropy for two discrete  $X$  and  $Y$  random variables is given as:

$$H(x|y) = - \sum_{i=1}^n \sum_{j=1}^n p(x_i, y_j) \log_2 \frac{P(x_i)}{P(x_i, y_j)} \tag{4}$$

where  $p(x_i, y_j)$  is  $X = x_i$  and  $Y = y_j$  joint probability.

Mutual information as a feature selection method implies reducing and decreasing uncertainty for one variable given the known value of another variable. The ratio of two (or more) random variables,  $X$  and  $Y$ , carries the burden of information resulting from one random characteristic through all the other features. The mutual information formula varies depending on the variable type. If the input variables are continuous, the mutual information is given by the following formula:

$$I(X, Y) = \int_x \int_y p(x, y) \log \frac{p(x, y)}{p(x)p(y)} dx dy \tag{5}$$

If the mutual information is calculated based on discrete variables, the correct form of the formula is:

$$I(X; Y) = \sum_{x,y} p(x, y) \log \frac{p(x, y)}{p(x)p(y)} \tag{6}$$

which can also be translated as

$$H(x) - H(x|y) = H(y) - H(y|x) = H(x) + H(y) - H(x, y) \tag{7}$$

Mutual information determines the distribution’s resemblance to the products of the factored marginal distributions. The probability would be 0 if  $X$  and  $Y$  were both unconnected and independent.

The mutual information between the subset of ingoing variables  $Xs$  and the target variable  $Y$  is maximized regarding variable selection criteria. If the variable  $Z$  is also added, the conditional mutual information needs to be calculated to measure the uncertainty shared by the first two variables ( $X$  and  $Y$ ) but not by the third one ( $Z$ ). The quantity is called mutual information. This information is given by the following formula:

$$I(X; Y|Z) = - \sum_{x,y,z} p(x, y, z) \log \frac{p(x, y|z)}{p(x|z)} \tag{8}$$

which can be translated as

$$H(XZ) + H(YZ) - H(XYZ) - H(Z) \tag{9}$$

The mutual information has three important properties. The first one is the chain rule, which is given by:

$$I(X; Y_1 Y_2 \dots Y_n) = \sum_{i=1}^n I(X; Y_i | Y^{i-1}) \tag{10}$$

where  $Y^{i-1}$  is  $\{Y_1, Y_2, \dots, Y_{i-2}, Y_{i-1}\}$ .

The second one is represented by the fact that there is no monotonicity. The mutual information, if there are conditionings, can either increase or decrease:

$$I(X; Y|Z) \not\leq I(X; Y) \tag{11}$$

$$I(X; Y|Z) \not\geq I(X; Y) \tag{12}$$

The non-negativity:  $I(X; Y) \geq 0$  represents the third feature of the mutual information. For demonstrating this feature there are two important concepts:

$$\text{relative entropy : } E[f(x)] \geq f(E[x]) \tag{13}$$

Jensen’s inequality:

$$D(p(x)||q(x)) = \sum_x p(x) \log \frac{p(x)}{q(x)} \tag{14}$$

These concepts are important in demonstrating the non-negativity because the mutual information could be defined as:

$$I(X; Y) = D(p(x, y)||p(x)p(y)) \tag{15}$$

To demonstrate the non-negativity of the mutual information, it is enough to demonstrate the non-negativity of the relative entropy:

$$\begin{aligned} D(p(x)||q(x)) &= \sum_x p(x) \log \frac{p(x)}{q(x)} = - \sum_x p(x) \log \frac{q(x)}{p(x)} = -E \left[ \log \frac{q(x)}{p(x)} \right] \\ &= - \log \left( E \left[ \log \frac{q(x)}{p(x)} \right] \right) = - \log \left( \sum_x p(x) \log \frac{q(x)}{p(x)} \right) = - \log \left( \sum_x q(x) \right) \leq 0 \end{aligned} \tag{16}$$

To compare the accuracy of both methods, the logistic regression has been applied, using top N variables from each method as input in the logistic regression models. The probability for categorization issues with two possible outcomes are modelled using logistic regression. Based on the number of the independent variables, the model takes two forms:

$$P(Y = 1|X) = \frac{e^{\alpha+\beta X}}{1 + e^{\alpha+\beta X}} = \frac{1}{1 + e^{-(\alpha+\beta X)}} \tag{17}$$

if there is just one independent variable;

$$P(Y = 1|X_1, X_2, X_3, \dots, X_k) = \frac{e^{(\beta_0+\beta_1 X_1+\beta_2 X_2+\dots+\beta_k X_k)}}{1 - e^{(\beta_0+\beta_1 X_1+\beta_2 X_2+\dots+\beta_k X_k)}} \tag{18}$$

if there are more than one independent variables.

From the model, the coefficients formula could be extracted:

$$e^{\beta_0} = \frac{P(Y = 1|X_1 = X_2 = X_3 = \dots = X_k = 0)}{1 - P(Y = 1|X_1 = X_2 = X_3 = \dots = X_k = 0)} = \frac{P(Y = 1|X_1 = X_2 = X_3 = \dots = X_k = 0)}{P(Y = 0|X_1 = X_2 = X_3 = \dots = X_k = 0)} = OR_{initial} \tag{19}$$

This represents the odds report ( $OR = \frac{p}{1-p}$ ) in the initial state  $X_1 = X_2 = \dots = X_k$

$$e^{\beta_i} = \frac{P(y = 1|X_i = 1, X_j = 0 \text{ for } j \neq i)}{1 - P(y = 1|X_i = 1, X_j = 0 \text{ for } j \neq i)} \times \frac{1}{OR_{initial}} = \frac{OR_{X_i=1, X_j=1, \text{for } j \neq i}}{OR_{initial}} \tag{20}$$

For the logistic regression there is not an  $R^2$  as we have for the linear regression, but there are some other indicators that could be used to choose the best-fitting model:

➤ Cox & Snell Pseudo- $R^2$ :

$$R^2 = 1 - \left[ \frac{-2LL_{null}}{-2LL_k} \right]^{2/n} \tag{21}$$

➤ Nagelkerke Pseudo- $R^2$ :

$$\frac{1 - \left[ \frac{-2LL_{null}}{-2LL_k} \right]^{2/n}}{1 - (-2LL_{null})^{2/n}} \tag{22}$$

- Akaike’s Information Criterion (AIC):

$$AIC = -2LL_k + 2k \tag{23}$$

where  $k$  is the number of estimated parameters

- Bayesian Information Criterion (BIC):

$$BIC = -2LL_k + k \times \log(n) \tag{24}$$

where  $k$  is the number of estimated parameters and  $n$  represents the number of observations.

- Log-likelihood  $\chi^2$  (LR chi2):

$$LR\ chi2 = -2 \log_e \left( \frac{L_s(\hat{\theta})}{L_g(\hat{\theta})} \right) \tag{25}$$

where  $k$  is the number of estimated parameters, and  $n$  represents the number of observations.

The model with an overall better accuracy will showcase what feature selection method suits the dataset better. The accuracy for classification problems is checked with ROC and AUC curves. The area under a receiver operating characteristic is abbreviated as AUC ROC. The area under the ROC curve is one of the most-used performance basis sets in binary classification applications. The accuracy of the models was evaluated using the ROC and AUC curve (area under the curve). Values very close to 1 indicates a better model performance. Thus, the area under the ROC curve equals the proportion of pairings of items of the type successfully ordered by the algorithm. This may be expressed numerically as follows:

$$\frac{\sum_{i=1}^q \sum_{j=1}^q I[y_i < y_j] I'[a_i < a_j]}{\sum_{i=1}^q \sum_{j=1}^q I[y_i < y_j]} \tag{26}$$

$$I'[a_i < a_j] = \begin{cases} 0, & a_i > a_j, \\ 0.5, & a_i = a_j, \\ 1, & a_i < a_j \end{cases} \quad I[y_i < y_j] = \begin{cases} 0, & y_i \geq y_j, \\ 1, & y_i < y_j \end{cases} \tag{27}$$

In general, the binary solution for the AUC ROC is:

$$\frac{TPR \times FPR}{2} + TPR \times (1 - FPR) + \frac{(1 - TPR) \times (1 - FPR)}{2} = \frac{1 + TPR - FPR}{2} \tag{28}$$

where  $TPR$  stands for True Positive Rate and  $FPR$  for False Positive rate, and:

$$TPR = \frac{TP}{TP + FN} \text{ and } FPR = 1 - Specificity = 1 - \frac{TN}{TN + FP} = \frac{FP}{TN + FP} \tag{29}$$

In all techniques, variables were ordered by the performance of significance, and each variable was assigned a category ranging from 1 to 4 depending on its quartile of importance. The variables with the most significant relevance are represented in the fourth quartile.

To implement all three stages of the research methodology, we used both the R and the 15 STATA software versions.

#### 4. Empirical Results

##### 4.1. The Profile of the Respondents

From a total sample of 111,334 respondents, 54% were male, with a balanced age distribution; 56% were married, and only 23% were single or never married. Almost 39% have a middle educational level, only 30% have an upper education level, and an overwhelming proportion (94.7%) are native (born in their country). Most of them have 2 or

4 people in the household, and they are full-time employees (37%) or retired/pensioned (17.5%). Most respondents belong to the private business sector (64.4%), and only 29.45% are from public institutions (Table A2 of the Appendix A).

#### 4.2. Summary Statistics

The overall opinion regarding this behaviour of cheating on taxes is not justifiable, the average being 2.119; therefore, people are not inclined to have this type of behaviour.

Regarding the religiosity and religion-related factors, it can be highlighted that (Tables A2 and A3 from the Appendix A):

- Most respondents are Roman Catholic (22.4%) and Muslim (21.7%), while categories such as Jew, Hindu or Buddhist, and others are relatively poorly represented.
- The religious services attendance is rather moderated, the perception being that they attend only on special holidays/Christmas/Easter.
- Also, the frequency of praying is rather moderated, the average perception being that individuals pray when they attend religious services.
- The overall perception regarding the frequency of praying to God outside of religious services is that individuals pray on average several times per year outside the religious services.
- The common perception is that the majority are religious persons (61.9% of respondents believe that they are religious) and only 7.90% are convinced atheists.
- Regarding the central beliefs, most of the respondents believe in God (74.6%), followed by their beliefs in heaven (55.5%) and life after death (54.2%), and in last place, the belief in hell (46.1%).
- The overall perception is that God is very important in people's lives, as well as the overall perception of the importance of religion.

From the perspective of life perception indicators, almost 68.2% of the respondents declared to belong to a religious organisation. In comparison, only 14.3% declared to be a humanitarian or charitable organisation member.

From the perspective of politics and society indicators, most individuals are mixed, both materialist and post-materialist, with a rather low level of political interest, being rather on the middle on the political scale, having the perception that both people and government should take equal responsibility, with a highest level of confidence in churches, followed by government, and lastly in political parties, with a moderated level of satisfaction in the political system and attributing a high level of importance to the democracy.

Regarding the national identity indicators, most individuals exhibited a moderated level of trust in people from other religions, but they have a powerful feeling of belonging to their country.

After a first inspection of the dataset, variables such as frequency of praying, praying to God outside of religious services, self-positioning in the political scale, and institution of occupation have been dropped since they exhibited a significant percentage of missing values.

#### 4.3. Identifying the Main Determinants of Tax Morality Based on Feature Selection Approach

Using the chi-square test and mutual information, the section has aimed to identify and analyse the main determinants of tax morale. The empirical results of chi-squared method pointed out (Table 2) that variables located in the first place as necessary in explaining the behaviour of fiscal morality are mostly the religion variables, concerning the main beliefs in hell, heaven, God, and life after death, the religious denomination and the importance of religion, and the importance of God. These variables are presented as weights of importance sorted from high to low. The features extracted further are from the fourth quartile, representing the features with the highest importance.

**Table 2.** The empirical results of chi-squared feature importance.

Variable	Attribute Importance
Believe in Hell	0.255
Believe in Heaven	0.230
Religious denomination	0.219
Importance of Religion	0.164
Believe in God	0.162
Believe in life after death	0.153
Number of people in household	0.143
Employment status	0.136
Membership to religious organisations	0.122
Trust in people of another religion	0.119
Frequency of religious service attendance	0.117
Confidence in Churches	0.110
Closeness to the country	0.103
Educational level	0.101
Government responsibility	0.101
Age	0.100
Confidence in Government	0.087
Confidence in Political Parties	0.082
Post-Materialist index	0.075
Marital status	0.075
Satisfaction with the political system	0.073
Interest in politics	0.068
Religious person	0.059
Sex	0.046

Furthermore, a logistic regression model has been developed to test the statistical significance of these predictors on the probability of having a fiscal morality behaviour.

Variables such as household composition and employment status are essential socio-demographic variables. At the same time, membership in religious organisations and trust in people of another religion are other relevant variables explaining the behaviour of tax morality.

The empirical results of the second method applied, the mutual information revealed that religious denomination, how close you feel to the country, age, employment status, trust in people from another religion, government responsibility, people in household, satisfaction with the political system, and marital status are the relevant characteristics explaining the behaviour of tax morale (Figure 4).

The heat map highlighted the most important characteristics, with the colour of each cell reflecting the significance of each variable (the vertical axis) as ordered by variable selection (in the horizontal axis). The ranking relevance is represented by white cells, which reflect more value variables, while darker cells indicate characteristics that were not picked using a certain feature selection approach.

Table 3 shows the empirical findings of a logistic regression model that supports variable selection using the chi-squared approach. The religious denomination caught the influence of the world's major faiths, such as Protestant, Catholic, Orthodox, Muslim, Buddhist, and other religions. The results revealed a high link between religiosity and tax morale. Almost all the coefficients are significant except for Catholicism and other Christian religions. Analysing the coefficients, we can see that Protestants, Muslims, Buddhists, and individuals of various religions have higher tax morale than non-religious people. Thus, even if the coefficient is not statistically significant, Orthodox and other Christians had worse tax morale than the reference group.



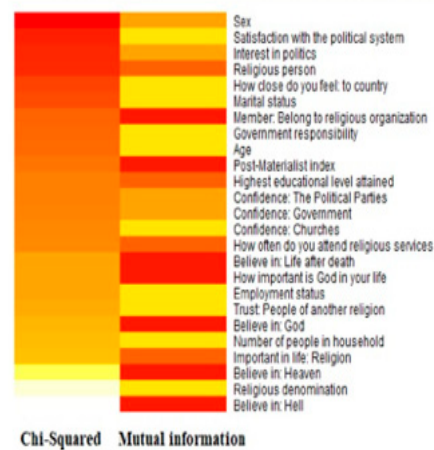


Figure 4. Heat map of the features selected and their importance in explaining the behaviour of tax morality.

Table 3. The empirical results of tax morality logistic regression model based on chi-squared method of variable selection.

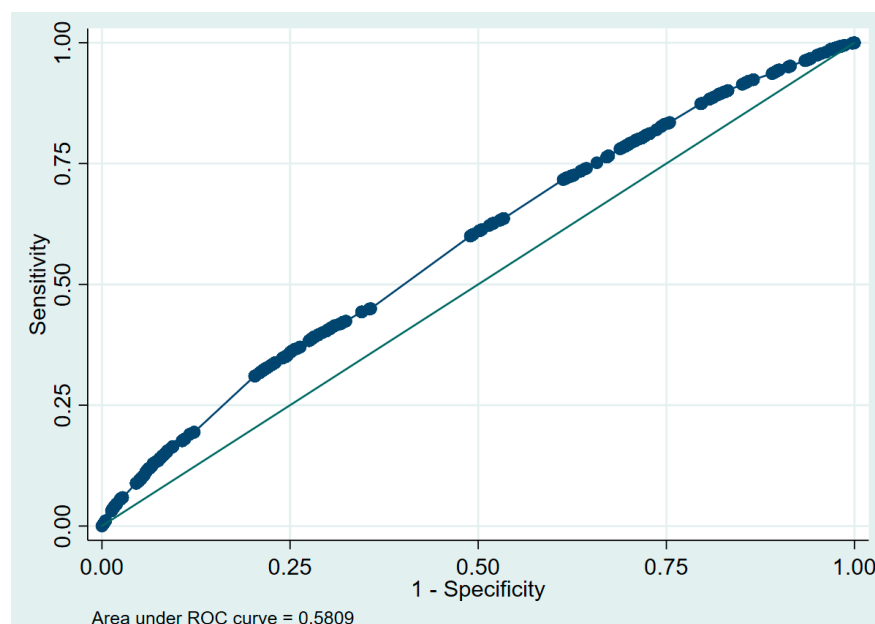
Variables	Coefficient	Standard Error	z	Probability	95% Conf. Interval	
Believe in God (ref = no)						
Yes	0.062 *	0.036	1.730	0.083	−0.008	0.132
Believe in life after death (ref = no)						
Yes	0.029	0.025	1.130	0.257	−0.021	0.078
Believe in hell (ref = no)						
yes	−0.069 **	0.030	−2.290	0.022	−0.127	−0.010
believe in heaven (ref = no)						
yes	−0.130 ***	0.034	−3.880	0.000	−0.196	−0.065
Religious denomination (ref = do not belong to a denomination)						
Roman Catholic	0.044	0.031	1.450	0.147	−0.016	0.104
Protestant	0.714 ***	0.039	18.390	0.000	0.638	0.790
Orthodox	−0.171 ***	0.037	−4.680	0.000	−0.243	−0.099
Muslim	0.102 ***	0.033	3.070	0.002	0.037	0.167
Buddhist	0.289 ***	0.057	5.100	0.000	0.178	0.400
Other Christian	−0.021	0.053	−0.390	0.696	−0.126	0.084
Other	0.347 ***	0.061	5.700	0.000	0.228	0.467
Importance of religion (ref = not important)						
Important	0.007	0.026	0.280	0.783	0.043	0.057
Importance of God (ref = low importance)						
Medium importance	0.593 ***	0.034	17.300	0.000	0.660	0.526
Very important	0.224 ***	0.038	5.880	0.000	0.298	0.149
Constant	1.823 ***	0.022	81.110	0.000	1.750	1.882
Number of obs.	92,496					
Log likelihood	−41,279.182					
LR chi2(25)	1157.80 ***					
Pseudo R2	20.56%					
AIC	82,588.36					
BIC	82,729.89					

Note: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

However, the coefficient of Orthodox people is unusual if we consider that the Orthodox Church is very linked with the state [64]. However, it is known that in post-communist countries, during the communist periods, people developed anti-religious policies. We need to treat the results for Buddhists and other religions with caution since we have a relatively low number of observations and consider that, for example, Muslims are not

always forced to pay taxes [25]. At a certain point, the size of each religious group, in some characteristics, may influence results. Therefore, the results need to be regarded with due reserve. The empirical results revealed that religion's importance does not have a significant impact. Instead, God's importance seems to impact the behavior of tax morality. Also, different beliefs (in God, in life after death, in hell, and in heaven) have been considered, pointing out that those who believe in God and life after death have higher tax morale than those who do not have these beliefs. The sign for the coefficient belief in hell and heaven is unusual. Individuals having this kind of belief were more inclined to cheat on taxes. A potential explanation is that they would be acquitted of any wrongdoing by having this faith.

The AUC value of the first model is relatively small, indicating that it needs to classify the results more accurately and therefore needs improvement (Figure 5). Therefore, the model incorporated the interaction effects between individuals' belief in God and heaven, exploring whether the firm belief in the existence of God and heaven does not give people the certainty that they will get into heaven regardless of what they do.



**Figure 5.** The ROC curve for the first model.

The empirical results are similar (Table 4). The religious denomination caught the influence of the world's major faiths, such as Protestant, Catholic, Orthodox, Muslim, Buddhist, and other religions. The results revealed a high link between religiosity and tax morale. Almost all the coefficients are significant except for Catholicism and other Christian religions. Analysing the coefficients, we can see that Protestants, Muslims, Buddhists, and individuals of various religions have higher tax morale than non-religious people. Thus, even if the coefficient is not statistically significant, Orthodox and other Christians had worse tax morale than the reference group.

**Table 4.** The empirical results of tax morality logistic regression model with interaction effects based on chi-squared method of variable selection.

Variables	Coefficient	Standard Error	z	Probability	95% Conf. Interval	
Believe in God (ref = no)						
Yes	0.085 **	0.039	2.200	0.028	0.009	0.161
Believe in life after death (ref = no)						
Yes	0.030	0.025	1.190	0.232	−0.019	0.080
Believe in hell (ref = no)						
yes	−0.065 **	0.030	−2.160	0.031	−0.124	−0.006
believe in heaven (ref = no)						
yes	−0.036	0.069	−0.520	0.602	−0.171	0.099
Belief in God#belief in heaven						
Yes#yes	−0.112 *	0.071	−1.580	0.10	−0.250	0.027
Religious denomination (ref = do not belong to a denomination)						
Roman Catholic	0.042	0.031	1.380	0.166	−0.018	0.103
Protestant	0.712 ***	0.039	18.340	0.000	0.636	0.788
Orthodox	−0.174 ***	0.037	−4.760	0.000	−0.246	−0.103
Muslim	0.100 ***	0.033	3.020	0.003	0.035	0.165
Buddhist	0.272 ***	0.057	4.740	0.000	0.160	0.385
Other Christian	−0.023	0.053	−0.430	0.665	−0.128	0.082
Other	0.345 ***	0.061	5.660	0.000	0.225	0.464
Importance of religion (ref = not important)						
Important	0.008	0.026	0.290	0.770	−0.043	0.058
Importance of God (ref = low importance)						
Medium importance	0.598 ***	0.034	17.360	0.000	0.665	0.530
Very important	0.226 ***	0.038	5.930	0.000	0.301	0.151
Constant	1.808 ***	0.034	53.200	0.000	1.741	1.875
Number of obs.	92,496					
Log likelihood	−41,277.924					
LR chi2(25)	1160.31 ***					
Pseudo R2	22.54%					
AIC	82,587.85					
BIC	82,738.81					

Note: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

The coefficient of Orthodox people remains negative, a potential explanation being that the Orthodox Church is very linked with the state [64]. However, it is known that in post-communist countries, during the communist periods, people developed anti-religious policies. It is worth mentioning that we need to treat with caution the results for the categories Buddhist and other religions since we have a relatively low number of observations and considering that, for example, Muslims are not always forced to pay taxes [25].

The empirical results confirmed that the importance of religion does not exhibit a significant impact. Instead, God’s importance seems to impact the behaviour of tax morality. Also, different beliefs (in God and belief in hell) significantly impacted individual’s tax morality. Therefore, having a higher level of trust in God will lead to higher tax morale, while faith in the existence of hell will push people to cheat on taxes if they would have the chance since the final destination is hell. The impact of the belief in the existence of heaven on tax morality is accentuated by faith in God. Therefore, if faith in God is associated with a higher level of tax morality, the certainty of heaven’s existence will offer the individuals the possibility of decreasing their fiscal morality since they have the certainty that they will reach heaven.

The empirical results of the logistic regression model based on the mutual information feature selection algorithm revealed the statistically significant impact of religious denomination, level of trust in people from other religions and confidence in churches as

the most relevant variables proxy for the religiosity of individuals (Tables 3 and 5). For the category of national identity indicators, we observed a statistically significant impact from the level of closeness to the country. In contrast government responsibility and the level of satisfaction with the political system were proved to be significant political factors. As socio-demographic factors with a significant impact, we can mention age, employment, marital status, and household composition. Therefore, if we were to draw the profile of the fiscal, moral individual, it would be given by the following characteristics: an adult over 25 years old, a full-time employee or retired, married, and having only one member in its household. The second model confirmed the results concerning the religious denomination, pointing out that Orthodox and Roman Catholics have lower tax morale than people without religious denominations. Protestants exhibit a higher level of tax morality than the reference group. At the same time, the impact of Buddhism and other religions is significant and needs to be treated with caution. The level of closeness to the country positively impacted tax morality. This result is also available for individuals with a higher level of trust in people from other religions, who have a higher level of tax morality. The level of confidence in churches seems to increase tax morale. Individuals who perceive the responsibility need to be more on people also exhibit a higher level of tax morale. At the same time, satisfaction with the political system is positively related to higher tax morale.

**Table 5.** The empirical results of tax morality logistic regression model based on mutual information variable selection algorithm.

Variables	Coefficient	Standard Error	z	Probability	95% Confidence Interval	
Do you belong to a religion or religious denomination? (ref = do not belong to a denomination)						
Roman Catholic	−0.091 ***	0.026	−3.420	0.001	−0.142	−0.039
Protestant	0.549 ***	0.038	14.460	0.000	0.475	0.623
Orthodox	−0.244 ***	0.033	−7.450	0.000	−0.309	−0.180
Muslim	0.034	0.029	1.180	0.237	−0.023	0.091
Buddhist	0.174 ***	0.057	3.070	0.002	0.063	0.285
Other Christian (Evangelical/Pentecostal/Free church/etc.)	−0.119 **	0.051	−2.330	0.020	−0.219	−0.019
Others	0.208 ***	0.059	3.500	0.000	0.091	0.325
How close do you feel to your country (ref =not close)						
Close	0.389 ***	0.024	16.540	0.000	0.142	0.039
Age (ref = 18–25)						
25–34	0.085 ***	0.034	2.510	0.012	0.019	0.152
35–44	0.208 ***	0.037	5.640	0.000	0.136	0.281
45–54	0.248 ***	0.039	6.430	0.000	0.172	0.323
55–64	0.296 ***	0.041	7.170	0.000	0.215	0.377
65 and more years	0.374 ***	0.052	7.240	0.000	0.273	0.476
Employment status (ref = full time)						
Part-time	−0.048	0.035	−1.380	0.168	−0.116	0.020
Self-employed	−0.086 ***	0.029	−3.020	0.003	−0.143	−0.030
Retired/pensioned	0.284 ***	0.040	7.020	0.000	0.205	0.363
Housewife	0.014	0.031	0.450	0.654	−0.046	0.074
Student	0.202 ***	0.046	4.410	0.000	0.112	0.291
Unemployed	−0.073 **	0.033	−2.220	0.026	−0.136	−0.009
Other	0.137 **	0.071	1.930	0.054	−0.002	0.276
Trust in people of another religion (ref = not trust)						
Trust	0.173 ***	0.018	9.540	0.000	0.208	0.137

Table 5. Cont.

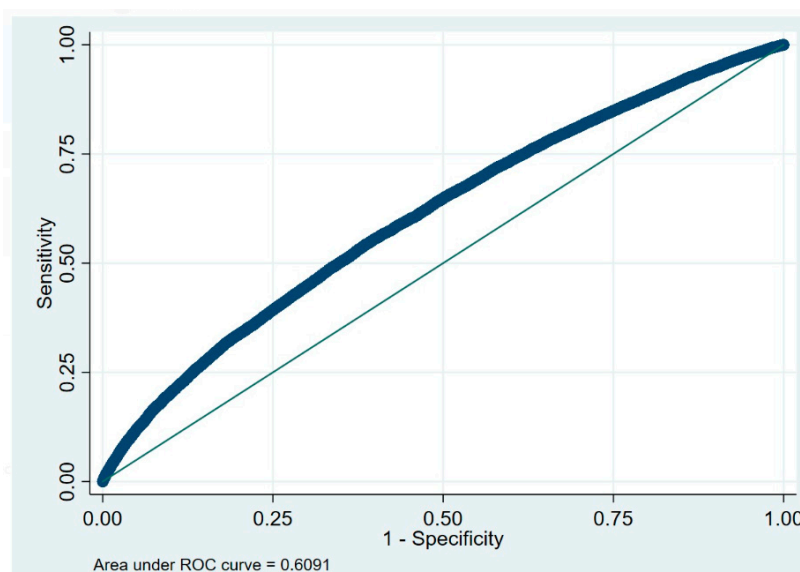
Variables	Coefficient	Standard Error	z	Probability	95% Confidence Interval	
Government responsibility (ref = small)						
Medium	−0.234 ***	0.022	−10.800	0.000	−0.276	−0.191
High	0.030	0.024	1.260	0.206	−0.017	0.078
Number of people in household (ref = 1)						
2	−0.008	0.035	−0.220	0.828	−0.077	0.062
3	−0.077 **	0.037	−2.090	0.036	−0.149	−0.005
4	−0.087 **	0.037	−2.330	0.020	−0.160	−0.014
5	−0.162 ***	0.041	−3.990	0.000	−0.241	−0.082
6 or more	−0.140 ***	0.040	−3.490	0.000	−0.219	−0.061
Satisfaction with the political system (ref = small)						
Medium	−0.082 ***	0.021	−3.900	0.000	−0.123	−0.041
High	0.060 **	0.026	2.330	0.020	0.010	0.111
Marital status (ref = married)						
Living together as married	−0.175 ***	0.039	−4.470	0.000	−0.252	−0.098
Divorced	−0.210 ***	0.041	−5.110	0.000	−0.291	−0.130
Separated	−0.181 ***	0.062	−2.910	0.004	−0.303	−0.059
Widowed	−0.202 ***	0.042	−4.800	0.000	−0.284	−0.120
Single	−0.134 ***	0.028	−4.850	0.000	−0.189	−0.080
Confidence in churches (ref = small)						
High	0.075 ***	0.020	3.750	0.000	0.036	0.113
Constant	1.665	0.068	24.370	0.000	1.531	1.799
Number of obs	92,496					
Log likelihood	−41,276.102					
LR chi2(25)	1179.80 ***					
Pseudo R2	29.66%					
AIC	82,344.16					
BIC	82,213.19					

Note: \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Analysing the socio-demographic variables' impact, higher tax morale is significantly correlated with an increase in age. Compared to the other groups, married persons have more excellent tax morale. Self-employed or jobless people have lower tax morale than full-time employees, but retired/pensioned people, students, and others have better tax morale than full-time employees. The part-time workers category suffers from a lack of statistical significance. Households with more than three persons have lower tax morale than those with only one member. The high probability of the Hosmer and Lemeshow test for both logistic regression models (29.9% and 34%, respectively) revealed a good fit of the models. The AUC revealed a moderated improvement of the model (Figure 6). The overall correct classification rate is estimated to be similar for both models (83.21% and 83.25%, respectively).

Furthermore, the analysis explores the interaction effects between age and the confidence in churches, employment status, government responsibility and marital status combined with the number of people in the household. The empirical results of three models are presented in the Appendix A.

The empirical results are preserved in all three models. Orthodox and Roman Catholics have a lower tax morale than people without religious denominations. At the same time, Protestants exhibit a higher level of tax morality comparative with the reference group.



**Figure 6.** The ROC curve for the second model.

The level of closeness to the country exhibited a positive impact on tax morality, and this result is also available for individuals with a higher level of trust in people from other religions, who have a higher level of tax morality. The level of confidence in churches seems to increase tax morale. Individuals who perceive the responsibility need to be more on people also exhibit a higher level of tax morale. At the same time, satisfaction with the political system is positively related to a higher tax morale.

From the point of view of fiscal and moral profile, older persons, usually married, retired/pensioned or student or full-time employee, having one or at most two people in household.

It is crucial to point out that age's effect on tax morality is even more significant combined with a relatively high level of confidence in churches, all coefficients being highly statistically significant. Another relevant result concerns the interaction between employment status and government responsibility. A higher level of government responsibility increases the fiscal morality of self-employed persons compared to full-time employees. Similar statements regarding morality are found in [65]. The interaction effect between marital status and the number of people in the household revealed that the pressure of having many significantly decreased the tax morality of those divorced, separated, widowed, or single/never married in comparison to those married.

## 5. Discussion

Since most tax systems rely on taxpayers' voluntary compliance for most of their revenues, tax morale—generally understood as the inherent incentive to pay taxes—is an essential component of the tax system. Therefore, raising tax morale has the potential to boost revenue while requiring (relatively) minimal enforcement effort. This potential can be substantially realised in the short term through behavioural economic strategies. However, additional structural adjustments are required to foster confidence and legitimacy among taxpayers.

A deeper understanding of the factors influencing taxpayers' perceptions of the tax system and willingness to pay taxes is the starting point for improving tax morale.

The empirical findings in this context showed that the most critical aspects of religiosity, such as religious denomination, belief in God, and the significance of God, as well as levels of trust in other religions and churches, have been linked to greater levels of tax morale. The findings of Torgler [1], who identified perceived religiosity, religious guidance, active membership in a church or a religious organisation, relevance of church attendance, religious education, active membership in a church or a religious organisation, and trust

in the church as the key determinants of raising tax morality, partially validate the results. Orthodox and Roman Catholics have poorer tax morale than the reference group, which communist anti-religious policies may explain. Protestants, Muslims, Buddhists, and individuals of other religions had better tax morale than people who did not identify as having a particular religion. Regarding religion, the findings are slightly different over time because, as Torgler [1] noted in 2006, Catholics, Buddhists, and people of other religions all have higher tax morale than non-religious people. This was based on data from the World Values Survey, which covered more than 30 countries between 1995 and 1997. Contrarily, Orthodox and Protestants tend to have poorer morale than the reference group, albeit the Protestant coefficient is not always statistically significant. Another important observation has been drawn by [25] that Muslims are not always obligated to pay all taxes. If the government engages in activities that are not legitimated, tax evasion might not be immoral.

The impact of the belief in the existence of heaven on tax morality is accentuated by faith in God. As religiosity variables, the importance of God, together with the beliefs in God and heaven, raises the tax morality of individuals. Therefore, if faith in God is associated with a higher level of tax morality, the certainty of heaven's existence will offer the individuals the possibility of decreasing their fiscal morality since they have the certainty that they will reach heaven. The level of closeness to the country positively impacted tax morality. This result is also available for individuals with a higher level of trust in people from other religions, who have a higher level of tax morality. The level of confidence in churches seems to increase tax morale. Individuals who perceive the responsibility need to be more on people also exhibit a higher level of tax morale. At the same time, satisfaction with the political system is positively related to higher tax morale. From the point of view of fiscal and moral profile, older persons, usually married, retired/pensioned, or student or full-time employee, have one or at most two people in the household. Torgler [1] exhibited similar results: a higher age is significantly correlated with higher tax morale. The results are in line with the findings of [34–37]. Married people have a higher tax morale, and people living together have a lower tax morale than singles, and the results are in line with [1,34].

People employed part-time, at home, or retired have a higher tax morale than people employed full-time, while self-employed or unemployed persons tend to have a lower tax morale than full-time employees. The results subscribe to the studies of [42,43] in which significantly greater compliance costs impact self-employed people. It is essential to point out that age's effect on tax morality is even more significant combined with a relatively high level of confidence in churches, all coefficients being highly statistically significant. Another relevant result concerns the interaction between employment status and government responsibility. A higher level of government responsibility increases the fiscal morality of self-employed persons compared to full-time employees.

The interaction effect between marital status and the number of people in the household revealed that the pressure of having many significantly variables decreased the tax morality of those divorced, separated, widowed, or single/never married compared to those married.

Torgler [1] explored the interaction effect between religiosity and trustworthiness, indicating that religiosity works through its impact on trustworthiness and has an independent effect. In conclusion, outside the critical role of religion and faith in explaining the dynamics of tax morale, it is essential to mention the government and political credibility, which could represent a significant driver in creating the citizens' confidence necessary to increase fiscal morality. As policy considerations we can mention the following:

- Encourage programmes that educate taxpayers, especially those that incorporate research and analysis on tax morale. Encourage the growth of tax administrations, particularly regarding enhancing tax payment convenience.
- In the long run, work to improve the relationship between revenue and expenditure to create the social contract. This should be done before enacting hypothecated taxes.

From the perspective of the study's main limitations, it is essential to point out the unbalanced size of some characteristics that could impact the results as well as the potential hiding latent variables. Since the size of each religious group is unbalanced, in some characteristics, this may influence results. Therefore, the results need to be regarded with due reserve. Also, although other variables are included in the models, there is a high possibility that the religion-related ones hide other latent variables. Therefore, it is important to state that the relationship found could be not a cause-and-effect one, and further studies could be conducted to find other drivers highly related with religion that could explain the cause (or not), and this will be a further direction of research.

## 6. Conclusions

Trying to investigate the potential impact of religion and religiosity on tax morale, examining nevertheless the importance of non-economic factors in the complicated equation of tax compliance, we have explored the joint dataset of EVS/WVS 2017-2020 using, instead, machine learning techniques suitable for both output and input categorical variables: chi-squared and mutual information.

The results were both predictable and surprising. The empirical results revealed that variables such as religious denomination, faith in God and the importance of God, together with the level of trust in people from other religion, confidence in churches have been associated with a higher level of tax morale, being the most relevant variables of religiosity.

Protestants, Muslims, Buddhists, and people of other religions have better tax morale than persons of no religious affiliation, but Orthodox and Roman Catholics have lower tax morale than the reference group, which might be explained by communist anti-religious measures.

The impact of the belief in the existence of heaven on tax morality is accentuated by faith in God. As religiosity variables, the importance of God, together with the beliefs in God and heaven, raises the tax morality of individuals. Therefore, if faith in God is associated with a higher level of tax morality, the certainty of heaven's existence will offer the individuals the possibility of decreasing their fiscal morality since they have the certainty that they will reach heaven. The level of closeness to the country exhibited a positive impact on tax morality, and this result is also available for individuals with a higher level of trust in people from other religions, who have a higher level of tax morality. The level of confidence in churches seems to increase tax morale. Individuals who perceive the responsibility need to be more on people also exhibit a higher level of tax morale. At the same time, satisfaction with the political system is positively related to higher tax morale. From the point of view of fiscal and moral profile, older persons, usually married, retired/pensioned, or student or full-time employee, have one or at most two people in the household. People employed part-time, at home, or retired have a higher tax morale than people employed full-time, while self-employed or unemployed persons tend to have a lower tax morale than full-time employees. Married people have a higher tax morale, and people living together have a lower tax morale than singles. It is crucial to point out that age's effect on tax morality is even more significant combined with a relatively high level of confidence in churches, all coefficients being highly statistically significant. Another relevant result concerns the interaction between employment status and government responsibility. A higher level of government responsibility increases the fiscal morality of self-employed persons compared to full-time employees. The interaction effect between marital status and the number of people in the household revealed that the pressure of having many people significantly decreased the tax morality of those divorced, separated, widowed, or single/never married compared to those married.

Another important finding is related to the main characteristics of a person's fiscal morale. Therefore, an individual with an excellent fiscal morality profile is characterised by the following: he is an adult over 25 years old, married, and having only one member in his household. He may be employed full-time or retired.



In conclusion, outside the critical role of religion and faith in explaining the dynamics of tax morale, it is essential to mention the government and political credibility, which could represent a significant driver in creating the citizens' confidence necessary to increase fiscal morality. The empirical findings show the need to include non-economic elements in tax compliance analyses. Tax morale and compliance are not just determined by the capacity to escape taxes, tax rates, and the likelihood of detection.

As future directions of research, more in-depth country-level analysis is needed, including surveys, to identify the drivers of tax morale at the local and sub-national level, and their relationship to other compliance factors; moreover, a deeper understanding of the drivers and components of trust in government, and an increase in the research and data available on developing countries, especially on tax and gender, are needed.

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## Appendix A

**Table A1.** Summary statistics of the ordinal variables in the analysis.

Variable	Obs	Mean	Std. Dev.	Min	Max
Justifiable: Cheating on taxes	109,953	2.119	2.060	1	10
How often do you attend religious services	110,343	4.843	2.560	1	8
Frequency of praying	61,636	3.497	2.654	1	8
How important is God in your life	109,677	6.910	3.359	1	10
Confidence: Churches	108,732	2.295	0.998	1	4
Trust: People of another religion	105,232	2.595	0.847	1	4
Interest in politics	110,639	2.665	0.958	1	4
Government responsibility	109,784	5.641	2.956	1	10
Confidence: The Government	107,355	2.680	0.949	1	4
Satisfaction with the political system	107,383	5.270	2.717	1	10
Self-positioning in political scale	81,948	5.621	2.414	1	10
Importance of democracy	109,305	8.590	2.031	1	10
Important in life: Religion	110,166	1.372	0.483	1	2
Post-Materialist index	106,862	1.855	0.622	1	3
Confidence: The Political Parties	107,101	3.013	0.845	1	4
How close do you feel: to country	110,250	1.708	0.758	1	4

**Table A2.** The distribution of nominal variables in our analysis.

<b>Religious Denomination</b>	<b>Percentage</b>
Roman Catholic	22.40%
Protestant	10.90%
Orthodox	10.70%
Jew	0.00%
Muslim	21.70%
Hindu	0.00%
Buddhist	2.80%
Other Christian	3.00%
Other	2.60%
Do not belong to a denomination	24.80%
Missing	1.00%
Religious person	Percentage
A religious person	61.90%
Not a religious person	27.30%
A convinced atheist	7.90%
Missing	2.90%
Believe in: God	Percentage
Yes	74.60%
No	20.60%
Missing	4.80%
Believe in: life after death	Percentage
Yes	54.20%
No	36.00%
Missing	9.70%
Believe in: hell	Percentage
Yes	46.10%
No	45.00%
Missing	8.90%
Believe in: heaven	Percentage
Yes	55.50%
No	35.70%
Missing	8.80%
Member: Belong to religious organisation	Percentage
Mentioned	68.20%
Not mentioned	30.40%
Missing	1.40%
Member: Humanitarian or charitable organisation	Percentage
Mentioned	14.30%
Not mentioned	84.10%
Missing	1.60%

Table A2. Cont.

Religious Denomination	Percentage
Socio-demographic variables	
Sex	Percentage
Male	46.10%
Female	53.80%
Missing	0.10%
Age	Percentage
15–24	12.40%
25–34	18.60%
35–44	18.50%
45–54	17.20%
55–64	15.90%
65+	17.10%
Missing	0.30%
Marital status	Percentage
Married	55.60%
Living together as married	5.00%
Divorced	5.90%
Separated	1.90%
Widowed	7.40%
Single/Never married	23.50%
Missing	0.60%
Respondent immigrant/born in country	Percentage
I am born in this country	94.50%
I am an immigrant to this country	5.30%
Missing	0.20%
Number of people in household	Percentage
1	13.00%
2	23.70%
3	18.20%
4	20.00%
5	11.40%
6+	12.70%
Missing	1.00%
Institution of occupation	Percentage
Private business	46.90%
Public institution	21.50%
Private non-profit institution	4.50%
Missing	27.20%
Highest educational level attained	Percentage
Upper	30.70%

**Table A2.** *Cont.*

Religious Denomination	Percentage
Middle	39.30%
Lower	29.20%
Missing	0.80%
Employment status	Percentage
Full-time (30 h a week or more)	36.60%
Part-time (less than 30 h a week)	7.30%
Self-employed	11.60%
Retired/pensioned	17.30%
Housewife (not otherwise employed)	11.20%
Student	5.30%
Unemployed	8.00%
Other	1.80%
Missing	0.90%

**Table A3.** The empirical results of tax morality logistic regression model with interaction effects based on mutual information variable selection algorithm.

Model I	Coef.	Std. Err.	z	p > z	95% Conf. Interval	
Religious denomination (ref = do not belong to a denomination)						
Roman Catholic	−0.091 ***	0.027	−3.420	0.001	−0.143	−0.039
Protestant	0.550 ***	0.038	14.470	0.000	0.475	0.624
Orthodox (Russian/Greek/etc.)	−0.243 ***	0.033	−7.420	0.000	−0.308	−0.179
Muslim	0.034	0.029	1.180	0.240	−0.023	0.091
Buddhist	0.176 ***	0.057	3.100	0.002	0.065	0.287
Other Christian (Evangelical/Pentecostal/Free church/etc.)	−0.120 ***	0.051	−2.350	0.019	−0.220	−0.020
Other	0.211 ***	0.059	3.540	0.000	0.094	0.327
2. How close to do you feel to your country (ref = not close)						
close	0.389 ***	0.024	16.510	0.000	0.435	0.343
Employment status (ref = full time)						
Part time (less than 30 h a week)	−0.046	0.035	−1.320	0.186	−0.114	0.022
Self employed	−0.085 ***	0.029	−2.980	0.003	−0.142	−0.029
Retired/pensioned	0.286 ***	0.041	7.070	0.000	0.207	0.366
Housewife (not otherwise employed)	0.015	0.031	0.490	0.621	−0.045	0.075
Student	0.210 ***	0.046	4.580	0.000	0.120	0.300
Unemployed	−0.072 **	0.033	−2.220	0.026	−0.136	−0.009
Other	0.137 *	0.071	1.930	0.054	−0.002	0.276
2. Trust in people of other religion (ref = not trust)						
Trust	0.173 ***	0.018	9.540	0.000	0.208	0.137
Government responsivity (ref = small)						
medium	−0.234 ***	0.022	−10.790	0.000	−0.276	−0.191
high	0.030	0.024	1.240	0.214	−0.017	0.077
Number of people in household (ref = 1)						
2	−0.008	0.035	−0.220	0.825	−0.077	0.062
3	−0.077 ***	0.037	−2.090	0.036	−0.149	−0.005
4	−0.086 ***	0.037	−2.300	0.022	−0.159	−0.013
5	−0.161 ***	0.041	−3.980	0.000	−0.241	−0.082
6 and more	−0.140 ***	0.040	−3.490	0.000	−0.219	−0.061
Satisfaction with the political system (ref = small)						
medium	−0.082 ***	0.021	−3.900	0.000	−0.123	−0.041
high	0.060 **	0.026	2.320	0.020	0.009	0.110
Marital status (ref = married)						
Living together as married	−0.175 ***	0.039	−4.470	0.000	−0.252	−0.098
Divorced	−0.214 ***	0.041	−5.190	0.000	−0.295	−0.133
Separated	−0.182 ***	0.062	−2.920	0.003	−0.304	−0.060
Widowed	−0.202 ***	0.042	−4.800	0.000	−0.285	−0.120
Single/Never married	−0.134 ***	0.028	−4.840	0.000	−0.189	−0.080

Table A3. Cont.

	Coefficient	Sd. error	z	Probability	95% Conf. Interval	
Age (ref = 18–25)						
25–34	0.037	0.041	0.900	0.366	−0.044	0.119
35–44	0.146 ***	0.044	3.310	0.001	0.059	0.232
45–54	0.185 ***	0.046	4.040	0.000	0.095	0.275
55–64	0.216 ***	0.049	4.430	0.000	0.120	0.311
65 and more years	0.346 ***	0.058	5.960	0.000	0.233	0.460
Confidence in churches (ref = small)						
high	0.054	0.047	1.140	0.256	0.146	0.039
Age #Confidence in churches						
25–34#high	0.128 **	0.061	2.120	0.034	0.010	0.247
35–44#high	0.166 ***	0.062	2.690	0.007	0.045	0.288
45–54#high	0.165 ***	0.063	2.610	0.009	0.041	0.289
55–64#high	0.208 ***	0.066	3.150	0.002	0.078	0.337
65 and more years#high	0.076	0.069	1.110	0.269	−0.059	0.212
Constant	1.787 ***	0.063	28.470	0.000	1.664	1.910
<b>Model II</b>						
Do you belong to a religion or religious denomination? (ref = do not belong to a denomination)						
Roman Catholic	−0.092 ***	0.027	−3.470	0.001	−0.144	−0.040
Protestant	0.545 ***	0.038	14.340	0.000	0.470	0.619
Orthodox (Russian/Greek/etc.)	−0.243 ***	0.033	−7.390	0.000	−0.307	−0.178
Muslim	0.034	0.029	1.180	0.237	−0.023	0.091
Buddhist	0.176 ***	0.057	3.110	0.002	0.065	0.287
Other Christian (Evangelical/Pentecostal/Free church/etc.)	−0.119 **	0.051	−2.330	0.020	−0.219	−0.019
Other	0.210 ***	0.059	3.530	0.000	0.093	0.327
Age (ref = 18–25)						
25–34	0.086 ***	0.034	2.530	0.012	0.019	0.152
35–44	0.209 ***	0.037	5.670	0.000	0.137	0.282
45–54	0.250 ***	0.039	6.480	0.000	0.174	0.325
55–64	0.299 ***	0.041	7.230	0.000	0.218	0.380
65 and more years	0.372 ***	0.052	7.190	0.000	0.271	0.473
How close do you feel to your country (ref =not close)						
Close	0.389 ***	0.024	16.510	0.000	0.435	0.343
Trust in people of another religion (ref = not trust)						
Trust	0.171 ***	0.018	9.440	0.000	0.207	0.136
Number of people in household (ref = 1)						
2	−0.008	0.035	−0.210	0.831	−0.077	0.062
3	−0.075 **	0.037	−2.030	0.042	−0.147	−0.003
4	−0.084 **	0.037	−2.250	0.025	−0.157	−0.011
5	−0.159 ***	0.041	−3.910	0.000	−0.238	−0.079
6 and more	−0.138 ***	0.040	−3.440	0.001	−0.217	−0.060
Satisfaction with the political system (ref = small)						
Medium	−0.081 ***	0.021	−3.880	0.000	−0.123	−0.040
High	0.060 ***	0.026	2.320	0.020	0.009	0.110
Marital status (ref = married)						
Living together as married	−0.173 ***	0.039	−4.400	0.000	−0.249	−0.096
Divorced	−0.210 ***	0.041	−5.110	0.000	−0.291	−0.130
Separated	−0.182 ***	0.062	−2.920	0.003	−0.304	−0.060
Widowed	−0.199 ***	0.042	−4.720	0.000	−0.281	−0.116
Single/Never married	−0.132 ***	0.028	−4.780	0.000	−0.187	−0.078
Confidence in churches (ref = small)						
High	0.074 ***	0.020	3.720	0.000	0.035	0.113
Employment status (ref = full-time)						
Part-time (less than 30 h a week)	−0.062	0.069	−0.910	0.365	−0.197	0.072
Self-employed	−0.182 ***	0.052	−3.470	0.001	−0.285	−0.079
Retired/pensioned	0.387 ***	0.063	6.130	0.000	0.264	0.511
Housewife (not otherwise employed)	0.050	0.061	0.820	0.414	−0.070	0.170
Student	0.146 *	0.081	1.800	0.071	−0.013	0.305
Unemployed	−0.087	0.066	−1.320	0.187	−0.217	0.042
Other	−0.028	0.140	−0.200	0.844	−0.303	0.247
Government responsibility (ref = small)						
Medium	−0.245 ***	0.034	−7.180	0.000	−0.312	−0.178
High	0.032	0.040	0.810	0.420	−0.046	0.110
Employment status (ref = full time)						
#Government responsibility (ref = small)						
Part-time (less than 30 h a week)#Medium	0.074	0.086	0.870	0.386	−0.093	0.242
Part-time (less than 30 h a week)#High	−0.069	0.094	−0.730	0.463	−0.254	0.115

Table A3. Cont.

	Coefficient	Standard error	z	Probability	95% Conf. Interval	
Self-employed#Medium	0.112 *	0.068	1.660	0.097	-0.020	0.245
Self-employed#High	0.158 **	0.074	2.130	0.033	0.013	0.303
Retired/pensioned#Medium	0.078	0.070	-1.120	0.263	-0.216	0.059
Retired/pensioned#High	-0.244 ***	0.079	-3.080	0.002	-0.398	-0.089
Housewife (not otherwise employed)#Medium	-0.085	0.075	-1.140	0.253	-0.232	0.061
Housewife (not otherwise employed)#High	-0.002	0.080	-0.020	0.980	-0.160	0.156
Student#Medium	0.083	0.096	0.870	0.385	-0.104	0.270
Student#High	0.057	0.109	0.520	0.605	-0.158	0.271
Unemployed#Medium	-0.037	0.082	-0.450	0.655	-0.197	0.124
Unemployed#High	0.075	0.086	0.870	0.384	-0.093	0.243
Other#Medium	0.482 ***	0.180	2.690	0.007	0.130	0.834
Other#High	-0.153	0.185	-0.830	0.408	-0.515	0.209
Constant	1.741 ***	0.063	27.540	0.000	1.617	1.865
<b>Model III</b>						
Do you belong to a religion or religious denomination? (ref = do not belong to a denomination)						
Roman Catholic	-0.091 ***	0.027	-3.460	0.001	-0.144	-0.040
Protestant	0.546 ***	0.038	14.390	0.000	0.472	0.621
Orthodox (Russian/Greek/etc.)	-0.245 ***	0.033	-7.480	0.000	-0.310	-0.181
Muslim	0.0322138	0.029	1.110	0.267	-0.025	0.089
Buddhist	0.175 ***	0.057	3.100	0.002	0.065	0.287
Other Christian (Evangelical/Pentecostal/Free church/etc.)	-0.119 **	0.051	-2.340	0.019	-0.220	-0.019
Other	0.209 ***	0.060	3.520	0.000	0.093	0.326
Age (ref = 18–25)						
25–34	0.083 **	0.034	2.440	0.015	0.016	0.151
35–44	0.206 ***	0.038	5.470	0.000	0.132	0.280
45–54	0.247 ***	0.039	6.340	0.000	0.171	0.324
55–64	0.295 ***	0.042	7.090	0.000	0.214	0.377
65 and more years	0.370 ***	0.052	7.130	0.000	0.269	0.472
How close do you feel to your country (ref = not close)						
Close	0.388 ***	0.024	16.500	0.000	0.435	0.343
Employment status (ref = full-time)						
Part-time (less than 30 h a week)	-0.049	0.035	-1.420	0.155	-0.118	0.019
Self-employed	-0.086 ***	0.029	-3.040	0.002	-0.143	-0.031
Retired/pensioned	0.276 ***	0.041	6.830	0.000	0.197	0.356
Housewife (not otherwise employed)	0.013	0.031	0.440	0.657	-0.047	0.074
Student	0.204 ***	0.046	4.450	0.000	0.114	0.294
Unemployed	-0.071 **	0.033	-2.180	0.029	-0.135	-0.007
Other	0.136 *	0.071	1.920	0.055	-0.003	0.276
Trust in people of another religion (ref = not trust)						
Trust	0.171 ***	0.018	9.440	0.000	0.207	0.136
Government responsibility (ref = small)						
Medium	-0.234 ***	0.022	-10.830	0.000	-0.277	-0.192
High	0.030	0.024	1.250	0.212	-0.017	0.077
Satisfaction with the political system (ref = small)						
Medium	-0.082 ***	0.021	-3.940	0.000	-0.124	-0.041
High	0.060 **	0.026	2.340	0.019	0.010	0.111
Confidence in churches (ref = small)						
High	0.074 ***	0.020	3.750	0.000	0.036	0.113
Marital status (ref = married)						
Living together as married	-0.179	0.300	-0.600	0.548	-0.768	0.408
Divorced	0.176	0.122	1.450	0.146	-0.061	0.415
Separated	0.261	0.164	1.590	0.111	-0.060	0.582
Widowed	0.273 **	0.120	2.290	0.022	0.039	0.509
Single/Never married	0.283 **	0.115	2.460	0.014	0.058	0.509
Number of people in household (ref = 1)						
2	0.407 ***	0.110	3.690	0.000	0.191	0.624
3	0.322 ***	0.111	2.910	0.004	0.106	0.540
4	0.309 ***	0.110	2.800	0.005	0.093	0.525
5	0.255 **	0.112	2.280	0.023	0.036	0.476
6 and more	0.270 ***	0.112	2.410	0.016	0.051	0.490
Marital status (ref = married) # Number of people in household (ref = 1)						
Living together as married#2	0.074	0.312	0.240	0.811	-0.537	0.686
Living together as married#3	0.030	0.311	0.100	0.923	-0.580	0.640
Living together as married#4	-0.001	0.310	0.000	0.999	-0.607	0.606
Living together as married#5	0.001	0.315	0.000	0.996	-0.616	0.620
Living together as married#6 and more	-0.077	0.311	-0.250	0.803	-0.688	0.533

Table A3. Cont.

Divorced#2	−0.404 ***	0.145	−2.790	0.005	−0.688	−0.121
Divorced#3	−0.325 **	0.155	−2.090	0.036	−0.629	−0.021
Divorced#4	−0.424 **	0.175	−2.420	0.015	−0.768	−0.081
Divorced#5	−0.452 **	0.215	−2.110	0.035	−0.874	−0.032
Divorced#6 and more	−0.295	0.224	−1.320	0.186	−0.734	0.143
Separated#2	−0.672 ***	0.207	−3.240	0.001	−1.079	−0.266
Separated#3	−0.378 *	0.213	−1.770	0.076	−0.796	0.040
Separated#4	−0.284	0.243	−1.170	0.241	−0.761	0.191
Separated#5	−0.447 *	0.263	−1.700	0.089	−0.964	0.069
Separated#6 and more	−0.403 *	0.237	−1.700	0.089	−0.869	0.061
Widowed#2	−0.568 ***	0.148	−3.850	0.000	−0.858	−0.279
Widowed#3	−0.554 ***	0.160	−3.470	0.001	−0.868	−0.241
Widowed#4	−0.384 **	0.175	−2.200	0.028	−0.728	−0.041
Widowed#5	−0.552 ***	0.176	−3.140	0.002	−0.897	−0.207
Widowed#6 and more	−0.643 ***	0.174	−3.690	0.000	−0.985	−0.302
Single/Never married#2	−0.438 ***	0.125	−3.490	0.000	−0.684	−0.192
Single/Never married#3	−0.423 ***	0.124	−3.420	0.001	−0.667	−0.181
Single/Never married#4	−0.408 ***	0.124	−3.300	0.001	−0.652	−0.166
Single/Never married#5	−0.464 ***	0.129	−3.600	0.000	−0.718	−0.212
Single/Never married#6 and more	−0.415 ***	0.128	−3.250	0.001	−0.665	−0.165
Constant	1.341 ***	0.117	11.420	0.000	1.111	1.571

Note: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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