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# Ideological alignment, public sector size and tax morale: empirical evidence from OECD economies

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This paper analyzes the extent to which ideological differences between citizens and their governments, in conjunction with the observed size of the public sector, influence taxpayers' intrinsic motivations to pay taxes. We utilize data from the World Values Survey and the European Values Study, encompassing 23 OECD economies from 1995 to 2018. Our findings indicate that the tax morale of citizens who hold right-wing ideological views in relation to their government significantly decreases when the public sector surpasses the OECD average. Conversely, citizens who hold left-wing ideological views in relation to their government exhibit a higher intrinsic motivation to pay taxes, particularly when the public sector is considered undersized.

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## Introduction

Understanding citizens' motivations to pay taxes is crucial, given that combating tax evasion and avoidance has become a cornerstone of governmental policies in developed countries, especially after the financial crisis in 2008. This importance stems from two reasons. Firstly, non-compliance results in significant revenue losses. According to the European Commission (2017), in 2009, tax evasion and avoidance in the European Union (EU) led to a revenue loss of €1 trillion, which is more than eight times the size of the EU's annual expenditure budget (€116 billion).[1] In the United States (US), the Internal Revenue Service (2017) (IRS) reports an average annual net tax gap of $406 billion for the period 2008–2010, which is more than four times the annual cost of the healthcare program promoted by US president Barack Obama.[2] Secondly, tax evasion and avoidance hinder the desired level of income redistribution in society. The increase in inequality observed in most countries since 1970 would have been even greater if tax evasion, particularly from undeclared capital income, were taken into account (see pp. 201, Piketty 2015).

In this study, we analyze the extent to which ideological alignment between citizens and governments influences citizens' tax morale when the public sector is considered either undersized or oversized. The empirical analysis is based on individual data from the World Values Survey (Haerpfer et al. 2022) and the European Values Study (EVS 2022). We find that the tax morale of citizens with left-leaning ideological stances in relation to the government decreases significantly when the public sector is oversized, i.e., when the public sector surpasses the OECD average. Instead, citizens with right-leaning ideological stances in relation to the government exhibit a higher intrinsic motivation to pay taxes, particularly when the public sector is undersized.

While the role of ideological stances in tax morale has been overlooked in the literature so far, several studies have included citizens' perceptions about the quality of public institutions. The basic idea behind the relationship between tax morale and institutional quality is that citizens and governments sign an implicit 'psychological' contract under which citizens receive public goods and services from the government in exchange for their tax payments (Feld and Frey 2002). Accordingly, a positive relationship between tax morale and institutional quality is predicted. As measures of institutional quality at the country level, the literature has used, for instance, corruption (Torgler 2006), tax progressivity (Doerrenberg and Peichl 2013), or the adequacy of public goods provision approximated by ethnic fractionalization (Lago-Peñas and Lago-Peñas 2010). Other studies employ individual-level data from survey responses to specific questions about trust in public institutions. The results show that high levels of tax morale can be associated with high levels of trust in public institutions. Focusing on the specific measures of trust which are most related to our study, e.g., Chan et al. (2017) and Torgler (2005) find higher levels of tax morale among individuals who trust more their governments.[3]

The rest of this paper is organized as follows. Section "Hypothesis and relation to the literature" states the hypothesis subject to empirical testing and relates it to the literature. In Section "Empirical approach", we describe the empirical strategy. Section "Results" presents and discusses the estimation results. Finally, Section "Conclusions " concludes.

## Hypothesis and relation to the literature

In this study, we analyze in how far citizens' ideological stances influence their intrinsic motivation to pay taxes. The connection between citizens' ideology and tax morale is based on the observation that, in general, right-wing voters, as compared to their left-wing counterparts, are more in favor of a small public sector and reduced public spending (see, e.g., Cusack 1997; Hibbs 1977; Pickering and Rockey 2011). Indeed, the empirical evidence indicates that countries governed by leftist parties follow a pattern of low unemployment and high inflation, which is associated with greater public spending. On the other hand, countries dominated by center-rightist governments promote policies that reduce public expenditure through the deregulation of the public sector, resulting in higher unemployment and less inflation (see, e.g., Alesina 1987). Consequently, the motivation of right-wing voters to pay taxes when the public sector is large is typically low, as they believe the public sector is oversized and that taxation and public spending are excessively high. On the other hand, when public spending is low, left-wing voters might perceive the public sector as undersized, leading to an increase in their intrinsic motivation to pay taxes. Accordingly, the hypothesis subjected to empirical testing is:

Hypothesis 1: Right-wing voters exhibit lower tax morale when they consider that the public sector is oversized. Left-wing voters exhibit higher tax morale when they consider that the public sector is undersized.

While the relationship between citizens' ideological stances and tax morale has not yet been addressed, the analysis is related to the literature on tax morale in the following way. Taxpayers' motives or incentives for tax evasion have been studied in the framework of the Allingham and Sandmo (1972) model in which risk averse individuals choose the amount of undeclared income to maximize the expected utility, which increases with their amount of evaded income and decreases with the probability of detection and the severity of fines and sanctions. More recently, the literature has contributed with other motives that go beyond selfishness and deterrence and are grouped under the concept of 'tax morale' to explain the non-pecuniary factors in the taxpayers' decision on whether or not to evade taxes.[4] According to Torgler (2007) and Luttmer and Singhal (2014), apart from deviations from the rational utility maximization model, two main channels that explain citizens' non-pecuniary motivations to pay taxes can be distinguished. First, *personal and social norms* and, second, *reciprocity*.

*Personal and social norms* comprise the individual's intrinsic motivation to pay taxes, peer effects and social and cultural influences.[5] An example, for the importance of intrinsic motivations to pay taxes is the study by Dwenger et al. (2016) who document a high level of compliance with a local German Protestant church tax, even in the absence of any tax enforcement. The relevance of religious convictions to tax morale has also been shown in numerous other studies (Grasmick et al. 1991; Stack and Kposowa 2006; Torgler 2006). An example of the importance of peer effects is the study by Sigala et al. (1999) who find that taxpayers' compliance behavior crucially depends on the perceived tax evasion in their reference group (friends, neighbors, or colleagues). Cultural effects have been identified, for instance, by Halla (2012) and Kountouris and Remoundou (2013). These authors show that the level of tax morale in a country varies according to their immigration background.

*Reciprocity* is based on the idea that citizens view taxes as part of a social or 'psychological' contract, where tax payments are made in exchange for services provided by the state (Feld and Frey 2002). A prediction of this reciprocity nexus is that tax morale increases with citizens' satisfaction regarding the quality and quantity of public goods and services provision (see, e.g., Alm et al. 1993; Barone and Mocetti 2011). Up to now, the literature has tried to test this prediction by using different indicators for the quality of public services. First, some studies have shown that

'trust' in political leadership and in the public administration leads to more voluntary tax compliance (see, e.g., Alm et al. 2006; Torgler 2004). Second, Doerrenberg and Peichl (2013) find evidence that citizens' tax morale is related to the degree of income redistribution. Thus, individuals in countries with a more progressive tax rate system are more likely to exhibit a higher general tax morale, whereas, however, this effect decreases with the individual income level. Finally, Lago-Peñas and Lago-Peñas (2010) find that ethnic fractionalization, as an indicator of the goodness of fit between provided and desired public goods, is shown to have a negative impact on tax morale. While these findings can be seen as evidence of the relevance of the reciprocity mechanism in tax morale, the variables used in the literature are global indicators for the overall quality of the public sector, rather than individual measures of the alignment between a citizen's desired quantity and quality of public goods and the ones provided by the government.

A few studies have documented a positive relationship between ideological alignment and tax compliance. Cebula (2013) analyzes how public resentment towards or greater approval of the president's various spending and/or tax policies (as well, perhaps, as his other policies) affects tax compliance in the US. The results provide clear evidence of a significant positive relationship between the level of approval and tax evasion. Similarly, a recent study by Cullen et al. (2021) employs aggregated data at the county level to show that reported taxable income in US counties increases when a county moves into political alignment with the president.

While we believe that these findings support the ones in this paper, there are four main differences to our approach. First, our focus is on tax morale rather than tax compliance. Although these concepts are closely related, a lower intrinsic motivation to pay taxes does not automatically translate into more tax evasion, as this also depends on tax enforcement. Moreover, tax morale also plays a role for legal tax avoidance which is not less important than tax evasion. Second, our analysis is based on individual instead of regional-level data enabling us to establish a direct connection between citizens' intrinsic motivations to pay taxes and their ideology, while also controlling for essential individual characteristics relevant to tax compliance. Third, we examine ideological differences in relation to a policy outcome, namely, public sector size which depends on the levels of public expenditure and taxation. Finally, our data is not limited to the US but encompasses 23 developed economies. This broader perspective allows for a more comprehensive understanding of the influence of ideology on tax morale compared to the insights derived solely from the US two-party system.

## Empirical approach

The organization of this section is as follows. We first describe the data. Then, we specify the empirical model. Finally, we provide some details on the heteroskedasticity-based instrumental variable approach by proposed by Lewbel (2012) to tackle endogeneity issues.

**Data**. Our individual-level data are from the World value survey (WVS) and the European value study (EVS). These surveys contain representative questionnaire data from face-to-face interviews conducted by professional scientific institutions at the respondents' home. In this study we make use of the combined EVS/WVS data file which, for the variables of interest, leaves us with nearly 80,000 observations between 1995 and 2018 for 23 OECD countries. [6,7] Furthermore, for some of our explanatory variables we make use of country-level data. Details on variable definitions, data sources and the descriptive statistics of our variables can be found in Tables 1–3.

*Dependent variable: Tax morale*. Our dependent variable, *Tax morale*, is based on the following question from the EVS/WVS: *Please tell me for each of the following whether you think it can always be justified, never be justified, or something in between, using this card: 'Cheating on tax if you have the chance'*. Responses to this question are on a ten-point scale ranging from 1 (never justify) to 10 (always). As is common in the literature, we re-coded *Tax morale* into a four-point scale to facilitate the interpretation of our results. Thus, for the ordered probit estimation *Tax morale* is re-coded into a four-point scale using the following criterion: responses from 7 to 10 were combined into a value 0 (the lowest level of tax morale), responses 5 and 6 were re-coded as 1; responses 3 and 4 re-coded as 2; and 1 and 2 are re-coded as 3 (the highest level of tax morale). For robustness checks we also employ the original ten-point scale.[8]

The advantage of this measurement of the dependent variable is that it allows us to obtain cross-country comparable data for a large set of countries over a period of 18 years.[9] Another advantage is that tax morale considers the motivations for both tax evasion and tax avoidance behavior which are central to ideological motives. Finally, it should be noted that in developed countries, as shown by Richardson (2006) and Torgler et al. (2008), there is a strong negative correlation between actual tax evasion and tax morale.[10]

*Explanatory variables*

Ideology: The variable *Ideology* comes directly from the EVS/WVS and is measured on a ten-point scale, from 0 (extreme leftist) to 10 (extreme rightist). [11] From Hypothesis 1 we expect that tax morale is negatively related to *Ideology*.

Public sector size: The variable *Public sector size* is measured by total general government expenditure as a share of Gross Domestic Product (GDP) from OECD (2023). The variable has a mean of 44.7% and ranges from 31.0% (Switzerland, 2007) to 61.4% (Sweden, 1996).

Interaction of ideology and public sector size: To asses the influence of citizens' ideological stance (*Ideology*) on tax morale, we consider *i)* the current size of the public sector, and *ii)* the distance of citizens' ideology to that of the party coalition in government. As regards to the current size of the public sector, we define the variables *Public sector oversized* and *Public sector undersized* as the mean-adjusted value of *Public sector size*, measured in absolute value. Consequently, we consider that the public sector is oversized if *Public sector size* surpasses the average of developed economies, and undersized if it falls short of the average.

The distance between citizens' and government ideology is measured by the variables *Right to government* and *Left to government*. *Right to government* (*Left to government*) is the difference between the variables *Ideology* and *Government ideology*, when the distance takes positive (negative) values. Both variables are measured in absolute values. *Government ideology* is from the Parliaments and Governments Database (ParlGov) by Döring et al. (2023). This database contains information on parties' ideological positioning on a 0 (leftist)-10 (rightist) scale. Moreover, it includes data on the composition of Parliaments and government coalitions. In case of multi-party governments, *Government ideology* is measured as the unweighted mean of coalition parties' ideology.[12]

We use the interaction of both variables to account for the fact that the scope for changes in public sector size by governments is

**Table 1 Data definitions and sources.**

| Variable | Measurement | Source |
|---|---|---|
| Tax morale | Respondents' tax morale rescaled into a four-point scale. Responses 7 through 10 were combined into a value 0 (low tax morale), while the remaining responses were combined in groups of two (5 and 6 into 1; 3 and 4 into 2; 1 and 2 into 3). | Haerpfer et al. (2022)/ EVS (2022) |
| Income | Respondents' self-reported household income level before taxes and deductions on a ten-point scale. | Haerpfer et al. (2022)/ EVS (2022) |
| Public sector size | Measured as the total general government expenditure as a share of GDP. | OECD (2023) |
| Ideology | Self-reported ideology rescaled to take values between −5 (left) and 5 (right). | Haerpfer et al. (2022)/ EVS (2022) |
| Ideological difference | Difference between each respondent's ideology and that of her government calculated as the unweighted mean of all parties in the cabinet. | Döring et al. (2023) |
| Weighted ideological difference | Difference between the respondent's ideology and that of her government calculated as a weighted mean by occupied seats in the cabinet. | Döring et al. (2023) |
| Ideological difference to prime minister | Difference between the respondent's ideology and that of the prime minister's party. | Döring et al. (2023) |
| Government effectiveness | Perceptions of (i) the quality of public services, (ii) its independence from political parties, and (iii) the credibility of government. Ranges from −2.5(weak) to 2.5(strong). | World Bank (2023b) |
| Inflation | Annual percentage change in consumer prices. | World Bank (2023a) |
| Unemployment | Annual unemployment rate in percentage points. | World Bank (2023a) |
| Age | Respondent's age calculated using the year of birth. | Haerpfer et al. (2022)/ EVS (2022) |
| Female | Dichotomous variable taking value 1 for female and 0 for male. | Haerpfer et al. (2022)/ EVS (2022) |
| Religious | Dichotomous variable taking value 1 if the respondent declares to be a religious person and 0 if otherwise (not religious or convinced atheist). | Haerpfer et al. (2022)/ EVS (2022) |
| Patriotic | Dichotomous variable taking vale 1 if the respondent declares to be very or quite proud of being a citizen of the country and 0 otherwise (not very or not at all proud). | Haerpfer et al. (2022)/ EVS (2022) |
| Educational level | Three dummy variables (Low, Medium and High) accounting for whether the respondent has adequately or inadequately completed primary (compulsory), secondary or tertiary education respectively. | Haerpfer et al. (2022)/ EVS (2022) |
| Unemployed | Dichotomous variable taking value 1 if the respondent is currently unemployed and 0 if otherwise. | Haerpfer et al. (2022)/ EVS (2022) |
| Self-employed | Dichotomous variable taking value 1 if the respondent is currently self-employed and 0 if otherwise. | Haerpfer et al. (2022)/ EVS (2022) |
| Retired | Dichotomous variable taking value 1 if the respondent is retired/pensioned and 0 if otherwise. | Haerpfer et al. (2022)/ EVS (2022) |
| Other | Dichotomous variable taking value 1 if the respondent is: in military service, housewife not otherwise employed, student, not working because of disability, other reasons; and 0 if otherwise. | Haerpfer et al. (2022)/ EVS (2022) |
| Married/Partnership | Dichotomous variable taking value 1 if the respondent is currently married or in a partnership and 0 if otherwise. | Haerpfer et al. (2022)/ EVS (2022) |
| Divorced/Separated | Dichotomous variable taking value 1 if the respondent is currently divorced or separated and 0 if otherwise. | Haerpfer et al. (2022)/ EVS (2022) |
| Widowed | Dichotomous variable taking value 1 if the respondent is currently widowed and 0 if otherwise. | Haerpfer et al. (2022)/ EVS (2022) |

often limited due to long-term contracts or public debt, for example. In this context, the ideological distance to the government serves as a short-term indicator for the potential discontent with government policies aimed to adjust the size of the public sector under the given constraints. According to Hypothesis 1, we expect that right-leaning citizens in relation to the government will exhibit lower tax morale when the public sector is oversized. In contrast, left-leaning citizens in relation to the government consider that cheating on taxes is less justified when the public sector is undersized. The expected impact of *Right to government* × *Public sector oversized* on tax morale is therefore negative, while the expected impact of *Left to government* × *Public sector undersized* on tax morale is positive.

Income: Respondents to the WVS/EVS classify themselves into ten income groups constructed with information from country-specific income distributions. Accordingly, the variable *Income* is measured on a ten-point scale. From previous results in the literature (see, e.g., Doerrenberg and Peichl 2013), we expect a negative influence of *Income* on *Tax morale*.

Government effectiveness: The efficiency of the public sector is measured with *Government effectiveness* as defined by World Bank Governance Indicators. It is measured on a scale that ranges from −2.5 (weak) to 2.5 (strong) government performance. The expected effect of *Government effectiveness* on the probability to exhibit the highest *Tax morale* level is expected to be positive (see, e.g., Alm et al. 2006; Torgler 2004).

Economic controls: As further country-specific economic variables we use *Inflation* and *Unemployment*. Both variables are measured in percentage points.

Socio-demographic controls: As is common in the literature that uses data from the EVS/WVS, we include in our analysis a number of variables to account for the respondents' socio-

**Table 2 Descriptive statistics of categorical and dummy variables.**

| Variable | Value | Frequency | Percent |
|---|---|---|---|
| Tax morale | Low | 4105 | 5.18 |
| | Medium low | 5862 | 7.40 |
| | Medium high | 10,023 | 12.66 |
| | High | 59,199 | 74.76 |
| | *Total* | 79,189 | 100 |
| Gender | Male | 39,221 | 49.53 |
| | Female | 39,968 | 50.47 |
| | *Total* | 79,189 | 100 |
| Religious | Non religious | 34,368 | 43.40 |
| | Religious | 44,821 | 56.60 |
| | *Total* | 79,189 | 100 |
| Patriotic | Non patriotic | 8910 | 11.25 |
| | Patriotic | 70,279 | 88.75 |
| | *Total* | 79,189 | 100 |
| Educational level | Low | 12,628 | 15.95 |
| | Medium | 40,988 | 51.76 |
| | High | 25,573 | 32.29 |
| | *Total* | 79,189 | 100 |
| Occupational status | Employed | 40,474 | 51.11 |
| | Unemployed | 3942 | 4.98 |
| | Self-employed | 5011 | 6.33 |
| | Retired | 17,853 | 22.54 |
| | Other | 11,909 | 15.04 |
| | *Total* | 79,189 | 100 |
| Marital status | Never married | 18,055 | 22.80 |
| | Married/partnership | 48,279 | 60.97 |
| | Divorced/separated | 7623 | 9.63 |
| | Widowed | 5232 | 6.61 |
| | *Total* | 79,189 | 100 |

**Table 3 Descriptive statistics of continuous variables.**

| Variable | Obs. | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| *Individual-level variables* | | | | | |
| Income | 79,189 | 4.285 | 2.530 | 0 | 9 |
| Ideology | 79,189 | −0.134 | 2.292 | −5 | 5 |
| Right to government | 34,743 | 1.960 | 1.560 | 0.024 | 8.059 |
| Left to government | 44,446 | 2.422 | 1.727 | 0.023 | 8.661 |
| Right to government × Public Sector oversized | 16,512 | 1.010 | 0.803 | 0.011 | 4.199 |
| Right to government × Public Sector undersized | 18,231 | 0.746 | 0.608 | 0.021 | 2.863 |
| Left to government × Public Sector oversized | 23,902 | 1.0231 | 0.913 | 0.012 | 3.902 |
| Left to government × Public Sector undersized | 20,544 | 0.930 | 0.647 | 0.020 | 3.334 |
| Age | 79,189 | 48.14 | 17.151 | 15 | 108 |
| *Country-level variables* | | | | | |
| Public sector size | 79,189 | 0.447 | 0.070 | 0.310 SWI 2007 | 0.614 SWE 1996 |
| Government effectiveness | 79,189 | 1.596 | 0.475 | 0.280 TUR 2009 | 2.250 DNK 2008 |
| Inflation | 79,189 | 2.222 | 1.846 | −0.72 TUR 2010 | 12.01 ICE 2009 |
| Unemployment | 79,189 | 7.349 | 3.627 | 2.2 ICE 1999 | 22.7 SPA 1995 |

demographic characteristics such as age, gender, educational level, occupational status and marital status. Furthermore, to account for personal and social norms, we define two dichotomous variables indicating religious beliefs and patriotism, respectively.[13] Regarding the impact of these variables on tax morale the literature concludes that elderly people, women and married individuals exhibit higher levels of tax morale, whereas the self-employed manifest lower levels of tax morale (see, e.g., Alm and Torgler 2006; Rodriguez-Justicia and Theilen 2018; Torgler 2005). Finally, we include fixed effects to account for time invariant institutional and idiosyncratic differences across countries that are not captured by the aforementioned country-specific variables.

**Empirical model**. We employ an ordered probit regression model to account for the categorical character of our dependent variable *Tax morale*. The model contains country and time dummies to account for unobservable country and time-specific effects with the US and 1995 as the reference country and year, respectively. Specifically, the estimation model is:

$$y^*_{i,c} = \boldsymbol{\beta}'\boldsymbol{x}_{i,c} + \boldsymbol{\gamma}'\boldsymbol{z}_{i,c} + \boldsymbol{\eta}_j + \boldsymbol{\rho}_t + \boldsymbol{\nu}_c + \varepsilon_{i,c} \quad (1)$$

where $y^*$ is a latent variable (tax morale of individual $i$ in country $c$), $\mathbf{x}$ is a vector of main explanatory variables, $\mathbf{z}$ is a vector of control variables, $\boldsymbol{\eta}_j$ is a vector of intercepts for each tax morale category (*Middle low*, *Middle high* and *High* as compared to the base category *Low*), and $\boldsymbol{\rho}_t$ and $\boldsymbol{\nu}_c$ are vectors of time and country dummies, respectively. The latent variable $y^*_{i,c}$ is only observable when it crosses thresholds:

$$y^*_{i,c} = j \quad \text{if} \quad \alpha_j < j \le \alpha_{j+1}, \quad j = 0, 1, 2, 3,$$

and the probability that $y^*_{i,c} = j$ is:

$$P(y^*_{i,c} = j) = F(\alpha_{j+1} - \boldsymbol{\beta}'\boldsymbol{x}_{i,c} - \boldsymbol{\gamma}'\boldsymbol{z}_{i,c} - \boldsymbol{\eta}_j - \boldsymbol{\rho}_t - \boldsymbol{\nu}_c) - F(\alpha_j - \boldsymbol{\beta}'\boldsymbol{x}_{i,c} - \boldsymbol{\gamma}'\boldsymbol{z}_{i,c} - \boldsymbol{\eta}_j - \boldsymbol{\rho}_t - \boldsymbol{\nu}_c)$$

where $F$ denotes the standard normal cumulative distribution function. The four categories for $y^*$ are: low ($j = 0$), medium low ($j = 1$), medium high ($j = 2$), and high ($j = 3$). The vector of control variables $\mathbf{z}$ includes: *Age*, a gender dummy (*Female*), a dummy for religious beliefs (*Religious*), a dummy for patriotism (*Patriotic*), two educational level dummies (*Medium* and *High*), four occupational status dummies (*Unemployed*, *Self-employed*, *Retired*, *Other*), three marital status dummies (*Married*, *Divorced* and *Widowed*) and, as economic controls, *Inflation* and *Unemployment*.

**Endogeneity**. It is well recognized that endogeneity is a major problem in the estimation of tax morale. In our case, tax morale and ideological motives are likely to be jointly determined by unobservable variables and, therefore, instrumental variables estimation is indicated. However, as in most cases, it is hard to find valid instruments for *Ideology* fulfilling relevance and exogeneity conditions. In this paper, we try to address the endogeneity problem employing the approach proposed by Lewbel (2012), based on using heteroskedasticity to generate valid instruments.

In the following, we briefly sketch the Lewbel (2012) approach of heteroskedasticity-based identification. Consider Eq. (1) in the form of a linear regression

$$y_{i,c} = \boldsymbol{\beta}'\boldsymbol{x}_{i,c} + \boldsymbol{\gamma}'\boldsymbol{z}_{i,c} + \boldsymbol{\eta}_j + \boldsymbol{\rho}_t + \boldsymbol{\nu}_c + \varepsilon_{i,c} \quad (2)$$

Now, suppose that *Ideology* ($\tilde{x}$) is endogenous, i.e., depends on $y$, such that

$$\tilde{x}_{i,c} = \tilde{\psi} y_{i,c} + \tilde{\gamma}' z_{i,c} + \tilde{\eta}_j + \tilde{\rho}_t + \tilde{v}_c + u_{i,c} \quad (3)$$

Lewbel (2012) shows that the structural model parameters in Eq. (2) are identified if exogenous or predetermined variables $\mathbf{z_{i,c}}$ are available with $Cov[\mathbf{z_{i,c}}, \varepsilon_{i,c}^2] \neq 0, Cov[\mathbf{z_{i,c}}, u_{i,c}^2] \neq 0$, and $Cov[\mathbf{z_{i,c}}, \varepsilon_{i,c} u_{i,c}] = 0$. These assumptions allow to use generated instruments $(\mathbf{z_{i,c}} - E[\mathbf{z_c}])u_{i,c}$ as instruments to evaluate the model in Eq. (2) by means of efficient GMM estimation.

## Results

This section is organized as follows. First, we present the main estimation results allowing to assess the validity of Hypothesis 1. Second, we use the approach proposed by Lewbel (2012) to address possible endogeneity issues. Finally, we employ different robustness checks to assess whether our results are sensitive to our most important specification assumptions.

**Main results**. The estimation results are displayed in Table 4. The reported $p$-values are clustered by country to avoid an underestimation because of intra-group error correlation. The discussion is limited to estimates with a $p$-value below 5 percent.

Specification I shows the results from ordered-probit estimation with *Tax morale* on a four-point scale. It should be noted that, due to the non-linearity of the ordered-probit regression model, the coefficient estimates cannot be interpreted directly. Therefore, to obtain an impression of the quantitative impact of the variables we also provide the marginal effects for the probability to exhibit the highest level of tax morale (i.e., *Tax morale* = *High*) in column 2.

As it turns out, neither *Ideology* nor *Public sector size* show a significant impact on tax morale. Instead, the estimate for the interaction *Right to government* × *Public sector oversized* is negative at the 1% significance level. From the marginal effects in column 2 we obtain that the probability to exhibit the highest level of tax morale is 2,4 percent lower for a citizen that is 5 points right to the government (e.g., a moderate rightist with *Ideology* = 7.5 under a moderate leftist government with *Government ideology* = 2.5) when the size of the Public sector is 20% above the average of developed economies. This is also the estimated impact for the mean value of this interaction variable (which is 1.010), whereas for the maximum value of this interaction effect (which is 4.199) the estimated impact is four times larger. The estimated mean effect is in size comparable to the impact that a shift from a low to a high educational level has on tax morale, an effect that has been considered as relevant in the tax morale literature (see, e.g., Rodriguez-Justicia and Theilen 2018).

The remaining results in Specification I regarding *Income* and *Government effectiveness*, *Inflation* and *Unemployment* turn out to lack significant impacts. With regard to the socioeconomic control variables, the results obtained are in line with previous empirical studies based on the EVS/WVS. Thus, elderly people, women, and religious or patriotic individuals exhibit higher levels of tax morale. The marginal effects for the latter three variables with respect to their reference categories are 6.4%, 3.7% and 5.8%, respectively. Higher education level turns out to have a positive impact on tax morale.[14] The employment and marital status have a significant influence on tax morale with positive effects for retired and married individuals and negative effects for unemployed, self-employed and divorced individuals with respect to their base categories (Employed and Never married, respectively).

**Table 4 Tax morale and *Ideological alignment*.**

| | (I) | | (II) | (III) |
|---|---|---|---|---|
| | Tax morale | | Tax morale | Tax morale |
| | oprobit | ME | OLS | Lewbel |
| Ideology | 0.005 | 0.002 | 0.002 | 0.008 |
| | (0.014) | | (0.010) | (0.007) |
| Public Sector size | 0.891 | 0.264 | 0.533 | −0.325*** |
| | (0.556) | | (0.348) | (0.062) |
| Right to government × Public Sector oversized | −0.080*** | −0.024 | −0.058*** | −0.072*** |
| | (0.029) | | (0.018) | (0.012) |
| Right to government × Public Sector undersized | −0.070 | −0.021 | −0.048 | −0.031** |
| | (0.057) | | (0.036) | (0.153) |
| Left to government × Public Sector oversized | 0.056* | 0.017 | 0.023 | 0.039*** |
| | (0.034) | | (0.021) | (0.011) |
| Left to government × Public Sector undersized | 0.045 | 0.013 | 0.019 | 0.042*** |
| | (0.034) | | (0.023) | (0.012) |
| Government effectiveness | −0.056 | −0.016 | 0.005 | −0.092*** |
| | (0.90) | | (0.050) | (0.008) |
| Inflation | 0.018* | 0.005 | 0.010* | 0.016*** |
| | (0.010) | | (0.005) | (0.001) |
| Unemployment | −0.008 | −0.002 | −0.003 | −0.006*** |
| | (0.005) | | (0.004) | (0.001) |
| Income | 0.000 | 0.000 | 0.001 | −0.002 |
| | (0.004) | | (0.002) | (0.001) |
| Age | 0.008*** | 0.002 | 0.004*** | 0.006*** |
| | (0.001) | | (0.000) | (0.000) |
| Gender (Ref.: Male) | 0.218*** | 0.064 | 0.128*** | 0.131*** |
| | (0.024) | | (0.015) | (0.006) |
| Religious (Ref.: Non religious) | 0.125*** | 0.037 | 0.075*** | 0.044*** |
| | (0.015) | | (0.010) | (0.007) |
| Patriotic (Ref.: Non patriotic) | 0.195*** | 0.058 | 0.135*** | 0.147*** |
| | (0.023) | | (0.021) | (0.011) |
| Educational level (Ref.: Low) | | | | |
| Medium | −0.026 | −0.008 | −0.018 | 0.002 |
| | (0.027) | | (0.016) | (0.009) |
| High | 0.067** | 0.019 | 0.045** | 0.090*** |
| | (0.034) | | (0.020) | (0.010) |
| Occupational status (Ref.: Employed) | | | | |
| Unemployed | −0.056** | −0.017 | −0.045** | −0.044*** |
| | (0.027) | | (0.018) | (0.016) |
| Self-employed | −0.121*** | −0.038 | −0.076*** | −0.077*** |
| | (0.031) | | (0.023) | (0.013) |
| Retired | 0.071*** | 0.021 | 0.037*** | 0.023** |
| | (0.022) | | (0.012) | (0.010) |
| Other | 0.037** | 0.011 | 0.016 | 0.021** |
| | (0.016) | | (0.013) | (0.009) |
| Marital status (Ref.: Never married) | | | | |
| Married/living together | 0.072*** | 0.021 | 0.050*** | 0.052*** |
| | (0.021) | | (0.016) | (0.008) |
| Divorced/separated | −0.071*** | −0.022 | −0.042*** | −0.048*** |
| | (0.016) | | (0.012) | (0.013) |
| Widowed | 0.009 | 0.003 | 0.013 | −0.022 |
| | (0.030) | | (0.019) | (0.014) |
| Constant(s) (omitted) | YES | | YES | YES |
| Observations | 79,189 | | 79,189 | 79,189 |
| Pseudo R-squared | 0.053 | | | |
| R-squared | | | 0.081 | |
| Centered R-squared | | | | 0.041 |

All estimations with clustered standard errors by country (23 clusters) and country and time fixed effects. Marginal effects (ME) in percentage points. Robust $p$-values in parentheses where ***, ** and * indicate $p < 0.01$, $p < 0.05$ and $p < 0.1$, respectively.

**Table 5 Tax morale on a ten-point scale and on a [0, 1] interval.**

| | (I) | | (II) | | (III) | |
|---|---|---|---|---|---|---|
| | Tax morale | | Tax morale | | Tax morale | |
| | 4 point | | 10 point | | [0,1] | |
| | oprobit | ME | oprobit | ME | GLM | ME |
| Ideology | 0.005 | 0.002 | 0.004 | 0.001 | 0.002 | 0.002 |
| | (0.014) | | (0.012) | | (0.012) | |
| Public sector size | 0.891 | 0.264 | 0.826 | 0.295 | 0.797* | 0.797 |
| | (0.556) | | (0.503) | | (0.446) | |
| Right to government × Public Sector oversized | −0.080*** | −0.024 | −0.054** | −0.019 | −0.066*** | −0.066 |
| | (0.029) | | (0.026) | | (0.024) | |
| Right to government × Public Sector undersized | −0.070 | −0.021 | −0.038 | −0.013 | −0.062 | −0.062 |
| | (0.057) | | (0.049) | | (0.046) | |
| Left to government × Public Sector oversized | 0.056* | 0.017 | 0.057** | 0.020 | 0.034 | 0.034 |
| | (0.034) | | (0.028) | | (0.027) | |
| Left to government × Public Sector undersized | 0.045 | 0.013 | 0.040 | 0.014 | 0.027 | 0.027 |
| | (0.034) | | (0.028) | | (0.030) | |
| Government effectiveness | −0.056 | −0.016 | −0.064 | −0.023 | −0.031 | −0.031 |
| | (0.090) | | (0.078) | | (0.070) | |
| Inflation | 0.018* | 0.005 | 0.015 | 0.005 | 0.013* | 0.013 |
| | (0.010) | | (0.009) | | (0.007) | |
| Unemployment | −0.008 | −0.002 | −0.012** | −0.004 | −0.007* | −0.007 |
| | (0.005) | | (0.006) | | (0.004) | |
| Income | 0.000 | 0.000 | −0.003 | −0.001 | 0.001 | 0.001 |
| | (0.004) | | (0.004) | | (0.003) | |
| Age | 0.008*** | 0.002 | 0.007*** | 0.003 | 0.006*** | 0.006 |
| | (0.001) | | (0.001) | | (0.001) | |
| Gender (Ref.: Male) | 0.218*** | 0.064 | 0.207*** | 0.074 | 0.173*** | 0.173 |
| | (0.024) | | (0.023) | | (0.019) | |
| Religious (Ref.: Non religious) | 0.125*** | 0.037 | 0.127*** | 0.045 | 0.099*** | 0.099 |
| | (0.015) | | (0.015) | | (0.012) | |
| Patriotic (Ref.: Non patriotic) | 0.195*** | 0.058 | 0.172*** | 0.061 | 0.159*** | 0.159 |
| | (0.023) | | (0.020) | | (0.017) | |
| Educational level (Ref.: Low) | | | | | | |
| Medium | −0.026 | −0.008 | −0.030 | −0.011 | −0.014 | −0.014 |
| | (0.027) | | (0.019) | | (0.017) | |
| High | 0.067** | 0.019 | 0.020 | 0.007 | 0.060** | 0.060 |
| | (0.034) | | (0.025) | | (0.023) | |
| Occupational status (Ref.: Employed) | | | | | | |
| Unemployed | −0.056** | −0.017 | −0.029 | −0.011 | −0.050*** | −0.050 |
| | (0.027) | | (0.028) | | (0.019) | |
| Self-employed | −0.121*** | −0.038 | −0.106*** | −0.039 | −0.092*** | −0.092 |
| | (0.031) | | (0.025) | | (0.024) | |
| Retired | 0.071*** | 0.021 | 0.086*** | 0.030 | 0.064*** | 0.064 |
| | (0.022) | | (0.019) | | (0.016) | |
| Other | 0.037** | 0.011 | 0.027* | 0.010 | 0.031** | 0.031 |
| | (0.016) | | (0.015) | | (0.013) | |
| Marital status (Ref.: Never married) | | | | | | |
| Married/living together | 0.072*** | 0.021 | 0.074*** | 0.026 | 0.056*** | 0.056 |
| | (0.021) | | (0.021) | | (0.018) | |
| Divorced/separated | −0.071*** | −0.022 | −0.049*** | −0.018 | −0.065*** | −0.065 |
| | (0.016) | | (0.017) | | (0.015) | |
| Widowed | 0.009 | 0.003 | 0.027 | 0.010 | 0.012 | 0.012 |
| | (0.030) | | (0.030) | | (0.027) | |
| Constant(s) (omitted) | YES | | YES | | YES | |
| Observations | 79,189 | | 79,189 | | 79,189 | |
| Pseudo R-squared | 0.054 | | 0.053 | | | |
| AIC | | | | | 0.594 | |
| BIC | | | | | −866321.9 | |

Ordered probit and generalized linear model (GLM) with clustered standard errors by country (23 clusters). All estimations include country and time fixed effects. Marginal effects (ME) in percentage points. Robust *p*-values in parentheses where ***, ** and * indicate $p < 0.01$, $p < 0.05$ and $p < 0.1$, respectively.

**Table 6 Tax morale and alternative government ideology measures.**

| | (I) | | (II) | | (III) | |
|---|---|---|---|---|---|---|
| | Tax morale | | Tax morale | | Tax morale | |
| | (Government ideology is unweighted coalition mean) | | (Government ideology is weighted coalition mean) | | (Government ideology is ideology of leading party) | |
| | oprobit | ME | oprobit | ME | oprobit | ME |
| Ideology | 0.005 | 0.002 | 0.003 | 0.001 | 0.004 | 0.001 |
| | (0.014) | | (0.014) | | (0.014) | |
| Public sector size | 0.891 | 0.264 | 0.874 | 0.259 | 0.984* | 0.291 |
| | (0.556) | | (0.542) | | (0.529) | |
| Right to government × Public Sector oversized | −0.080*** | −0.024 | −0.081*** | −0.024 | −0.068*** | −0.020 |
| | (0.029) | | (0.025) | | (0.024) | |
| Right to government × Public Sector undersized | −0.070 | −0.021 | −0.066 | −0.020 | −0.065 | −0.019 |
| | (0.057) | | (0.057) | | (0.057) | |
| Left to government × Public Sector oversized | 0.056* | 0.017 | 0.046 | 0.014 | 0.058** | 0.017 |
| | (0.034) | | (0.030) | | (0.025) | |
| Left to government × Public Sector undersized | 0.045 | 0.013 | 0.038 | 0.011 | 0.050 | 0.015 |
| | (0.034) | | (0.034) | | (0.034) | |
| Government effectiveness | −0.056 | −0.016 | −0.050 | −0.015 | −0.062 | −0.018 |
| | (0.090) | | (0.092) | | (0.093) | |
| Inflation | 0.018* | 0.005 | 0.017* | 0.005 | 0.015* | 0.005 |
| | (0.010) | | (0.009) | | (0.009) | |
| Unemployment | −0.008 | −0.002 | −0.008 | −0.002 | −0.009 | −0.003 |
| | (0.005) | | (0.006) | | (0.005) | |
| Income | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.004) | | (0.004) | | (0.004) | |
| Age | 0.008*** | 0.002 | 0.008*** | 0.002 | 0.008*** | 0.002 |
| | (0.001) | | (0.001) | | (0.001) | |
| Gender (Ref.: Male) | 0.218*** | 0.064 | 0.218*** | 0.064 | 0.218*** | 0.065 |
| | (0.024) | | (0.024) | | (0.024) | |
| Religious (Ref.: Non religious) | 0.125*** | 0.037 | 0.125*** | 0.037 | 0.125*** | 0.037 |
| | (0.015) | | (0.015) | | (0.015) | |
| Patriotic (Ref.: Non patriotic) | 0.195*** | 0.058 | 0.194*** | 0.058 | 0.196*** | 0.058 |
| | (0.023) | | (0.023) | | (0.024) | |
| Educational level (Ref.: Low) | | | | | | |
| Medium | −0.026 | −0.008 | −0.026 | −0.008 | −0.026 | −0.008 |
| | (0.027) | | (0.026) | | (0.026) | |
| High | 0.067** | 0.019 | 0.066** | 0.019 | 0.066** | 0.019 |
| | (0.034) | | (0.033) | | (0.033) | |
| Occupational status (Ref.: Employed) | | | | | | |
| Unemployed | −0.056** | −0.017 | −0.056** | −0.017 | −0.056** | −0.017 |
| | (0.027) | | (0.027) | | (0.027) | |
| Self-employed | −0.121*** | −0.038 | −0.121*** | −0.038 | −0.122*** | −0.038 |
| | (0.031) | | (0.031) | | (0.032) | |
| Retired | 0.071*** | 0.021 | 0.071*** | 0.021 | 0.070*** | 0.021 |
| | (0.022) | | (0.022) | | (0.022) | |
| Other | 0.037** | 0.011 | 0.037** | 0.011 | 0.037** | 0.011 |
| | (0.016) | | (0.016) | | (0.016) | |
| Marital status (Ref.: Never married) | | | | | | |
| Married / living together | 0.072*** | 0.021 | 0.072*** | 0.021 | 0.073*** | 0.022 |
| | (0.021) | | (0.021) | | (0.021) | |
| Divorced / separated | −0.071*** | −0.022 | −0.071*** | −0.022 | −0.071*** | −0.022 |
| | (0.016) | | (0.016) | | (0.016) | |
| Widowed | 0.009 | 0.003 | 0.010 | 0.003 | 0.010 | 0.003 |
| | (0.030) | | (0.030) | | (0.030) | |
| Constant(s) (omitted) | YES | | YES | | YES | |
| Observations | 79,189 | | 79,189 | | 79,189 | |
| Pseudo R-squared | 0.054 | | 0.053 | | 0.053 | |

Ordered probit with clustered standard errors by country (23 clusters). All estimations include country and time fixed effects. Marginal effects (ME) in percentage points. Robust *p*-values in parentheses where ***, ** and * indicate $p < 0.01$, $p < 0.05$ and $p < 0.1$, respectively.

**Table 7 Estimation results excluding BEL, DK, IRE, JAP, LUX and TUR.**

| | (I) | | (II) | |
|---|---|---|---|---|
| | Tax morale | | Tax morale | |
| | oprobit | ME | oprobit | ME |
| Ideology | 0.005 | 0.002 | 0.001 | 0.000 |
| | (0.014) | | (0.013) | |
| Public sector size | 0.891 | 0.264 | 0.908 | 0.284 |
| | (0.556) | | (0.614) | |
| Right to government × Public Sector oversized | −0.080*** | −0.024 | −0.077*** | −0.024 |
| | (0.029) | | (0.029) | |
| Right to government × Public Sector undersized | −0.070 | −0.021 | −0.071 | −0.022 |
| | (0.057) | | (0.056) | |
| Left to government × Public Sector oversized | 0.056* | 0.017 | 0.033 | 0.010 |
| | (0.034) | | (0.031) | |
| Left to government × Public Sector undersized | 0.045 | 0.013 | 0.044 | 0.014 |
| | (0.034) | | (0.029) | |
| Government effectiveness | −0.056 | −0.016 | −0.044 | −0.014 |
| | (0.090) | | (0.124) | |
| Inflation | 0.018* | 0.005 | 0.016 | 0.005 |
| | (0.010) | | (0.011) | |
| Unemployment | −0.008 | −0.002 | −0.012** | −0.004 |
| | (0.005) | | (0.005) | |
| Income | 0.000 | 0.000 | 0.001 | 0.000 |
| | (0.004) | | (0.004) | |
| Age | 0.008*** | 0.002 | 0.008*** | 0.002 |
| | (0.001) | | (0.001) | |
| Gender (Ref.: Male) | 0.218*** | 0.064 | 0.213*** | 0.067 |
| | (0.024) | | (0.026) | |
| Religious (Ref.: Non religious) | 0.125*** | 0.037 | 0.131*** | 0.041 |
| | (0.015) | | (0.016) | |
| Patriotic (Ref.: Non patriotic) | 0.195*** | 0.058 | 0.201*** | 0.063 |
| | (0.023) | | (0.024) | |
| Educational level (Ref.: Low) | | | | |
| Medium | −0.026 | −0.008 | −0.029 | −0.009 |
| | (0.027) | | (0.029) | |
| High | 0.067** | 0.019 | 0.059 | 0.018 |
| | (0.034) | | (0.037) | |
| Occupational status (Ref.: Employed) | | | | |
| Unemployed | −0.056** | −0.017 | −0.068** | −0.022 |
| | (0.027) | | (0.031) | |
| Self-employed | −0.121*** | −0.038 | −0.127*** | −0.042 |
| | (0.031) | | (0.033) | |
| Retired | 0.071*** | 0.021 | 0.080*** | 0.025 |
| | (0.022) | | (0.024) | |
| Other | 0.037** | 0.011 | 0.035* | 0.011 |
| | (0.016) | | (0.018) | |
| Marital status (Ref.: Never married) | | | | |
| Married/living together | 0.072*** | 0.021 | 0.079*** | 0.025 |
| | (0.021) | | (0.024) | |
| Divorced/separated | −0.071*** | −0.022 | −0.068*** | −0.022 |
| | (0.016) | | (0.018) | |
| Widowed | 0.009 | 0.003 | 0.017 | 0.005 |
| | (0.030) | | (0.035) | |
| Constant(s) (omitted) | YES | | YES | |
| Observations | 79,189 | | 64,291 | |
| Pseudo R-squared | 0.054 | | 0.034 | |

Ordered probit with clustered standard errors by country (17 clusters). All estimations include country and time fixed effects. Marginal effects (ME) in percentage points. Robust *p*-values in parentheses where ***, ** and * indicate $p < 0.01$, $p < 0.05$ and $p < 0.1$, respectively.

In terms of significance and signs, the results from OLS estimation under Specification II corroborate these results entirely.

**Endogeneity**. Specification III in Table 4 contains the results from Instrumental Variable estimation. As it turns out, the parameter estimates remain fairly robust both in terms of their magnitude after controlling for endogeneity by means of instrument variable estimation following the method proposed by Lewbel (2012). However, as regards to significance, the parameter estimates of some variables become highly significant under Instrumental Variable estimation. *Public sector size* now has a significant negative impact on tax morale. All citizens whose ideological stances are to the right of the government exhibit lower tax morale, with a larger estimated impact when the public sector is oversized. On the other hand, all citizens who are to the left of the government exhibit higher tax morale, with a larger estimated impact when the public sector is undersized. As such, these results are fully consistent with Hypothesis 1.

Regarding the validity of our generated instruments we obtain that: (i) underidentification is rejected by the Kleibergen and Paap (2006) LM-statistic with *p*-value 0.0000 ; (ii) weak identification is not a problem as the Kleibergen and Paap (2006) Wald F-statistic is above 5% maximal IV relative bias and above 10% maximal IV size using critical values from Stock and Yogo (2005); (iii) there is no overidentification as the null hypothesis that our instruments are valid cannot be rejected employing the Hansen (1982) J-statistic with a *p*-value of 0.000. Consequently, these tests confirm the quality and validity of our instruments. Acknowledging the limitations in the data to find valid instruments, the method proposed by Lewbel (2012) indicates that the endogeneity bias is not such as to modify the results in Specifications I-III substantially. However, considering that the evidence is still too weak to claim the existence of a causal relationship between ideological distance and tax morale, we conclude that ideological distance and tax morale are at least strongly correlated.

**Robustness checks**. Several robustness checks are indicated whose results are displayed in Tables 5–7. First, we check whether our results are sensitive to the categorization of the dependent variable. For this purpose we perform alternative estimations employing the original ten-point scale of our dependent variable (Tax morale). The results in Table 5 (Specification II) indicate that this alternative categorization does not imply substantial changes.

Second, as an alternative estimation method in Table 5 we use the generalized linear model (GLM) where we rescale our dependent variable from the original ten-point scale to take values between 0 and 1. The estimates in Specification III are similar in terms of sign and significance to those in Specification I and indicate that this alternative estimation procedure does not modify our conclusions regarding the impact of our ideology and public sector size interaction variables on *Tax morale*.

Third, to test the sensitivity of the above results regarding the measurement of *Government ideology*, in Table 6 *Government ideology*, measured as the unweighted coalition mean (in Specification I), is alternatively measured as the weighted coalition mean (in Specification II) and as the ideology of the leading party in government (in Specification III), respectively. In Specification II, *Government ideology* is calculated as the weighted mean of coalition parties' ideology using the seats in Parliament for the construction of weights. In Specification III, *Government ideology* is the ideology of the party of the prime minister. We find that these alternative forms of measuring government ideology have negligible effects on the aforementioned results.

Finally, to confirm that the results are not driven by outliers, the model in (1) is estimated by excluding the countries with lowest and highest levels of tax morale, i.e., the most left and right-skewed distribution of tax morale. As observed in Supplementary Fig. S4 in the Supplementary information to this

paper, the three countries that exhibit the lowest average tax morale are Belgium (1.92), Luxembourg (2.21), and Ireland (2.31), whereas the three countries with the highest levels of tax morale are Denmark (2.66), Japan (2.85), and Turkey (2.87). The results in Table 7 indicate that, despite the loss of nearly 15,000 observations, the sign, significance, and magnitude of the parameter estimates of our main explanatory variables remain almost unchanged.

## Conclusions

In this paper, we analyze to what extent citizens' ideological stances influence their intrinsic motivations to pay taxes. Our results indicate that citizens with right-leaning ideological stances in relation to the government tend to exhibit lower tax morale, especially when the public sector is considered oversized. In contrast, citizens with left-leaning ideological stances in relation to the government exhibit higher tax morale, particularly when the public sector is perceived as undersized. While lower tax morale does not automatically lead to increased tax evasion or tax avoidance, it does suggest a higher inclination towards such behaviors. This implies that citizens who have not seen their preferred public sector policies implemented through elections are motivated to address this to some extent through tax compliance and avoidance. Indeed, the findings in Cebula (2013) and Cullen et al. (2021) provide some evidence supporting this notion. Consequently, reported taxable income in U.S. counties has been shown to increase in accordance with the approval of the president's policies or ideological alignment. In the context of the increased ideological polarization observed among citizens in most developed countries over the last decade, there is a potential risk of a decline in tax morale and tax compliance.

While the focus of this study has been on the size of the public sector, it would be intriguing to analyze the extent to which specific spending policies, in conjunction with citizens' ideology, influence their intrinsic motivation to pay taxes and, consequently, their tax compliance and tax avoidance behaviors. This presents an interesting avenue for future research.

## Data availability

The data that support the findings of this study are openly available in GESIS Data Archive (EVS, 2022) at https://dbk.gesis.org/, https://doi.org/10.4232/1.14021, World Values Survey Trend File (1981-2022) Cross-National Dataset (Haerpfer et al. 2022) at http://www.worldvaluessurvey.org, 10.14281/18241.23, ParlGov database (Döring et al. 2023) at http://www.parlgov.org, OECD Database (OECD, 2023) at http://stats.oecd.org, World Development Indicators (World Bank, 2023a) at https://datacatalog.worldbank.org/dataset/world-development-indicators and Worldwide Governance Indicators (World Bank, 2023a) at https://info.worldbank.org/governance/WGI.

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## Notes

1 See Murphy (2012), who estimates that the revenue loss due to tax evasion and tax avoidance amounts up to €860 billion and €150 billion, respectively.
2 The net tax gap is calculated by the Internal Revenue Service (2017) as the gross tax gap less tax that will be subsequently collected, either paid voluntarily or as the result of IRS administrative and enforcement activities.
3 For other measures of trust in public institutions in the literature see the overview by Horodnic (2018).
4 The concept of tax morale goes back to the 1960s and 1970s, where it was developed by Günter Schmölders and his colleagues (the 'Cologne school of tax psychology').
5 For an overview on this literature see Hofmann et al. (2008), Wenzel (2003) or Luttmer and Singhal (2014).
6 Between 2019 and 2022 no surveys were performed such that 2018 represents the most recent wave. The countries considered are: Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Denmark (DEN), Finland (FIN), France (FRA), Germany (GER), Greece (GRE), Iceland (ICE), Ireland (IRE), Italy (ITA), Japan (JAP), Luxembourg (LUX), the Netherlands (NED), New Zealand (NZL), Norway (NOR), Spain (SPA), Sweden (SWE), Switzerland (SWI), Turkey (TUR), the United Kingdom (UK) and the US.
7 As tax evasion behavior and fairness perceptions are substantially different in Eastern European countries, these are not included into the analysis. For details on the number of observation per country and the year in which they were taken, see Supplementary Table S1 in the Supplementary information to this article.
8 See Supplementary Figs. S1 and S2 in the Supplementary information to this article for the distribution of the dependent variable on a four-point scale and on the original ten-point scale, respectively.
9 A cross-country comprehensive data base for tax evasion is not available as tax evasion behavior is rather difficult to measure and existing information in many countries is not publicly revealed (Andreoni et al. 1998).
10 See also Elffers et al. (1987) and Frey and Torgler (2007) for an extensive discussion on the bias of self-reported tax evasion measures.
11 The distribution of *Ideology* is displayed in Supplementary Fig. S3 in the Supplementary information. In order to use the same range as for *Government ideology* the original variable that ranges from 1 to 10 is rescaled to range from 0 to 10.
12 In election years, we consider the ideology of the government that has been in office throughout most of that year.
13 The choice of the control variables is motivated by two criteria. Firstly, we employ variables that have been commonly found in the literature to have an influence on tax tax morale. Secondly, we include variables mostly available for all waves and countries. A more detailed description of the definition and measurement of these variables can be found in Table 1.
14 See Rodriguez-Justicia and Theilen (2018) for the role of education as an indirect channel in shaping individuals' tax morale.

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## Author contributions

Both authors have collaborated on the empirical analysis and drafted the paper together. The corresponding author is Bernd Theilen.

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The authors declare no competing interests.

## Ethical approval

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## Informed consent

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## Additional information

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