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Philipp Doerrenberg
Denvil Duncan
Clemens Fuest
Andreas Peichl

CESIFO WORKING PAPER NO. 3858
CATEGORY 1: PUBLIC FINANCE
JUNE 2012

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Abstract

This paper provides evidence of efficient taxation of groups with heterogeneous levels of 'tax morale'. We set up an optimal income tax model where high tax morale implies a high subjective cost of evading taxes. The model predicts that 'nice guys finish last': groups with higher tax morale will be taxed more heavily, simply because taxing them is less costly. Based on unique cross-country micro data and an IV approach to rule out reverse causality, we find empirical support for this hypothesis. Income groups with high tax morale systematically face higher average and marginal tax rates. To the best of our knowledge, this is the first paper to investigate whether differences in tax morale affect the distribution of the tax burden across different groups of taxpayers.

JEL-Code: H200, H300, D700.

Keywords: tax morale, tax compliance, optimal taxation, political economy.

Philipp Doerrenberg
University of Cologne
Cologne / Germany
doerrenberg@wiso.uni-koeln.de

Denvil Duncan
Indiana University
Bloomington / USA
duncande@indiana.edu

Clemens Fuest
University of Oxford
Oxford / United Kingdom
Clemens.Fuest@sbs.ox.ac.uk

Andreas Peichl
IZA Bonn
Bonn / Germany
peichl@iza.org

June 2, 2012
Peichl is grateful for financial support from the Deutsche Forschungsgemeinschaft DFG. We are grateful to Klara Sabirianova-Peter for providing us with tax rate data from the World Tax Indicators. We would like to thank Oleg Badunenko, Felix Bierbrauer, Dan Hamermesh, Bradley Heim, Hillary Hoynes, Stephen Jenkins, Kai Konrad, Peter Kuhn, Jorge Luis Martinez, Nico Pestel, Andrew Oswald, Salmai Qari, Justin Ross, Sebastian Siegloch, Andràs Simonovits, Caroline Weber and Jeff Wooldridge for helpful comments and suggestions. We also benefited from participants of the IIPF 2011 (Ann Arbor), shadow2011 (Münster), CESifo Political Economy (Dresden), FAU Tax Compliance (Nürnberg) and IZA Labor Supply (Dublin) conferences, as well as seminars in Bonn (IZA), Bloomington (SPEA), Cologne, and Uppsala. The usual disclaimer applies.

1 Introduction

Tax morale[1]—the intrinsic motivation to honestly pay taxes—is widely seen as beneficial for an economy because it reduces the cost of financing the public sector. Therefore, a large part of the academic and political debate focuses on the impact of institutions and policies on tax morale and on ways of improving it. This paper takes a different perspective and explores whether differences in tax morale across different groups of taxpayers within and across countries affect the tax burden imposed on these groups. Our main hypothesis is that groups with a high level of tax morale are taxed more heavily because taxing them creates smaller distortions. Using unique cross-country micro data and an instrumental variable (IV) approach, we provide robust evidence supporting our hypothesis.

The theoretical basis of our approach is straightforward. We start from the observation that different groups of individuals within one country as well as across countries can have different levels of tax morale. If the absolute amount of tax paid by a particular group of taxpayers is given, a high level of tax morale will imply that the tax base is large, so that tax rates can be low. This is advantageous because tax distortions of economic activity are smaller and tax enforcement and administration costs are lower than in cases where tax morale is low. It pays to have a high level of tax morale in such a world. However, if the tax revenue raised from particular groups of taxpayers is not given, groups with a high level of tax morale may end up paying higher taxes than groups with low tax morale. The reason is that a high level of tax morale reduces the cost of taxation, since groups with low tax morale respond to increases in taxation by evading more, relative to high morale groups.

We set up a simple model of optimal taxation, where the government maximizes an objective function in which each group of taxpayers has a given weight. The weight may depend on income, political influence, or other factors, but is unrelated to tax morale. Tax morale is introduced by assuming that different groups of taxpayers face different subjective costs of evading taxes. In this model, the government will systematically impose higher tax rates on groups with higher tax morale because taxing them causes smaller distortions. Our theoretical analysis thus yields the hypothesis that '*nice guys finish last*': groups with higher tax morale are taxed more heavily.

We test our hypothesis using data from the World Value Survey (WVS), the European Values Survey (EVS), and detailed income tax data from the World

[1]The term 'tax morale' might be misleading and 'tax honesty' or 'tax ethics' might be more appropriate. However, it is the terminology used in the literature. Therein, tax morale is typically defined as '*the intrinsic motivation to pay taxes which arises from the moral obligation to pay taxes as a contribution to society*' (e.g., Schwartz and Orleans 1967; Cummings et al. 2009).

Tax Indicators Database (WTI) (Sabirianova-Peter et al. 2010). Combining these sources enables us to construct a unique micro dataset with all the necessary information in order to test the hypothesis. The WVS data allow us to observe levels of tax morale for different income groups in different countries, as well as various control variables. We then use the WTI database to compute average and marginal tax rates for the different income groups.

Causal identification of the hypothesized effect requires a (quasi-) experimental approach. Unfortunately, such an identification strategy is not available in our setting as this would require running the same controlled experiment in all countries or randomized IVs.[2] Nonetheless, in the spirit of Imbens (2010), we think it is yet important to fully exploit the available data in order to improve our understanding of the relationship between tax morale and tax policy. Therefore, we approximate the causal effect as precisely as possible by employing two (non-randomly assigned) IVs that we argue to be exogenous conditional on a rich set of control variables. Using this identification strategy, we find that the data confirm our hypothesis: groups with higher levels of tax morale systematically face higher average and marginal tax rates. Results are robust to various specification checks.

To the best of our knowledge, this is the first paper to investigate whether differences in tax morale affect the distribution of the tax burden across different groups of taxpayers. The early literature on tax evasion and compliance models tax evasion essentially as a lottery, where individuals face a simple problem of expected utility maximization (Allingham and Sandmo 1972; Yitzhaki 1974; Sandmo 1981). This approach has been criticized for failing to explain why taxpayers seem to pay taxes even in situations where detection is unlikely and penalties are low (Slemrod and Yitzhaki 2002; Frey and Feld 2002; Torgler 2002). In light of these findings, more recent research has put a lot of emphasis on tax morale as a major determinant of individuals' responsiveness to taxes (Erard and Feinstein 1994; Andreoni et al. 1998; Torgler 2007). Several studies have shown that tax morale is indeed negatively correlated with tax evasion and the size of the shadow economy (Torgler and Schneider 2009; Halla 2012).

These findings suggest that the prevailing level of tax morale is an important determinant of the government's ability to raise taxes and the cost of doing so (Feld and Frey 2007). Therefore, many scholars argue that policy makers should design tax systems and broader political institutions so as to preserve and improve tax

[2]This is a major short-coming of the tax evasion/tax morale literature. In the context of tax evasion and tax morale, we are only aware of a few studies that exploit randomized variation to identify true causal effects (Slemrod et al. 2001a; Slemrod et al. 2001b; Kleven et al. 2011). Slemrod and Weber (2012) survey identification issues in this strand of literature.

morale.[3] While these studies focus on the impact of policy and institutions on tax morale, this paper takes a different perspective by asking whether policymakers exploit the fact that their citizens have different levels of tax morale when setting tax rates. In other words, we take the level of tax morale as given and ask how tax morale affects the tax burden governments impose on different groups of taxpayers.[4]

Our paper is also related to the growing literature on the elasticity of taxable income, which starts from the observation that taxpayers change their reported income in response to changes in tax rates (Feldstein 1999; Saez et al. 2012). While such behavioral responses were limited to labor supply changes in much of the classical optimal income tax literature (Mirrlees 1971; Sheshinski 1972), it has since been recognized that labor responses are usually small and that additional margins exist which are relatively more sensitive to tax rate changes (Slemrod 1992). Evading taxes is one common way for taxpayers to adjust their taxable income and our analysis shows that differences in tax evasion behavior, as proxied by tax morale, have implications for the tax policy governments pursue. The actual distribution of tax burdens is indeed associated with tax morale (and hence tax evasion), i.e., governments take this information into account when designing actual tax systems.[5]

The remainder of the paper is set up as follows. We develop a simple model of tax policy with tax morale in Section 2. Section 3 describes the data sources and presents summary statistics. The empirical strategy and the results are presented in Sections 4 and 5, respectively. Section 6 provides several sensitivity analyses. Finally, Section 7 concludes.

2 The Model

In this section we set up a simple model of optimal taxation with tax morale. Income groups have heterogeneous levels of tax morale and maximize their utility with respect to their labor supply and evasion decisions. Governments may tax different income groups differently. The optimal policy maximizes an objective function which

[3]For instance, Doerrenberg and Peichl (2011) show that higher tax progressivity is associated with higher tax morale. Torgler (2007) provides an extensive overview of the literature on the determinants of tax morale.

[4]Qari et al. (2011) show that countries with higher levels of patriotism typically have higher levels of taxation as well.

[5]See, e.g., Slemrod and Yitzhaki (2002) for a survey of optimal policy design in the presence of tax evasion. More recently, Chetty (2009) analyzes the welfare implications of accounting for tax evasion and avoidance in the taxable income elasticity. Saez (2001) provides an optimal income tax model based on labor supply elasticities which is extended by Piketty et al. (2011) and Saez et al. (2012) to take tax evasion into account. Cremer and Gahvari (1993) provide a model of commodity taxation including tax evasion.

may be interpreted as a welfare function or a function reflecting political influence. The optimal tax rates set by the government then depend, among other things, on the level of tax morale of the different groups. Groups with a high level of tax morale are taxed more heavily because, other things equal, their reported income reacts less elastically to tax rate changes than the reported income of groups with lower tax morale.

2.1 Households

Consider an economy with n groups of households, $i = 1, ..., n$. For simplicity, we normalize group size to unity, i.e., there is one household representing each group. We model tax morale as follows. We assume that households can easily evade taxes, but doing so gives rise to a subjective cost. The cost function is given by the function $\beta(e_i, m_i)$, where e_i is undeclared income of group i and m_i is a parameter which captures differences in tax morale—the intrinsic motivation to honestly pay taxes—across groups. The cost function $\beta(e_i, m_i)$ can be interpreted broadly as also including possible real costs of evading or being detected and fined. The crucial point for our analysis is that it also includes differences in tax morale.[6] The utility function of household i is given by

$$u_i = c_i - \alpha(l_i) - \beta(e_i, m_i) \tag{1}$$

where c_i is consumption, l_i is labor supply and $\alpha(l_i)$ is a strictly convex function which represents the disutility of work (in the Appendix we show the results for a simplified case where the disutilities of labor and evasion enter the utility function quadratically.) The assumption of quasi-linearity in consumption simplifies notation by allowing us to abstract from income effects of taxation on labor supply and evasion. We assume that the tax evasion cost function has the following properties:

Assumption 1: $\beta_e, \beta_{ee} > 0, \beta_{em} > 0, \beta_{eem} > 0$.

This assumption implies that the marginal cost of evading taxes is strictly convex in the amount of evaded income e_i. In addition, the marginal cost of undeclared income is higher for households with higher tax morale ($\beta_{em} > 0$) and this marginal cost also increases more quickly ($\beta_{eem} > 0$). As will become clear below, either of the latter two properties is sufficient to generate the result that households with higher tax morale will be taxed more heavily than households with lower tax morale.

[6]Note that our approach can also be interpreted in terms of a 'warm glow' effect, i.e., the intrinsic satisfaction of doing the right thing when complying with the tax law.

Following Feldstein (1999), it is convenient to express utility in terms of earned income $y_i = l_i w_i$, where w_i is the wage rate of household i and declared income $d_i = y_i - e_i$. This yields for our utility function:

$$u_i = c_i - \alpha(\frac{y_i}{w_i}) - \beta(y_i - d_i, m_i). \tag{2}$$

The household's budget constraint is

$$c_i = y_i - t_i d_i, \tag{3}$$

where t_i is the income tax rate. The household chooses earned income y_i and declared income d_i to maximize utility, subject to the budget constraint. This yields the following first order conditions:

$$\begin{aligned} 1 - \alpha_1(\frac{y_i^*}{w_i})\frac{1}{w_i} - \beta_e(y_i^* - d_i^*, m_i) &= 0, & (4)\\ -t_i + \beta_e(y_i^* - d_i^*, m_i) &= 0. & (5) \end{aligned}$$

Note that (4) and (5) implicitly define the household's optimal choices, which can be expressed by the functions $y_i^*(t_i, m_i)$, $d_i^*(t_i, m_i)$. For later use note that

$$\frac{\partial d_i}{\partial t_i} = -\left[\frac{1}{\beta_{ee}} + \frac{w_i^2}{\alpha_{11}}\right] < 0, \frac{\partial d_i}{\partial m_i} = \frac{\beta_{em}}{\beta_{ee}} > 0. \tag{6}$$

An increase in the tax rate on household i reduces declared income for two reasons. Firstly, labor supply and, hence, earned income declines. Secondly, the higher tax rate induce the household to declare a smaller part of the income earned, which means that tax evasion increases. Moreover, declared income is increasing in the level of tax morale, as one would expect.

2.2 The Government

The government finances a given revenue target R using a wage tax, which may differ across household groups. The government budget constraint is given by

$$R = \sum t_i d_i. \tag{7}$$

In the decision making process of the government, each group i is given a weight b_i, which may be interpreted either as a welfare weight or as a parameter reflecting relative political influence. Given the optimal choices of the households,

the government maximizes the objective function

$$W = \sum b_i u_i \tag{8}$$

subject to (7). The optimal tax rate levied on group i is given by the formula

$$t_i^* = -\frac{(\eta - b_i)}{\eta} d_i \left[\frac{\partial d_i}{\partial t_i}\right]^{-1}, \tag{9}$$

where η is the marginal cost of public funds. This formula implies that, for a given cost of public funds, the optimal tax rate levied on household i is increasing in the household's tax morale parameter m_i if $\beta_{em} > 0$ (which implies $\partial d_i/\partial m_i > 0$) and $\beta_{eem} > 0$, as assumed above in assumption 1. The economic explanation is as follows. If $\beta_{em} > 0$, a higher tax morale increases the tax base, holding everything else constant, so that it is optimal to levy a higher tax rate on this group. $\beta_{eem}(e_i, m_i) > 0$ implies that the decline in the tax base caused by a higher tax rate is smaller for groups with higher tax morale. This is because their marginal cost of evading taxes increases quickly as evasion increases. Both effects imply that the elasticity of declared income with respect to the tax base declines if tax morale increases. The presence of one of these effects is sufficient for the result that a higher tax morale leads to a higher optimal tax rate. Clearly, this is well in line with standard results of optimal income tax theory following Ramsey (1927) or Mirrlees (1971). Groups with a higher responsiveness to taxation should be taxed lower than groups with low levels of responsiveness, i.e., a low elasticity of taxable income (e.g., Feldstein 1999 and Saez et al. 2012). Hence, our empirical analysis also provides an empirical verification of the inverse elasticity rule of optimal taxation, which, to the best of our knowledge, has not been tested for income taxation before.

Note also that, by assuming separability between the disutility of work and the subjective cost of evading taxes, we have assumed that tax morale does not affect the elasticity of labor supply. But of course, group specific differences may also be driven by differences in labor supply elasticities. In our empirical analysis we will assume that tax morale and the elasticity of labor supply are unrelated. We will come back to this point in the discussion of our results.[7]

[7]While it is straightforward to generalize our model in various aspects, we opt for a simple model which includes the features and channels we can explore empirically. For instance, we do not build in detection probabilities and penalties. We assume that these are implicitly captured in the model parameters on evasion and tax morale. In principle, it would be possible to construct a richer model, which allows for tax avoidance (e.g., income shifting) in addition to evasion and that would allow for sorting of individuals into tax brackets. As evasion implies a tax rate of zero while avoidance or income shifting yields a positive (but smaller) tax rate, our main results would not change in that case. Simonovits (2011) builds on an earlier version of our paper and extends

2.3 Testable Hypothesis

To sum up, the theoretical model yields the following result:

Result 1: Group i's efficient tax rate t_i increases with group i's tax morale parameter m_i.

The next step in the analysis is to operationalize our hypothesis. This requires us to classify individuals into groups as we argue that governments cannot observe individual tax morale (which is private information). Policymakers only observe how certain groups with certain observable characteristics respond to taxation. Furthermore, full discrimination in terms of taxation is neither legally nor economically feasible. As we are interested in the personal income tax, a natural place to start is income. For various reasons, governments levy different tax rates for different levels of income (tax brackets) and hence tax distinct income groups differently. When doing so they take into account that different income groups have different levels of tax morale and adjust their taxation of the groups accordingly. Therefore, we classify individuals by income groups and restate our hypothesis as follows:

Testable Hypothesis: Group i's mean tax rate $\overline{t_i}$ increases with group i's mean tax morale $\overline{m_i}$,

where $\overline{t_i}$ and $\overline{m_i}$ are t_i and m_i, respectively, averaged across individuals within income group i. This hypothesis can be tested with any data set that classifies individuals by income and for which both tax rates and tax morale are available at the income group or individual level.

3 Data and Operationalization

While we know of no single data set that jointly satisfies all the data requirements mentioned in Section 2.3, it is possible to construct such a data set using information from different sources. In order to test our hypothesis empirically, we combine micro data on tax morale and other covariates from the World Values Survey (WVS) and European Values Survey (EVS) (EVS/WVS 2006; WVS 2009) with information on tax rates from the World Tax Indicators (WTI) (Sabirianova-Peter et al. 2010). Below we discuss each data source and define our measures of tax morale and tax

our model by introducing redistributive concerns, but does not derive different conclusions in his numerical simulations. Traxler (2010) allows tax morale to be endogenous and incorporates it into the seminal tax evasion framework of Allingham and Sandmo (1972).

rates.

The *WVS/EVS* is the most common data source in tax morale research. It is a worldwide survey which collects comparative data on many different values and attitudes using standardized questionnaires for representative national samples of at least 1000 respondents per country (Inglehart n.d.). The surveys are conducted by professional scientific institutions and performed through face-to-face interviews at the respondents' home and in their respective national language.[8] We employ all five waves, which were carried out between 1981-1984, 1989-1993, 1994-1998, 1999-2004, and 2005-2008, respectively.

Our key explanatory variable, tax morale, is measured by individuals' responses to the following question:

> *Please tell me for the following statement whether you think it can always be justified, never be justified, or something in between: 'Cheating on taxes if you have the chance'.*

The question is measured on a ten-scale index with one (1) meaning 'never justifiable' and ten (10) meaning 'always justifiable'. This is by far the most frequently used measure for tax morale (e.g., Slemrod 2003, Alm and Torgler 2006, Richardson 2006 and Halla 2012), but it is of course not free of bias. For example, Andreoni et al. (1998) argue that people might overstate their degree of morality in self-reports such as the WVS and those who have evaded might want to excuse their behavior by declaring a high tax morale. Elffers et al. (1987) find that there are significant differences between actual tax evasion and self-reported tax evasion in surveys. Nevertheless, asking about tax morale is less blunt than asking about tax evading behavior, and so the degree of honesty should be higher (Frey and Torgler 2007). Another shortcoming of the question is the fact that taxpayers might find tax evasion justifiable if tax revenue is used for, say, financing a dictator's war machine (Frey and Torgler 2007).

Nonetheless, previous studies show that low WVS levels of tax morale are associated with high tax evasion and vice versa (Torgler and Schneider 2009; Halla 2012). This provides evidence in our favor of the view that true tax evasion behavior can indeed be proxied with responses to questions about tax morale. As we describe below, we aggregate the WVS/EVS data on the level of income groups. This might help to cancel out incorrect reporting by respondents. Given these arguments in favor of the variable and the frequent use in the literature, we believe that it is appropriate to measure tax morale with this question.

[8] Inglehart (2000) provides more comprehensive information on the WVS.

In addition to the tax morale question, the WVS/EVS contains information on gross income. However, instead of reporting their actual income level, respondents only indicate which of ten income groups (brackets) their income falls into.[9] Therefore, we know each individual's income group and tax morale. We use this information to define two measures of tax morale for our empirical analysis: i) 'tax morale index' represents income-group averages of the original 10-scale variable as reported in the survey; ii) 'tax morale dummy' is based on a dummy variable that is equal to 1 for individuals who report the highest level of tax morale (1 on the original scale) and '0' for individuals who report a value greater than 1. It follows that 'tax morale dummy' is the share of individuals in each income-group that report the highest possible level of tax morale.[10] Both variables are coded such that a higher value implies a higher level of tax morale.

Unlike tax morale, which is covered at the individual level across countries and time in the WVS/EVS, tax rates at this level are more difficult to obtain. Of course, statutory variables, such as the top marginal personal income tax rate, have very wide country-year coverage and are available from many sources. However, our analysis requires tax rates that vary across time, countries, and income groups. We rely on data from the recently published *World Tax Indicator* database to overcome these challenges. This large panel data set covers personal income tax structures at the country level in 189 countries for the period 1981 to 2005 (Sabirianova-Peter et al. 2010). As it contains the complete national income tax structures, including statutory rates, tax brackets, country-specific tax formulae, standard deductions and tax credits, among others, the data allow us to compute average and marginal tax rates.[11] More importantly, we are able to calculate these tax rates for any level of gross income and hence the income group levels reported in the WVS/EVS.[12] We use the raw WTI data to estimate average (AR) and marginal (MR) tax rates for each income group reported in the WVS/EVS for each country-year.[13] Both tax

[9]The provided income steps are adjusted to the respective national income distributions, but they do not reflect income deciles.

[10]This operationalization is commonly used (see, e.g., Alm and Torgler 2006.

[11]The WTI collects tax schedule information for single tax payers only. This is not likely to have any noticeable effect on the results since very few countries tax family income (exceptions include Germany, France and the U.S.) or have tax schedules that depend on marital status (Sabirianova-Peter et al. 2010).

[12]A potential problem with the survey information is that we do not know whether individuals reported the income reported to tax authorities or their true income. However, we are on the safe side since the potential bias of tax evaders reporting their true income (low morale, high income, high tax rate) leads to an underestimation of the effect of tax morale on tax rates.

[13]Estimation is restricted to 52 countries that recorded gross income. For a sensitivity check (see Section 6), we also estimate lead tax rates to analyze the impact of tax morale in year t on tax rates in $t+1$.

rates adjust for standard deductions and credits and are calculated using country specific tax formulae.[14] Because there is no adjustment for tax evasion or avoidance, these tax rates are close to, but are not, effective tax rates. Nonetheless, they are superior to using statutory rates.

In order to relate the calculated income group tax rates to the WVS/EVS data, all information from the WVS/EVS are aggregated (means) on the level of country-year income groups. We restrict the sample to employed individuals before aggregating the data in an effort to limit our analysis to individuals who potentially paid income taxes. We also exclude the respective lowest income group in each country-year observation from our estimations as individuals in theses groups usually do not pay income taxes; hence, we do not observe any variation in taxes within and across these groups. Finally, the aggregated WVS/EVS information are merged with the tax rates from the WTI. It seems reasonable to aggregate individual information—including tax morale—on the income group level because i) it is very unlikely that policy makers have individual level information on tax morale and ii) even if they do, they could not tax each person individually. In addition, grouping can alleviate measurement error in the covariates. Table 5 in the Appendix provides summary statistics for all relevant variables. In Table 6 we display means and standard deviations of our key variables separately for each country-year observation. The standard deviations in this table—shown in the second row of each country-year—reveal that all key variables feature variation across income-groups within a given country-year observation.

4 Estimation Strategy

4.1 Empirical Model

As indicated in Section 2.3, we are interested in testing the hypothesis that individuals with higher tax morale face higher tax rates. This is done by estimating the following model:

$$\overline{t_{ijt}} = \alpha + \beta \overline{m_{ijt}} + \overline{X}\delta + C\phi + \upsilon_i + \theta_t + \epsilon_{ijt}, \tag{10}$$

where subscripts i, j, and t indicate income group, country, and survey wave respectively; $\overline{m_{ijt}}$ is one of our tax morale measures ('tax morale index' or 'tax morale

[14] We are not able to adjust for deductions and credits that vary by individual characteristics (e.g., child credits). See Sabirianova-Peter et al. (2010) for a more detail description of the WTI and the tax rates.

dummy'); and υ_i, θ_t, and ϵ_{ijt} are income group dummies, survey wave dummies, and *iid* error terms, respectively.[15]

The vectors, $\overline{X}$ and C control for income group and country-level variables, respectively, that affect tax rates and are correlated with tax morale. $\overline{X}$ includes several confounding variables on the income-group level: marital status, number of children, religiosity, patriotism, and employment status.[16] All variables in $\overline{X}$ are obtained from the WVS/EVS and averaged over income groups. We include per capita GDP (in PPP), GDP growth rate, and foreign direct investments (FDI) in vector C in order to account for confounding country-level variables. All country-level variables are taken from the Worldbank's World Development Indicators (World Bank 2010). Our specification hence exploits across-country and within-country variation in tax morale to explain heterogenous levels of tax rates.

4.2 Identification Issues

Estimating equation (10) by OLS provides evidence of a positive association (conditional correlation) between group-level tax morale and tax rates (see Table 7 in the Appendix). Although this is consistent with our theoretical predictions, we believe the OLS estimates are biased for at least two reasons. First, previous research has established a feedback effect from tax rates (or the general system of taxation) to the level of tax morale (e.g., Doerrenberg and Peichl 2011), which implies reverse causality bias. Second, we are not able to control for the actual extent of tax evasion or the size of the shadow economy. Since both variables are known determinants of tax rates and tax morale, we must also contend with omitted variable bias. Ex-ante, the direction of the bias resulting from reverse causality and omitted variables is not clear because the relationship between tax rates and tax morale is found to be ambiguous in the literature (Torgler and Schneider 2007).

In light of these issues, identification requires an alternative estimation strategy. Unfortunately, it is not possible to obtain quasi-experimental evidence to answer our research question as this requires either a controlled field experiment or an instrumental variable (IV) based on random assignment. Although both alternatives

[15]Recall that 'tax morale dummy' is the share of individuals in each income group that reports the highest level of tax morale whereas 'tax morale index' is the average of the 10-point scale value.

[16]These are known determinants of tax morale and tax rates (e.g. Torgler 2007). Note that the theoretical relationship between income and tax morale is not clear (see Doerrenberg and Peichl 2011). On the one hand, evasion yields higher returns for high-income earners—especially in countries with progressive tax systems. On the other hand, people earning high incomes might have higher societal stakes and therefore be more affected by sanctions, i.e., losing a well-paid job. Accordingly, the empirical picture is ambiguous as well. Whereas Konrad and Qari (2009) cannot find any significant effects using European data, a negative relationship is found by Torgler (2006) for a larger set of countries.

are unavailable in our setting with many countries over time, we believe—as argued by Imbens (2010)—that, even in the absence of randomization based evidence, an attempt ought to be made to answer interesting research questions. Therefore, we rely on two-stage least squares (2SLS) using a non-randomly assigned IV z_{ijt} for our identification strategy. An IV that is sufficiently strongly correlated with tax morale, but not with the error term in the structural equation of interest, will provide the exogenous variation needed to overcome endogeneity. The IV approach is discussed below.

4.3 Instruments

Finding suitable instruments is generally a difficult task. We require a variable that is related to income group tax morale, but does not have any direct link to the same income group's tax rate. Given the structure of our dataset, we also require a variable with sufficient variation across income groups. We mainly employ two variables based on questions asked in the WVS/EVS as IVs in our analysis.[17] The first IV exploits the answer to the question '*Tell me whether you think it can always be justified, never be justified or something in between, to avoid a fare on public transportation*'. Respondents are asked to respond to the question on a 10 point scale where 1 implies never justified. We first reverse the scale of the variable so that higher values indicate higher 'dodging-fares-morale' and then use the income group average as our IV. Many individuals who report high tax morale also develop a high level of 'dodging-fares-morale' and hence we expect a positive relationship between the two variables.

The second IV is based on a question concerning attitudes on educating and raising one's own children: '*Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important?*' We use the share of people in each income group who replied that 'unselfishness' is one of the key qualities children should be encouraged to learn as an IV. The economic intuition behind this IVs is that (honestly) paying taxes can be seen as a service to society: taxes finance public goods and social benefits. Hence, we argue that individuals who have low tax morale and tend to evade their taxes are less likely to believe that it is especially important for their children to develop an unselfish character.

[17] Lubian and Zarri (2011) also use tax morale as an explanatory variable (to explain happiness) and instrument it with another question from the same survey. They, however, use a different dataset (for Italy) and their instrument is not available in our data.

4.3.1 Exclusion Restriction

Using one or both of our IVs allows us to estimate equation (10) by 2SLS, which produces consistent estimates of β if the IVs satisfy two conditions: they must be correlated with tax morale and orthogonal to the error term in the specification of interest. The former can be verified by regressing the endogenous variable—tax morale—on all exogenous variables and the IVs (see discussion on relevance below). The latter condition, however, can only be defended on the basis of economic theory and intuitive reasoning. Consider the variable z, which represents one or both of our IVs: we require z to affect tax rates only indirectly through tax morale in order to identify the parameter of interest. In other words, we have to assume that 'dodging-fares-morale' and 'child unselfishness' have neither a direct effect on tax rate nor an indirect effect through a variable other than tax morale.

Without conditioning on control variables, this orthogonality condition is unlikely to hold in our case because z is not based on random assignment and is therefore likely to be correlated with other variables that affect tax rates. For example, high income individuals likely have higher 'dodging-fares-morale' since bus fare is a relatively smaller component of their income. Since high income individuals also have higher tax rates, our 2SLS estimates would be biased. Another possible drawback occurs for countries where public transportation is operated by the government and where taxes and public transportation are financed from the same budget. If, in those countries, many people dodge fares, the transportation sector might have to be cross-subsidized by tax revenue, which implies higher taxes, *ceteris paribus*. However, public transportation is privately or semi-privately run in most countries. Moreover, semi-privately run transportation companies usually operate on a different budget than the tax legislating government. Similarly, one might argue that 'child unselfishness' is correlated with individual characteristics that also affect tax rates, which again implies biased estimates. For example, the orthogonality condition would be violated if the rich were systematically more selfish than the poor, as argued in Kraus et al. (2011) and Piff et al. (2012), and as a result do not believe their children should be unselfish. Though, this does not seem to be the case in our data.

However, it is still possible to obtain consistent estimates under these circumstances as long as we control for factors that affect both tax rates and the IVs. For the following 2SLS model, we argue that $E(\varsigma^2, z) = 0$, i.e., the error term in equation (12), is uncorrelated with our instrument if we condition on a rich set of control variables which we include on both stages of the 2SLS model. In other words, the predicted value of tax morale, as estimated on the first stage, is exogenous condi-

tional on these controls, and therefore yields consistent estimates of the effect of tax morale on tax rates.

Our 2SLS model controls for several confounding variables that were also included in equation (10): confounders $\overline{X}$, income group dummies υ_i (to control for income), wave dummies θ_t, and country level variables C. In order to further ensure exclusion, we additionally control for a vector $\overline{W}$ containing a set of variables which are likely to indirectly affect both tax rates and instruments z. This vector includes education, age, age squared, gender, and trust in other people.

Therefore, our baseline regression model is specified as:

$$\overline{m_{ijt}} = \gamma_0 + \gamma_1 z_{ijt} + \overline{X}\delta^1 + C\phi^1 + \overline{W}\rho^1 + \upsilon_i^1 + \theta_t^1 + \varsigma_{ijt}^1 \tag{11}$$

$$\overline{t_{ijt}} = \alpha + \beta\overline{m_{ijt}} + \overline{X}\delta^2 + C\phi^2 + \overline{W}\rho^2 + \upsilon_i^2 + \theta_t^2 + \varsigma_{ijt}^2, \tag{12}$$

where z_{ijt} is one or both of our instruments, and β is our coefficient of interest. All other variables are as described above and all subscripts are defined as in equation (10).

Our main concern regarding identification of the tax morale parameter in a simple OLS model is potential reverse causality bias. Using the IV approach helps to mitigate this bias because we believe our IVs to be unaffected by tax rates. In other words, we argue that it is unlikely that 'dodging fares' and 'child unselfishness' are affected by an individual's perception of the tax system. For instance, Algan and Cahuc (2009) show that 'civic attitudes' (i.e., 'benefit morale' from WVS in their case) cannot be systematically changed quickly by changing institutions (see Guiso et al. 2006 for an overview of the literature on the effect of inherited values on economic outcomes).

4.3.2 Instrument Relevance

Intuitively, 2SLS uses the fitted values from the first-stage equation (11) as substitutes for $\overline{m_{ijt}}$ in the second stage regression of tax rates on income group's characteristics: equation (12). To the extent that (11) is well specified, identification of the impact of tax morale on tax rates will rely only on that part of the variation in m_{ijt} driven by exogenous variation thus allowing us to interpret β as the causal effect of tax morale on tax rates. The validity of these results, however, depend on how well the instruments perform in the first stage equation (11). In other words, γ_1 has to be statistically different from zero and economically large.

Evidence that this condition is satisfied is presented in Table 1, which reports

results for the 2SLS model of tax morale on marginal tax rates.[18] Panel B shows the first stage results for two measures of tax morale and three IV specifications. We find a strong positive correlation between both IVs —'dodging-fares-morale' and 'child unselfishness'—and tax morale after conditioning on all confounding variables. The estimated correlation parameters are economically large and statistically different from zero at the 1 percent level, which is initial proof that our IVs are in fact correlated with the endogenous variable. The observation of a positive correlation between our IVs and tax morale is not surprising since individuals who report high tax morale are also likely to develop a high level of 'dodging-fares-morale'. Similarly, if individuals view paying taxes as a service to society[19] then a reasonable expectation is that individuals with high tax morale who tend not to evade taxes are more likely to believe that it is especially important for their children to be unselfish. In other words, we would expect 'child unselfishness' to be positively correlated with tax morale as well.

We also find that the F-statistics of excluded instruments are larger than 10 when 'dodging-fares-morale' is used as the IV.[20] The respective F-statistics for specifications with 'child unselfishness' are lower: F-statistics are around 4 when 'tax morale index' is the endogenous variable and around 9 when 'tax morale dummy' is the endogenous variable.[21] Our over-identified specifications, where we use both available instruments, disclose F-statistics of excluded instruments of above 30, thus putting us in the 'safe zone'. Finally, we cannot reject the null hypothesis of the Hansen test of over-identification at reasonable levels of significance in our over-identified specifications.

Similar results are observed when average tax rate is used as the dependent variable, except that the over-identification results are not as strong (see 10). Given this evidence, we are fairly confident that our IVs are correlated with tax morale and that we do not suffer from a weak instrument problem.

[18] See Tables 8 and 9 in the Appendix for more detailed results including all control variables. Similar results for average tax rate are presented in Tables 10, 8, and 12

[19] This follows from the fact that taxes generally finance public goods and social benefits.

[20] IV estimations are prone to be biased and inconsistent if the correlation between instrument and instrumented variable is too weak and if there are many over-identifying restrictions (Bound et al. 1995). Staiger and Stock (1997) suggest that F-statistics of excluded instruments need to be larger than 10 to exclude the problem of weak instruments.

[21] The former figure might indicate a weak instrument problem. However, Angrist and Pischke (2009a, page 215) note that this is not a mechanical rule and F-statistics smaller than 10 might not always be fatal. In the just-identified case—say, one endogenous variable and one instrument—the two-stage-least-squares (2SLS) estimates are approximately unbiased (median-unbiased) and weak instrument problems only cause second-stage standard errors to be large (Angrist and Pischke 2009a; Angrist and Pischke 2009b, page 209). Even in those specifications with the smallest F-statistics, we obtain decently small standard errors suggesting that we do not suffer from a weak instrument problem.

5 Estimation Results

This section describes our second stage results. Baseline estimates are presented in Section 5.1 while Section 5.2 discusses the potential necessity to include country fixed effects into our empirical model and presents respective results. All estimations display panel-adjusted standard errors that account for clustering effects of a certain country's income groups and are robust to the presence of heteroscedasticity.

5.1 Baseline Results

The second stage results in Panel A of Table 1[22] confirm our main hypothesis: we observe that a higher level of tax morale is associated with higher taxation, ceteris paribus.[23] This finding is independent of how we measure tax morale. Increasing 'tax morale index' by one standard deviation in the 'cheating' specification increases the marginal tax rate by 0.58 (=11.211*0.806/15.475) standard deviations from the mean marginal tax rate in the sample. The estimate is statistically different from zero at the 1% level. The point estimate is larger, but less significant when 'child unselfishness' is employed as IV: a one standard deviation increase in 'tax morale index' increases the tax rate by 0.98 standard deviations. In the over-identified case, where we use both available IVs, the coefficient is highly significant and very close to the point estimate in the 'cheat' specification.

The absolute magnitude of the coefficients on 'tax morale dummy' are much larger than on 'tax morale index'. The estimated coefficient in this specification tells us the change in average tax rates if a group's average tax morale increases from the lowest to the highest level. A one standard deviation increase in 'tax morale dummy' increases the marginal tax rate by 0.59 (=53.513*0.171/15.475) standard deviation in the 'cheat' specification and 0.62 standard deviations in the 'unselfishness' specification.[24] The point estimate in the over-identified model lies between the coefficients in the just-identified models and is significantly different from zero at

[22]Tables 11 and 8 in the Appendix display more details including all control variables.

[23]Note that the coefficients from the 2SLS estimations are higher than those of the OLS regressions reported in Table 7 in the Appendix. This is in line with a negative relationship between income and tax morale, which—due to the positive correlation between income and tax rates—feeds through to a negative correlation between income and tax morale in our sample. See also the discussion in footnote 16. Therefore, the OLS estimates are likely to be biased downwards.

[24]Recall that 'tax morale dummy' is the share of individuals in an income group with the highest level of tax morale. Therefore, an alternative interpretation of our coefficients is that, relative to groups where everyone has the lowest level of tax morale, average tax rate is 53.5 percentage points higher for income groups where everyone has the highest level of tax morale. However, since none of the groups in our sample has these extreme values of tax morale, it makes more sense to use the standard deviations interpretation of the results. The same reasoning applies to 'tax morale index'.

the 1% level. Again, the coefficient stemming from the over-identified specification is very close to the corresponding one in the 'cheat' specification. Hence, in terms of standard deviations, the results are in accordance with the 'tax morale index' specifications.

Table 1: Effect of Tax Morale (TM) on Marginal Tax Rate (MR)

Panel A: Second Stage Results						
Dependent Variable: Marginal Tax Rate (MR)						
TM Index	11.211***	18.840*	11.775***	–	–	–
	(2.111)	(11.095)	(2.114)	–	–	–
TM Dummy	–	–	–	53.513***	55.876**	54.981***
	–	–	–	(9.725)	(25.539)	(9.358)
Instrument:	cheat	unself	both	cheat	unself	both
N	503	566	494	503	566	494
Panel B: First Stage Results						
Dep. Var:	Tax Morale Index			Tax Morale Dummy		
Cheat	0.500***	–	0.500***	0.105***	–	0.106***
	(0.062)	–	(0.062)	(0.014)	–	(0.013)
Unself	–	0.503**	0.401	–	0.170***	0.131**
	–	(0.252)	(0.244)	–	(0.058)	(0.055)
N	503	566	494	503	566	494
F-stat	64.45	4.00	34.76	58.13	8.53	33.40
Hansen	–	–	0.1749	–	–	0.3728

Panel C: Summary Statistics					
	MR	TM Index	TM Dummy	cheat	unself
Mean	30.147	8.490	0.575	8.547	0.311
Std. Dev.	15.475	0.806	0.171	0.671	0.165

[1] Dependent variable: MR [2] Baseline 2SLS IV estimation [3] Instruments: 'Dodging fares justifiable','Child unselfishness' or both [4] Cluster adjusted standard errors [5] All specifications include the full set of control variables. See Tables 8 and 9 [6] *F-stat* indicates F-statistic of excluded instruments [7] Hansen indicates p-value of Hansen over-identification test [8] * < 0.10, ** < 0.05, *** < 0.01

The results and patterns for average tax rate (AR) presented in Panel A of Table 10 in the Appendix are very similar to those described above. An increase in 'tax morale index' ('tax morale dummy') by one standard deviation increases AR by 0.73 (0.73) standard deviations with 'cheat' as the IV and by 1.62 (0.98) standard

deviation in the 'unselfishness' specification. The over-identified estimation yields highly significant estimates that are very close to the corresponding values in the just-identified cases. In the last three specifications, where 'tax morale dummy' serves as the explanatory variable, all three coefficients of interest are positive and statistically different from zero.

Regarding the effect of confounding variables (see Tables 8 and 11 in the Appendix), we mostly observe theoretically expected effects: We include dummies for each income group in the analysis in order to capture non-linear effects of income. Reflecting the progressivity of tax systems in almost all countries in the analysis, we clearly observe that higher income groups pay higher tax rates. Dummy variables for each survey wave indicate that there is a trend in time towards lower levels of taxation—a trend that is widely recognized (Sabirianova-Peter et al. 2010). We further observe that tax rates are higher in rich countries and, all else equal, a higher level of foreign direct investments (FDI, as a proxy for openness) yields lower rates. We also see from the data that groups with high average numbers of children face lower rates (for reasons of clear arrangement, the displayed result tables do not show the coefficients of included sociodemographic control variables).

Overall, we find international cross-country and within-country evidence that is consistent with our hypothesis in all specifications. We find effects that are quite robust to both the use of different IVs and the operationalization of the explanatory variable 'tax morale'. It seems to be the case that income groups with high levels of tax morale, ceteris paribus, face systematically higher average and marginal tax rates.

Imbens and Angrist (1994) note that the coefficients in IV estimations should be interpreted as 'Local Average Treatment Effects' (LATE). That is, the observed effect is the effect of the so-called complier population (see also Angrist et al. 1996). In our case, this implies that the reported coefficients are restricted to the subsample of individuals that would change their level of tax morale in response to a hypothetical change in the instruments. The IV approach prevents the hazard of reverse causality as we assume the instruments to be unrelated to the dependent variables. However, depending on which instrument is used, we observe different magnitudes in coefficients. This should be a sign of caution indicating that we cannot take the actual magnitude of the coefficients for granted. The robust positive sign, nevertheless, provides evidence backing our hypothesis. Even in those specifications with low F-statistics of excluded instruments, and hence higher second-stage standard errors, we do not expect the results to be biased as they are just-identified (Angrist and Pischke 2009b).

5.2 Fixed Effects Models

The results presented thus far exploit variation both within and between countries.[25] However, it is possible that our results are mostly driven by genuine differences between countries as opposed to within country variation which we, however, partly also exploited. Additionally, the estimates will be biased if country level time invariant factors are correlated with tax morale *and/or* the instrumental variables.[26] To check this, we employ country fixed effects regressions that solely rely on within country variation (in accordance with our theoretical model).[27] However, estimating the model with country fixed effects is problematic for several reasons. First, the fixed effects are highly collinear with tax morale, which inflates the standard errors and thus reduces the precision of the estimates. Second, controlling for country fixed effects implies including a large set of dummy variables, which reduces our degrees of freedom: this, too, leads to inflated standard errors. Finally, the sample is highly unbalanced with many gaps in the data because many countries did not participate in every wave of the WVS/EVS: for example, some countries participated in the first and last waves while others participated in only one wave. Estimating the above model including the full set of country fixed effects and excluding the country-level variables, we find that estimates continue to be positive but, due to the mentioned reasons, imprecisely measured.

Since controlling for fixed effects might be particularly important in order to truly answer the question of interest, we explore several ways of overcoming the challenges described above. The first approach uses country-group (regional) fixed effects on the income-group level while the second set of approaches uses actual country fixed effects on the individual person level.

5.2.1 Country Group Fixed Effects

First, following the WVS/EVS literature (e.g. Helliwell 2003), we form groups of countries to reduce the number of country fixed effect variables. We then estimate a country-group fixed effects model with eight country groups: English-speaking countries (Anglo-Saxon plus Australia and New Zealand); Continental Europe plus Israel; Scandinavia; Eastern Central Europe; former Soviet countries; Latin America; Asia; and (other) Developing Countries (see Table 6 for an overview of country-

[25] See Table 6 for information on variation across income-groups in each country-year observation.

[26] Note that we do include income-group fixed effects, which accounts for any income-group level time invariant factors.

[27] Note, however, that we indirectly account for some country-specific effects in our previous estimations by including country-level control variables in all of our regressions.

groups). To the extent that country-level time-invariant factors are common across countries within a region, this approach should address any bias resulting from omitted fixed effects, even if imperfectly so. As shown in Table 2, the country-group fixed effect estimations yield significant coefficients that are very close to the baseline specification when 'cheat' is employed as the instrument.[28]

Table 2: Country Group fixed effect Estimations

Expl. Variable	Tax Morale Index		Tax Morale Dummy	
Dependent Variable	AR	MR	AR	MR
No Country Group Fixed Effects (baseline)				
Tax Morale	13.711***	11.211***	65.062***	53.513***
	(2.178)	2.111)	(9.771)	(9.725)
Country Group Fixed Effects:				
Tax Morale	12.850***	11.368***	88.791***	79.223***
	(2.743)	(2.716)	(18.765)	(18.902)
Observations	504	503	504	503

[1] 2SLS IV regressions [2] Instrument: cheat [3] Income-group level
[4] Cluster adjusted standard errors [5] All specifications include the same control variables as the baseline, but exclude country-level variables [6] Groups as defined before (see Appendix)
[7] $^{*} < 0.10$, $^{**} < 0.05$, $^{***} < 0.01$

5.2.2 Individual Level Analyses

The second attempt to address country-level fixed effects, involves estimating our models at the individual level. This approach provides greater within country variation than our previous estimations based on averages of individual values within income groups. The challenge in implementing this approach is that we do not have individual level data on income. Instead, the WVS provides data on each respondent's income group. We take several approaches in order to overcome this challenge and estimate our models on the individual level using country fixed effects. Running the regressions on the individual level will yield coefficients that are an order

[28] As 'unselfishness' is a potentially weak instrument with very small F-statistics of excluded instruments in these fixed effect estimations, the second-stage results become insignificant. Simple OLS regressions containing country-group fixed effects yield very similar—and even more significant—coefficients to the baseline OLS estimations presented in the Appendix. Additionally, OLS and IV estimations with and without country fixed effects, on the sample of countries that are part of at least two survey waves, also yield positive point estimates. However, these estimates are not statistically significant, likely as a result of the smaller sample size.

of magnitude smaller than the income group estimates reported in Tables 1 and 10. This can be explained by the increased variation in the explanatory variables which results in smaller coefficients on the individual than the aggregate level.[29] Additionally, whereas before our coefficients represented the effect of a one-unit increase in a *group*'s average tax morale, in the individual regressions they stand for a one-unit change in an *individual*'s tax morale. Obviously, this also yields smaller coefficients.

We use three separate estimation strategies to implement the analysis on the individual level: (1) 'inverse multilevel analysis' with dependent variable on the income group-level and independent variables on the individual level, (2) interval regression, and (3) imputation of individual income levels and corresponding tax rates. The three approaches differ in how they treat the (unobserved) variation in the dependent variable. In the first approach, we neglect this variation by assigning each individual the reported (midpoint) income and corresponding tax rate (i.e. AR or MR) of his/her income group. In the second approach, we assign each individual her income group's lower and upper bound tax rates and run an interval regression, i.e. a generalized Tobit regression for interval censored data (Wooldridge 2006). In the third approach, we employ a multiple imputation procedure, which is comparable to the approach proposed by Jenkins et al. (2011) and described in more detail in Appendix B, in order to generate even more variation on the left-hand side of our estimations. For each individual, we randomly draw an income (and corresponding AR and MR) lying between the lower and upper bounds of her income group and then estimate the model. This is repeated 500 times and the average coefficients are reported. We employ the combination method proposed by Reiter (2003), and applied by Jenkins et al. (2011), to calculate standard-errors and levels of significance, taking into account the finite number of imputations. Note that randomly assigning tax rates within each bracket generates noise and renders the relationship between tax morale and tax rates less strong. This might lead to smaller coefficients – hence, it is a conservative approach for the expected positive relationship.

Our analysis includes the following control variables; i) the same individual-level controls as in the baseline (including vector W), ii) survey wave fixed effects, iii) income group fixed effects, and iv) country fixed effects. We exclude country-

[29] See, e.g., Wooldridge (2006). For intuition, consider a simple univariate OLS regression of y on x where the slope coefficient is given by the covariance of x and y over the variance of x. Estimation at the individual level allows us to use the maximum available variation in each variable (see Table 14 in the Appendix for Summary Statistics of the used sample). Because the variation on the individual level is greater than on the group level, the slope coefficient decreases c.p. (the actual change also depends on the change in the covariance). In addition, the smaller coefficients could be an indicator of attenuation bias due to measurement error in the explanatory variables, which may be alleviated by grouping the covariates. Therefore, we prefer to keep the income group level regressions as our baseline specifications.

Table 3: Individual Level fixed effect Estimations

Expl. Variable	Tax Morale Index		Tax Morale Dummy	
Dependent Variable	AR	MR	AR	MR
Panel A: Inverse Multilevel Analysis				
No Country Fixed Effects				
Tax Morale	1.431***	1.288***	7.910***	7.122***
	(0.258)	(0.259)	(1.391)	(1.399)
Country Group Fixed Effects:				
Tax Morale	0.866***	0.761***	4.851***	4.265***
	(0.144)	(0.149)	(0.790)	(0.820)
Country Fixed Effects:				
Tax Morale	0.168***	0.157***	0.937***	0.871***
	(0.051)	(0.054)	(0.279)	(0.299)
Observations	30,024	30,024	30,024	30,024
Panel B: Interval Regression				
No Country Fixed Effects				
Tax Morale	1.431***	1.237***	7.920***	6.844***
	(0.244)	(0.233)	(1.355)	(1.297)
Country Group Fixed Effects:				
Tax Morale	0.861***	0.701***	4.830***	3.935***
	(0.141)	(0.134)	(0.787)	(0.753)
Country Fixed Effects:				
Tax Morale	0.167***	0.151***	0.929***	0.844***
	(0.050)	(0.048)	(0.276)	(0.265)
Observations	29,816	29,816	29,816	29,816
Panel C: Multiple Imputation Approach				
No Country Fixed Effects				
Tax Morale	1.430***	1.259***	7.914***	6.968***
	(0.257)	(0.250)	(1.382)	(1.347)
Country Group Fixed Effects:				
Tax Morale	0.865***	0.723***	4.850***	4.056***
	(0.143)	(0.142)	(0.787)	(0.784)
Country Fixed Effects:				
Tax Morale	0.171***	0.163***	0.953***	0.906***
	(0.050)	(0.051)	(0.274)	(0.283)
Observations	29.834	29.834	29.834	29.834

[1] 2SLS IV regressions [2] Instrument: cheat [3] Individual person level [4] All specifications include the same control variables as the baseline, but exclude country-level variables [5] Groups as defined before (see Appendix) [6] Multiple Imputation Standard Errors are calculated following Reiter (2003)
[7] * < 0.10, **< 0.05, *** < 0.01

level variables from our estimations in order to use the full sample of countries, including those that are only part of one WVS wave. Due to the insignificant results of the 'child' instrument in the country-group fixed effects estimation (see Section 5.2.1), and for brevity, we focus on the 'cheat' instrument here. Results from these regressions are presented in Table 3.

The results are very similar for the three approaches—despite the different treatment of the variation in the dependent variable. As expected, the individual level estimations are an order of magnitude smaller than the income group estimates. Nonetheless, the coefficients—for both 'tax morale index' and 'tax morale dummy'—are positive and statistically different from zero. This is not only true for the baseline but also when including country-group and even country fixed effects. Of course, the estimated coefficients become smaller since country fixed effects take out a lot of variation. However, as all country specific effects are captured and controlled for, the positive coefficients can be attributed solely to within-country variation in tax morale. This provides further evidence that our results are not only driven by between country variation. For example, using the inverse multilevel analysis including the full set of country fixed effects, we find that a one standard deviation rise in an individual's 'tax morale index' increases her group's marginal tax rate by 0.023 ($= (0.157 * 2.336)/15.642$) standard deviations.

6 Sensitivity Checks

For our set of sensitivity checks, we go back to income-group level estimations, as in the baseline results. We first include a country level measure of bureaucratic quality (ICRG 2011)—a variable found to be a possible determinant of tax morale (Barone and Mocetti 2011)—in order to control for the possibility that countries with less efficient governments have higher tax rates (Brennan and Buchanan 1980).[30] We also run regressions in which we weight the income groups by the number of their members. Additionally, we restrict the analysis to OECD countries in order to gain insights for a more homogeneous set of countries. Finally, we employ lead tax rates where tax rates in year $t+1$ are related to tax morale in year t. Tables 4 (dependent variable: MR) and 13 (dependent variable: AR; table displayed in the Appendix) summarize these sensitivity checks.

We are able to confirm our baseline results in almost all sensitivity checks. Tax rates, ceteris paribus, depend positively on the level of tax morale and the

[30]This variable is not available for all country-year observations which is why we only include it in a robustness check.

results are mostly significantly different from zero. In most specifications, the size of the tax morale point estimates is roughly similar to the sizes in the baseline. Interestingly, when the sample is restricted to OECD countries, we find significant point estimates that are slightly larger than in the baseline scenario. Additionally, we confirm Brennan and Buchanan's (1980) argument of a negative relationship between tax rates and the quality of bureaucracy.

Table 4: Sensitivity Checks for Marginal Tax Rate

Independent Variable	Tax Morale Index			Tax Morale Dummy		
Instrument	Cheat	Unself	Both	Cheat	Unself	Both
			Baseline			
Tax Morale	11.211***	18.840*	11.775***	53.513***	55.876**	54.981***
	(2.111)	(11.095)	(2.114)	(9.725)	(25.539)	(9.358)
F-stat excl instr	64.45	4.00	34.76	58.13	8.53	33.40
N	503	566	494	503	566	494
			Institutional Quality			
Tax Morale	12.253***	12.062∗	12.461***	59.181***	47.127*	58.796***
	(2.114)	(6.981)	(2.095)	(9.236)	(24.800)	(8.998)
Institutional Quality	-2.169	-2.220	-2.273	-5.238***	-4.303***	-5.389***
	(1.565)	(1.548)	(1.608)	(1.480)	(1.530)	(1.511)
F-stat excl instr	55.79	6.48	31.08	58.84	8.27	33.76
N	463	526	454	463	526	454
			Weighted by number of observations in income group			
Tax Morale	10.171***	94.150	10.840***	50.599***	143.176*	57.828***
	(2.427)	(133.127)	(2.476)	(11.459)	(75.376)	(11.616)
F-stat excl instr	70.90	0.46	35.32	65.64	3.92	35.50
N	501	564	492	501	564	492
			OECD Countries			
Tax Morale	14.014***	19.794**	14.290***	70.348***	62.357***	70.224***
	(2.489)	(8.728)	(2.476)	(11.962)	(21.976)	(11.511)
F-stat excl instr	54.69	6.86	32.75	48.24	12.07	29.97
N	384	420	384	384	420	384
			Lead Tax Rates			
Tax Morale	9.961***	18.918	10.450***	46.902***	54.993**	49.152***
	(2.106)	(11.978)	(2.083)	(9.239)	(26.377)	(9.067)
F-stat excl instr	56.40	3.53	30.89	53.26	8.02	29.81
N	476	548	476	476	548	476

[1] Dep. Var. MR [2] 2SLS IV estimations [3] Income-group level [4] Cluster-adjusted standard errors [4] All estimations include same control variables as in baseline specifications. [5] Lead tax rates estimations are IV regressions of tax rates in year $t+1$ on tax morale in t. [6] Weighted IV regressions weight income groups with the number of individuals in each respective group [8] * < 0.10, **< 0.05, *** < 0.01

7 Conclusion

In this paper, we construct an international panel dataset of (average and marginal) tax rates and tax morale parameters in order to provide evidence of the relationship between tax morale and the tax burden imposed on different income groups. We set up a simple model of Ramsey-type optimal income taxation where different groups of taxpayers face different subjective costs of evading taxes. The model shows that the tax rate imposed on a group will be higher, the higher the group's tax morale, i.e., the less responsive tax base will be taxed at higher rates. Using data from the EVS/WVS and the WTI and based on an IV approach, we find empirical support for this hypothesis. Our results show that 'nice guys finish last', i.e., groups with higher tax morale have to bear a higher tax burden. The inclusion of country fixed effects and several robustness checks validate our baseline results.

However, one should note that the identification strategy used in this paper has limitations. Unfortunately, a (quasi-) experimental set-up is not available to investigate the impact of tax morale on the distribution of tax burdens. As a result, we rely on a non-random IV strategy and argue that this provides exogenous variation—conditional on the rich set of control variables included in our regressions—which is sufficient to proxy the true causal effect. Although we believe this is an important first step in answering the question posed here, it would be interesting to test our results with data that allow for cleaner identification in future research.

From the government's perspective, taking into account tax morale when setting tax rates is efficient because the costs of taxation—caused by distortions—are smaller for individuals with a high tax morale. Our paper therefore relates to the growing literature on elasticities of taxable income (Feldstein 1999; Saez et al. 2012). If the tax morale parameter is interpreted as a proxy for the tax evasion elasticity, our empirical results show that the actual distribution of tax burdens is indeed associated with these elasticities, i.e., that governments take this information into account when designing actual tax systems. This provides an empirical test of the inverse elasticity rule of optimal taxation, which is another contribution of our paper.

Our results are open to alternative interpretations, though. It is possible that groups with high tax morale might be less politically opposed to tax increases and are taxed more heavily because they are less likely to vote against (parties in favor of) tax increases. A Gallup poll in 2011 showed that in the US 71% of Democrats are in favor of higher taxes (on the rich) whereas 69% of Republican voters were against

it.[31] Investigating this issue would be an interesting avenue for future research.

Another alternative story consistent with our model and the empirical findings could be the following: Some countries have both high tax rates and efficient tax enforcement leaving little scope for tax evasion. Others have lower tax rates and less efficient tax enforcement. This could reflect societies' views on tax enforcement but it could also reflect technological enforcement constraints. As a result, people in 'high enforcement countries' will have high tax morale because evasion is not an option for them (given tax enforcement). In contrast, people in a 'low tax enforcement country' might have low tax morale because evasion is a real possibility. Hence, governments have to impose lower taxes on factors that are susceptible to evasion or avoidance by necessity. However, this story neglects the fact that the tax morale question in the survey refers to a hypothetical situation in which evading taxes is possible. It is also inconsistent with previous research on tax morale that finds no association between tax morale and tax enforcement parameters such as the fine rate or audit probability (Torgler 2005; Torgler and Schneider 2007).

Our findings also shed new light on the growing literature on tax morale. So far, scholars have mostly argued that a high general level of tax morale is advantageous for a society because it increases the efficiency of a tax system. Many empirical studies have worked out possible determinants of tax morale and derived the policy implication that strengthening these determinants helps to increase tax morale and therefore the efficiency of raising taxes. While we do not contradict this view, we show that governments already seem to exploit high relative levels of tax morale among particular groups and, ceteris paribus, tax them higher than low morale groups in the same country. The welfare implications of this finding are, however, less clear. Despite being taxed more heavily, such a policy might still be welfare improving, even for high morale groups, if they receive some kind of 'warm glow' effect due to the intrinsic satisfaction of doing the right thing when complying with the tax law. This is also in line with recent observations from the US, where rich individuals like Warren Buffet claim they would like to pay higher taxes, provided that other rich people also face higher taxes. It would also be interesting to extend the analysis to allow for endogenous levels of tax morale (see, e.g., Traxler 2010, for endogenous tax morale in the standard model of tax evasion). A tax policy as sketched in our study could be self defeating in the long term if it created incentives to develop a lower level of tax morale. Exploring this is a topic for future research.

[31] Note, however, that in our data the correlation between political inclination and tax morale is different. Tax morale of conservative households is slightly higher than average.

A Appendix

A.1 Summary Statistics: Income Group Level

Table 5: Summary statistics

Variable	Mean	Std. Dev.	N
Average Tax Rate (AR)	23.311	15.208	576
Marginal Tax Rate (MR)	30.147	15.475	575
AR lead	23.27	15.626	549
MR lead	29.924	15.736	548
Tax Morale Index	8.49	0.806	583
Tax Morale Dummy	0.575	0.171	583
Cheat public transp	8.547	0.671	511
Unself imp for child	0.311	0.165	574
Full time	0.722	0.151	583
Part time	0.126	0.094	583
Self employed	0.152	0.136	583
Single	0.296	0.136	583
Married	0.631	0.168	583
Divorced	0.052	0.075	583
Widowed	0.021	0.033	583
Age	39.071	3.787	583
Male	0.607	0.123	583
Numb children	1.764	0.560	583
Age at compl educ	19.375	3.274	583
Church once month	0.347	0.244	583
Patriotism	3.32	0.374	583
Trust most people	0.358	0.187	583
GDP per cap ppp	19.725	11.344	583
GDP growth	2.714	3.292	583
FDI net inflows	12.796	69.635	583
Institutional Quality	3.148	0.879	542

Table 6: Means and Standard Deviations of key variables by country and year

Country	Group	Year	TM-10	TM-2	AR	MR	cheat	unself
Albania	East Eur	2002	9.079	0.587	17.672	21.972	8.583	0.134
			0.185	0.049	5.449	6.337	0.250	0.044

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Australia	Anglo	1995	8.616	0.563	44.611	46.441	8.819	0.400
			0.209	0.059	0.912	1.480	0.187	0.039
		2005	8.701	0.546	23.058	33.248	8.361	0.502
			0.164	0.089	7.708	12.012	0.498	0.105
Austria	Cont Eur	1999	8.687	0.553	21.224	33.229	8.509	0.042
			0.184	0.039	7.578	11.275	0.415	0.034
Belgium	Cont Eur	1990	6.290	0.261	24.841	39.387	8.217	0.272
			0.528	0.056	8.187	9.122	0.375	0.054
		1999	6.941	0.310	23.078	36.633	8.538	0.353
			0.524	0.063	9.618	13.581	0.267	0.045
Brazil	Latin	1990	7.789	0.531	24.751	24.885	8.341	0.339
			0.540	0.055	0.304	0.325	0.467	0.046
Bulgaria	East Eur	1999	8.804	0.626	14.997	24.356	.	0.143
			0.429	0.097	5.269	7.095	.	0.033
Canada	Anglo	1982	8.920	0.704	17.103	26.267	8.687	0.143
			0.724	0.164	6.643	9.177	0.627	0.105
		1990	8.437	0.546	24.224	31.524	8.764	0.426
			0.500	0.090	6.121	9.489	0.325	0.055
		2000	8.886	0.657	21.856	30.253	8.662	0.461
			0.272	0.088	7.053	9.844	0.177	0.035
		2006	9.116	0.655	20.900	27.254	8.786	0.471
			0.246	0.053	6.807	9.239	0.323	0.073
Chile	Latin	1990	9.121	0.748	14.285	24.712	8.040	0.088
			0.183	0.048	11.747	17.849	0.432	0.020
		1996	8.818	0.634	17.509	28.563	8.582	0.245
			0.416	0.081	11.651	15.678	0.400	0.045
		2000	8.726	0.697	22.826	34.549	7.546	0.352
			0.550	0.068	12.185	13.709	0.739	0.094
Croatia	East Eur	1999	8.187	0.578	19.322	26.484	7.785	.
			0.526	0.079	9.609	12.704	0.487	.
Czech Republic	East Eur	1999	8.785	0.527	13.666	19.210	7.863	0.360
			0.190	0.080	2.644	4.723	0.409	0.046
Denmark	Scand	1981	8.436	0.618	35.985	48.582	9.162	0.250
			0.417	0.079	8.459	14.175	0.226	0.059
		1999	8.795	0.601	42.805	56.731	9.161	0.574
			0.342	0.035	7.640	7.391	0.243	0.065
Estonia	Soviet	1999	7.605	0.357	22.220	24.845	.	0.147
			0.490	0.084	2.962	3.464	.	0.052
Finland	Scand	1990	7.542	0.315	11.171	23.508	8.704	0.152
			1.321	0.189	8.603	13.530	0.470	0.116
		2005	8.715	0.543	14.719	25.566	8.515	0.323
			0.339	0.095	9.016	13.124	0.324	0.124
France	Cont Eur	1999	7.599	0.421	12.016	20.705	8.195	0.413
			0.443	0.055	6.031	9.120	0.238	0.071
Germany	Cont Eur	1990	8.267	0.464	23.754	32.703	8.879	0.077
			0.196	0.040	4.318	8.297	0.181	0.015
Hungary	East Eur	1991	7.682	0.482	19.412	30.257	7.712	0.273
			0.301	0.075	12.321	15.603	0.456	0.062
Iceland	Scand	1984	8.570	0.590	26.081	30.974	8.908	0.190
			0.449	0.130	5.355	9.122	0.250	0.055
India	Asia	1990	9.439	0.801	8.686	17.930	9.592	0.251
			0.152	0.050	10.441	17.471	0.259	0.102
		2001	9.126	0.819	8.868	12.917	9.282	0.378
			0.588	0.113	10.753	14.706	0.616	0.064

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Ireland	Anglo	1990	8.045	0.444	23.787	38.492	8.740	0.545
			0.302	0.076	13.700	18.184	0.361	0.094
Italy	Cont Eur	1990	7.647	0.393	49.877	49.943	8.704	0.398
			0.986	0.228	0.160	0.170	1.301	0.153
		1999	8.572	0.538	45.457	45.491	8.732	0.441
			0.244	0.055	0.019	0.026	0.111	0.038
		2005	8.415	0.522	27.996	33.774	9.065	0.476
			0.586	0.090	3.772	6.395	0.464	0.141
Japan	Asia	1990	9.541	0.814	64.896	64.973	9.529	0.448
			0.119	0.041	0.063	0.081	0.108	0.081
		1995	9.504	0.811	21.246	32.636	9.461	0.407
			0.124	0.019	5.958	10.724	0.124	0.041
		2000	9.527	0.812	49.944	49.988	9.367	0.550
			0.134	0.047	0.027	0.037	0.159	0.063
		2005	9.390	0.778	49.944	49.988	9.358	0.461
			0.260	0.074	0.027	0.037	0.249	0.112
Latvia	Soviet	1999	7.946	0.467	21.977	23.856	.	0.134
			0.863	0.154	3.096	3.431	.	0.079
Lithuania	Soviet	1999	7.278	0.379	32.319	32.782	7.754	0.286
			0.578	0.079	0.583	0.654	0.548	0.064
Luxembourg	Cont Eur	1999	7.792	0.447	11.922	25.227	8.475	0.326
			0.584	0.097	6.641	12.221	0.609	0.100
Malta	Cont Eur	1999	9.238	0.742	7.209	16.946	.	0.530
			0.222	0.054	6.657	13.908	.	0.115
Mexico	Latin	2000	8.666	0.669	4.133	8.498	7.339	0.514
			0.366	0.076	5.373	9.989	0.259	0.071
		2005	8.746	0.681	7.513	15.243	7.013	0.463
			0.345	0.083	6.379	11.805	0.894	0.098
Morocco	Develop	2001	9.578	0.930	18.459	24.182	8.801	0.092
			0.383	0.048	18.422	20.526	0.406	0.065
Netherlands	Cont Eur	1981	7.701	0.371	12.933	24.974	8.340	0.088
			0.685	0.155	5.542	10.088	0.306	0.060
		1990	7.771	0.381	32.546	40.010	8.348	0.227
			0.321	0.082	4.417	8.678	0.500	0.059
Nigeria	Develop	1990	8.683	0.614	37.634	43.428	8.476	0.176
			0.264	0.048	6.734	7.278	0.255	0.041
Norway	Scand	1996	8.196	0.458	25.411	34.634	9.134	0.108
			0.290	0.068	5.999	9.786	0.447	0.030
Peru	Latin	1996	8.759	0.625	5.046	8.316	8.083	0.174
			0.498	0.074	5.332	7.458	0.559	0.097
		2001	8.900	0.673	3.781	6.563	8.477	0.467
			0.316	0.080	5.020	7.433	0.553	0.056
Portugal	Cont Eur	1990	7.403	0.375	39.944	39.980	8.325	0.304
			0.344	0.046	0.051	0.059	0.302	0.063
Slovakia	East Eur	1999	8.898	0.602	15.539	22.375	.	0.203
			0.191	0.064	3.222	6.365	.	0.040
Slovenia	East Eur	1999	8.515	0.568	22.756	30.034	.	0.398
			0.360	0.063	4.840	6.787	.	0.084
South Africa	Develop	1996	8.889	0.706	22.405	33.542	9.095	0.247
			0.309	0.075	12.893	16.196	0.330	0.047
		2001	8.755	0.598	14.575	21.494	8.774	0.315
			0.150	0.056	14.041	18.432	0.304	0.052
Spain	Cont Eur	1981	7.858	0.445	40.000	40.000	8.478	0.038

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			0.266	0.053	0.000	0.000	0.260	0.017
		1990	7.898	0.475	14.195	22.927	8.408	0.081
			0.699	0.118	8.710	11.496	0.283	0.034
		1995	8.652	0.654	55.872	55.957	8.703	0.174
			0.655	0.073	0.117	0.128	0.743	0.084
Sweden	Scand	1996	8.297	0.459	8.695	19.398	8.025	0.259
			0.289	0.083	8.185	15.971	0.290	0.042
		1999	8.423	0.469	6.889	17.085	.	0.330
			0.308	0.097	6.954	15.250	.	0.050
		2006	8.466	0.478	4.884	15.316	8.058	0.333
			0.351	0.098	5.512	15.119	0.272	0.063
Turkey	Develop	2001	9.630	0.882	39.998	39.999	.	0.296
			0.458	0.151	0.002	0.002	.	0.089
Uganda	Develop	2001	7.802	0.611	29.961	29.982	8.439	0.172
			1.241	0.257	0.039	0.045	0.438	0.140
United Kingdom	Anglo	1990	8.231	0.471	15.011	21.664	8.670	0.592
			0.236	0.073	7.723	8.292	0.466	0.074
United States	Anglo	1990	9.010	0.654	13.390	19.146	8.688	0.421
			0.499	0.148	5.006	8.304	0.556	0.108
		2000	8.661	0.591	15.049	22.008	8.375	0.386
			0.304	0.087	5.648	8.656	0.205	0.049
Venezuela	Latin	2000	9.291	0.738	33.973	33.994	8.460	0.525
			0.244	0.056	0.014	0.018	0.448	0.069

For each country-year: first row indicates the mean; second row indicates standard deviation
Abbreviations: TM-10: Tax morale index, TM-2: Tax morale dummy, AR: Average tax rate, MR: marginal tax rate, cheat: Cheating on public transportation, unself: Unselfishness important for child, Anglo: Anglo-Saxon plus AUS and NZ, Cont Eur: Continental Europe plus Israel, Scand: Scandinavia, East Eur: Eastern Central Europe, Soviet: Former Soviet countries, Latin: Latin America, Asia: Asia, Develop: Developing countries

A.2 OLS results

Table 7: OLS Estimations of Tax Morale on Tax Rates

Independent Variable	Tax Morale Ten		Tax Morale Dummy	
Dependent Variable	AR	MR	AR	MR
Tax morale ten	2.824***	2.216***		
	(0.816)	(0.752)		
Tax morale dummy			18.654***	15.598***
			(3.618)	(3.323)
Income group 3	2.298	6.716**	2.446	6.793**
	(2.891)	(2.949)	(2.856)	(2.914)
Income group 4	3.849	8.878***	4.085	9.023***
	(2.786)	(2.891)	(2.752)	(2.860)
Income group 5	5.372*	11.656***	5.372*	11.619***
	(3.049)	(3.046)	(3.019)	(3.018)
Income group 6	8.042***	15.771***	8.081***	15.775***
	(3.025)	(2.779)	(2.999)	(2.762)
Income group 7	10.621***	18.443***	10.955***	18.714***
	(3.006)	(2.792)	(2.969)	(2.758)
Income group 8	11.623***	19.552***	11.941***	19.815***
	(2.898)	(2.838)	(2.859)	(2.802)
Income group 9	14.328***	21.775***	14.497***	21.925***
	(3.101)	(2.926)	(3.024)	(2.865)
Income group 10	15.380***	22.530***	15.522***	22.676***

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	(3.173)	(3.055)	(3.065)	(2.975)
Part time	2.365	−5.295	0.182	−7.289
	(7.543)	(7.365)	(7.611)	(7.485)
Self employed	22.176***	12.357***	20.452***	10.845***
	(4.402)	(4.090)	(4.462)	(4.141)
Married	5.498	8.025	4.058	6.698
	(5.859)	(6.136)	(5.784)	(6.048)
Divorced	−30.509***	−29.865***	−30.827***	−29.885***
	(10.835)	(9.900)	(10.639)	(9.876)
Widowed	8.555	11.611	7.402	10.679
	(21.212)	(18.783)	(20.693)	(18.464)
Age	1.050	1.165	1.033	1.170
	(2.162)	(1.932)	(2.054)	(1.866)
Age squared	−1.635	−1.591	−1.545	−1.544
	(2.714)	(2.422)	(2.568)	(2.341)
Male	−2.898	−6.798	−2.794	−6.691
	(5.732)	(5.323)	(5.628)	(5.228)
Number children	−0.993	−0.691	−0.975	−0.697
	(1.600)	(1.444)	(1.585)	(1.429)
Age at compl educ	−0.292	−0.362*	−0.247	−0.324*
	(0.201)	(0.200)	(0.193)	(0.192)
Church once month	−3.344	−0.691	−4.000	−1.221
	(3.012)	(2.829)	(2.994)	(2.816)
Patriotism	−12.086***	−10.236***	−12.213***	−10.422***
	(1.886)	(1.758)	(1.765)	(1.677)
Trust most people	−9.819*	−3.526	−9.474*	−3.266
	(5.103)	(4.974)	(4.936)	(4.866)
Wave 2	1.703	0.025	1.888	0.192
	(2.902)	(2.565)	(2.907)	(2.540)
Wave 3	0.059	−1.072	−0.317	−1.440
	(2.858)	(2.752)	(2.844)	(2.723)
Wave 4	−2.738	−5.425**	−3.082	−5.765**
	(2.808)	(2.521)	(2.805)	(2.505)
Wave 5	−4.109	−5.886**	−4.794	−6.538**
	(3.062)	(2.990)	(3.062)	(2.983)
GDP per capita	0.489***	0.467***	0.516***	0.490***
	(0.085)	(0.088)	(0.086)	(0.089)
GDP growth	0.075	0.234	0.090	0.244
	(0.171)	(0.170)	(0.170)	(0.168)
FDI net inflows	−0.054***	−0.040***	−0.055***	−0.040***
	(0.007)	(0.007)	(0.007)	(0.007)
cons	16.034	13.356	29.130	23.152
	(43.938)	(38.964)	(41.064)	(36.944)
N	576	575	576	575
R2	0.346	0.459	0.361	0.470

[1] Dependent variables are average (AR) and marginal (MR) tax rates

[2] Estimation is by OLS with clustered standard errors [3] Income group 2, wave 1, full time, single and female are reference categories

[4] $^{*} < 0.10$, $^{**} < 0.05$, $^{***} < 0.01$

A.3 Baseline Results

A.3.1 Second Stage: MR

Table 8: Baseline: Dependent Var: MR

Independent Variable	Tax Morale Ten			Tax Morale Dummy		
Instrument	*cheat*	*unself*	*both*	*cheat*	*unself*	*both*
Tax morale ten	11.211***	18.840*	11.775***			
	(2.111)	(11.095)	(2.114)			
Tax morale dummy				53.513***	55.876**	54.981***
				(9.725)	(25.539)	(9.358)
Income group 3	5.252	5.695	5.077	6.173*	6.517**	5.953*
	(3.241)	(3.856)	(3.336)	(3.191)	(3.121)	(3.266)
Income group 4	7.219**	7.192*	6.924**	8.352***	8.678***	8.065**
	(3.246)	(3.930)	(3.365)	(3.226)	(3.091)	(3.316)
Income group 5	11.560***	11.627***	11.120***	11.572***	11.242***	11.041***
	(3.366)	(3.922)	(3.500)	(3.410)	(3.273)	(3.523)
Income group 6	16.306***	16.896***	15.982***	16.368***	15.914***	15.925***
	(3.235)	(4.079)	(3.388)	(3.272)	(3.195)	(3.400)
Income group 7	20.175***	21.603***	19.697***	20.615***	20.237***	20.060***
	(3.288)	(4.756)	(3.473)	(3.284)	(3.436)	(3.439)
Income group 8	21.830***	23.161***	21.524***	22.157***	21.433***	21.658***
	(3.104)	(4.815)	(3.280)	(3.158)	(3.429)	(3.308)
Income group 9	24.973***	27.020***	24.872***	24.641***	24.185***	24.606***
	(3.219)	(5.406)	(3.402)	(3.297)	(3.559)	(3.455)
Income group 10	27.351***	30.077***	27.272***	26.325***	25.417***	26.031***
	(3.478)	(7.194)	(3.631)	(3.366)	(3.948)	(3.483)
Part time	−15.908*	−12.438	−16.256*	−19.581**	−15.100	−20.173**
	(9.146)	(10.478)	(9.418)	(9.861)	(9.649)	(10.064)
Self employed	2.266	5.775	1.985	−0.445	5.523	0.133
	(6.994)	(10.196)	(7.464)	(7.269)	(7.622)	(7.525)
Married	1.521	−3.802	1.709	0.187	−0.367	0.842
	(7.441)	(11.869)	(7.624)	(7.066)	(8.448)	(7.185)
Divorced	−21.923	−18.261	−20.767	−23.597	−25.718*	−22.777
	(17.656)	(24.926)	(18.205)	(15.262)	(14.162)	(15.346)
Widowed	24.006	34.351	22.009	15.563	14.599	12.859
	(23.331)	(32.774)	(23.842)	(22.218)	(21.659)	(22.538)
Age	3.294	3.735	3.387	2.881	2.102	2.963
	(2.775)	(3.988)	(2.841)	(2.369)	(2.456)	(2.403)
Age squared	−4.095	−5.081	−4.211	−3.415	−2.679	−3.530
	(3.442)	(5.102)	(3.524)	(2.991)	(3.106)	(3.036)
Male	−8.537	−4.369	−8.705	−6.841	−6.405	−8.015
	(7.308)	(8.720)	(7.976)	(6.740)	(5.869)	(7.084)
Number children	−3.108*	−2.150	−3.337**	−2.611	−1.334	−2.868*
	(1.649)	(2.189)	(1.699)	(1.677)	(1.660)	(1.718)
Age at compl educ	−0.472**	−0.096	−0.465**	−0.400*	−0.130	−0.391*
	(0.223)	(0.276)	(0.227)	(0.214)	(0.206)	(0.215)
Church once month	4.398	−2.255	4.980	3.264	−2.830	3.976
	(3.916)	(4.521)	(4.162)	(3.797)	(3.504)	(4.020)
Patriotism	−16.375***	−20.011***	−16.738***	−14.691***	−14.484***	−15.093***
	(2.574)	(7.553)	(2.683)	(2.459)	(3.393)	(2.561)
Trust most people	−10.848*	−18.582*	−11.232*	−6.055	−7.853	−6.085
	(5.612)	(10.131)	(5.738)	(5.594)	(5.328)	(5.714)
Wave 2	−1.618	2.461	−1.795	−1.290	1.341	−1.521
	(2.962)	(3.938)	(3.053)	(3.019)	(3.024)	(3.100)
Wave 3	−6.773*	−7.207	−7.195**	−6.355*	−4.586	−6.649*
	(3.523)	(5.269)	(3.633)	(3.526)	(3.593)	(3.590)
Wave 4	−10.404***	−12.654**	−10.806***	−10.108***	−9.237***	−10.387***
	(3.228)	(5.686)	(3.315)	(3.278)	(3.510)	(3.306)
Wave 5	−11.871***	−13.769**	−12.322***	−12.203***	−10.905**	−12.354***
	(4.032)	(6.558)	(4.174)	(4.172)	(4.340)	(4.192)
GDP per capita	0.480***	0.599***	0.481***	0.561***	0.597***	0.562***
	(0.119)	(0.147)	(0.123)	(0.126)	(0.119)	(0.128)
GDP growth	0.262	0.114	0.235	0.317	0.221	0.286
	(0.221)	(0.225)	(0.225)	(0.207)	(0.174)	(0.210)
FDI net inflows	−0.031***	−0.023	−0.030***	−0.037***	−0.036***	−0.037***
	(0.009)	(0.015)	(0.009)	(0.008)	(0.008)	(0.009)

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cons	−69.290	−132.156	−73.815	−9.822	−0.884	−9.746
	(56.888)	(120.142)	(58.374)	(45.619)	(48.679)	(46.279)
N	503	566	494	503	566	494
F-stat						

[1] Dependent variable: MR [2] Baseline 2SLS IV estimation [3] Instruments: 'Dodging fares justifiable','Child unselfishness' or both [4] Cluster adjusted standard errors [5] Income group 2, wave 1, full time, single and female are reference categories [6] $^{*} < 0.10$, $^{**} < 0.05$, $^{***} < 0.01$

A.3.2 First Stage: MR

Table 9: Baseline: First Stage

Dependent Variable	Tax Morale Ten			Tax Morale Dummy		
Cheat on pub transp	0.500***		0.500***	0.105***		0.106***
	(0.062)		(0.062)	(0.014)		(0.013)
Unself imp for child		0.503**	0.401		0.170***	0.131**
		(0.252)	(0.244)		(0.058)	(0.055)
Income group 3	0.067	0.045	0.067	−0.003	0.001	−0.003
	(0.154)	(0.175)	(0.155)	(0.033)	(0.038)	(0.033)
Income group 4	0.030	0.082	0.029	−0.015	0.001	−0.016
	(0.158)	(0.179)	(0.161)	(0.034)	(0.038)	(0.034)
Income group 5	−0.096	−0.024	−0.085	−0.020	−0.001	−0.018
	(0.159)	(0.179)	(0.162)	(0.035)	(0.040)	(0.036)
Income group 6	−0.166	−0.093	−0.161	−0.036	−0.014	−0.034
	(0.168)	(0.189)	(0.171)	(0.037)	(0.041)	(0.037)
Income group 7	−0.260	−0.208	−0.233	−0.063	−0.046	−0.056
	(0.196)	(0.210)	(0.201)	(0.042)	(0.046)	(0.043)
Income group 8	−0.281	−0.246	−0.268	−0.065*	−0.052	−0.061
	(0.176)	(0.201)	(0.180)	(0.038)	(0.044)	(0.039)
Income group 9	−0.378*	−0.322	−0.359*	−0.073*	−0.058	−0.072
	(0.194)	(0.215)	(0.198)	(0.044)	(0.049)	(0.045)
Income group 10	−0.370*	−0.491**	−0.376*	−0.058	−0.082*	−0.060
	(0.201)	(0.222)	(0.202)	(0.043)	(0.048)	(0.043)
Part time	0.614	0.314	0.518	0.197**	0.154	0.169*
	(0.422)	(0.422)	(0.424)	(0.097)	(0.096)	(0.096)
Self employed	−0.306	0.448	−0.264	−0.013	0.156	−0.018
	(0.464)	(0.459)	(0.469)	(0.108)	(0.105)	(0.104)
Married	0.046	0.774*	0.025	0.035	0.199**	0.025
	(0.413)	(0.421)	(0.411)	(0.083)	(0.089)	(0.080)
Divorced	−1.491	−0.518	−1.413	−0.281*	−0.041	−0.252
	(0.999)	(1.084)	(1.023)	(0.168)	(0.178)	(0.168)
Widowed	−1.699	−1.349	−1.532	−0.198	−0.101	−0.149
	(1.297)	(1.203)	(1.280)	(0.301)	(0.271)	(0.298)
Age	−0.138	−0.163	−0.141	−0.021	−0.026	−0.023
	(0.135)	(0.150)	(0.136)	(0.024)	(0.031)	(0.024)
Age squared	0.167	0.217	0.167	0.022	0.030	0.024
	(0.169)	(0.192)	(0.171)	(0.031)	(0.041)	(0.031)
Male	0.111	−0.271	0.062	−0.009	−0.055	−0.009
	(0.491)	(0.427)	(0.520)	(0.089)	(0.081)	(0.092)
Number children	0.218**	0.077	0.221**	0.036	0.011	0.038*
	(0.096)	(0.096)	(0.097)	(0.022)	(0.022)	(0.022)
Age at compl educ	0.003	−0.016	0.001	−0.001	−0.005*	−0.001
	(0.014)	(0.012)	(0.014)	(0.003)	(0.003)	(0.003)
Church once month	−0.369	0.062	−0.412*	−0.056	0.031	−0.071
	(0.232)	(0.203)	(0.240)	(0.048)	(0.045)	(0.049)
Patriotism	0.529***	0.555***	0.516***	0.079**	0.088**	0.079**
	(0.167)	(0.165)	(0.171)	(0.035)	(0.037)	(0.035)
Trust most people	0.485*	0.901***	0.451	0.012	0.112*	0.004
	(0.282)	(0.279)	(0.288)	(0.057)	(0.058)	(0.056)

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Wave 2	0.087	−0.243	0.024	0.012	−0.062*	−0.008
	(0.148)	(0.157)	(0.162)	(0.034)	(0.037)	(0.037)
Wave 3	0.491***	0.307	0.453**	0.095**	0.057	0.082**
	(0.175)	(0.196)	(0.177)	(0.041)	(0.046)	(0.040)
Wave 4	0.664***	0.309*	0.567***	0.134***	0.043	0.102***
	(0.164)	(0.183)	(0.171)	(0.037)	(0.043)	(0.038)
Wave 5	0.878***	0.357	0.787***	0.190***	0.069	0.158***
	(0.231)	(0.225)	(0.230)	(0.051)	(0.051)	(0.049)
GDP per capita	−0.013**	−0.011*	−0.014**	−0.004***	−0.004***	−0.005***
	(0.006)	(0.006)	(0.007)	(0.001)	(0.001)	(0.001)
GDP growth	0.013	0.010	0.017	0.002	0.001	0.003
	(0.011)	(0.011)	(0.011)	(0.002)	(0.002)	(0.002)
FDI net inflows	−0.001*	−0.001*	−0.001	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
cons	4.683*	9.176***	4.874*	−0.130	0.745	−0.085
	(2.581)	(2.935)	(2.643)	(0.454)	(0.600)	(0.466)
N	503	566	494	503	566	494
R2	0.442	0.301	0.445	0.426	0.307	0.443

[[1] 1st stage results [2] OLS [3] Dependent vars: tax morale index or tax morale dummy [4] Cluster-adjusted standard errors [5] Income group 2, wave 1, full time, single and female are reference categories [6] Cheating on public transportation and Unselfishness important for child are second-stage exclusion restrictions [7] Results correspond to second stages in Tables textbfbaseline-MR and 8 [8] * < 0.10, ** < 0.05, *** < 0.01

A.3.3 Overview Baseline Results: Average Tax Rate

Table 10: Effect of Tax Morale (TM) on Average Tax Rate (AR)

Panel A: Second Stage Results						
Dependent Variable: Average Tax Rate (AR)						
TM Index	13.711***	30.533*	14.657***	–	–	–
	(2.178)	(16.325)	(2.184)	–	–	–
TM Dummy	–	–	–	65.062***	87.170***	68.865***
	–	–	–	(9.771)	(31.417)	(9.401)
Instrument:	cheat	unself	both	cheat	unself	both
N	504	567	495	504	567	495
Panel B: First Stage Results						
Dep. Var:	Tax Morale Index			Tax Morale Dummy		
Cheat	0.497***	–	0.497***	0.105***	–	0.106***
	(0.062)	–	(0.062)	(0.014)	–	(0.013)
Unself	–	0.483*	0.375	–	0.169***	0.129**
	–	(0.251)	(0.243)	–	(0.058)	(0.055)
N	504	567	495	504	567	495
F-stat	64.09	3.71	34.43	58.41	8.54	33.61
Hansen	–	–	0.0264	–	–	0.0854

Panel C: Summary Statistics					
	AR	TM Index	TM Dummy	cheat	unself
Mean	23.311	8.490	0.575	8.547	0.311
Std. Dev.	15.208	0.806	0.171	0.671	0.165

[1] Dependent variable: AR [2] Baseline 2SLS IV estimation [3] Instruments: 'Dodging fares justifiable','Child unselfishness' or both [4] Cluster adjusted standard errors [5] All specifications include the full set of control variables. See Tables 11 and 12 [6] *F-stat* indicates F-statistic of excluded instruments [7] Hansen indicates p-value of Hansen over-identification test [8] * < 0.10, **< 0.05, *** < 0.01

A.3.4 Second Stage: AR

Table 11: Baseline: Dependent Var: AR

Independent Variable	Tax Morale Ten			Tax Morale Dummy		
Instrument	*cheat*	*unself*	*both*	*cheat*	*unself*	*both*
Tax morale ten	13.711***	30.533*	14.657***			
	(2.178)	(16.325)	(2.184)			
Tax morale dummy				65.062***	87.170***	68.865***
				(9.771)	(31.417)	(9.401)
Income group 3	0.539	0.186	0.263	1.889	2.001	1.601
	(3.393)	(5.376)	(3.537)	(3.329)	(3.664)	(3.455)
Income group 4	1.812	0.694	1.453	3.427	3.599	3.124
	(3.331)	(5.596)	(3.501)	(3.271)	(3.587)	(3.411)
Income group 5	5.150	5.109	4.727	5.390	4.971	4.885
	(3.471)	(5.285)	(3.650)	(3.527)	(3.825)	(3.696)
Income group 6	8.460**	9.691*	8.197**	8.763**	8.558**	8.395**
	(3.516)	(5.679)	(3.717)	(3.546)	(3.987)	(3.734)
Income group 7	12.553***	15.644**	12.100***	13.301***	13.762***	12.836***
	(3.615)	(6.694)	(3.861)	(3.597)	(4.356)	(3.826)
Income group 8	14.168***	17.392***	13.893***	14.753***	14.875***	14.317***
	(3.286)	(6.748)	(3.523)	(3.339)	(4.222)	(3.557)
Income group 9	17.918***	22.712***	17.961***	17.708***	18.409***	17.909***
	(3.533)	(7.638)	(3.783)	(3.617)	(4.485)	(3.853)
Income group 10	21.069***	27.609***	21.074***	20.010***	20.283***	19.811***
	(3.661)	(10.298)	(3.871)	(3.514)	(4.971)	(3.706)
Part time	−10.538	−10.722	−11.342	−14.381	−13.224	−15.690
	(9.933)	(14.903)	(10.369)	(10.470)	(11.435)	(10.831)
Self employed	12.204	10.973	12.019	9.087	11.281	9.882
	(8.152)	(15.807)	(8.810)	(8.408)	(10.404)	(8.847)
Married	−2.329	−14.539	−2.282	−3.783	−8.115	−3.324
	(7.993)	(17.113)	(8.252)	(7.528)	(10.291)	(7.721)
Divorced	−21.582	−9.975	−20.219	−24.652	−24.208	−23.691
	(20.777)	(36.992)	(21.715)	(17.554)	(18.698)	(17.967)
Widowed	22.324	45.518	20.780	12.961	15.387	10.606
	(26.528)	(45.609)	(27.363)	(25.352)	(27.346)	(26.062)
Age	3.614	5.300	3.791	3.115	2.610	3.302
	(3.129)	(5.774)	(3.234)	(2.593)	(3.136)	(2.665)
Age squared	−4.710	−7.408	−4.938	−3.890	−3.467	−4.145
	(3.841)	(7.374)	(3.973)	(3.209)	(3.923)	(3.306)
Male	−5.456	1.040	−6.102	−3.527	−2.447	−5.365
	(8.583)	(13.438)	(9.559)	(7.739)	(7.756)	(8.294)
Number children	−3.739**	−3.457	−4.037**	−3.067	−1.989	−3.397*
	(1.899)	(3.278)	(1.974)	(1.925)	(2.192)	(1.999)
Age at compl educ	−0.443*	0.127	−0.436*	−0.344	0.082	−0.329
	(0.249)	(0.395)	(0.257)	(0.239)	(0.259)	(0.246)
Church once month	4.041	−5.646	4.881	2.432	−6.801	3.426
	(4.304)	(6.497)	(4.647)	(4.105)	(4.413)	(4.427)
Patriotism	−19.283***	−28.335**	−19.974***	−17.228***	−19.131***	−18.017***
	(2.758)	(11.423)	(2.917)	(2.615)	(4.545)	(2.787)
Trust most people	−18.086***	−33.842**	−18.793***	−12.771**	−17.301***	−13.055**
	(5.997)	(14.346)	(6.190)	(5.823)	(6.107)	(6.012)
Wave 2	0.142	5.734	−0.005	0.612	3.943	0.443
	(3.390)	(5.870)	(3.530)	(3.521)	(4.153)	(3.671)
Wave 3	−6.229	−10.086	−6.758*	−5.662	−5.558	−6.061
	(3.895)	(7.228)	(4.056)	(3.967)	(4.418)	(4.101)
Wave 4	−8.423**	−14.601*	−8.942**	−8.076**	−8.876**	−8.492**
	(3.629)	(7.983)	(3.762)	(3.756)	(4.466)	(3.846)
Wave 5	−10.867**	−17.275*	−11.391**	−11.116**	−12.091**	−11.333**
	(4.351)	(9.173)	(4.559)	(4.569)	(5.265)	(4.648)
GDP per capita	0.547***	0.704***	0.551***	0.649***	0.698***	0.659***
	(0.129)	(0.216)	(0.137)	(0.138)	(0.151)	(0.143)
GDP growth	0.011	−0.132	−0.034	0.082	0.050	0.029

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	(0.237)	(0.319)	(0.245)	(0.224)	(0.209)	(0.232)
FDI net inflows	−0.044***	−0.026	−0.043***	−0.052***	−0.047***	−0.051***
	(0.009)	(0.022)	(0.010)	(0.009)	(0.010)	(0.009)
cons	−85.151	−225.141	−92.750	−12.730	−11.661	−14.138
	(64.743)	(175.903)	(67.115)	(50.517)	(61.959)	(51.961)
N	504	567	495	504	567	495
F-stat						

[1] Dependent variable: AR [2] Baseline 2SLS IV estimation [3] Instruments: 'Dodging fares justifiable','Child unselfishness' or both [4] Cluster adjusted standard errors [5] Income group 2, wave 1, full time, single and female are reference categories [6] * < 0.10, **< 0.05, *** < 0.01

A.3.5 First Stage: AR

Table 12: Baseline: First Stage

Dependent Variable	Tax Morale Ten			Tax Morale Dummy		
Cheat on pub transp	0.497***		0.497***	0.105***		0.106***
	(0.062)		(0.062)	(0.014)		(0.013)
Unself imp for child		0.483*	0.375		0.169***	0.129**
		(0.251)	(0.243)		(0.058)	(0.055)
Income group 3	0.086	0.062	0.089	−0.003	0.001	−0.002
	(0.152)	(0.173)	(0.153)	(0.033)	(0.038)	(0.032)
Income group 4	0.050	0.099	0.052	−0.014	0.001	−0.014
	(0.156)	(0.178)	(0.160)	(0.033)	(0.038)	(0.033)
Income group 5	−0.076	−0.007	−0.062	−0.020	−0.001	−0.016
	(0.157)	(0.177)	(0.160)	(0.035)	(0.039)	(0.035)
Income group 6	−0.146	−0.075	−0.137	−0.035	−0.013	−0.033
	(0.167)	(0.187)	(0.170)	(0.036)	(0.041)	(0.036)
Income group 7	−0.240	−0.191	−0.210	−0.062	−0.045	−0.055
	(0.195)	(0.208)	(0.199)	(0.041)	(0.045)	(0.042)
Income group 8	−0.263	−0.230	−0.247	−0.064*	−0.052	−0.060
	(0.175)	(0.200)	(0.178)	(0.038)	(0.043)	(0.038)
Income group 9	−0.359*	−0.305	−0.336*	−0.073*	−0.057	−0.071
	(0.193)	(0.214)	(0.196)	(0.044)	(0.048)	(0.044)
Income group 10	−0.351*	−0.473**	−0.354*	−0.058	−0.082*	−0.059
	(0.200)	(0.221)	(0.202)	(0.043)	(0.048)	(0.042)
Part time	0.663	0.360	0.579	0.199**	0.155	0.173*
	(0.421)	(0.421)	(0.423)	(0.096)	(0.095)	(0.094)
Self employed	−0.289	0.455	−0.245	−0.013	0.156	−0.017
	(0.466)	(0.461)	(0.471)	(0.107)	(0.105)	(0.104)
Married	0.060	0.780*	0.036	0.035	0.200**	0.026
	(0.411)	(0.420)	(0.409)	(0.083)	(0.089)	(0.080)
Divorced	−1.569	−0.590	−1.506	−0.283*	−0.043	−0.258
	(0.976)	(1.059)	(0.994)	(0.167)	(0.175)	(0.166)
Widowed	−1.610	−1.270	−1.438	−0.195	−0.099	−0.144
	(1.295)	(1.200)	(1.280)	(0.301)	(0.270)	(0.297)
Age	−0.137	−0.162	−0.139	−0.021	−0.026	−0.023
	(0.135)	(0.150)	(0.137)	(0.024)	(0.031)	(0.024)
Age squared	0.165	0.215	0.165	0.022	0.030	0.024
	(0.170)	(0.193)	(0.172)	(0.031)	(0.041)	(0.032)
Male	0.098	−0.272	0.055	−0.009	−0.055	−0.009
	(0.491)	(0.427)	(0.521)	(0.089)	(0.081)	(0.092)
Number children	0.222**	0.080	0.226**	0.036*	0.011	0.038*
	(0.096)	(0.096)	(0.097)	(0.022)	(0.022)	(0.022)
Age at compl educ	0.004	−0.015	0.003	−0.001	−0.005*	−0.001
	(0.014)	(0.012)	(0.014)	(0.003)	(0.003)	(0.003)
Church once month	−0.386*	0.050	−0.430*	−0.057	0.031	−0.072
	(0.231)	(0.203)	(0.239)	(0.047)	(0.045)	(0.048)
Patriotism	0.526***	0.553***	0.514***	0.079**	0.088**	0.079**

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	(0.168)	(0.165)	(0.171)	(0.035)	(0.037)	(0.035)
Trust most people	0.438	0.858***	0.399	0.011	0.111*	0.001
	(0.280)	(0.275)	(0.285)	(0.056)	(0.057)	(0.055)
Wave 2	0.093	−0.235	0.036	0.012	−0.062*	−0.008
	(0.147)	(0.156)	(0.161)	(0.034)	(0.037)	(0.037)
Wave 3	0.493***	0.310	0.459***	0.095**	0.057	0.082**
	(0.175)	(0.196)	(0.176)	(0.041)	(0.046)	(0.040)
Wave 4	0.658***	0.311*	0.568***	0.133***	0.043	0.102***
	(0.164)	(0.183)	(0.171)	(0.037)	(0.043)	(0.038)
Wave 5	0.885***	0.368	0.802***	0.190***	0.069	0.159***
	(0.232)	(0.225)	(0.230)	(0.051)	(0.051)	(0.049)
GDP per capita	−0.013**	−0.010*	−0.014**	−0.004***	−0.004***	−0.005***
	(0.006)	(0.006)	(0.007)	(0.001)	(0.001)	(0.001)
GDP growth	0.013	0.010	0.017	0.002	0.001	0.003
	(0.011)	(0.011)	(0.011)	(0.002)	(0.002)	(0.002)
FDI net inflows	−0.001*	−0.001*	−0.001	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
cons	4.661*	9.113***	4.828*	−0.131	0.743	−0.088
	(2.593)	(2.940)	(2.653)	(0.454)	(0.600)	(0.467)
N	504	567	495	504	567	495
R2	0.441	0.300	0.442	0.426	0.307	0.443

[[1] 1st stage results [2] OLS [3] Dependent vars: tax morale index or tax morale dummy [4] Cluster-adjusted standard errors [5] Income group 2, wave 1, full time, single and female are reference categories [6] Cheating on public transportation and Unselfishness important for child are second-stage exclusion restrictions [7] Results correspond to second stages in Tables **BASELINE-AR** and 11 [8] $^{*} < 0.10$, $^{**} < 0.05$, $^{***} < 0.01$

A.4 Sensitivity checks

Table 13: Sensitivity Checks for Average Tax Rate

Independent Variable	Tax Morale Index			Tax Morale Dummy		
Instrument	Cheat	Unself	Both	Cheat	Unself	Both
			Baseline			
Tax Morale	13.711∗∗∗	30.533∗	14.657∗∗∗	65.062∗∗∗	87.170∗∗∗	68.865∗∗∗
	(2.178)	(16.325)	(2.184)	9.771)	(31.417)	(9.401)
F-stat excl instr	64.09	3.71	34.43	58.41	8.54	33.61
N	504	567	495	504	567	495
			Institutional Quality			
Tax Morale	15.448∗∗∗	23.864∗∗	16.330∗∗∗	74.044∗∗∗	89.935∗∗∗	76.499∗∗∗
	(2.225)	(10.834)	(2.228)	(9.045)	(33.950)	(8.849)
Institutional Quality	-4.737∗∗∗	-4.134∗	-4.905∗∗∗	-8.552∗∗∗	-8.122∗∗∗	-8.920∗∗∗
	(1.681)	(2.168)	(1.757)	(1.537)	(1.902)	(1.586)
F-stat excl instr	55.51	6.07	30.83	59.21	8.40	34.12
N	464	527	455	464	527	455
			Weighted by number of observations in income group			
Tax Morale	12.652∗∗∗	142.929	13.573∗∗∗	62.836∗∗∗	212.340∗∗	73.006∗∗∗
	(2.301)	(204.535)	(2.370)	(10.812)	(100.871)	(11.204)
F-stat excl instr	70.94	0.44	35.32	65.69	3.93	35.55

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N	502	565	493	502	565	493
			OECD Countries			
Tax Morale	16.369***	30.794**	17.059***	80.964***	93.440***	84.349***
	(2.679)	(12.095)	(2.642)	(12.215)	(26.076)	(11.429)
F-stat excl instr	53.79	6.49	31.65	49.35	12.36	30.68
N	385	421	385	385	421	385
			Lead Tax Rates			
Tax Morale	11.559***	31.173*	12.423***	54.169***	87.143***	59.073***
	(2.139)	(17.990)	(2.111)	(9.096)	(32.826)	(8.944)
F-stat excl instr	56.09	3.26	30.57	53.45	8.03	29.94
N	477	549	477	477	549	477

[1] Dep. Var. AR [2] 2SLS IV estimations [3] Income-group level [4] Cluster-adjusted standard errors [4] All estimations include same control variables as in baseline specifications. [5] Lead tax rates estimations are IV regressions of tax rates in year $t+1$ on tax morale in t. [6] Weighted IV regressions weight income groups with the number of individuals in each respective group [8] $^{*} < 0.10$, $^{**} < 0.05$, $^{***} < 0.01$

A.5 Summary Statistics: Individual level

Table 14: Summary Statistics: Individual Level

Variable	**Mean**	**Std. Dev.**
Average Tax Rate (AR)	23.125	14.883
Marginal Tax Rate (MR)	30.274	15.642
Tax Morale Index	8.538	2.336
tax Morale Dummy	0.581	0.493
Cheat public transp	8.632	2.207
N	30044	

B Multiple imputation procedure

In order to tackle the problem of not having individual level data on income, among others, we employ a multiple imputation procedure, which is comparable to the approach proposed by Jenkins et al. (2011). The basic steps are as follows:

1. For each country-year, divide each of the 10 income groups of the WVS data

into 100 equally wide segments.[32]

2. For each of the resulting 100 incomes within each income group, calculate the corresponding (average and marginal) tax rates using the WTI data.

3. Randomly assign one of the 100 incomes (within an income group) to each individual in that income group. This step also automatically assigns corresponding tax rates to individuals. Since some groups have more than 100 individuals, it is possible for two or more individuals within a given group to have the same income.

4. Run individual level IV-regressions.

5. Repeat steps (3) and (4) 500 times.

The average (mean) coefficients of these 500 replications is used to derive our coefficient of interest. We employ the combination method proposed by Reiter (2003), and applied by Jenkins et al. (2011), to calculate standard-errors and levels of significance, taking into account the finite number of imputations.

C Alternative Models

In this Appendix, we set up two alternative theoretical models to show that the main results do not depend on a particular model. The first alternative is a simplified version of the general approach in the main body of the paper, i.e., we make a specific assumption about the utility function in equation 2. The second one introduces a critical level of evasion. The household only faces subjective costs of evading if her amount of evaded income exceeds this critical level.

C.1 Model with quadratic cost function

C.1.1 Households

Consider an economy with n groups of households, $i = 1, ..., n$. For simplicity, we normalize group size to unity, i.e., there is one household representing each group. We model tax morale as follows. We assume that households can easily evade taxes, but doing so gives rise to a subjective cost. The cost function is given by $0.5e_i^2 m_i$, where e_i is undeclared income of group i and m_i is a positive parameter which

[32]In principle, it is possible to randomly assign each individual a random income between the lower and upper bounds for the respective income brackets. However, we would not gain more variation in tax rates, whereas the computational procedure would be slightly more difficult.

captures differences in tax morale—the intrinsic motivation to honestly pay taxes—across groups. Groups with a high value of m_i have a high level of tax morale, and vice versa. Of course, this approach to modeling tax morale is very simple, and many other approaches may be contemplated. However, our key result does not depend on this particular approach. In Appendix C.2, we show that another approach, where taxpayers face 'moral costs' only if e_i exceeds some critical threshold, leads to the same result regarding the impact of tax morale on group specific tax rates.

We assume a simple utility function for household i which is given by

$$u_i = c_i - \frac{l_i^2}{2a_i} - 0.5e_i^2 m_i, \tag{13}$$

where c_i is consumption, l_i is labor supply and a_i is a parameter reflecting the disutility of work. Following Feldstein (1999), it is convenient to express utility in terms of earned income $y_i = l_i w_i$, where w_i is the wage rate of household i and declared income $d_i = y_i - e_i$, which yields

$$u_i = c_i - \frac{1}{2a_i}\left(\frac{y_i}{w_i}\right)^2 - 0.5(y_i - d_i)^2 m_i. \tag{14}$$

The household's budget constraint is

$$c_i = y_i - t_i d_i, \tag{15}$$

where t_i is the income tax rate. The household chooses earned income y_i and declared income d_i to maximize utility, subject to the budget constraint. This yields the following optimal choices:

$$y_i^* = a_i w_i^2 (1 - t_i), \tag{16}$$

$$d_i^* = a_i w_i^2 (1 - t_i) - \frac{t_i}{m_i}. \tag{17}$$

C.1.2 The Government

The government finances a given revenue target R using a wage tax, which may differ across household groups. The government budget constraint is given by

$$R = \sum t_i d_i. \tag{18}$$

Using (16) and (17), this can be expressed as

$$R = \sum t_i \left(a_i w_i^2 (1 - t_i) - \frac{t_i}{m_i} \right). \tag{19}$$

In the decision making process of the government, each group i is given a weight b_i, which may be interpreted either as a welfare weight or as a parameter reflecting relative political influence. The government maximizes the objective function

$$W = \sum b_i u_i \tag{20}$$

subject to (19). The optimal tax rate levied on group i is given by the formula

$$t_i^* = \frac{(\eta - b_i)}{(2\eta - b_i)} \frac{a_i w_i^2}{a_i w_i^2 + \frac{1}{m_i}}, \tag{21}$$

where η is the marginal cost of public funds. It thus turns out that the optimal tax imposed on group i is higher, the higher m_i, i.e. the higher the tax morale of group i, and vice versa.

C.2 Model with a Critical Level of Evasion

We develop a variant of our model of tax morale to show that our key result, that the optimal tax on group i is low if the tax morale of group i is low, does not depend on the particular model used in Section 2. We now assume that differences in tax morale arise for the following reason. There is a critical level of tax evasion denoted by $\overline{e}_i$. As long as the undeclared income of an individual of group i, e_i is below the critical level $\overline{e}_i$, the subjective cost of evading this income is zero. This reflects the idea that a small amount of tax evasion may be seen as morally acceptable. In groups with a high level of tax morale $\overline{e}_i$ this 'acceptable' level will be low or even equal to zero, in groups with a lower level of tax morale it may be quite high. If $e_i \geq \overline{e}_i$, the subjective cost of tax evasion of group i is given by $0.5(e - \overline{e}_i)^2 \sigma$, where σ is a positive tax morale parameter, which does not differ across groups. In this case, the utility function for household i is given by

$$u_i = c_i - \frac{1}{2a_i} \left(\frac{y_i}{w_i} \right)^2 - max[0, 0.5(e - \overline{e}_i)^2 \sigma]. \tag{22}$$

The household's budget constraint is again

$$c_i = y_i - t_i d_i, \tag{23}$$

where t_i is the income tax rate. The household chooses gross income y_i and declared income d_i to maximize utility, subject to the budget constraint. This yields

$$y_i^* = a_i w_i^2 (1 - t_i), \tag{24}$$

$$d_i^* = a_i w_i^2 (1 - t_i) - \frac{t_i}{\sigma} - \overline{e}_i. \tag{25}$$

The optimal tax rate is now given by

$$t_i^* = \frac{(\eta - b_i)}{(2\eta - b_i)} \frac{(a_i w_i^2 - \overline{e}_i)}{(a_i w_i^2 + \frac{1}{\sigma})}. \tag{26}$$

In this model, tax morale is low if the threshold $\overline{e}_i$ is high. Again, the optimal tax rate on groups with low tax morale is lower than that on groups with higher tax morale.

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