# Tolerance of tax evasion

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Abstract

We present a formal model in which individuals want the government to tolerate tax evasion because, in the context of limited state capacity, evasion provides insurance. Preferred tolerance of tax evasion increases with income, because government programs are also redistributive. We take the model to the data using the World Values Survey. We show that both in the model and in the WVS data justification of tax evasion is increasing in individuals' income, presents an inverted-U shape in perceived risk and is decreasing in institutional quality. Our analysis suggests that strong tax enforcement might not be popular among many citizens, particularly so in weak institutional environments.

Keywords: Informality, tax morale, tolerance of evasion

JEL: H20, H26, O17

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# Contents

# 1 Introduction

Individuals have different opinions regarding law compliance. Many think, or at least say when asked, that cheating on taxes, public benefits and public transport fares is never justifiable, but some individuals are more "flexible". We show in this paper that high income individuals tend to justify tax evasion to a larger degree than low income individuals. The probability of justifying tax evasion also depends on individuals' perceptions of risk: it reaches a maximum at intermediate values of risk and decreases when risk is perceived as either smaller or larger. Also weak institutional environments tend to be associated with more justification of tax evasion.

We take the observed justification of tax evasion as a proxy for individuals' preferences for government tolerance of tax evasion. The premise is that individuals who say that cheating on taxes is never justifiable are more likely to support a policy of zero tolerance than individuals who are more willing to justify evasion.[3] Based on this premise, we present a formal model of individuals' preferences for tolerance of tax evasion and take it to the data using survey responses to questions about justification of tax evasion.

In our model, the government redistributes income and provides insurance. Because of incomplete insurance markets, public insurance is valuable. The government redistributes income and provides insurance through a formal program, but its ability to protect individuals with this program is limited. The government can provide some additional insurance tolerating noncompliance of some norms and, in particular, tolerating some tax evasion when an individual faced a negative shock. In this framework, individuals may want positive taxation but also some tolerance of tax evasion.

Consider for example the case of unemployment insurance. In developing countries unemployment insurance programs are often small and even inexistent, and black market labor is widespread. Our conjecture is that governments might tolerate black market labor as a compensation for the weaknesses of the formal unemployment insurance program. Strict enforcement of the labor code might not be popular in such conditions.

We allow for considerable heterogeneity among agents in order to analyze how different income levels, perceptions of risk and of state capacity, among other variables, can explain the observed differences in the desired levels of both taxation and tolerance of tax evasion.

Ours is not a model about the individuals' decision to evade,[4] but about individuals' preferences regarding government tolerance of tax evasion. In the tradition of political

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[3] Analyzing a large Italian anti-tax evasion program, Casaburi and Troiano (2015) provide evidence that the strengthening of tax enforcement increases the probability of reelection to a lesser extent the higher is population justification of tax evasion.

[4] Since the seminal papers of Becker (1968) and Allingham and Sandmo (1972), an extensive literature on individuals' incentives to evade taxes has been developed. For surveys of this literature, see Andreoni et al (1998), Sandmo (2005) and Slemrod (2007). Benabou and Tirole (2011) provide a general model of pro-social behavior that encompasses tax compliance as a particular application and extends previous literature incorporating reputational concerns as well as externalities. In the present paper, in order to

economics (Persson and Tabellini, 2000), we derive a function of policy preferences from the primitive utility functions. We depart from more conventional models of the political economy of public finance in considering tolerance of tax evasion as one of the policy variables. In our model, individuals will simultaneously choose their optimal levels of taxation and government tolerance of tax evasion. We do not analyze the political equilibrium, but we hope that, by providing a systematic analysis of individuals' preferences towards taxation and enforcement, our paper can serve as a building block in a positive political economy theory of tax enforcement.

We see our study as a contribution to the literature on informality. Most of the literature focusses on individuals and firms, trying to understand the reasons why they exit and/or are excluded from the formal sector (for a survery, see Perry et. al. 2007). Governments also play an important role in the explanation, since informality has predominantly been considered a result of the limited ability of governments to monitor and enforce the law.[5] In the present paper we explore a complementary hypothesis –advanced in Forteza (2011) and Forteza and Noboa (2014)– according to which governments might be unwilling –rather than unable– to enforce the law if they could only commit to simple (not fully contingent) policy rules. According to this story, tolerance of informality might be a way of gaining flexibility through discretion. The evidence in the present paper provides some support to that story, as individuals are more likely to justify evasion if they think that individual effort is not conducive to success and if governments are not very effective. If these believes are correctly reflected in political support, politicians will tolerate informality.

The hypothesis that politicians are sometimes unwilling rather than unable to enforce the law has recently been explored in the literature. Holland (2014 and 2016) analyzes the case of street vendors in three Latin American countries, and provides evidence of politically driven enforcement efforts. Feierherd (2014) analyzes inspections to firms in Brazil and shows that there are systematic biases across municipalities, with more inspections of big firms if the mayor belongs to the left-wing labor party (PT) and of small businesses if the mayor belongs to the center-right-wing social-democratic party (PSDB). Brollo, Kaufmann and La Ferrara (2014) provide empirical evidence that the degree of enforcement of conditionality in a Brazilian welfare program impacts on citizens vote, and that politicians, aware of this, manipulate the degree of enforcement before elections. Our paper contributes to this recent literature analyzing the case of taxation.

Our paper owes much to the literature of tax morale. This literature has used survey data to characterize individuals' attitudes towards tax obligations. Studying answers to questions regarding how justifiable cheating on taxes is, the literature has tried to unravel what is behind tax compliance. One motivation of this line of inquiry is the idea that the incentives provided by the risk of being caught evading and having to pay fines are not strong enough to explain

focus on government tolerance of tax evasion, we abstract from individuals' incentives, both conventional material incentives and reputational concerns.

[5] Khan, Khwaja and Olken (2016) present experimental evidence on the positive impact of linking payments to tax inspectors to performance on tax collection.

the relatively high levels of compliance that prevail in most countries (see, for example, Feld and Frey, 2002, Sandmo 2005 and Torgler and Schaltegger, 2005).[6]

Luttmer and Singhal (2014) provide a survey of the literature on tax morale. They review studies that analyze specific mechanisms through which tax morale may impact on tax compliance. These include: intrinsic motivation, reciprocity, peer effects and social influences, long-run cultural factors and information imperfections and deviations from utility maximization. Some studies have reported positive correlations between measures of institutional quality, trust in government, satisfaction with public services and tax morale, which is interpreted as reciprocity.

In the present paper, we complement these studies by analyzing some covariates that, to the best of our knowledge, have not yet been analyzed in the tax morale literature. We show that beliefs about the role of luck and connections in individual performance and about how much control individuals feel they have over their own life correlate with the justification of tax evasion. We also show that individuals' beliefs about their ranking in income distribution and how proud they are of their nation co-vary systematically with justification of tax evasion. We do not claim these are tax morale effects, though. Individuals who benefit more with tax evasion may justify it more simply because they expect to rip higher benefits.

We think the present paper also makes an analytical contribution to the literature on tax morale. We model tax morale as an intrinsic motivation for tax compliance and add this motivation to the more standard pecuniary effects of tax evasion. We show how the interaction between these two motivations can produce specific responses in terms of justification of tax evasion that are consistent with some stylized facts we uncover from the world values survey data.

Our paper is also related to a literature that links preferences for redistribution to beliefs about the importance of luck. According to this literature, the support for redistributive policies positively correlates with the belief that luck and connections is more important than hard work to succeed in life (Alesina et. al. 2001; Alesina and Angeletos, 2005a, 2005b; among others). Piketty (1995) provides an explanation of this fact noting that the belief that outcomes depend mostly on luck should also lead to the conclusion that redistribution is relatively less distortionary. Therefore, individuals who believe that success depends mostly on luck will favor more redistribution than individuals who believe in the importance of hard work. Alesina and Angeletos (2005b) and Benabou and Tirole (2005) present related but different models that rationalize the correlation between support for redistribution and the belief in the importance of luck based on notions of fairness. Both models exhibit two equilibria, one in which individuals believe that the world is fair (luck plays a modest role) and support the laissez faire and one in which individuals believe the world is unfair (luck is crucial) and hence support the welfare state.

[6] Slemrod (2003, 2007, p 39) criticizes this argument though, on the grounds that the unconditional probabilities of detection typically used in these computations are much lower than the probabilities that unreported activities are detected. He also points out that "the stark differences in compliance rates across taxable items that line up closely with detection rates suggest strongly that deterrence is a powerful factor in evasion decisions" (Slemrod 2007).

The correlation we show in this paper between the belief that luck is decisive and the justification of cheating suggests a complementary channel. Individuals who belief that success depends heavily on luck might not only support more redistribution, but they might also demand more tolerance of tax evasion, at least in some range values. In other words, individuals who believe that luck determines outcomes might demand "flexibility" regarding law compliance.

The theme in this paper is also related to a growing literature on culture and development. The notion that "culture matters" is probably more extended among political scientists than economists. Inglehart, Welzel and collaborators have made a significant contribution in this regard producing the "world values surveys" (WVS). The WVS provides a comprehensive database on individuals' opinions gathered with a common methodology in almost 100 countries since 1981 (http://www.worldvaluessurvey.org/wvs.jsp). Mostly based on this data, they have also provided systematic analysis of values and beliefs across countries and time (see, for example, Inglehart and Welzel, 2005). Most of the data we use in the present paper comes from the WVS.

In recent years, economists have paid increasing attention to culture, analyzing both theoretically and empirically how values and beliefs affect and are affected by the economy (Alesina and Angeletos, 2005a and b; Alesina and Fuchs-Schündeln, 2007; Alesina and Giuliano, 2010 and 2014; Benabou and Tirole, 2011; Besley, Jensen and Persson, 2014). We hope our paper makes a contribution to this literature by showing how several values and beliefs interplay with standard incentives to determine systematic patterns of support for tolerance of tax evasion.

After this introduction, the paper continues as follows. In section 2, we present a formal model that relates individuals' tolerance of evasion with several values and beliefs. In section 3, we present the data and the econometric methodology. In section 4 we present our main empirical results. The paper ends with some concluding remarks in section 5.

# 2 The Model

## 2.1 The setting

Our model focuses on individuals preferences for policy instruments. In the tradition of the new political economy (Persson and Tabellini, 2000), we derive functions of policy preferences from primitive utility functions, assuming individuals are aware of the tradeoffs governments face and, in particular, are aware of governments' budget constraint. Our main goal is to explain several correlations we observe in public opinion surveys so we are interested in predicting bliss points of different citizens rather than in the political mechanism that leads to the selection of one particular policy.

The policy variable we are more interested in is the degree of enforcement of the norms. In our model, the government can tolerate some degree of noncompliance or "cheating". In a second best context, represented in our model by missing private insurance markets and limited government insurance capacity, adding this policy tool can be welfare improving. If so, individuals will not support a zero-tolerance policy, they will rather justify some degree of noncompliance.

The society is composed of a continuum of individuals and the population has mass 1. There is a government that collects taxes and redistributes income in a lump-sum fashion.

The timing is as follows. First, individuals acting as citizens determine their preferred tax rate and a rate of tolerance of tax evasion. Second, nature chooses the realization of an individual's idiosyncratic income shock. Income can be either "high" or "low", relative to his average income. Third, the government implements the policies chosen in the first place, i.e. it collects taxes, tolerating some evasion, and redistributes income. Fourth, individuals choose consumption.

In the fourth stage individual $i$ chooses consumption, knowing his realized disposable income. Let individual $i$ consumption and disposable income be $c_i^H, c_i^L, yd_i^H$ and $yd_i^L$, if he got high and low output respectively. Then his resources constraints are $c_i^H \leq yd_i^H$ and $c_i^L \leq yd_i^L$.

Before that, in the third stage, the government collects taxes at the rate $t \in [0,1]$, tolerating some tax evasion or "cheating on taxes" $ch \in [0,1]$ of those who experienced a negative realization of the shock.[7] These two rates have already been determined in the first stage by citizens. With the proceeds, the government pays a lump-sum transfer $b$ to each and every citizen. Thus, individual $i$ disposable income is:

$$c_i^H \leq yd_i^H = (1-t)(1+\sigma)y_i + b \quad ; \; c_i^L \leq yd_i^L = \big(1-t(1-ch)\big)(1-\sigma)y_i + b \qquad (1)$$

Where $(1+\sigma)y_i$ and $(1-\sigma)y_i$ are before-taxes income in the good and bad states of nature, respectively. We assume that $y_i > 0\ \forall i$ and $\sigma \in [0,1]$. Just to save on notation, we will often write this stochastic income as $(1+\varepsilon)y_i$, where $\varepsilon = \{\sigma, -\sigma\}$.

In the second stage, individuals produce and nature picks the realization of the income shock. For simplicity, we assume that there is a 0.5 probability of high and low output.

In the first stage, individuals pick their preferred tax rate and rate of tolerance of evasion. At this stage, individual $i$ knows (i) his own expected income $y_i = E_\varepsilon[(1+\varepsilon)y_i|i\,]$, (ii) the distribution of $y_j$ in the population, and (iii) the probability of high and low output. They also have beliefs about $\sigma$, which in our simple model turns out to be the coefficient of variation of income $CV_\varepsilon[(1+\varepsilon)y_i|i\,] = \sigma$.[8]

As we said, individuals know the probability of both states of nature, but they may disagree on the value of $\sigma$. Some individuals think that risk is very small, and hence believe that $\sigma$ is close to zero. At the other extreme, some individuals think that the world is a very risky place in

[7] We show in remark 4 at the end of this section that allowing evasion, possibly at a different rate, to those who got high output would not modify the results, for it is never optimum to allow evasion in the good state of nature.

[8] We made assumptions to have a simple parametrization of the expected income and the coefficient of variation of income, because these are two of the main covariates we analyze in the empirical part of this paper.

which income may end up being zero if you are unlucky, i.e. they think that $\sigma$ is close to 1. To acknowledge these different beliefs, we call $\sigma_i$ individual $i$ belief about the value of $\sigma$.[9]

Conditional on his belief $\sigma_i$, individual $i$ expects that the government budget constraint is as follows:

$$b = t\overline{y} - 0.5. t. ch. (1 - \sigma_i)\overline{y} \geq 0 \quad (2)$$

Where $\overline{y} = E_{j,\varepsilon}\left[(1+\varepsilon)y_j\right] = E_j\left[y_j\right]$ is the expected value of $y_j$ or average income before taxes. Half of the population experiences the negative shock and is allowed to evade taxes.[10]

Individuals' preferences can be represented by utility functions with two additive components. The first component is a conventional expected utility function of consumption, with the usual properties that represent preferences of risk averse individuals:

$$E_\varepsilon[u(c_i)] = u\left(c_i^H\right) + u\left(c_i^L\right) \quad ; \; u' > 0, u'' < 0 \quad (3)$$

Where, to economize on notation and without any loss of generality, we have dropped the ½ that correspond to the probabilities of the two states of nature.

The second component of utility represents intrinsic preferences for evasion. We assume that individuals may care not only for the pecuniary implications of tax evasion but also for cheating per se. In principle, we tend to interpret cheating as "a bad", and in this sense we will usually refer to this component as the disutility of cheating and include it in the utility function with a minus sign.[11]

We assume that there is considerable heterogeneity regarding the intrinsic disutility of cheating, and this heterogeneity stems from different preferences and beliefs, some of which are measured through various questions in the surveys. We represent the relevant individual traits by the vector $x$ and we specifically assume that the marginal disutility of cheating is a function of $x$. We include in $x$ most of the variables that the literature has shown to be correlated to tax morale, like gender and age. It has consistently been reported, for example, that women have higher tax morale than men. In the logic of our model, this means that women have higher marginal disutility of cheating than men.[12]

In summary, total utility is given by:

$$E_\varepsilon[u(c_i)] - \beta' x. ch \quad (4)$$

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[9] Notice that while $y_i$ denotes individual $i's$ income, $\sigma_i$ denotes individual $i's$ belief about the population parameter $\sigma$. So individual $i$ expects that individual $j$ has income $(1+\sigma_i)y_j$ in the good state, and $(1-\sigma_i)y_j$ in the bad state of nature.

[10] It is easy to check, using (1) and (2) that $E_{i,\varepsilon}[c_i] \leq E_i\,[y_i]$.

[11] This form of modeling the disutility of evading is inspired in Sandmo (2005).

[12] Notice that social stigma effects a la Allingham and Sandmo (1972) and reputational concerns and externalities a la Benabou and Tirole (2011) do not arise or are already endogenized in our setting in which individuals are not deciding how much they will individually evade but how much tolerance they want the government to exercise.

We will assume that cheating causes intrinsic disutility, i.e. it reduces utility in the absence of pecuniary benefits of cheating:

$$0 < \beta' x \tag{5}$$

The indirect utility function –the maximum utility individuals can get given the policy variables and market outcomes–, results from maximizing total utility in consumption. In our simple framework, this maximization involves choosing maximum feasible consumption, so that inequalities (1) must be binding.

The function of policy preferences can be computed substituting the government budget constraint in the indirect utility function. Two of the three policy variables can be chosen freely. We substitute the flat government transfers $b$ out to get a function of policy preferences in the taxation rate and the tolerance of evasion:

$$W(ch, \sigma_i, x, t, y_i) = u(c_i^H) + u(c_i^L) - \beta' x.ch$$

Where: $$c_i^H = (1-t)(1+\sigma_i)y_i + t\overline{y} - 0.5.t.ch.(1-\sigma_i)\overline{y} \tag{6}$$
$$c_i^L = (1-t)(1-\sigma_i)y_i + t\overline{y} - 0.5.t.ch.(1-\sigma_i)\overline{y} + t.ch.(1-\sigma_i)y_i$$

Before moving to the determination of optimal taxation and tolerance of evasion, we present a few remarks about our setting.

**Remark 1**: In this framework, tolerance of tax evasion is equivalent to having two tax rates, one for each state of nature. Hence there would be no need for tolerance if the government could implement these two tax rates. We rather assume that there is only one tax rate as a simple form of representing the limited capacity of the state to provide insurance through formal mechanisms.[13] In this context, individuals' justification of tax evasion can be thought of as a demand for "flexibility", which provides some of the missing insurance.

**Remark 2**: Individuals with different beliefs about $\sigma$ will have different views about the impact of a given tolerance of tax evasion on the government budget constraint. Individuals are nevertheless rational in the sense that, conditional on their beliefs, they will choose their preferred levels of $t$ and $ch$ consistent with (1) and (2).

**Remark 3**: Our cheating variable refers to a policy instrument, the degree of law enforcement, rather than to the individuals' decision to cheat on taxes. In order to focus on tolerance of evasion, we totally abstract from the much analyzed incentives to evade, like fines and the probability of being caught (Allingham and Sandmo, 1972). So in our model if tolerance of tax evasion has been set to a certain level, all individuals who got low output will evade to that level.

[13] The limited capacity of governments to implement fully contingent pre-committed policies is probably related more to the expenditure than to the income side of the budget. In the present paper, we chose to represent this limited capacity assuming the government can set only one tax rate for simplicity. Forteza and Noboa (2014) present a more general model in which the state cannot commit to fully contingent protection programs because of either Knightian uncertainty or non-verifiability of outcomes.

**Remark 4**: The assumption that cheating is allowed only in the bad state of nature is natural but, more importantly, it involves no loss of generality, for it is never optimum to choose a positive rate of cheating in the good state of nature. Let $c_i^H \leq \left(1 - t'(1 - ch^H)\right)(1 + \sigma_i)y_i + b$, and $c_i^L \leq \left(1 - t'(1 - ch^L)\right)(1 - \sigma_i)y_i + b$, where $ch^H$ and $ch^L$ represent the allowed rate of tax evasion in the good and bad states of nature respectively. These budget constraints are actually identical to (1) if we relabel the variables as follows: $t = t'(1 - ch^H) \in [0,1]$, $1 - ch = (1 - ch^L)/(1 - ch^H)$. Notice that $ch \in [0,1]$, if $0 \leq ch^H < ch^L \leq 1$. In turn, at the optimum $ch^H < ch^L$ since the pecuniary benefit of cheating is higher in the bad than in the good state of nature and the intrinsic disutility of cheating is the same in both states of nature. Therefore, any consumption pair in the budget set under the triplet $(t', ch^L, ch^H)$ also belongs to the budget set under $(t, ch, 0)$. Finally, notice that $(t, ch, 0) \leq (t', ch^L, ch^H)$ and hence the expected utility of consumption is the same and the intrinsic disutility of cheating is larger under $(t', ch^L, ch^H)$ than under $(t, ch, 0)$.

## 2.2 Optimal taxation and tolerance of evasion

We show first that, with the assumptions made so far, individuals with average or below average expected income prefer maximum redistribution and insurance and no tax evasion and individuals with above average expected income prefer less than full redistribution and insurance and, depending on parameter values, they may prefer some tax evasion.

We think that this very simplified model is useful to see some of the basic forces behind the optimal choices of low and high income earners, but the result that low income individuals prefer full taxation is of course not very appealing. We therefore present in the following section a second version of the model in which we introduce distortions from taxation.

### 2.2.1 Optimal policies with non-distortionary taxes

**Proposition 1**: In the model with no distortions (i) individuals with average or below average expected income $y_i \leq \bar{y}$ prefer $c_i^L = c_i^H$, $t = 1$ and $ch = 0$; and (ii) individuals with above average expected income prefer $c_i^L < c_i^H$, $t < 1$ and $ch \geq 0$, with $ch = 0 \; if \; t = 0$.

**Proof**: It will prove useful to write consumption in the good and bad states of nature as functions of the expected consumption and the consumption gap $c_i^H - c_i^L$:

$$c_i^H = E_\varepsilon[c_i] + 0.5\left(c_i^H - c_i^L\right) \quad ; \quad c_i^L = E_\varepsilon[c_i] - 0.5\left(c_i^H - c_i^L\right) \tag{7}$$

where $E_\varepsilon[c_i] = 0.5\left(c_i^L + c_i^H\right)$.

Deriving the function of policy preferences (6) in $t$ and $ch$, using (7):

$$W_t(ch, \sigma, x, t, y_i) = \left(u'\left(c_i^L\right) + u'\left(c_i^H\right)\right)\frac{dE_\varepsilon[c_i]}{dt} - 0.5\left(u'\left(c_i^L\right) - u'\left(c_i^H\right)\right)\frac{d\left(c_i^H - c_i^L\right)}{dt} \tag{8}$$

$$W_{ch}(ch,\sigma,x,t,y_i) = \left(u'(c_i^L)+u'(c_i^H)\right)\frac{dE_\varepsilon[c_i]}{dch} - 0.5\left(u'(c_i^L)-u'(c_i^H)\right)\frac{d(c_i^H-c_i^L)}{dch} - \beta' x \tag{9}$$

In turn, from (6):

$$\begin{aligned} E_\varepsilon[c_i] &= y_i + t\big(1-0.5ch(1-\sigma_i)\big)(\overline{y}-y_i) \\ c_i^H - c_i^L &= 2(1-t)\sigma_i y_i - t.ch.(1-\sigma_i)y_i \end{aligned} \tag{10}$$

And hence:

$$\begin{aligned} \frac{dE_\varepsilon[c_i]}{dt} &= \big(1-0.5ch(1-\sigma_i)\big)(\overline{y}-y_i) \\ \frac{d(c_i^H-c_i^L)}{dt} &= -\big(2\sigma_i + ch(1-\sigma_i)\big)y_i < 0 \\ \frac{dE_\varepsilon[c_i]}{dch} &= -0.5t(1-\sigma_i)(\overline{y}-y_i) \\ \frac{d(c_i^H-c_i^L)}{dch} &= -t(1-\sigma_i)y_i \le 0 \end{aligned} \tag{11}$$

Where $1-0.5ch(1-\sigma_i) > 0$.

Substituting (11) in (8) and (9):

$$\begin{aligned} W_t(ch,\sigma_i,x,t,y_i) &= \left(u'(c_i^L)+u'(c_i^H)\right)\big(1-0.5ch(1-\sigma_i)\big)(\overline{y}-y_i) \\ &+ \left(u'(c_i^L)-u'(c_i^H)\right)\big(\sigma_i+0.5ch(1-\sigma_i)\big)y_i \end{aligned} \tag{12}$$

$$\begin{aligned} W_{ch}(ch,\sigma_i,x,t,y_i) &= \left(u'(c_i^L)+u'(c_i^H)\right)0.5t(1-\sigma_i)(y_i-\overline{y}) \\ &+ \left(u'(c_i^L)-u'(c_i^H)\right)0.5t(1-\sigma_i)y_i - \beta' x \end{aligned} \tag{13}$$

(i) Individuals with average or below average expected income $y_i \le \overline{y}$.

Suppose first that, at the optimal values of $t$ and $ch$, $c_i^L < c_i^H$. Then $u'(c_i^L) - u'(c_i^H) > 0$ and hence equation (12) would imply that the marginal expected utility of taxation of these individuals is positive:

$$W_t(ch,\sigma_i,x,t,y_i) > 0 \quad if\ y_i \le \overline{y}\ and\ c_i^L < c_i^H$$

Hence these individuals would prefer $t = 1$. But, by virtue of (10), $c_i^L \ge c_i^H$ if $t = 1$, which is a contradiction.

Suppose now that, at the optimal values of $t$ and $ch$, $c_i^L > c_i^H$. Then $u'(c_i^L) - u'(c_i^H) < 0$, and equation (13) would imply that the marginal utility of tolerance of tax evasion is negative for these individuals:

$$W_{ch}(ch, \sigma_i, x, t, y_i) < 0 \ \ if \ y_i \leq \overline{y} \ \ and \ c_i^L > c_i^H$$

Hence these individuals would prefer $ch = 0$. But equation (10) would then imply that $c_i^L \leq c_i^H$, which is also a contradiction.

Finally, suppose that at the optimum $c_i^L = c_i^H$. Then, equation (12) implies that the marginal expected utility of taxation of these individuals is non-negative:

$$W_t(ch, \sigma_i, x, t, y_i) \geq 0 \ \ if \ y_i \leq \overline{y} \ \ and \ c_i^L = c_i^H$$

Hence these individuals prefer $t = 1$. Also, if $c_i^L = c_i^H$, equation (13) and assumption (4) imply that the marginal utility of tolerance of tax evasion is negative:

$$W_{ch}(ch, \sigma_i, x, t, y_i) < 0 \ \ if \ y_i \leq \overline{y} \ \ and \ c_i^L = c_i^H$$

Hence these individuals prefer $ch = 0$. This policy choice ($t = 1$ and $ch = 0$) implies, by virtue of equation (10), that $c_i^L = c_i^H$.

(ii) Individuals with above average expected income $y_i > \overline{y}$.

We first notice that the marginal utility of taxation at $t = 1$ is negative so full taxation is not an optimum for these individuals. Indeed, the first term in (12) is negative if $y_i > \overline{y}$. In turn, by virtue of (10), $c_i^L \geq c_i^H if \ t = 1$ and hence $u'(c_i^L) - u'(c_i^H) \leq 0$, so the second term in (12) would also be negative if $t = 1$. Therefore, (12) implies that the marginal utility of taxation is negative at $t = 1$:

$$W_t(ch, \sigma_i, x, t = 1, y_i) < 0 \ if \ y_i > \overline{y}$$

And hence $t = 1$ cannot be an optimum for these individuals.

We now show by contradiction that these individuals will prefer less than full insurance, i.e. they prefer $c_i^L < c_i^H$. Suppose otherwise, i.e. suppose that $c_i^L \geq c_i^H$, then (12) implies that the marginal utility of taxation would be negative for these individuals so they would choose $t = 0$. But if $t = 0$, (10) implies that $c_i^L < c_i^H$, which is a contradiction.

These individuals may prefer positive cheating if the marginal intrinsic disutility of cheating is not too large. More formally, $ch > 0 \ if \ W_{ch}(ch = 0, \sigma_i, x, t, y_i) > 0$, therefore:

$$ch > 0 \ if \ \left(u'(c_i^L) + u'(c_i^H)\right) 0.5t(1 - \sigma_i)(y_i - \overline{y}) + \left(u'(c_i^L) - u'(c_i^H)\right) 0.5t(1 - \sigma_i)y_i > \beta' x$$

With $c_i^L = (1 - t)(1 - \sigma_i)y_i + t\overline{y}$; $c_i^H = (1 - t)(1 + \sigma_i)y_i + t\overline{y}$ and $t < 1$.

Finally, these individuals prefer zero cheating if they prefer zero taxation. Indeed, assumption (4) and equation (13) imply that $W_{ch}(ch, \sigma_i, x, t = 0, y_i) < 0$. **QED**

In order to develop the intuition behind these results, we find it useful to notice that the standard deviation of consumption of individual $i$ can be written as a linear function of the consumption gap if, as proposition 1 proves, consumption in the bad state of nature is not greater than in the good state of nature:

$$SD_{\varepsilon}[c_i] = 0.5\left(c_i^H - c_i^L\right) \quad if \quad c_i^L \leq c_i^H \tag{14}$$

Using (14), the marginal utilities in (8) and (9) can be written in terms of the expected consumption and the standard deviation of consumption:

$$W_t(ch, \sigma_i, x, t, y_i) = \left(u'\left(c_i^L\right) + u'\left(c_i^H\right)\right)\frac{dE_{\varepsilon}[c_i]}{dt} - \left(u'\left(c_i^L\right) - u'\left(c_i^H\right)\right)\frac{dSD_{\varepsilon}[c_i]}{dt} \tag{15}$$

$$W_{ch}(ch, \sigma_i, x, t, y_i) = \left(u'\left(c_i^L\right) + u'\left(c_i^H\right)\right)\frac{dE_{\varepsilon}[c_i]}{dch} - \left(u'\left(c_i^L\right) - u'\left(c_i^H\right)\right)\frac{dSD_{\varepsilon}[c_i]}{dch} - \beta' x \tag{16}$$

Therefore, the pecuniary effects of marginal changes in taxation and tolerance of tax evasion on expected utility can be decomposed into an ex-ante redistribution effect and an insurance effect. The redistributive effect is captured by the first term and the insurance effect by the second term in equations (15) and (16). Computing the effects of marginal changes in the policy variables on the expected and the standard deviation of consumption we get (12) and (13). Hence, the first and second terms in the derivatives computed in (12) and (13) capture the effects of policy changes that go through ex-ante redistribution and insurance, respectively.

An increase in the tax rate increases the expected disposable income of the individuals with below average income and decreases the expected disposable income of individuals with above average income. This effect stems from the redistributive nature of the government program.

An increase in the tax rate also reduces the gap between disposable income in the good and bad states of nature, so the government program provides insurance. All individuals, no matter their expected income, experience utility gains from the greater protection against income risk that is associated to an increase in the size of the program.

While the redistributive and insurance effects of the government program go in the same direction in the case of "poor" individuals $(y_i < \overline{y})$ they go in opposite directions in the case of "rich" individuals $(y_i > \overline{y})$. The "poor" will thus prefer maximum taxation and the "rich" will prefer less than maximum taxation. Because of insurance, at least some individuals with above average income will support some positive taxation even when they lose in expected terms.

Tax evasion also has redistributive effects in our model, but with opposite sign as taxation. While the government program redistributes from the "rich" to the "poor", tax evasion redistributes from the "poor" to the "rich". This effect is captured by the first term in equation (13). A one percentage point increase in tolerated evasion causes a $0.5. t. (1 - \sigma_i) y_i$ gain in expected income through fewer taxes effectively paid and a $0.5. t. (1 - \sigma_i) \overline{y}$ loss in expected income through lower government transfers. Gains outweigh losses in the case of above average income individuals.

Notice that, in this model, tax evasion has no direct pro-rich bias, since everybody can evade the same proportion of their due taxes when they have suffered a negative shock. Nevertheless, tax evasion is regressive because it reduces the size of the government program, so it undermines progressive redistribution. This second indirect effect can be seen noting that the government transfer is decreasing in tax evasion. Indeed, from equation (2):

$$\frac{db}{dch} = -0.5.t.(1-\sigma_i)\overline{y} \leq 0 \quad (17)$$

An increase in tax evasion also contributes to reduce the gap between disposable income in the good and bad states of nature, so it also provides insurance. This is because evasion is tolerated only in the bad state of nature.

Given these effects, the "poor" want a government program that is as large as possible. In the current version of the model, with no distortions from taxation, they want the government to fully expropriate income and redistribute it through a flat transfer. This policy choice provides maximum redistribution and full insurance. Evasion is not a good option for the "poor" because, in this context, it reduces redistribution without providing more insurance.

The "rich" prefer a smaller government program. Even when the program is to some extent valuable because of the insurance it provides, too much of this program is not desirable because of the pro-poor redistribution it causes. Tax evasion is a potentially valuable option for them, for it provides insurance without the ex-ante pro-poor redistribution embedded in the government program.

Tolerance of tax evasion will be more appealing in the margin to an above average income individual the larger is the tax amount to be evaded, i.e. the larger is $t(1-\sigma_i)y_i$, and the smaller is the intrinsic marginal disutility of tax evasion, i.e. the smaller is $\beta' x$ (see equation (13)). Individuals with sufficiently high intrinsic marginal disutility of tax evasion –sufficiently high tax morale– will not succumb to the temptation of supporting tax evasion even if they obtain pecuniary benefits from it. Also, even individuals with moderate to low intrinsic marginal disutility of tax evasion would not support it if the pecuniary gains were small, as it would be the case if the taxes to be evaded were small. Conversely, individuals with either low intrinsic disutility of evasion or large pecuniary benefits will support it.

### 2.2.2 Optimal policies with distortionary taxes

We assume now that taxes reduce expected output. We specifically assume that:

$$y_i(t) = y_i(1-t)^{1/ge} \quad ; \quad ge \geq 0 \quad (18)$$

where $ge$ stands for government effectiveness. The higher is this parameter, the smaller are the distortions from taxation. Taxes are not distortionary, and we are back in the previous section setting, if $ge \to \infty$. Hence we are assuming that, if taxes are distortionary, income goes to zero as the tax rate goes to one. This is the reason why, in this version of the model, nobody will support a hundred percent taxation.

It is immediately clear that the function of policy preferences is now as follows:

$$W(ch, \sigma_i, x, t, y_i) = u(c_i^H) + u(c_i^L) - \beta' x.ch$$

Where: **(19)**

$$c_i^H = (1-t)(1+\sigma_i)y_i(t) + t\overline{y}(t) - 0.5.t.ch.(1-\sigma_i)\overline{y}(t)$$
$$c_i^L = (1-t)(1-\sigma_i)y_i(t) + t\overline{y}(t) - 0.5.t.ch.(1-\sigma_i)\overline{y}(t) + t.ch.(1-\sigma_i)y_i(t)$$
$$\overline{y}(t) = \overline{y}(1-t)^{1/ge}$$

**Proposition 2**: In the model with distortionary taxation all individuals prefer $c_i^L < c_i^H$, $t < 1$ and $ch \geq 0$, with $ch = 0 \; if \; t = 0$.

**Proof**: From (18) and (19), $y_i(t=1) = c_i^L = c_i^H = 0$. This allocation cannot be an optimum because the utility function is increasing in consumption and there are positive consumption bundles in the option set. Hence $t < 1$.

Equations (8) and (9) still hold, but the tax rate will now have an additional effect on expected income and the consumption gap:

$$\frac{dE_\varepsilon[c_i]}{dt} = \big(1 - 0.5ch(1-\sigma_i)\big)\big(\overline{y}(t) - y_i(t)\big) + y_i(t)' + t\big(1 - 0.5ch(1-\sigma_i)\big)\big(\overline{y}(t)' - y_i(t)'\big) \quad \textbf{(20)}$$

$$\frac{d(c_i^H - c_i^L)}{dt} = -\big(\sigma_i + 0.5ch(1-\sigma_i)\big)y_i(t) + \big(2(1-t)\sigma_i - t.ch.(1-\sigma_i)\big)y_i(t)' < 0$$

Therefore, the marginal utilities of taxation and tolerance of evasion are:

$$W_t(ch, \sigma_i, x, t, y_i) = \Big(u'(c_i^L) + u'(c_i^H)\Big)\Big(\big(1 - 0.5ch(1-\sigma_i)\big)\big(\overline{y}(t) - y_i(t)\big) + f(t)\Big) + \Big(u'(c_i^L) - u'(c_i^H)\Big)\Big(\big(\sigma_i + 0.5ch(1-\sigma_i)\big)y_i(t) + g(t)\Big) \quad \textbf{(21)}$$

$$W_{ch}(ch, \sigma_i, x, t, y_i) = \Big(u'(c_i^L) + u'(c_i^H)\Big)0.5t(1-\sigma_i)\big(y_i(t) - \overline{y}(t)\big) + \Big(u'(c_i^L) - u'(c_i^H)\Big)0.5t(1-\sigma_i)y_i(t) - \beta' x \quad \textbf{(22)}$$

Where:

$$f(t) = \Big(1 - t\big(1 - 0.5ch(1-\sigma_i)\big)\Big)y_i(t)' + t\big(1 - 0.5ch(1-\sigma_i)\big)\overline{y}(t)' \leq 0$$

$$g(t) = \big((1-t)\sigma_i - 0.5t.ch(1-\sigma_i)\big)y_i(t)'$$

We now prove that $c_i^L < c_i^H$ by contradiction. We consider first the case of individuals with average or below average expected income $y_i(t) \leq \overline{y}(t)$. Suppose that $c_i^L \geq c_i^H$. Then (22) would imply that the marginal utility of tolerance of evasion would be negative for these individuals:

$$W_{ch}(ch, \sigma_i, x, t, y_i) < 0 \;\; if \;\; y_i(t) \leq \bar{y}(t) \; and \; c_i^L \geq c_i^H$$

And these individuals would choose $ch = 0$. But we have already proved that $t < 1$. Then, (10) would imply that $c_i^L < c_i^H$, which is a contradiction.

We consider now individuals with above average expected income $y_i(t) > \bar{y}(t)$. Suppose that $c_i^L \geq c_i^H$. Then (21) implies that the marginal utility of taxation is negative for these individuals:

$$W_t(ch, \sigma_i, x, t, y_i) < 0 \; if \; y_i(t) > \bar{y}(t) \; and \; c_i^L \geq c_i^H$$

So these individuals would choose $t = 0$. But then, (10) would imply that $c_i^L < c_i^H$.

All individuals may prefer some positive evasion, depending on parameter values. A sufficient condition for $ch > 0$ to be an optimum is that $W_{ch}(ch = 0, \sigma_i, x, t, y_i) > 0$. Therefore:

$$ch > 0 \; if \; \left(u'(c_i^L) + u'(c_i^H)\right) 0.5t(1-\sigma_i)\left(y_i(t) - \bar{y}(t)\right) + \left(u'(c_i^L) - u'(c_i^H)\right) 0.5t(1-\sigma_i)y_i(t) > \beta' x$$

With $c_i^L = (1-t)(1-\sigma_i)y_i(t) + t\bar{y}(t)$; $c_i^H = (1-t)(1+\sigma_i)y_i(t) + t\bar{y}(t)$ and $t < 1$.

In the above expression, the first term in the left hand side is non-positive, if $y_i(t) \leq \bar{y}(t)$, and positive, if $y_i(t) > \bar{y}(t)$. The second term is positive because of incomplete insurance: $c_i^L < c_i^H$. So, depending on parameter values, this condition may be fulfilled and even low income individuals may prefer some positive tolerance of tax evasion.

Finally, (22) implies that the marginal utility of tolerance of tax evasion is negative, and hence $ch = 0$ if $t = 0$. **QED**

With distortionary taxation, even low income individuals will not support a tax rate that fully expropriates output to be redistributed evenly. This opens the door for them to support some degree of tolerance of tax evasion when individuals have faced a negative shock, as a form of improving the insurance capacity of the government program. Tolerating tax evasion amounts to having two effective tax rates in a regime where the statutory tax is proportional, so that the effective tax schedule is really progressive. The idea that progressive taxation can be justified by an insurance argument was first stated by Varian (1980).[14]

## 2.3 Comparative statics

We first simulate the model to analyze the predicted impact of the exogenous variables on the preferred tax rates and tolerance of tax evasion. In the simulated data base, we regress tolerance of tax evasion on the exogenous variables to determine the main stylized facts. Afterwards, we do some analytics on the comparative statics in the general model to improve our understanding of the simulated stylized facts.

### 2.3.1 Comparative statics 1: Simulations

[14] We thank Professor Agnar Sandmo for calling our attention on this point.

For the simulations, we consider a constant relative risk aversion utility function: $u(c) = c^{1-\gamma}/1-\gamma$. We set the coefficient of relative risk aversion at 2 ($\gamma = 2$), which is within the range of values found in econometric analysis (Forteza and Sanroman, 2015).

Income without taxes, $y_i(t = 0)$, varies from 45 to 55 with the mean at 50. Notice that, since we are analyzing only individual preferred policies and not the political equilibrium, we do not need to specify the whole distribution of $y_i(t = 0)$. But the model and this simulation in particular are consistent with right skewed income distributions that are crucial for some standard results like for example in Metzler and Richard (1981) model.

Government effectiveness $ge$ varies from 31 to 35. With this parameter in the middle of the range, i.e. with $ge = 33$, the income loss due to a taxation rate of 40 percent would be about 1.5 percent.

The intrinsic disutility of cheating in these simulations is simply $\beta_1$ and we set $\beta_1 = 5 * 10^{-4}$.

While we did not make a systematic attempt at calibration –the model is probably too stylized for that– we chose these parameter values by trial and error to get interesting results that qualitatively replicate what we found in actual data. In particular, we chose these values to avoid that the preferred tax rate and tolerance of tax evasion were zero in the whole range of income values.[15]

Figure 1 shows some typical results. The preferred tax rate is decreasing and the preferred tolerance of tax evasion is increasing in expected income. Therefore, low-income individuals prefer more taxation and less evasion than high income individuals. The formal government program that is financed with taxes provides insurance and redistribution. Low income individuals benefit from both. Tax evasion provides insurance without redistribution. Hence, high income individuals prefer less taxation and more evasion than low income individuals.[16]

Insert figure 1 about here

Preferred tax rates are increasing in income risk. This is a natural result since the program is assumed to provide insurance, but tolerance of tax evasion presents an inverted-U pattern in income risk. This is because tax evasion also provides insurance, but it is not effective when income risk is very low, because risk is not an important issue in this case, and when it is very high, because expected taxes are low in this case.

Higher government effectiveness induces higher desired tax rates and lower desired tolerance of tax evasion. The efficiency loss due to taxation is lower the higher is government effectiveness. Hence, individuals prefer higher taxation and lower tax evasion when the

[15] If government effectiveness is sufficiently low and the intrinsic disutility of cheating $\beta' x$ is sufficiently large, $t = ch = 0$.

[16] The result that the individual's income positively impacts on his desired tax evasion is reminiscent of Allingham and Sandmo (1972), but the argument in our model is different from theirs. Analyzing the individuals' decision to evade, given the set of rules, Allingham and Sandmo argue that wealthier individuals will be more willing to take the risk of evading and being caught than poorer individuals, if absolute risk aversion is increasing in income. In our model, individuals are choosing the rules, and the wealthier prefer more tolerance of tax evasion than the poor because of the progressiveness embedded in the government program.

government is more effective. It is in the context of inefficient governments that citizens demand “flexibility” as an alternative to the formal government program. Informality is then seen as a substitute for the formal welfare state which is too costly.

The graphs in figure 1 are drawn for fixed values of the variables that are not represented in the axis. To check that the stylized facts we have just described are not simply the result of the specific values we chose for the drawings, we present in table 1 the results of a typical multivariate regression analysis done with the simulated database.

Insert table 1 about here

According to the results in the first column in table 1, the model predicts that the preferred tax rates are decreasing functions of income and increasing functions of government effectiveness. The tax rates are concave but monotonically increasing in income risk in the feasible value range.[17]

The second column in table 1 shows that, according to the model, tolerance of tax evasion is increasing in income and decreasing in government effectiveness. It presents an inverted-U pattern in risk, with a maximum at approximately the middle of the range value.

### 2.3.2 Comparative statics 2: Discussion and some analytic results

In the logic of the model, high income individuals prefer lower taxation and higher tolerance of tax evasion than low income individuals because of the redistributive effects of the government program.[18] While both policy instruments provide insurance, government taxation also generates redistribution from high to low income individuals. Therefore high income individuals favor a policy mix with lower taxation and more tax evasion.

The optimal tax rate is also increasing in income risk. This is because the government program that is financed with these taxes provides insurance, something that is more valuable the higher is income risk.

It is probably more surprising that optimal tolerance of tax evasion presents an inverted-U pattern in income risk. We provide here an intuitive argument for this result and a more formal argument below, in the corollary to proposition 2.

Notice first that the insurance benefit of tax evasion is low if income risk is low. In turn, tax evasion reduces the size of the government program and hence of redistribution, something that low income individuals dislike, but high income individuals may value. It is thus clear that low income individuals will not favor tax evasion when income risk is low, but what about high income individuals? In the model, high income individuals are especially unsupportive of the

[17] Indeed with the coefficients we get in the regression, the quadratic expression would reach a maximum at $\sigma = 1.14$ and this point is not feasible, since income in the bad state of nature is zero at $\sigma = 1$. Higher values of $\sigma$ would imply negative values of income.

[18] Our argument is related to Holland’s (2014 and 2016), in that the redistributive consequences of noncompliance impacts on the desired degree of enforcement. The main difference is that while in her study the beneficiaries of forbearance are poor in ours they are rich. Therefore, tolerance is negatively correlated with income in her study and positively correlated in ours.

government program, i.e. favor a low tax rate, when income risk is low. But if the tax rate is low, tolerance of tax evasion will not be very effective. Therefore, in the presence of some intrinsic disutility of tax evasion, neither low nor high income individuals will favor tolerance of tax evasion when income risk is low.

At the other extreme, when income risk is perceived as being so high that in the bad state of nature income is almost zero, tolerance of tax evasion is of little use simply because the tax bill of the unlucky is low. Then, neither low nor high income individuals will favor tolerance of tax evasion in this environment, if tax evasion causes some intrinsic disutility.

**Corollary to proposition 2:** $ch \rightarrow 0$ if (i) $\sigma_i \rightarrow 0$ or (ii) $\sigma_i \rightarrow 1$.

**Proof**: (i) $\sigma_i \rightarrow 0$.

Individuals with $y_i(t) \leq \overline{y}(t)$. The first term in the right hand side of (22) –the redistributive effect of tax evasion– is negative if $y_i(t) \leq \overline{y}(t)$. The second term –the insurance effect– also becomes negative, because (10) implies that $c_i^H < c_i^L$, and hence $u'(c_i^L) - u'(c_i^H) < 0$, if $\sigma_i \rightarrow 0$. The third term is negative by assumption (4). Hence individuals with $y_i(t) \leq \overline{y}(t)$ prefer no tax evasion if $\sigma_i \rightarrow 0$.

Individuals with $y_i(t) > \overline{y}(t)$. We first show that these individuals prefer that the tax rate is zero if $\sigma_i \rightarrow 0$ and then argue that if the tax rate is zero, tax evasion is not desirable. The first term in the right hand side of equation (21) is negative if $y_i(t) > \overline{y}(t)$. The second term –the insurance effect– also becomes negative. To see it, notice first that $\lim_{\sigma_i \rightarrow 0}\left(\sigma_i + 0.5ch(1 - \sigma_i)\right)y_i(t) + g(t) > 0$, and hence (10) implies that $c_i^H < c_i^L$, so $u'(c_i^L) - u'(c_i^H) < 0$, if $\sigma_i \rightarrow 0$. The marginal utility of tolerance of tax evasion (22) is negative if $t = 0$. Therefore, individuals with above average income also prefer zero tolerance of tax evasion if $\sigma_i \rightarrow 0$.

(ii) $\sigma_i \rightarrow 1$.

Because of assumption (4), the marginal utility of tolerance of tax evasion (22) is negative if $\sigma_i \rightarrow 1$. Therefore, individuals prefer $ch = 0$ if $\sigma_i \rightarrow 1$. **QED**

Notice that the corollary does not imply that the optimal tolerance of tax evasion must show an inverted-U pattern in income risk. It only proves that optimal tolerance tends to zero as income risk tends to zero and to one. We cannot rule out in general that this graph presents more complex shapes. But the corollary does show why, in the logic of the model, tolerance of tax evasion is not very appealing when income risk is at either extreme.

# 3 Data and methods

## 3.1 Data sources

The WVS represents the main source of data for the analysis presented in this paper. This survey started gathering individuals' opinions in 1981 and has covered almost a hundred countries since then. Surveys are organized in period waves containing between four and six years depending on the wave. In each wave questions are revised and there might be some differences between countries.

The analysis presented in this paper is based on wave 6, the most recent one. It was gathered between 2010 and 2014 depending on the country, and covered 60 countries. Questions were organized under the following chapters: perception of life, environment, work, family, politics and society, religion and morale, national identity, security, science, structure of life and socio-demographics.

In order to assess different opinions regarding tax compliance we used the following question asked in the WVS (wave 6): “Please tell me for each of the following actions whether you think it can always be justified, never be justified, or something in between.” The questionnaire continues with a list of actions, including: “Cheating on taxes if you have a chance”. Answers are distributed in a ten point scale, where 1 is “never justifiable” and 10 is “always justifiable”. Considering this question, we built a dichotomous variable (named $cheat$) that is equal to 1 if the respondent chose 2 to 10 in the ten scale index, and is equal to 0 if she chose 1.

Recoding the original into a more compact scale is common in the literature on tax morale. Torgler and Schaltegger (2005), Torgler (2006), Frey and Torgler (2007) and Streiff (2013) use a four-point scale. Alm and Torgler (2006), Doerrenberg and Peichl (2010), Heinemann (2011), Daude (2012), Halla (2012), and Gerstenblüth et. al. (2012) use a two-point scale. Most of these two-point scales take the value 1 when cheating on taxes is “never justified” and 0 otherwise. Alm and Torgler (2006) and Daude (2012) report results with the two-point scale, but mention that they obtain similar results with the four- and the original ten-point scales. Halla (2012) creates a binary variable equal to one if the respondent answered between 6 and 10 to the WVS questionnaire, and zero otherwise. Halla’s choice of the threshold is dictated by the aim of matching the WVS and the American General Social Survey questions on tax morale. Gerstenblüth et. al. built a binary variable where 1 stands for “never justify” and the closest next category, and 0 otherwise, in order to obtain a balanced frequency of observations.

We analyze how the answers to the question about tax evasion covary with three main explanatory variables, namely individuals’ average income, their perceptions about risk and their perceptions about the quality of government. Our focus on these three variables is motivated by the formal model in section 2 that produces some specific predictions about these relationships. We also consider a set of controls, mostly inspired in the literature on tax morale.

The WVS has a specific question about income. Individuals are asked the following: “On this card is an income scale on which 1 indicates the lowest income group and 10 the highest income group in your country. We would like to know in what group your household is. Please, specify the appropriate number, counting all wages, salaries, pensions and other incomes that come”. Notice that this question provides information about perceived as opposed to actual ranking in income distribution. But this is exactly what we need according to the model in section 2.[19]

We used two proxies for the individuals perceived income risk. First, we considered a question that explores the importance individuals attribute to luck as opposed to hard work for success. In the wave 6 of the WVS, the question is as follows: "Now I'd like you to tell me your views on various issues. How would you place your views on this scale? 1 means you agree completely with the statement on the left; 10 means you agree completely with the statement on the right; and if your views fall somewhere in between, you can choose any number in between". The statement on the left is "In the long run, hard work usually brings a better life", and the statement on the right is "Hard work doesn't generally bring success - it's more a matter of luck and connections". We used the WVS ten-point scale for this variable, and we named it $luck$.

The second proxy for income risk is a question about the importance of free choice in life. The questionnaire goes as follows: "Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means "no choice at all" and 10 means "a great deal of choice" to indicate how much freedom of choice and control you feel you have over the way your life turns out". We recoded the answers to this question setting "a great deal of choice" to 1 and "no choice at all" to 10 and named the new variable $no\ choice$. Individuals who think they have no choice are likely to perceive higher risk than individuals who think they have a great deal of free choice and control over their lives.

We used three proxies for the quality of government or, more generally, the state capacity. Two of them are computed from questions in the WVS, and reflect individuals' views, and the third one is based on a World Bank index of government effectiveness, and varies only at the country level.

The first question in the WVS we used for quality of government is as follows: "I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?" One of the organizations was "the government (in your nation's capital). We named this variable $confidence\ in\ government$ and recoded the WVS four-point scale to have 1 representing "none at all" and 4 "a great deal". The second question we included in this subgroup of covariates is as follows: "How proud are you to be [nationality]? Answers are distributed in a four-point scale, where 1 is "very proud" and 4 is "not at all proud". We named this variable $pride$ and recoded it to make higher values represent higher pride.

The third indicator of government quality is an aggregate indicator constructed by the World Bank's Worldwide Governance Indicators (WGI) project. This project reports indicators on 215 countries from 1996 through 2013. Six dimensions of governance are measured in the WGI:

[19] The questionnaire does not mention income deciles, probably to avoid technical jargon, but the question is formulated in such a form that individuals will most likely interpret it in that way. Hence, we will talk about income deciles when we refer to the ten-point scale in this question.

voice and accountability; political stability and absence of violence; government effectiveness; regulatory quality; rule of law; and control of corruption. As Kaufmann et. al. (2009, p. 4) explain, these indicators are constructed "based exclusively on subjective or perceptions based data on governance reflecting the views of a diverse range of informed stakeholders, including tens of thousands of household and firm survey respondents, as well as thousands of experts working for the private sector, NGOs, and public sector agencies". We chose to work with the "government effectiveness estimate" in the WGI project, which aims at "capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies" (Kaufmann et.al. 2009, p. 6). The indicator is defined as a continuous variable ranging from -2.5 to 2.5, and higher scores correspond to higher governance effectiveness. We called this variable $government\ effectiveness$.

We included most of the usual controls in the Tax Morale literature (see Frey and Torgler 2007, among others). Regarding demographics and marital status, we include dummies for several age groups, sex, and marital status. We also controlled for education using the following question in the WVS: "What is the highest educational level that you have attained?" Answers run in a nine scale index, where the highest value corresponds to "University-level education, with degree" and the lowest corresponds to "No formal education". We use the original nine-point index.

We decided not to include some other controls that are common in the tax morale literature because their inclusion caused a significant loss of data. This was the case of employment status, church attendance and social class.

We also control for country's per capita GDP at purchasing power parity (obtained from the April 2015 edition of the International Monetary Fund's World Economic Outlook database).

Finally, we include a control variable that, to the best of our knowledge, has not been previously explored in the tax morale literature, and is based on the following question: "Do you think most people would try to take advantage of you if they got the chance, or would they try to be fair? Please show your response on this card, where 1 means "people would try to take advantage of you," and 10 means "people would try to be fair"". We called this variable $fair$ and used the original ten-point scale.

All WVS data was weighted to take into account national populations characteristics and in order to make every countries' sample size equal.

Wave 6 of the WVS has 60 countries, but we could not include all of them because of data availability issues. We could cover only 55 countries when we included all the covariates we wanted to control for and 56 when we dropped $GDP$ as a control.[20]

[20] The 56 countries considered were: Algeria, Azerbaijan, Argentina, Australia, Armenia, Brazil, Belarus, Chile, China, Taiwan, Colombia, Cyprus, Ecuador, Estonia, Georgia, Ghana, Hong Kong, India, Iraq, Japan, Jordan, Kazakhstan, South Korea, Kuwait, Kyrgyzstan, Lebanon, Libya, Malaysia, Mexico, Morocco, Netherlands, Nigeria, Pakistan, Palestine, Peru, Philippines, Poland, Romania, Russia, Rwanda, Slovenia,

## 3.2 Descriptive statistics

The response to the question about justifiability of cheating on taxes varies greatly across individuals and countries. To have a sense of the between countries heterogeneity we computed the proportion of individuals whose answers lie at or below each point of the ten-point scale country by country. Using these proportions, we estimated empirical cumulative distribution functions ($CDF$) for the 55 countries for which we have this information. The $CDF$ gives a measure of the country intolerance of evasion: the higher the $CDF$ the lower the proportion of individuals willing to justify cheating on taxes at the given tolerance point or above. Conversely, $1 - CDF$ is a measure of country tolerance of tax evasion.

As it is apparent from figure 2, the between countries heterogeneity is particularly large at the bottom of the ten-point scale. The proportion of respondents saying that cheating on taxes is never justifiable, $F(cheat = 1)$, ranges from a minimum of 23 percent in India to a maximum of 87 percent in Japan. The cross country heterogeneity is smaller at other points in the scale.

Insert figure 2 about here

There is also considerable heterogeneity between WB regions and country income groups (figures 3 and 4).[21] Part of the country differences naturally average out when we look at groups of countries, but some remain. South Asia is the region that justifies cheating to a larger extent in most of the scale. Only at points 8 and 9 in the ten-point scale, the empirical $CDF$ of South Asia lies above the $CDF$ of other regions. Unexpectedly, Latin America and the Caribbean is the region with the lowest declared tolerance of tax evasion, close to and below that of North America (composed only by the United States in our sample).

Insert figures 3 and 4 about here

Tolerance of tax evasion is lower in high than in upper-middle and in upper- than in lower-middle income countries (figure 4). This ranking remains the same irrespective of the tolerance threshold we consider. In turn, the $CDF$ of low-income countries lies below the other three at the lowest point in the ten-point scale (cheating on taxes is "never justifiable") but crosses the other $CDFs$ at higher points. Hence low-income countries are more tolerant to tax evasion than the other three groups if we assess tolerance using the most extreme threshold ("never justifiable") but less tolerant than middle income countries if any other threshold is used.

In most regions and country-income groups, at least half of the population says that cheating on taxes is never justifiable (the median of the variable is equal to 1, see table 2). The exceptions are South Asia and Sub-Saharan Africa and the group of low income countries, but even there at least half of the population chooses one of the two lowest points in the ten-point scale when asked about justifiability of cheating on taxes. The mean score lies between a

South Africa, Zimbabwe, Singapore, Spain, Sweden, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Egypt, United States, Uruguay, Uzbekistan and Yemen. When we use $GDP$ as a control variable we drop Palestine.

[21] Notice however that the countries included in the WVS are not necessarily fully representative of each region. See notes in table 2.

minimum of 1.87 in Latin America and the Caribbean and a maximum of 2.90 in South Asia. In all regions and income groups the mean is well above the median, indicating that the distributions are skewed to the right.

Insert table 2 about here

All in all, this analysis shows that most of the heterogeneity regarding tolerance of tax evasion takes place at the lowest threshold. Therefore a binary variable that separates those who are totally intolerant to evasion from all the others looks as an appropriate simple indicator of tolerance of evasion. The last column in table 2 reports the frequencies of this variable across regions and country-income groups. This measure of tolerance of evasion ranges from a minimum of 30 percent in the Americas to a maximum of 55 percent in South Asia. The indicator is monotone in country income, ranging from a minimum of 34 percent in high-income countries to a maximum of 58 percent in low-income countries.

Table 3 contains some information about the distribution of perceptions regarding income ranking. In most regions and country-income groups the proportion of individuals who think they belong to the poorest decile is lower than ten percent and in all regions and country-groups the proportion of individuals who think or declare they belong to the richest decile is substantially smaller than ten percent. Conversely, the proportion of individuals who declare they belong to the $5^{th}$ decile is substantially higher than ten percent. This underestimation of the extremes and overestimation of the middle is a well-documented fact (see Cruces et. al. 2013 for a detailed analysis of this bias).

Table 3 also presents the mean of the original ten-point scale and of the two-point scale in the two variables we are using as proxies for perceived risk, namely the opinions about the importance of luck and connections as opposed to hard work for individual success and about choice. By construction of the indexes, the means in the two-point scales are equal to the proportion of respondents choosing 1. Notice first that, in all regions and country-income groups, more than 58 percent of respondents did not endorse the claim that "In the long run, hard work usually brings a better life”. Similarly, at least 72 percent of respondents did not endorse the claim that they had “A great deal of choice”.

In the ten-point scales the average response lied between 3.3 and 4.6, depending on regions and country-income groups. Regarding luck and connections, the mean score in the ten-point scale ranges from a minimum of 3.3 in the Middle East & North Africa to a maximum of 4.6 in Europe & Central Asia.[22] Regarding lack of choice, the minimum was observed in Latin America & the Caribbean and the maximum in South Asia. The propensity to attribute success to luck and connections is roughly increasing in country’s income (see lower panel in table 3). The mean score in the ten-point scale ranges from 3.79 in the low- and lower-middle- to 4.43 in high-income countries. There is no clear pattern regarding choice. In summary, there is no

[22] These figures should be taken with some caution and only as a first approximation, because some regions are probably not well represented in this sample. In particular, west Europe is represented by only three out of seventeen countries included in the WB region “Europe & Central Asia”. Since all countries are given the same weight in this analysis, west European countries weight only 3/17 in that region. At the moment of writing this paper, we have not been able to safely merge the WVS with the European Values Survey.

clear correlation across regions and country-income groups between the importance attributed to luck and connections and the beliefs about degrees of choice. Hence these two variables seem to be capturing different things.

Insert table 3 about here

As a preparation for the more formal econometric analysis in the following sections, it is useful to explore the covariation of tolerance of tax evasion and the two proxies for risk. In figure 5, we present the proportion of individuals choosing 2 and above in the ten-point scale for justification of tax evasion computed by the beliefs about (i) the importance of luck and connections for success (left panel) and (ii) the degree of choice they have in life (right panel). The dots are the observed frequencies and the continuous lines are the predicted probabilities from a probit model of tolerance in $luck$ and $luck$ squared, in the left panel, and $nochoice$ and $nochoice$ squared, in the right panel. The graphs show inverted-U patterns. Tolerance of tax evasion initially rises with importance of luck, increasing from about 0.27 to about 0.50 as importance of luck changes from 1 to 6. Then, for higher points in the importance of luck scale, tolerance of evasion diminishes with importance attributed to luck, dropping to about 0.33. Similarly, tolerance of tax evasion rises with the belief that there is little choice in life for low values of this variable up to a maximum at about point 6. For higher values of the $nochoice$ variable, tolerance falls as the belief that there is little choice grows.

Insert figure 5 about here

We replicated this analysis for different subgroups of observations and got basically the same pattern. The inverted-U curves are present in many individual countries, and in both sexes. Hence we include $luck$ and $nochoice$ squared in our regressions.

We present in table 4 the average of the three proxies for the quality of government by regions and country-income groups. Confidence in government exhibits a minimum in North America, followed closely by Latin America and the Caribbean, and a maximum in East Asia and the Pacific. The minimum for national pride is observed in East Asia and the Pacific and the maximum in Sub-Saharan Africa. The indicator of government effectiveness reaches a minimum in the Middle East and North Africa and a maximum in North America. As expected, government effectiveness is increasing in country income but, surprisingly, confidence in government and national pride are decreasing in country income.

Insert table 4 about here

Figure 6 shows countries mean justification of cheating on taxes by country's average confidence in government, national pride and government effectiveness. The linear fits indicate a positive slope for confidence in government and negative slopes for national pride and government effectiveness. But the slope coefficients of these linear fits are not significantly different from zero and the scatter plots suggest there is no clear relationship between these variables.

Insert figure 6 about here

## 3.3 Methods

We specified a two-level logistic model in which individuals (subindex $i$) are the level 1 and countries (subindex $j$) are the level 2. The level 1 model is specified as follows:

$$logit\{Pr(cheat_{ij} = 1|z_{ij})\} = \eta_{1j} + \eta_2' z_{ij}$$

Where $z_{ij}$ is the vector of covariates.

The level 2 model includes government effectiveness $(ge_j)$ impacting on the intercept and a random component $\zeta_{1j}$:[23]

$$\eta_{1j} = \gamma_{11} + \gamma_{12} ge_j + \zeta_{1j}$$

We substitute the level 2 into the level 1 equation to get a reduced form model:

$$logit\{Pr(cheat_{ij} = 1|z_{ij})\} = \beta_0 + \beta_1 ge_j + \beta_2' z_{ij} + \zeta_{1j} \qquad (23)$$

where $\beta_0 = \gamma_{11}; \beta_1 = \gamma_{12}; \beta_2 = \eta_2$.

We used gllamm in STATA to take due care of the particular structure of errors and used an adaptive quadrature with eight integration points for each individual effect. As a checking, we also computed the models using xtlogit, where the individuals (level 1) are treated as the $t$ dimension and the countries are treated as the $x$ dimension.[24]

The residual between-countries heterogeneity can be computed in the random intercept model as:

$$\rho = \frac{Var(\zeta_{1j})}{Var(\zeta_{1j}) + \pi^2/3}$$

$\rho$ measures the proportion of the residuals variance that is due to the variance of the random intercept.

# 4 Results

The main results are summarized in table 5. GDP was included as a control in the first two columns and omitted in the last two. As predicted by the model in section 2, the regression analysis shows that tolerance of tax evasion is an increasing function of income, a quadratic

[23] We also made attempts at estimating the model with random slopes for $luck_{ij}$ and $luck_{ij}^2$, but the model did not converge.
[24] See Rabe-Hesketh and Skrondal (2012) for a detailed explanation of gllamm and xtlogit in STATA.

concave function of the proxies for uncertainty and a decreasing function of the quality of government.

Insert table 5 about here

The coefficient for income is positive and significant at one percent. Recalling that income is measured here as the individuals perception of their ranking in the income deciles of their country, the results of this analysis imply that a move in the distribution of income from one decile to the next upper decile causes an increase in the odds of tolerating evasion of 6 percent. Individuals in the richest decile have a 70 percent higher odds of tolerating evasion than individuals in the poorest decile.[25] Hence, the coefficient is not only statistically significant but also economically important.

The two proxies for uncertainty also have coefficients significantly different from zero at one percent. The probability of tolerating evasion is quadratic in these two variables and the graph exhibits an inverted-U pattern, with a maximum at 6.2 in the case of luck and 5.6 in the case of no choice. So the maximum takes place approximately in the middle of the ten-point scales.

We computed the predicted effect of $x_k \in \{luck, no\ choice\}$ on the odds of tolerance of evasion (the odds ratios) as follows:

$$OR(a,b) = \frac{odds(cheat|x_k = a)}{odds(cheat|x_k = b)} = \left(exp(\beta_{x_k})\right)^{a-b} \left(exp\left(\beta_{x_k^2}\right)\right)^{a^2-b^2}$$

In table 6, we present the odds ratios for several values of $luck$ and $no\ choice$.

Insert table 6 about here

The odds of tolerance of evasion is estimated to be 1.35 times as high for individuals who chose 2 as for those who chose 1 in the question about the importance of luck and connections for success. The odds ratio is 1.71, if the answers to the question about luck are 3 and 1, and it reaches a maximum of 2.35 if the answers are 6 and 1. The odds of justifying cheating on taxes falls for values of $luck$ above 6, but still the estimated odds is 1.45 as large for someone who chose 10 as for someone who chose 1 in the luck scale. The pattern with the variable $choice$ is similar, and the odds ratios are smaller but still economically meaningful. Therefore, the answers to the questions about luck and connections and about choice in life do not only seem to be statistically significant but also economically important in explaining tolerance of evasion.

The results for the proxies of quality of government are less clear cut, but they provide some support to the hypothesis that higher quality of government induces lower tolerance of tax evasion.

The variable $confidence\ in\ government$ is not statistically significant at the usual significance levels (see table 5).

[25] Recall also that “tolerating evasion” means here that individuals do not endorse the assertion that “cheating on taxes” is “never justifiable”.

The coefficient of $pride$ is negative and significant at 1 percent. The point estimate for the odds ratio is 0.78. According to these results, the odds that someone who is "very proud" of his nation (point 4 in the four four-point scale) justifies tax evasion is only 47 percent $(0.47 = 0.78^3)$ as large as the odds that someone who is "not at all proud" of his nation (point 1 in the scale) does it.

The coefficient of $government\ effectiveness$ is negative, significant at 10 percent when GDP is included as a control variable and significant at 1 percent when GDP is not included. Notice however that the point estimate is further from zero when GDP is included in the regression than when it is excluded. Nevertheless, the significance level is smaller in the former case because the standard deviation of the estimation is much higher. The coefficient of GDP itself is not statistically significant. GDP and $government\ effectiveness$ both vary at the country level and are positively correlated. GDP may be capturing part of the effectiveness we are trying to measure using $government\ effectiveness$. If so, it could be better not to include it as a control variable. But, on the other hand, GDP may be capturing other effects different from quality of government or state capacity. In this case, excluding this variable would cause an omitted variable bias. Taking the point estimate of the regression without GDP –i.e. the estimation with the smaller effect–, and considering only the effect of government effectiveness, a typical North American country would have about 25 percent lower odds of tolerating evasion than a typical Latin American country $\left(0.76 = 0.834^{(1.63-0.10)}\right)$.[26]

Our results about quality of government are mostly in line with the finding in Frey and Torgler (2007) that indicators of institutional quality and, in particular, the WGI indicator of government effectiveness, are negatively correlated with the justification of tax evasion. Torgler (2003) and Slemrod (2003) present related evidence for trust in government. Slemrod (2007) interprets these findings as evidence of reciprocity: people will be more willing to pay taxes if the government delivers (see also Levi, 1998). Notice however that the mechanism at work in our model is different: individuals are less willing to justify tax evasion when the government is more efficient because efficiency brings down the costs of the formal program and hence tax evasion is less valuable.

The coefficients of $fair$ and $fair\ squared$ are significantly different from zero at 1 percent, the former positive and the latter negative. The graph of tolerance of tax evasion in $fair$ exhibits an inverted-U pattern with a maximum at around 5.6 in the ten-point scale.

The results for other controls are mostly in line with what it has been reported in the literature (see in particular, Frey and Torgler 2007). A few comments may nevertheless be useful, because the sample, the set of controls and the econometric models vary between studies.

We get a negative coefficient for woman, indicating that women are less tolerant than men to tax evasion. The coefficient however is significant only at 10 percent. The literature on tax morale has consistently found that women have higher tax morale than men, which is consistent with our result.

[26] Average government effectiveness is 1.63 in North America and 0.10 in Latin America (see table 4, column 4) and the odds ratio for government effectiveness is 0.834 (see table 5, column 4).

Education has a negative coefficient, significantly different from zero at 1 percent. Hence the more educated are less willing to justify tax evasion. Frey and Torgler (2007) get mixed results for this variable. In their regressions and depending on the specification, the coefficient of education varies from being not significantly different from zero to negative. The latter would mean that the more educated have lower tax morale or, in other words, that they are more willing to justify tax evasion. The discrepancy with our results is probably due to the inclusion of the variable $income$ in our regressions. Indeed, in Frey and Torgler specifications, education could be capturing the effect of income, which is not included as a regressor. If, as our model suggests, higher income individuals prefer more tolerance of tax evasion, the omission of this control, which is positively correlated to education, will likely bias the estimation of the impact of education on tax morale.

It could be argued that the income level is a channel through which education impacts on tax morale. If so, income should not be included as a separate regressor if we are interested in understanding the total impact of education on tax morale. However, according to our model affluence does not impact on justification of tax evasion through the intrinsic utility of cheating –a tax morale effect–, but through the pecuniary effect of cheating. Therefore, even when education positively impacts on affluence and affluence on tolerance of tax evasion, this does not look like a tax morale channel. If our model is correct, two individuals with the same utility functions (including the same disutility of cheating) would have different preferred tax evasion rates if they had different income.

Following Frey and Torgler (2007), we included several controls for age and marital status. These variables are reported in table A1 in the appendix. Our results are consistent with Frey and Torgler's in all these variables.

We did not include controls for employment status and church attendance in our preferred specifications because of missing data. When we included these controls we lost many observations. What is worst, the results changed if we estimated our models without these controls in the original sample and in the reduced sample for which these variables are available. This strongly suggests that the inclusion of these variables causes a missing of observations that is not at random. We also checked that, working with the reduced sample, the inclusion of these regressors did not modify the coefficients of interest. Because of this issue, we chose not to include these controls in our final regressions.

A similar issue arises with ideological self-identification. The inclusion of this regressor causes a loss of many observations and there is some evidence that the missing is not at random. Because of this issue, we decided not to include this variable in the regressions.

The residual between-countries heterogeneity is in the order of 8 percent. Hence, the variance of the random intercepts does not seem to play a key role in the unexplained heterogeneity.

# 5 Concluding remarks

We find that individuals' justification of tax evasion varies systematically with several covariates. Individuals tend to justify tax evasion to a larger degree the higher is their perception of their own ranking in income distribution. The odds of justifying tax evasion are estimated to be more than sixty percent higher for individuals in the richest than in the poorest decile. Hence, this effect is not only statistically highly significant, but also economically important.

Perceptions about risk or lack of control over own life have a strong non-monotone effect on justification of tax evasion. The probability of justifying tax evasion grows with perceived risk for low values of risk, reaches a maximum at around 6 in the ten-point scale used to assess these beliefs, and decreases for higher values. The effects are statistically highly significant, robust across specifications and economically important. Individuals who choose point 6 in the ten-point scale for the importance attributed to luck and connections as opposed to hard work for success in life have an about 70 percent higher odds of justifying tax evasion as individuals who choose point 1, i.e. who think that "in the long run, hard work usually brings a better life".

In the logic of our formal model, tolerance of tax evasion provides insurance, but it is not effective at either extreme. When income risk is very low, there is not much to protect against. When income risk is very high, income in the bad states and hence due taxes are expected to be so low that tax evasion is ineffective as a protection device.

The evidence on the effects of institutional quality on justification of tax evasion is more mixed, but two of the three proxies we used to measure this dimension indicate that justification of tax evasion is lower the higher is the perception of government quality and the effects seem to be economically important. If we focus on one of these proxies, the World Bank indicator of government effectiveness, a typical citizen from a country with the institutional quality of North America (1.63) would have about 25 percent lower odds of tolerating evasion than a citizen from a country with the institutional quality of Latin America and the Caribbean (0.1) only because of government effectiveness.

We also present in this paper a formal model that rationalizes these findings. In our model, individuals have well defined preferences for the tax rates as well as for government tolerance of tax evasion. Unlike in standard economic models of tax evasion, we focus not on the individuals' decision to evade but on their preferences for government's "flexibility". In the tradition of political economics, we derive a policy preferences function from the more primitive utility functions. Our policy preferences function varies in the tax rates and in the degree of tolerance of tax evasion.

Our model may also help to think formally about the many insights in the literature on tax morale. We think of tax morale –the intrinsic disutility of cheating in our model–, as preference parameters for tax noncompliance. Higher tax morale is represented by higher marginal disutility of cheating. As such, tax morale pertains to the realm of values. The well-established fact that women tend to justify cheating on taxes to a lower extent than men is probably something that can be attributed to values. Similarly our finding that the more educated tend to justify tax evasion to a lesser extent, after controlling for income, is probably a values issue and as such can safely be regarded as a tax morale effect.

But the model suggests that the preferred level of tolerance of tax evasion depends not only on values, but also on beliefs and interests. Some individuals may be inclined to demand higher tolerance of tax evasion not because they have lower tax morale, but because they believe there are risks that neither the private sector nor the government are able to insure against. Also some affluent individuals may support more tolerance of tax evasion simply because this is a form of limiting the size of a redistributive government. Hence our model may help to put the tax morale contributions in a broader perspective.

Finally, we hope our model and empirical findings help to add new perspectives to the role conventionally attributed to governments in informality and law noncompliance. The common wisdom is that informality arises because of the limited ability of governments to monitor and enforce the law. Our model suggests that responsive governments might also be *unwilling to enforce the law* when citizens think that weak enforcement helps to provide insurance or limit the amount of undesired redistribution.[27] If this is the case, strengthening governments monitoring and enforcement capacities might not be an effective solution to informality and norms noncompliance.

[27] In this sense, we follow the suggestion in Sandmo (2005) that "It is, e.g., not obvious that the low degree of enforcement of the tax law in some sectors or countries is entirely due to cost considerations; it may also be because the electorate is actually against attempts to achieve a higher rate of compliance."

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# Tables and figures

Table 1: Optimal tax rates and tolerance of tax evasion in the simulated database

| | Tax rate | Tolerance of evasion |
|---|---|---|
| $y_i(0)$ | -0.0367*** | 0.0844*** |
| | (0.000323) | (0.000756) |
| $\sigma$ | 1.285*** | 3.183*** |
| | (0.0115) | (0.0269) |
| $\sigma^2$ | -0.565*** | -3.063*** |
| | (0.0111) | (0.0259) |
| $gov. effect.$ | 0.00375*** | -0.00533*** |
| | (0.000692) | (0.00162) |
| Constant | 1.866*** | -4.148*** |
| | (0.0281) | (0.0657) |
| | | |
| Observations | 11,550 | 11,550 |
| R-squared | 0.858 | 0.708 |

Standard errors in parentheses

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

Source: Own computations based on the simulated database.

Table 2: Descriptive statistics 1. Tolerance of tax evasion

| | | 10-point scale (1) | | | | 2-point scale (2) |
|---|---|---|---|---|---|---|
| | Number of countries | Mean score | Median score | $10^{th}$ perc. | $90^{th}$ perc. | Mean score (probability of 1) |
| **Regions** (3) | | | | | | |
| East Asia & Pacific | 11 | 2.13 | 1 | 1 | 5 | 0.37 |
| Europe & Central Asia | 18 | 2.11 | 1 | 1 | 5 | 0.36 |
| Latin America & Caribbean | 9 | 1.87 | 1 | 1 | 4 | 0.30 |
| Middle East & North Africa | 10 | 2.31 | 1 | 1 | 6 | 0.39 |
| North America | 1 | 1.91 | 1 | 1 | 5 | 0.30 |
| South Asia | 2 | 2.90 | 2 | 1 | 7 | 0.55 |
| Sub-Saharan Africa | 5 | 2.46 | 2 | 1 | 6 | 0.52 |
| **Income groups** (4) | | | | | | |
| High income | 20 | 1.98 | 1 | 1 | 5 | 0.34 |
| Upper middle income | 20 | 2.23 | 1 | 1 | 5 | 0.37 |
| Lower middle income | 14 | 2.33 | 1 | 1 | 5 | 0.42 |
| Low income | 2 | 2.27 | 2 | 1 | 5 | 0.58 |

(1) Justifiable cheating on taxes, 10-point scale: 1 "Never justifiable" - 10 "Always justifiable".
(2) Justifiable cheating on taxes, 2-point scale: 0 "Never justifiable" - 1 Otherwise.
(3) Countries by region (World Bank classification): East Asia & Pacific: Australia, China, Hong Kong, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Taiwan and Thailand. Europe & Central Asia: Armenia, Azerbaijan, Belarus, Cyprus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Netherlands, Poland, Romania, Russia, Slovenia, Spain, Sweden, Turkey, Ukraine and Uzbekistan. Latin America & Caribbean: Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Trinidad and Tobago, and Uruguay. Middle East & North Africa: Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Palestine, Tunisia and Yemen. North America: United States. South Asia: India and Pakistan. Sub-Saharan Africa: Ghana, Nigeria, Rwanda, South Africa and Zimbabwe.
(4) Countries by income group (World Bank classification): High income: Australia, Chile, Cyprus, Estonia, Hong Kong, Japan, Kuwait, Netherlands, New Zealand, Poland, Russia, Singapore, Slovenia, South Korea, Spain, Sweden, Taiwan, Trinidad and Tobago, United States and Uruguay. Upper middle income: Argentina, Azerbaijan, Belarus, Brazil, China, Colombia, Ecuador, Iraq, Jordan, Kazakhstan, Lebanon, Libya, Malaysia, Mexico, Peru, Romania, South Africa, Thailand, Tunisia and Turkey. Lower middle income: Armenia, Egypt, Georgia, Ghana, India, Kyrgyzstan, Morocco, Nigeria, Pakistan, Palestine, Philippines, Ukraine, Uzbekistan and Yemen. Low income: Rwanda and Zimbabwe.
Data is not weighted by the population of each country (all countries have the same weight).
Source: Own computations based on WVS.

Table 3: Descriptive statistics 2. Income, importance of luck and connections, and choice.

| | Number of countries | Income group (1) | | | Luck and connections (2) | | No choice (3) | |
|---|---|---|---|---|---|---|---|---|
| | | Poorest group | 5th group | Richest group | Mean of 10-point scale | Mean of 2-point scale | Mean of 10-point scale | Mean of 2-point scale |
| **Regions** (4) | | | | | | | | |
| East Asia & Pacific | 11 | 0.10 | 0.21 | 0.02 | 4.04 | 0.79 | 3.86 | 0.84 |
| Europe & Central Asia | 18 | 0.06 | 0.25 | 0.01 | 4.64 | 0.80 | 4.00 | 0.83 |
| Latin America & Caribbean | 9 | 0.08 | 0.24 | 0.01 | 4.10 | 0.71 | 3.22 | 0.72 |
| Middle East & North Africa | 10 | 0.09 | 0.21 | 0.01 | 3.33 | 0.58 | 4.14 | 0.81 |
| North America | 1 | 0.05 | 0.21 | 0.01 | 3.83 | 0.79 | 3.27 | 0.81 |
| South Asia | 2 | 0.08 | 0.16 | 0.03 | 4.59 | 0.76 | 4.62 | 0.88 |
| Sub-Saharan Africa | 5 | 0.07 | 0.19 | 0.01 | 3.93 | 0.75 | 4.02 | 0.90 |
| **Income groups** (5) | | | | | | | | |
| High income | 20 | 0.06 | 0.23 | 0.02 | 4.43 | 0.82 | 3.82 | 0.83 |
| Upper middle income | 20 | 0.08 | 0.23 | 0.01 | 4.09 | 0.71 | 3.67 | 0.78 |
| Lower middle income | 14 | 0.10 | 0.20 | 0.02 | 3.79 | 0.66 | 4.21 | 0.82 |
| Low income | 2 | 0.05 | 0.19 | 0.01 | 3.79 | 0.75 | 4.36 | 0.94 |

(1) The WVS asks individuals to rank themselves in ten “income groups”.

(2) Importance of luck for success, 10-point scale: 1 "In the long run, hard work usually brings a better life" - 10 "Hard work doesn’t generally bring success - it’s more a matter of luck and connections". 2-point scale: 0 "In the long run, hard work usually brings a better life" - 1 Otherwise.

(3) No choice, 10-point scale: 1 "great deal of choice" - 10 "none at all". 2-point scale: 0 "A great deal of choice" - 1 Otherwise.

(4) and (5), see notes (3) and (4) on table 2.

Source: Own computations based on WVS

Table 4: Descriptive statistics 3. Confidence in government, national pride and government effectiveness. (average values)

| | Number of countries | Confidence in government (1) | National pride (2) | Government effectiveness (3) |
|---|---|---|---|---|
| **Regions** (4) | | | | |
| East Asia & Pacific | 11 | 2.61 | 3.35 | 1.09 |
| Europe & Central Asia | 18 | 2.40 | 3.40 | 0.19 |
| Latin America & Caribbean | 9 | 2.25 | 3.58 | 0.10 |
| Middle East & North Africa | 10 | 2.26 | 3.60 | -0.48 |
| North America | 1 | 2.23 | 3.49 | 1.63 |
| South Asia | 2 | 2.41 | 3.68 | -0.33 |
| Sub-Saharan Africa | 5 | 2.54 | 3.71 | -0.41 |
| **Income groups** (5) | | | | |
| High income | 20 | 2.35 | 3.33 | 1.14 |
| Upper middle income | 20 | 2.42 | 3.53 | -0.20 |
| Lower middle income | 14 | 2.43 | 3.65 | -0.49 |
| Low income | 2 | 2.66 | 3.76 | -0.77 |

(1) Confidence in government: 1 “none at all” - 4 “a great deal”.
(2) National pride: “How proud are you to be [nationality]? 1 “not at all proud” - 4 “very proud”.
(3) Government effectiveness is a continuos variable ranging from -2.5 to 2.5.
(4) and (5), see notes (3) and (4) in table 2.
Source: Own computations based on WVS and Kaufmann et. al. (2009).

Table 5: Two-level logit models for cheating on taxes. Random intercept.

| | (1) | | (2) | |
|---|---|---|---|---|
| **Covariates (a)** | **Coefficients** | **Odds ratios** | **Coefficients** | **Odds ratios** |
| *income* | 0.0597*** | 1.061*** | 0.0597*** | 1.062*** |
| | (0.0102) | (0.0108) | (0.0102) | (0.0108) |
| *luck* | 0.400*** | 1.491*** | 0.400*** | 1.491*** |
| | (0.0431) | (0.0643) | (0.0431) | (0.0643) |
| *luck squared* | -0.0324*** | 0.968*** | -0.0324*** | 0.968*** |
| | (0.00363) | (0.00351) | (0.00363) | (0.00351) |
| *no choice* | 0.203*** | 1.225*** | 0.203*** | 1.225*** |
| | (0.0272) | (0.0333) | (0.0272) | (0.0333) |
| *no choice squared* | -0.0182*** | 0.982*** | -0.0182*** | 0.982*** |
| | (0.00313) | (0.00308) | (0.00313) | (0.00308) |
| *confidence in government* | -0.00874 | 0.991 | -0.00868 | 0.991 |
| | (0.0317) | (0.0315) | (0.0317) | (0.0314) |
| *pride* | -0.249*** | 0.780*** | -0.249*** | 0.780*** |
| | (0.0314) | (0.0245) | (0.0314) | (0.0245) |
| *government effectiveness* | -0.229* | 0.795* | -0.182*** | 0.834*** |
| | (0.129) | (0.103) | (0.0578) | (0.0482) |
| *woman* | -0.105* | 0.900* | -0.105* | 0.900* |
| | (0.0545) | (0.0491) | (0.0546) | (0.0491) |
| *education* | -0.0250*** | 0.975*** | -0.0249*** | 0.975*** |
| | (0.00779) | (0.00759) | (0.00775) | (0.00756) |
| *fair* | 0.186*** | 1.204*** | 0.186*** | 1.204*** |
| | (0.0335) | (0.0403) | (0.0334) | (0.0402) |
| *fair squared* | -0.0165*** | 0.984*** | -0.0165*** | 0.984*** |
| | (0.00285) | (0.00280) | (0.00284) | (0.00279) |
| *gdp* | 0.00405 | 1.004 | | |
| | (0.00568) | (0.00570) | | |
| *constant* | -1.368*** | 0.916** | -0.0872** | 0.916** |
| | (0.248) | (0.0361) | (0.0394) | (0.0361) |
| **Number of units** | | | | |
| Level 1 (individuals) | 66,449 | 66,449 | 66,449 | 66,449 |
| Level 2 (countries) | 55.00 | 55.00 | 55.00 | 55.00 |

seEform in parentheses

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

**Variances and covariances of random effects**

| | (1) | | (2) | |
|---|---|---|---|---|
| *country* | 0.30 | | 0.31 | |
| *rho* | 0.08 | | 0.08 | |

(a) Covariates relative to age groups, marital status and employment status were omitted from the table. We present a complete table in the Appendix.

Source: Own computations based on WVS

Table 6: Odds ratios of tolerance of tax evasion conditional on importance of luck and connections and to lack of choice.

| $luck = a$ | $luck = b$ | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1 | 1.00 | | |
| 2 | 1.35 | 1.00 | |
| 3 | 1.71 | 1.27 | 1.00 |
| 4 | 2.03 | 1.50 | 1.19 |
| 5 | 2.26 | 1.67 | 1.32 |
| 6 | 2.35 | 1.74 | 1.37 |
| 7 | 2.30 | 1.70 | 1.34 |
| 8 | 2.10 | 1.55 | 1.23 |
| 9 | 1.80 | 1.33 | 1.05 |
| 10 | 1.45 | 1.07 | 0.85 |

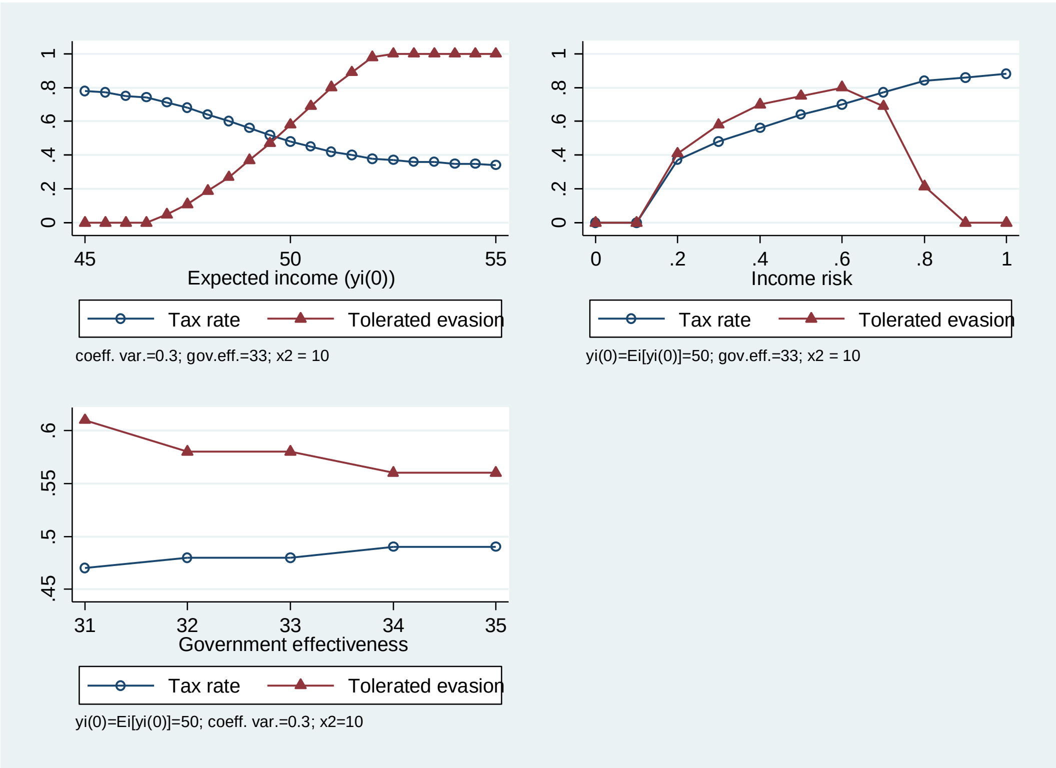
$OR(a, b) = odds(cheat|luck = a)/odds(cheat|luck = b)$

| $no\ choice = a$ | $no\ choice = b$ | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 1 | 1.00 | | |
| 2 | 1.16 | 1.00 | |
| 3 | 1.30 | 1.12 | 1.00 |
| 4 | 1.40 | 1.21 | 1.08 |
| 5 | 1.46 | 1.26 | 1.12 |
| 6 | 1.46 | 1.26 | 1.13 |
| 7 | 1.41 | 1.22 | 1.09 |
| 8 | 1.32 | 1.14 | 1.02 |
| 9 | 1.19 | 1.02 | 0.91 |
| 10 | 1.03 | 0.89 | 0.79 |

$OR(a, b) = odds(cheat|no\ choice = a)/odds(cheat|no\ choice = b)$

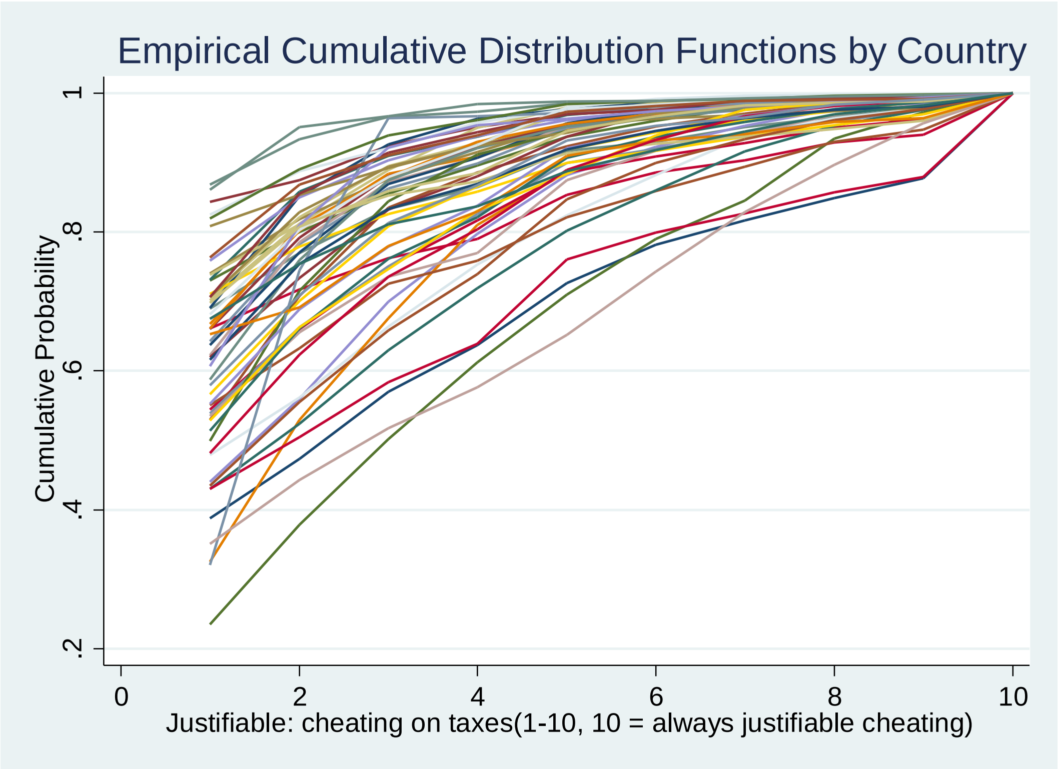
Source: own computations based on table 5, column (2).

Figure 1: Simulated optimal tax rates and tolerance of tax evasion



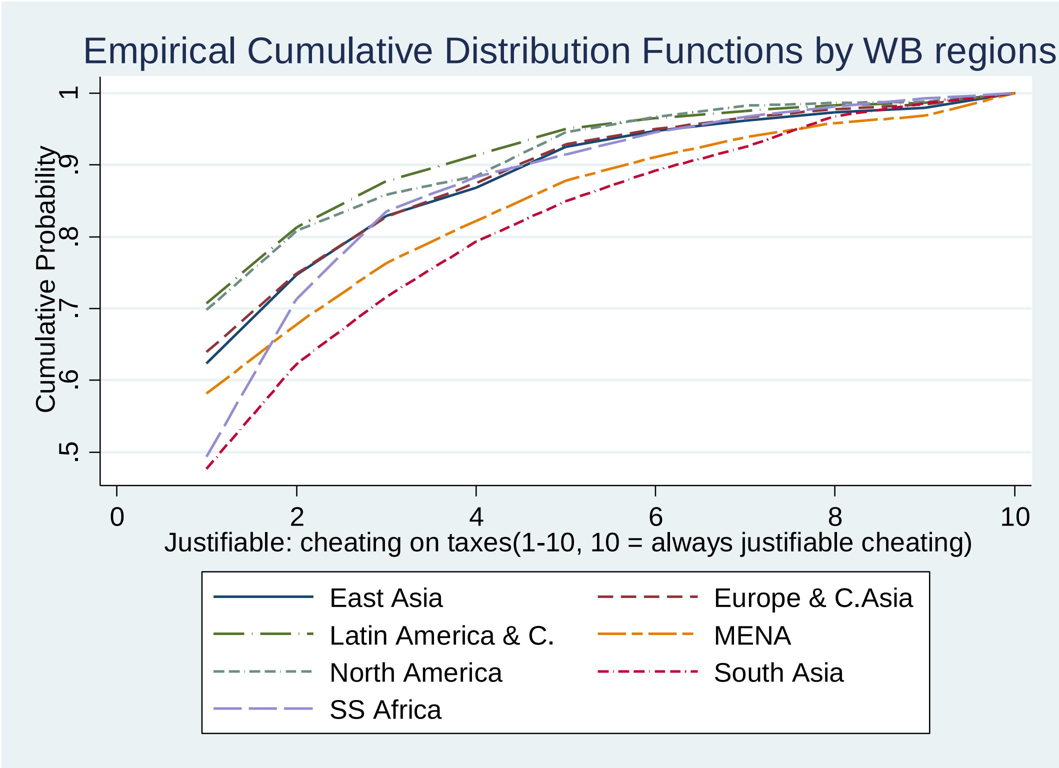

Source: Own computations based on simulations.

Figure 2: Tolerance of tax evasion: empirical cumulative distribution functions by country.



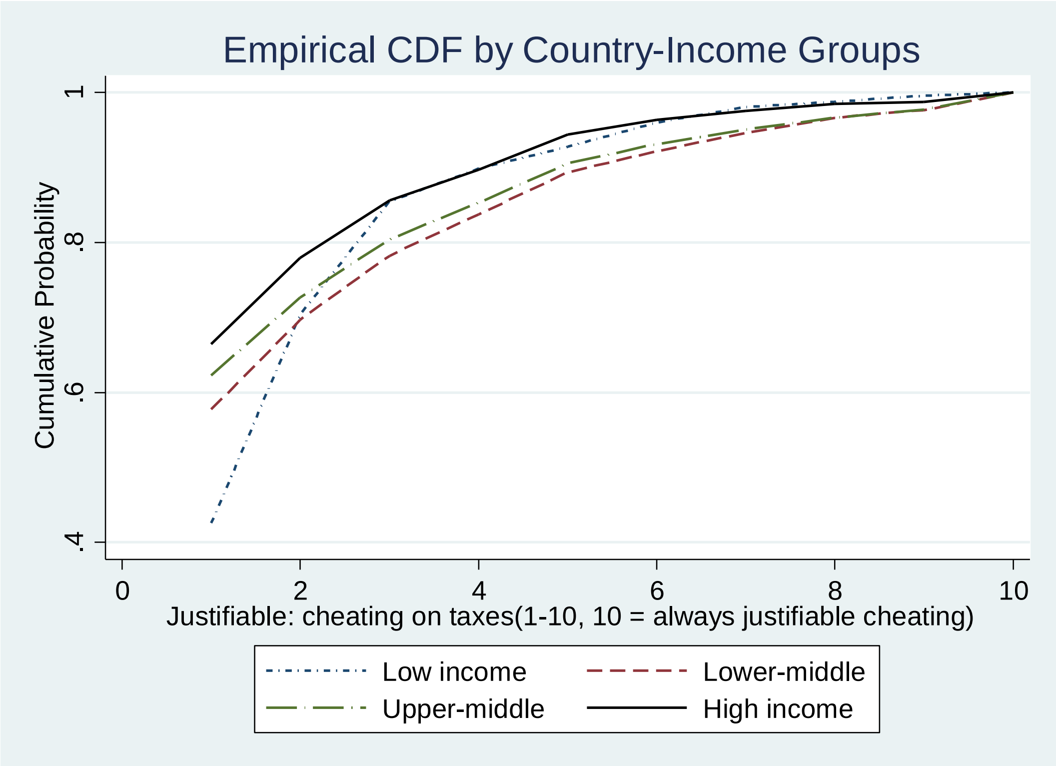

Source: Own computations based on WVS.

Figure 3: Tolerance of tax evasion: empirical cumulative distribution functions by WB regions




Source: Own computations based on WVS.

Figure 4: Tolerance of tax evasion: empirical cumulative distribution functions by WB country-income group

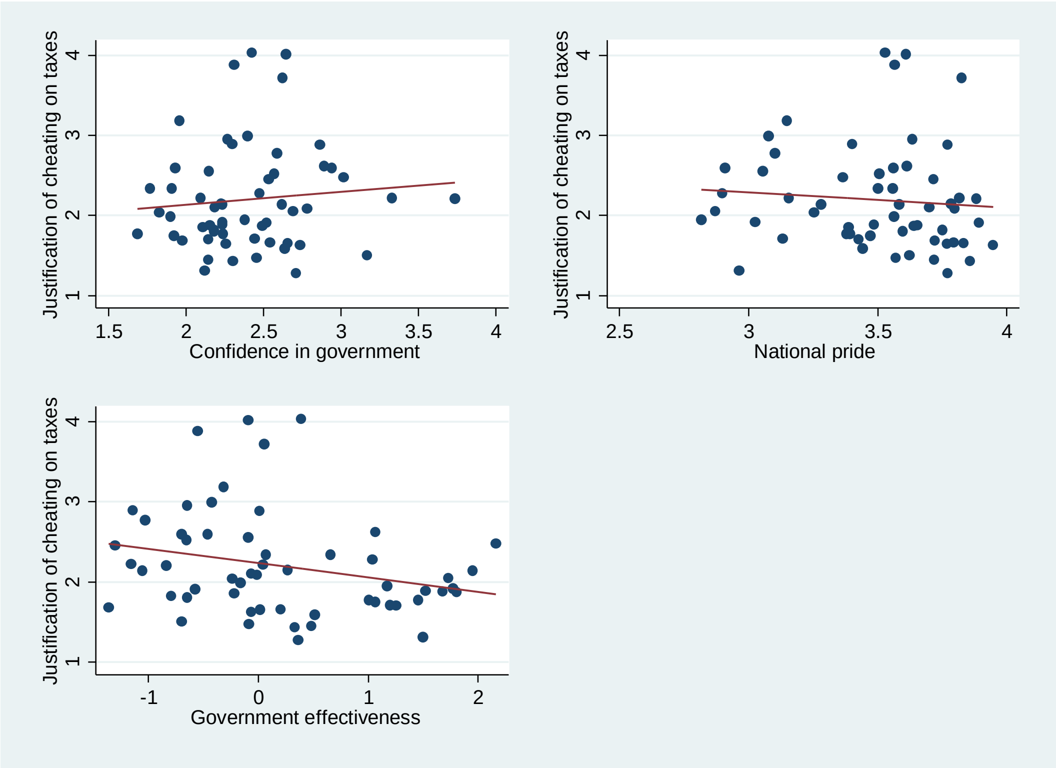



Source: Own computations based on WVS.

Figure 5: Tolerance of tax evasion, importance of luck and lack of choice


Source: Own computations based on WVS.

Figure 6: Tolerance of Evasion, Confidence in Government and Government Effectiveness




Source: Own computations based on WVS and WGI.

# 7 Appendix

Table A1: Two-level logit models for tolerance of tax evasion (0 = “never justifiable”, 1 = otherwise). Random intercept.

| | (1) | | (2) | |
|---|---|---|---|---|
| **Covariates (a)** | **Coefficients** | **Odds ratios** | **Coefficients** | **Odds ratios** |
| *income* | 0.0597*** | 1.061*** | 0.0597*** | 1.062*** |
| | (0.0102) | (0.0108) | (0.0102) | (0.0108) |
| *luck* | 0.400*** | 1.491*** | 0.400*** | 1.491*** |
| | (0.0431) | (0.0643) | (0.0431) | (0.0643) |
| *luck squared* | -0.0324*** | 0.968*** | -0.0324*** | 0.968*** |
| | (0.00363) | (0.00351) | (0.00363) | (0.00351) |
| *no choice* | 0.203*** | 1.225*** | 0.203*** | 1.225*** |
| | (0.0272) | (0.0333) | (0.0272) | (0.0333) |
| *no choice squared* | -0.0182*** | 0.982*** | -0.0182*** | 0.982*** |
| | (0.00313) | (0.00308) | (0.00313) | (0.00308) |
| *confidence in government* | -0.00874 | 0.991 | -0.00868 | 0.991 |
| | (0.0317) | (0.0315) | (0.0317) | (0.0314) |
| *pride* | -0.249*** | 0.780*** | -0.249*** | 0.780*** |
| | (0.0314) | (0.0245) | (0.0314) | (0.0245) |
| *government effectiveness* | -0.229* | 0.795* | -0.182*** | 0.834*** |
| | (0.129) | (0.103) | (0.0578) | (0.0482) |
| *woman* | -0.105* | 0.900* | -0.105* | 0.900* |
| | (0.0545) | (0.0491) | (0.0546) | (0.0491) |
| *education* | -0.0250*** | 0.975*** | -0.0249*** | 0.975*** |
| | (0.00779) | (0.00759) | (0.00775) | (0.00756) |
| *fair* | 0.186*** | 1.204*** | 0.186*** | 1.204*** |
| | (0.0335) | (0.0403) | (0.0334) | (0.0402) |
| *fair squared* | -0.0165*** | 0.984*** | -0.0165*** | 0.984*** |
| | (0.00285) | (0.00280) | (0.00284) | (0.00279) |
| *gdp* | 0.00405 | 1.004 | | |
| | (0.00568) | (0.00570) | | |
| *age30_39* | -0.0873** | 0.916** | -0.0872** | 0.916** |
| | (0.0394) | (0.0361) | (0.0394) | (0.0361) |
| *age40_49* | -0.159*** | 0.853*** | -0.159*** | 0.853*** |
| | (0.0449) | (0.0382) | (0.0448) | (0.0382) |
| *age50_59* | -0.294*** | 0.746*** | -0.293*** | 0.746*** |
| | (0.0453) | (0.0338) | (0.0453) | (0.0338) |
| *age60_69* | -0.383*** | 0.682*** | -0.383*** | 0.682*** |
| | (0.0601) | (0.0410) | (0.0601) | (0.0410) |
| *age70_* | -0.488*** | 0.614*** | -0.488*** | 0.614*** |
| | (0.0913) | (0.0561) | (0.0913) | (0.0561) |
| | | | | |
| | | | Continues on next page | |
| | | | | |

| | | | | |
|---|---|---|---|---|
| | (1) | | (2) | |
| **Covariates (a)** | **Coefficients** | **Odds ratios** | **Coefficients** | **Odds ratios** |
| | | | | |
| *divorced* | 0.211*** | 1.235*** | 0.211*** | 1.235*** |
| | (0.0440) | (0.0543) | (0.0440) | (0.0544) |
| *separated* | 0.211*** | 1.235*** | 0.211*** | 1.235*** |
| | (0.0817) | (0.101) | (0.0818) | (0.101) |
| *widowed* | 0.126** | 1.134** | 0.126** | 1.134** |
| | (0.0603) | (0.0684) | (0.0603) | (0.0684) |
| *never_married* | 0.113*** | 1.120*** | 0.113*** | 1.120*** |
| | (0.0361) | (0.0404) | (0.0361) | (0.0404) |
| *Constant* | -1.368*** | 0.255*** | -1.289*** | 0.276*** |
| | (0.248) | (0.0632) | (0.211) | (0.0582) |
| | | | | |
| **Number of units** | | | | |
| Level 1 (individuals) | 66,449 | 66,449 | 66,449 | 66,449 |
| Level 2 (countries) | 55 | 55 | 55 | 55 |
| | | | | |
| seEform in parentheses | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | |
| | | | | |
| **Variances and covariances of random effects** | | | | |
| | | | | |
| *country* | 0.303 | | 0.306 | |
| *rho* | 0.084 | | 0.085 | |
| | | | | |
| (a) Covariates relative to age groups, marital status and employment status were omitted from the table. We present a complete table in the Appendix. | | | | |
| Source: Own computations based on the WVS. | | | | |