

# Tolerance to 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 to tax evasion increases with income, because government programs are 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 to evasion

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# 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 to more justification of tax evasion.

There is considerable evidence that 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) present a related but different model that rationalizes the correlation between support for redistribution and belief in luck, based on the hypothesis that individuals prefer “fair” to “unfair” outcomes, where “fairness” is a measure of the distance between market outcomes and outcomes determined by effort. In their model, individuals favor redistribution to a larger extent if they believe that it is luck and connections rather than effort what drives the results.

The correlation we show in this paper between the belief in luck and the justification of cheating suggests a complementary channel. The disenchanted with the market might not only support more redistribution, as Piketty and Alesina and Angeletos argue, but they might also demand more tolerance to tax evasion. In other words, individuals who believe that luck determines outcomes might demand “flexibility” regarding law compliance.

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 survey, see Perry et. al. 2007). Governments also play an important role in the explanation, since informality is considered the result of the limited ability of governments to monitor and enforce the law. This hypothesis is consistent with at least two stylized facts, namely that informality is more prevalent (i) in weak institutional environments and (ii) among small than large firms.<sup>3</sup> The idea is convincing, but it might not be the whole story. The evidence we present in this paper suggests that governments’ limited enforcement capacity might not account for all the facts regarding informality.

In a related paper (Forteza and Noboa 2014), we argue that governments might be unwilling, rather than unable, to enforce the law, if they can only commit to simple (not fully contingent) policy rules. According to this story, tolerance to informality might be a way of gaining

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<sup>3</sup> Assuming fixed monitoring costs, it will be inefficient to monitor small firms (Bigio et. al. 2011; Busso et. al. 2013).

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 beliefs are correctly reflected in political support, politicians might tolerate informality.

If the limited enforcement capacity were the only problem, citizens would probably be less tolerant with tax evasion in weak than in strong states, where the problem is more severe. However, we see that people tend to justify cheating on taxes more if they are less confident in governments, i.e. if they think that governments are weaker or less effective. In the story of Forteza and Noboa, this can be rationalized as a demand for flexibility. In this light, it is not surprising that weak states are not only less able but also less willing to enforce the law than strong states.

Our paper owes much to the literature on 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. The idea is that the incentives provided by the risk of being caught evading and having to pay fines are not strong enough to explain the relatively high levels of compliance in most countries (see, for example, Torgler and Schaltegger, 2005).

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 have a significant impact on justification of tax evasion. We also show that individuals' beliefs about their ranking in income distribution and how proud they are of their nation have significant systematic effects on justification of tax evasion.

We hope this paper also makes an analytical contribution to the literature on tax morale. We provide a model that may help to think formally about the findings in the empirical literature and put them in a broader perspective.

The theme in this paper is also related to a growing literature on political 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 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 been paying increasing attention to culture. Alesina and collaborators, among others, have devoted considerable attention to this theme (Alesina and Angeletos, 2005a and b; Alesina and Fuchs-Schündeln, 2007; Alesina and Giuliano, 2010 and 2014). We hope our paper makes a contribution to this literature as well.

After this introduction, the paper continues as follows. In section 2, we present a formal model that relates individuals' tolerance to 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.

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 fiscal 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.

In our model, tolerance to "cheating" is an instrument of insurance because individuals are allowed to cheat if and only if they have experienced a negative shock. This instrument is potentially useful if both insurance markets are incomplete and the government has limited capacity to provide insurance through more conventional policies.

The society is composed of a continuum of individuals and the population has mass 1. Individual  $i$  generates income  $(1 + \varepsilon)y_i$ , where  $y_i > 0$  is certain and  $\varepsilon$  is stochastic. With probability 0.5,  $\varepsilon = \sigma \in [0,1]$  and with probability 0.5,  $\varepsilon = -\sigma$ . Therefore,  $E_\varepsilon[(1 + \varepsilon)y_i|y_i] = y_i$ , and the coefficient of variation of individual  $i$ 's income is  $CV_\varepsilon[(1 + \varepsilon)y_i|y_i] = \sigma$ .

There is a government that can redistribute income through a formal program that collects a tax proportional to income at the rate  $t \in [0,1]$  and redistributes the proceeds using a flat transfer  $b \geq 0$ . The government can also tolerate tax evasion or "cheating on taxes"  $ch \in [0,1]$  of those who experienced a negative realization of the shock.

With these assumptions, individuals' budget constraints in the two states of nature are:

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

and the government budget constraint is:

$$b = tE_i [y_i] - 0.5.t.ch.(1 - \sigma)E_i [y_i] \geq 0 \quad (2)$$

Where  $E_i [y_i]$  is the expected value of  $y_i$  or average income before taxes. Half of the population experiences the negative shock and is allowed to evade taxes.<sup>4</sup>

Notice that we are assuming there is no individual cost of evading, so individuals will evade as much as the government allows them to do it. This is not a model about the individual decision to evade but about the government decision to tolerate evasion. 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 to evasion, we totally abstract from the much analyzed incentives to evade, like fines and probability of being caught.

The distribution of  $y_i$  in the population is known to everybody, but there may be different beliefs about risk. Some individuals believe that  $\sigma$  is small, and other individuals believe that  $\sigma$  is large. Of course, not all of these beliefs can be correct, but individuals cannot learn the true value of  $\sigma$  in this model. They are nevertheless rational in the sense that, conditional on their beliefs, they will choose their preferred levels of  $t$  and  $ch$  which are consistent with (1) and (2).

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:

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

Where, to economize on notation and without any loss of generality, we have dropped the  $\frac{1}{2}$  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.

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 and beliefs by the vector  $x$  and we specifically assume that the marginal disutility of cheating is a function of  $x$ .

We consider two groups of variables in  $x$ . First, in sub-vector  $x_1$  we include the variables that the literature has shown to be correlated to tax morale, like gender, age and employment status. 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.

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<sup>4</sup> It is easy to check, using (1) and (2) that  $E_{i,\varepsilon}[c_i] \leq E_i [y_i]$ .

In sub-vector  $x_2$ , we include proxies for how opinionated individuals are. Some individuals tend to have stronger opinions about different topics than others: they are opinionated.<sup>5</sup> This characteristic is to some extent independent of the specific topic: those who hold strong opinions in one topic also tend to hold strong opinions in other topics. Nevertheless, some topics, usually controversial ones, provide better grounds for strong opinions to emerge.

We include in sub-vector  $x_2$  opinions expressed in the surveys that provide the ground for individuals to show how opinionated they are. Typically the questions are in the form of an N-point scale. We will say that an individual is more opinionated if he chooses a point that is further from the central value in the N-point scale. More specifically, we say that an individual is more opinionated the larger is  $x_2^d = (x_2 - x_2^m)^2$ , where  $x_2$  is the point he chose and  $x_2^m$  is the central value in the questionnaire scale. Faced to the same evidence, opinionated individuals will have higher values of  $x_2^d$  than undogmatic individuals.

Our main hypothesis regarding these variables is that, other things equal, opinionated individuals are less tolerant to noncompliance. If, as we hypothesize, opinionated individuals are less tolerant to evasion, the marginal intrinsic disutility of cheating will be an increasing function of  $x_2^d$ .

In summary, total utility is given by:

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

Where:  $\beta'x = \beta_0 + \beta_{x_1}x_1 + 0.5\beta_{x_2}x_2^d$ .

The hypothesis that opinionated individuals are less tolerant to evasion than moderate individuals implies that  $\beta_{x_2} \geq 0$ .

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 to evasion:

$$W(ch, \sigma, x, t, y_i) = u(c_i^H) + u(c_i^L) - \beta'x.ch \quad (5)$$

Where:  $c_i^H = (1 - t)(1 + \sigma)y_i + tE[y_i] - 0.5.t.ch.(1 - \sigma)E[y_i]$   
 $c_i^L = (1 - t)(1 - \sigma)y_i + tE[y_i] - 0.5.t.ch.(1 - \sigma)E[y_i] + t.ch.(1 - \sigma)y_i$

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<sup>5</sup> The Merriam-Webster online dictionary defines opinionated as “expressing strong beliefs or judgments about something: having or showing strong opinion”. The same source presents the following synonyms at the entrance for dogmatic: “doctrinaire, opinionated, opinionative, opinioned, pontifical, self-opinionated”.

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

$$0 < \beta'x \quad (6)$$

## 2.2 Optimal taxation and tolerance to 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 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  $y_i \leq E_i[y_i]$  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  $c_i^H - c_i^L$ :

$$c_i^H = E_\varepsilon[c_i] + 0.5(c_i^H - c_i^L) \quad ; \quad c_i^L = E_\varepsilon[c_i] - 0.5(c_i^H - c_i^L) \quad (7)$$

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

Deriving the function of policy preferences (5) in  $t$  and  $ch$ , using (7):

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

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

In turn, from (5):

$$\begin{aligned} E_\varepsilon[c_i] &= y_i + t(1 - 0.5ch(1 - \sigma))(E_i[y_i] - y_i) \\ c_i^H - c_i^L &= 2(1 - t)\sigma y_i - t.ch.(1 - \sigma)y_i \end{aligned} \quad (10)$$

And hence:

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

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

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

$$\begin{aligned}
W_t(ch, \sigma, x, t, y_i) &= (u'(c_i^L) + u'(c_i^H))(1 - 0.5ch(1 - \sigma))(E_i[y_i] - y_i) \\
&+ (u'(c_i^L) - u'(c_i^H))(\sigma + 0.5ch(1 - \sigma))y_i
\end{aligned} \tag{12}$$

$$\begin{aligned}
W_{ch}(ch, \sigma, x, t, y_i) &= (u'(c_i^L) + u'(c_i^H))0.5t(1 - \sigma)(y_i - E_i[y_i]) \\
&+ (u'(c_i^L) - u'(c_i^H))0.5t(1 - \sigma)y_i - \beta'x
\end{aligned} \tag{13}$$

(i) Individuals with average or below average expected income  $y_i \leq E_i[y_i]$ .

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:

$$W_t(ch, \sigma, x, t, y_i) > 0 \text{ if } y_i \leq E[y_i] \text{ and } c_i^L < c_i^H$$

Hence these individuals would prefer  $t = 1$ . But, by virtue of (10),  $c_i^L \geq c_i^H$  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 to tax evasion is negative for these individuals:

$$W_{ch}(ch, \sigma, x, t, y_i) < 0 \text{ if } y_i \leq E[y_i] \text{ and } c_i^L > c_i^H$$

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:

$$W_t(ch, \sigma, x, t, y_i) \geq 0 \text{ if } y_i \leq E[y_i] \text{ and } c_i^L = c_i^H$$

Hence these individuals prefer  $t = 1$ . Also, if  $c_i^L = c_i^H$ , equation (13) and assumption (6) imply that the marginal utility of tolerance to tax evasion is negative:

$$W_{ch}(ch, \sigma, x, t, y_i) < 0 \text{ if } y_i \leq E[y_i] \text{ and } c_i^L = c_i^H$$

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  $y_i > E[y_i]$ .

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  $y_i > E[y_i]$ . 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  $t = 1$ :

$$W_t(ch, \sigma, x, t = 1, y_i) < 0 \text{ if } y_i > E[y_i]$$

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 this 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  $W_{ch}(ch = 0, \sigma, x, t, y_i) > 0$ , therefore:

$$ch > 0 \text{ if } \left( u'(c_i^L) + u'(c_i^H) \right) 0.5t(1 - \sigma)(y_i - E_i[y_i]) + \left( u'(c_i^L) - u'(c_i^H) \right) 0.5t(1 - \sigma)y_i > \beta'x$$

With  $c_i^L = (1 - t)(1 - \sigma)y_i + tE[y_i]$ ;  $c_i^H = (1 - t)(1 + \sigma)y_i + tE[y_i]$  and  $t < 1$ .

Finally, these individuals prefer zero cheating if they prefer zero taxation. Indeed, assumption (6) and equation (13) imply that  $W_{ch}(ch, \sigma, x, t = 0, y_i) < 0$ . **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:

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

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

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

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

Therefore, the pecuniary effects of marginal changes in taxation and tolerance to 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 ( $y_i < E_i[y_i]$ ) they go in opposite directions in the case of rich individuals ( $y_i > E_i[y_i]$ ). 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  $0.5 \cdot t \cdot (1 - \sigma)y_i$  gain in expected income through fewer taxes effectively paid and a  $0.5 \cdot t \cdot (1 - \sigma)E_i[y_i]$  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 (1):

$$\frac{db}{dch} = -0.5 \cdot t \cdot (1 - \sigma)E_i[y_i] \leq 0 \quad (17)$$

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 effect stems from the assumption that 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 an option, since it would not provide more insurance and it would reduce redistribution.

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 to 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  $t(1 - \sigma)y_i$ , 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  $ge \rightarrow \infty$ . 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:

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

Where:

$$\begin{aligned} c_i^H &= (1 - t)(1 + \sigma)y_i(t) + tE[y_i(t)] - 0.5 \cdot t \cdot ch \cdot (1 - \sigma)E[y_i(t)] \\ c_i^L &= (1 - t)(1 - \sigma)y_i(t) + tE[y_i(t)] - 0.5 \cdot t \cdot ch \cdot (1 - \sigma)E[y_i(t)] \\ &\quad + t \cdot ch \cdot (1 - \sigma)y_i(t) \end{aligned} \quad (19)$$

**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:

$$\frac{dE_\varepsilon[c_i]}{dt} = (1 - 0.5ch(1 - \sigma))(E_i[y_i(t)] - y_i(t)) + y_i(t)' + t(1 - 0.5ch(1 - \sigma))(E_i[y_i(t)'] - y_i(t)') \quad (20)$$

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

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

$$\begin{aligned} W_t(ch, \sigma, x, t, y_i) &= (u'(c_i^L) + u'(c_i^H)) \left( (1 - 0.5ch(1 - \sigma))(E_i[y_i(t)] - y_i(t)) + f(t) \right) \\ &+ (u'(c_i^L) - u'(c_i^H)) \left( (\sigma + 0.5ch(1 - \sigma))y_i(t) + g(t) \right) \end{aligned} \quad (21)$$

$$\begin{aligned} W_{ch}(ch, \sigma, x, t, y_i) &= (u'(c_i^L) + u'(c_i^H)) 0.5t(1 - \sigma)(y_i(t) - E_i[y_i(t)]) \\ &+ (u'(c_i^L) - u'(c_i^H)) 0.5t(1 - \sigma)y_i(t) - \beta'x \end{aligned} \quad (22)$$

Where:

$$f(t) = (1 - t(1 - 0.5ch(1 - \sigma)))y_i(t)' + t(1 - 0.5ch(1 - \sigma))E_i[y_i(t)'] \leq 0$$

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

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  $y_i \leq E_i[y_i]$ . Suppose that  $c_i^L \geq c_i^H$ . Then (22) would imply that the marginal utility of tolerance to evasion would be negative for these individuals:

$$W_{ch}(ch, \sigma, x, t, y_i) < 0 \text{ if } y_i \leq E_i[y_i] \text{ and } c_i^L \geq c_i^H$$

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  $y_i > E_i[y_i]$ . Suppose that  $c_i^L \geq c_i^H$ . Then (21) implies that the marginal utility of taxation is negative for these individuals:

$$W_t(ch, \sigma, x, t, y_i) < 0 \text{ if } y_i > E_i[y_i] \text{ and } c_i^L \geq c_i^H$$

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  $W_{ch}(ch = 0, \sigma, x, t, y_i) > 0$ . Therefore:

$$ch > 0 \text{ if } \left( u'(c_i^L) + u'(c_i^H) \right) 0.5t(1 - \sigma)(y_i - E_i[y_i]) + \left( u'(c_i^L) - u'(c_i^H) \right) 0.5t(1 - \sigma)y_i > \beta'x$$

With  $c_i^L = (1 - t)(1 - \sigma)y_i(t) + tE[y_i(t)]$ ;  $c_i^H = (1 - t)(1 + \sigma)y_i(t) + tE[y_i(t)]$  and  $t < 1$ .

In the above expression, the first term in the left hand side is non-positive, if  $y_i \leq E_i[y_i]$ , and positive, if  $y_i > E_i[y_i]$ . 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 to tax evasion.

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

## 2.3 Comparative statics

We simulate the model to analyze the predicted impact of the exogenous variables on the preferred tax rates and tolerance to tax evasion. In the simulated data base, we regress tolerance to tax evasion on the exogenous variables to determine the main stylized facts. Then, 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

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 a quite common value 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.

We also included a proxy for opinionatedness  $x_2$  in these simulations, which is assumed to vary between 1 and 10. The intrinsic disutility of cheating is  $\beta_1 + \beta_2 x_2$  and we set  $\beta_1 = 5 * 10^{-4}$  and  $\beta_2 = 1.2 * 10^{-3}$ .

While we did not make a systematic attempt at calibration –the model is 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 to tax evasion were zero in the whole range of income values.<sup>6</sup>

Figure 1 shows some typical results. The preferred tax rate is decreasing and the preferred tolerance to tax evasion is increasing in expected income. Therefore, low-income individuals prefer more taxation and less evasion than high income individuals. This is consistent with the story the model tells. 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.

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 to 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 to 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 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.

Finally, tolerance to tax evasion exhibits an inverted-U pattern in  $x_2$ . The mechanism here operates through the intrinsic marginal disutility of cheating. The assumption is that individuals who hold strong opinions and are willing to choose values for the issue  $x_2$  that are far from the center are also intrinsically less tolerant to tax evasion than individuals who hold less extreme opinions.

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

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<sup>6</sup> If government effectiveness is sufficiently low and the intrinsic disutility of cheating  $\beta'x$  is sufficiently large,  $t = ch = 0$ .

effectiveness. The tax rates are concave but monotonically increasing in income risk in the feasible value range.<sup>7</sup>

The second column in table 1 shows that, according to the model, tolerance to tax evasion is increasing in income and decreasing in government effectiveness. It presents inverted-U patterns in risk and regressor  $x_2$ , with maximums 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 to tax evasion than low income individuals because of the redistributive effects of the government program. 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 to 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 government program, i.e. favor a low tax rate, when income risk is low. But if the tax rate is low, tolerance to 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 to 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 to 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 to tax evasion in this environment, if tax evasion causes some intrinsic disutility.

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

**Proof:** (i)  $\sigma \rightarrow 0$ . Individuals with  $y_i \leq E_i[y_i]$ . The first term in the right hand side of (22) –the redistributive effect of tax evasion– is negative if  $y_i \leq E_i[y_i]$ . The second term –the insurance effect– also becomes negative, because (10) implies that  $c_i^H < c_i^L$ , and hence  $u'(c_i^L) -$

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<sup>7</sup> 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.

$u'(c_i^H) < 0$ , if  $\sigma \rightarrow 0$ . The third term is negative by assumption (6). Hence individuals with  $y_i \leq E_i[y_i]$  prefer no tax evasion if  $\sigma \rightarrow 0$ .

Individuals with  $y_i > E_i[y_i]$ . We first show that these individuals prefer that the tax rate is zero if  $\sigma \rightarrow 0$  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  $y_i > E_i[y_i]$ . The second term –the insurance effect– also becomes negative. To see it, notice first that  $\lim_{\sigma \rightarrow 0} (\sigma + 0.5ch(1 - \sigma))y_i(t) + g(t) > 0$ , and hence (10) implies that  $c_i^H < c_i^L$ , so  $u'(c_i^L) - u'(c_i^H) < 0$ , if  $\sigma \rightarrow 0$ . The marginal utility of tolerance to tax evasion (22) is negative if  $t = 0$ . Therefore, individuals with above average income also prefer zero tolerance to tax evasion if  $\sigma \rightarrow 0$ .

(ii)  $\sigma \rightarrow 1$ . Because of assumption (6), the marginal utility of tolerance to tax evasion (22) is negative if  $\sigma \rightarrow 1$ . Therefore, individuals prefer  $ch = 0$  if  $\sigma \rightarrow 1$ . **QED**

Notice that the corollary does not imply that the optimal tolerance to 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 to tax evasion is not very appealing when income risk is at either extreme.

The opinions about income risk may also impact on tolerance to tax evasion if they signal how opinionated individuals are, i.e. if the importance attributed to luck for individual success, for example, is a variable in vector  $x_2$ . If this is the case, optimal tolerance to tax evasion will show an inverted-U pattern in income risk even if the pecuniary channel described in the corollary does not operate.

## 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.<sup>8</sup>

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*.

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<sup>8</sup> 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.

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: 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 that, in the logic of our model, is meant to capture how “opinionated” individuals are (variables that pertain to vector  $x_2$  in our model). The question goes as follows: “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. We also explored the ideological self-identification as a proxy for “opinionatedness”, but decided not to include it in the final regressions because of the loss of data.<sup>9</sup>

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.<sup>10</sup>

## 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 to evasion: the higher the *CDF* the lower the proportion of individuals willing to justify cheating on taxes at the given tolerance point or

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<sup>9</sup> We also found some evidence that missing was not at random. We discuss this issue at the end of section 4.

<sup>10</sup> 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, 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.

above. Conversely,  $1 - CDF$  is a measure of country tolerance to 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).<sup>11</sup> 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 to 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 to 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 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 to 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 to evasion. The last column in table 2 reports the frequencies of this variable across regions and country-income groups. This measure of tolerance to evasion ranges from a minimum of 30 percent in the Americas to a maximum of 55 percent in South Asia. The

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<sup>11</sup> Notice however that the countries included in the WVS are not necessarily fully representative of each region. See notes in table 2.

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<sup>th</sup> 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. 2011 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.<sup>12</sup> 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 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 to 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

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<sup>12</sup> 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.

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 to 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 to evasion diminishes with importance attributed to luck, dropping to about 0.33. Similarly, tolerance to 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:

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

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  $\zeta_{1j}$ :<sup>13</sup>

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

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

$$\text{logit}\{\text{Pr}(\text{cheat}_{ij} = 1|z_{ij})\} = \beta_0 + \beta_1ge_j + \beta_2' z_{ij} + \zeta_{1j} \quad (23)$$

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.<sup>14</sup>

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

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

$\rho$  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 to tax evasion is an increasing function of income, a quadratic concave function of the proxies for uncertainty and a decreasing function of the quality of government.

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

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<sup>13</sup> We also made attempts at estimating the model with random slopes for  $luck_{ij}$  and  $luck_{ij}^2$ , but the model did not converge.

<sup>14</sup> See Rabe-Hesketh and Skrondal (2012) for a detailed explanation of gllamm and xtlogit in STATA.

than individuals in the poorest decile.<sup>15</sup> 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 to evasion (the odds ratios) as follows:

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

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 to 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. Therefore, the answers to the question about luck and connections do not only seem to be statistically significant but also economically important in explaining tolerance to 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 to tax evasion.

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

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

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<sup>15</sup> Recall also that “tolerating evasion” means here that individuals do not endorse the assertion that “cheating on taxes” is “never justifiable”.

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 ( $0.76 = 0.834^{(1.63-0.10)}$ ).<sup>16</sup>

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. However, our model suggests a different interpretation. Individuals could be less tolerant to tax evasion when the government is more efficient simply because they are more willing to support an efficient government. This has nothing to do with an intrinsic preference for cheating, i.e. with tax morale.

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 to tax evasion in *fair* exhibits an inverted-U pattern with a maximum at around 5.6 in the ten-point scale.

We interpret this pattern as a reflection of opinionatedness. In terms of our model, *fair* would belong to  $x_2$ . We found a similar pattern with a variable of ideological self-identification.<sup>17</sup> It seems difficult to interpret these inverted-U shape functions of tolerance to tax evasion in these beliefs unless they are a symptom of a latent common trait. Our hypothesis is that answers to these questions and, in particular, deviations from the center, reflect how opinionated individuals are, and individuals who hold strong opinions tend to be less tolerant, among other things, to tax evasion.

As we have already discussed, *luck* and *no choice* exhibit a similar pattern, so these variables could also signal opinionatedness. But our model suggests that tolerance to tax evasion would be an inverted-U function of proxies for income risk because of pecuniary reasons, even if there is no opinionatedness effect. We cannot separate these two effects.

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.

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<sup>16</sup> 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).

<sup>17</sup> We did not include this variable in the regressions we report in this paper because of missing data.

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 to 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 to 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 is 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 to 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 to 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 to tax evasion. To the best of our knowledge, this is the first formal model that focuses on governments' willingness to enforce the laws.

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 to tax evasion depends not only on values, but also on beliefs and interests. Some individuals may be inclined to demand higher tolerance to 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 to 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. If this is the case, strengthening governments monitoring and enforcement capacities might not be an effective solution to informality and norms noncompliance.

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## Tables and figures

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

	Tax rate	Tolerance to evasion
$y_i(0)$	-0.0367*** (0.000323)	0.0844*** (0.000744)
$\sigma$	1.285*** (0.0115)	3.183*** (0.0265)
$\sigma^2$	-0.565*** (0.0111)	-3.063*** (0.0255)
<i>gov. effect.</i>	0.00375*** (0.000692)	-0.00533*** (0.00159)
$x_2$	-0.00312** (0.00152)	0.0564*** (0.00350)
$x_2^2$	0.000307** (0.000135)	-0.00563*** (0.000310)
Constant	1.871*** (0.0283)	-4.242*** (0.0651)
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 to tax evasion

	10-point scale (1)					2-point scale (2)
	Number of countries	Mean score	Median score	10 <sup>th</sup> perc.	90 <sup>th</sup> perc.	Mean score (probability of 1)
<b>Regions (3)</b>						
East Asia & Pacific	11	2.13	1	1	5	0.37
Europe & Central Asia	17	2.15	1	1	5	0.37
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
<b>Income groups (4)</b>						
High income	20	1.98	1	1	5	0.34
Upper middle income	20	2.23	1	1	5	0.37
Lower middle income	13	2.40	1	1	6	0.43
Low income	2	2.27	2	1	5	0.58
<p>(1) Justifiable cheating on taxes, 10-point scale: 1 "Never justifiable" - 10 "Always justifiable".</p> <p>(2) Justifiable cheating on taxes, 2-point scale: 0 "Never justifiable" - 1 Otherwise.</p> <p>(3) Countries by region (World Bank classification): <u>East Asia &amp; Pacific</u>: Australia, China, Hong Kong, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Taiwan and Thailand. <u>Europe &amp; Central Asia</u>: Armenia, Azerbaijan, Belarus, Cyprus, Estonia, Kazakhstan, Kyrgyzstan, Netherlands, Poland, Romania, Russia, Slovenia, Spain, Sweden, Turkey, Ukraine and Uzbekistan. <u>Latin America &amp; Caribbean</u>: Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Trinidad and Tobago, and Uruguay. <u>Middle East &amp; North Africa</u>: Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Palestine, Tunisia and Yemen. <u>North America</u>: United States. <u>South Asia</u>: India and Pakistan. <u>Sub-Saharan Africa</u>: Ghana, Nigeria, Rwanda, South Africa and Zimbabwe.</p> <p>(4) Countries by income group (World Bank classification): <u>High income</u>: 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. <u>Upper middle income</u>: Argentina, Azerbaijan, Belarus, Brazil, China, Colombia, Ecuador, Iraq, Jordan, Kazakhstan, Lebanon, Libya, Malaysia, Mexico, Peru, Romania, South Africa, Thailand, Tunisia and Turkey. <u>Lower middle income</u>: Armenia, Egypt, Ghana, India, Kyrgyzstan, Morocco, Nigeria, Pakistan, Palestine, Philippines, Ukraine, Uzbekistan and Yemen. <u>Low income</u>: Rwanda and Zimbabwe.</p> <p>Data is not weighted by the population of each country (all countries have the same weight).</p> <p>Source: Own computations based on WVS.</p>						

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

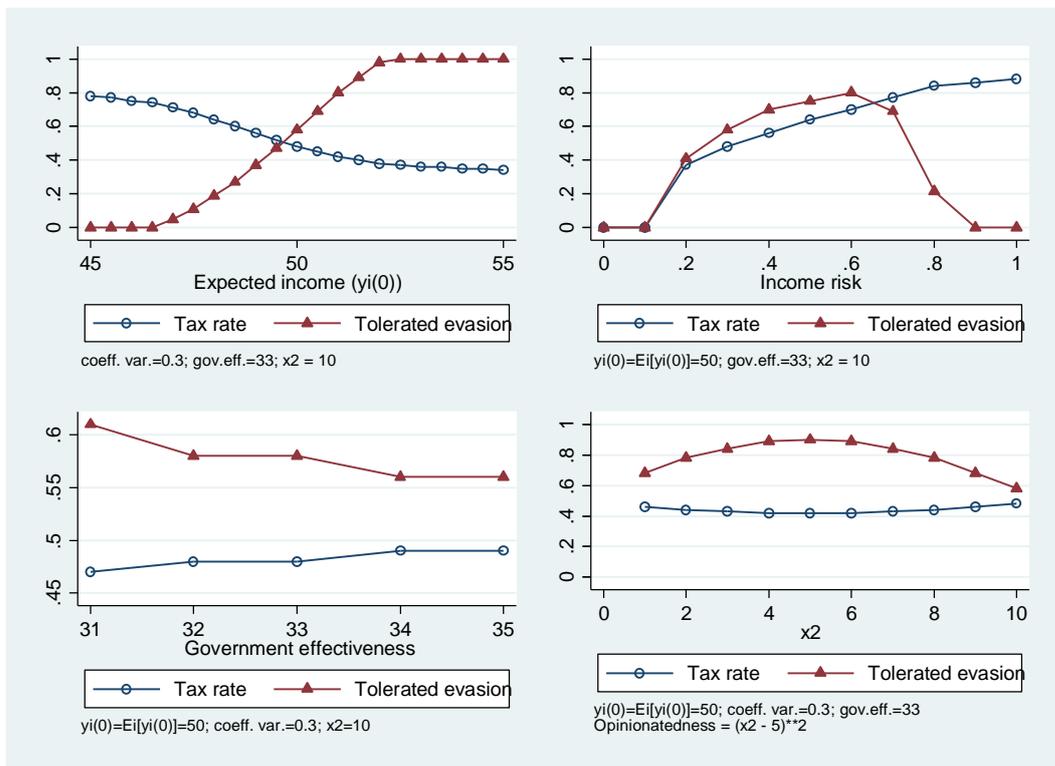
Table 5: Two-level logit models for cheating on taxes. Random intercept.

Covariates (a)	(1)		(2)	
	Coefficients	Odds ratios	Coefficients	Odds ratios
<i>income</i>	0.0597*** (0.0102)	1.061*** (0.0108)	0.0597*** (0.0102)	1.062*** (0.0108)
<i>luck</i>	0.400*** (0.0431)	1.491*** (0.0643)	0.400*** (0.0431)	1.491*** (0.0643)
<i>luck squared</i>	-0.0324*** (0.00363)	0.968*** (0.00351)	-0.0324*** (0.00363)	0.968*** (0.00351)
<i>no choice</i>	0.203*** (0.0272)	1.225*** (0.0333)	0.203*** (0.0272)	1.225*** (0.0333)
<i>no choice squared</i>	-0.0182*** (0.00313)	0.982*** (0.00308)	-0.0182*** (0.00313)	0.982*** (0.00308)
<i>confidence in government</i>	-0.00874 (0.0317)	0.991 (0.0315)	-0.00868 (0.0317)	0.991 (0.0314)
<i>pride</i>	-0.249*** (0.0314)	0.780*** (0.0245)	-0.249*** (0.0314)	0.780*** (0.0245)
<i>government effectiveness</i>	-0.229* (0.129)	0.795* (0.103)	-0.182*** (0.0578)	0.834*** (0.0482)
<i>woman</i>	-0.105* (0.0545)	0.900* (0.0491)	-0.105* (0.0546)	0.900* (0.0491)
<i>education</i>	-0.0250*** (0.00779)	0.975*** (0.00759)	-0.0249*** (0.00775)	0.975*** (0.00756)
<i>fair</i>	0.186*** (0.0335)	1.204*** (0.0403)	0.186*** (0.0334)	1.204*** (0.0402)
<i>fair squared</i>	-0.0165*** (0.00285)	0.984*** (0.00280)	-0.0165*** (0.00284)	0.984*** (0.00279)
<i>gdp</i>	0.00405 (0.00568)	1.004 (0.00570)		
<i>constant</i>	-1.368*** (0.248)	0.916** (0.0361)	-0.0872** (0.0394)	0.916** (0.0361)
<b>Number of units</b>				
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				
<b>Variances and covariances of random effects</b>				
<i>country</i>	0.30		0.31	
<i>rho</i>	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 to tax evasion conditional on importance of luck and connections and to lack of choice.

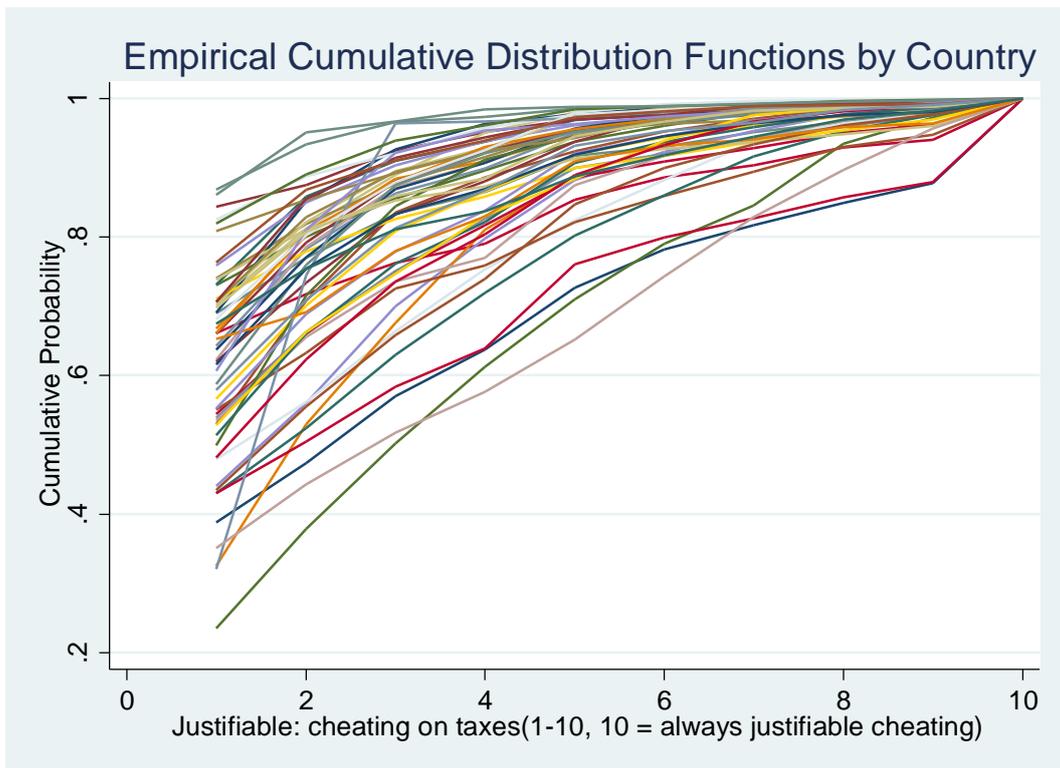
<i>luck = a</i>	<i>luck = b</i>		
	1	2	3
1	1.00		
2	1.35	1.00	
3	1.71	1.27	1.00
4	2.03	1.50	1.19
5	2.26	1.67	1.32
6	2.35	1.74	1.37
7	2.30	1.70	1.34
8	2.10	1.55	1.23
9	1.80	1.33	1.05
10	1.45	1.07	0.85
$OR(a, b) = odds(cheat luck = a)/odds(cheat luck = b)$			
<i>no choice = a</i>	<i>no choice = b</i>		
	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 4, column (2).			

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



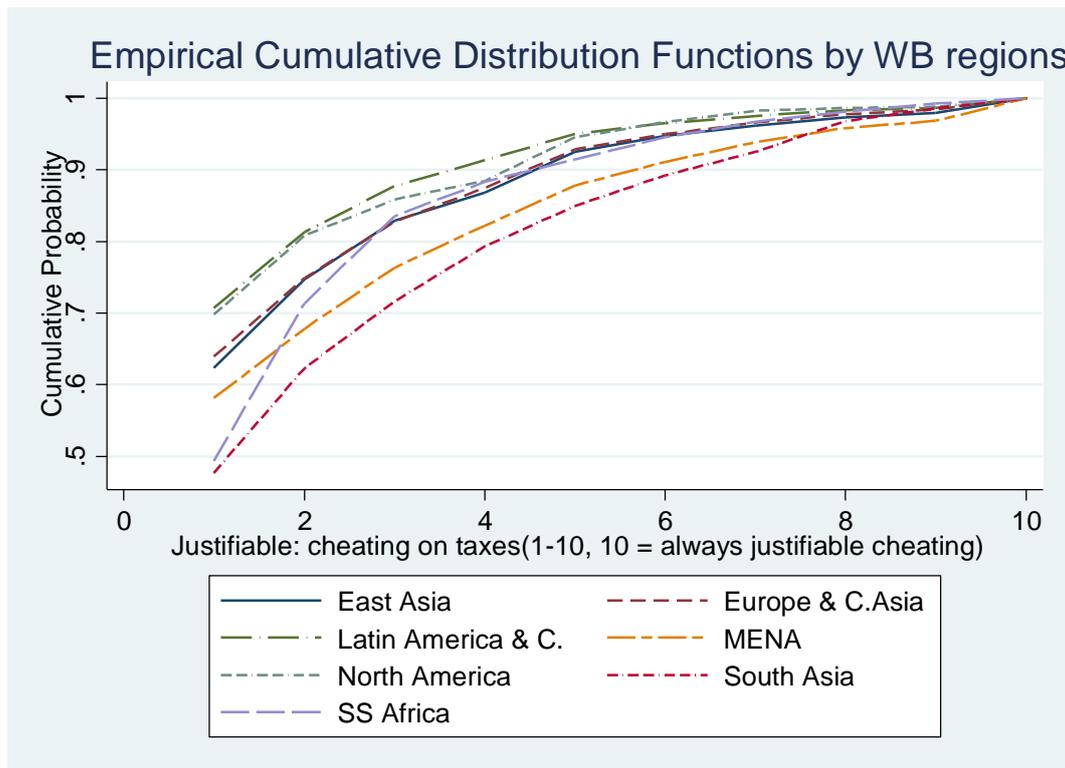
Source: Own computations based on simulations.

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



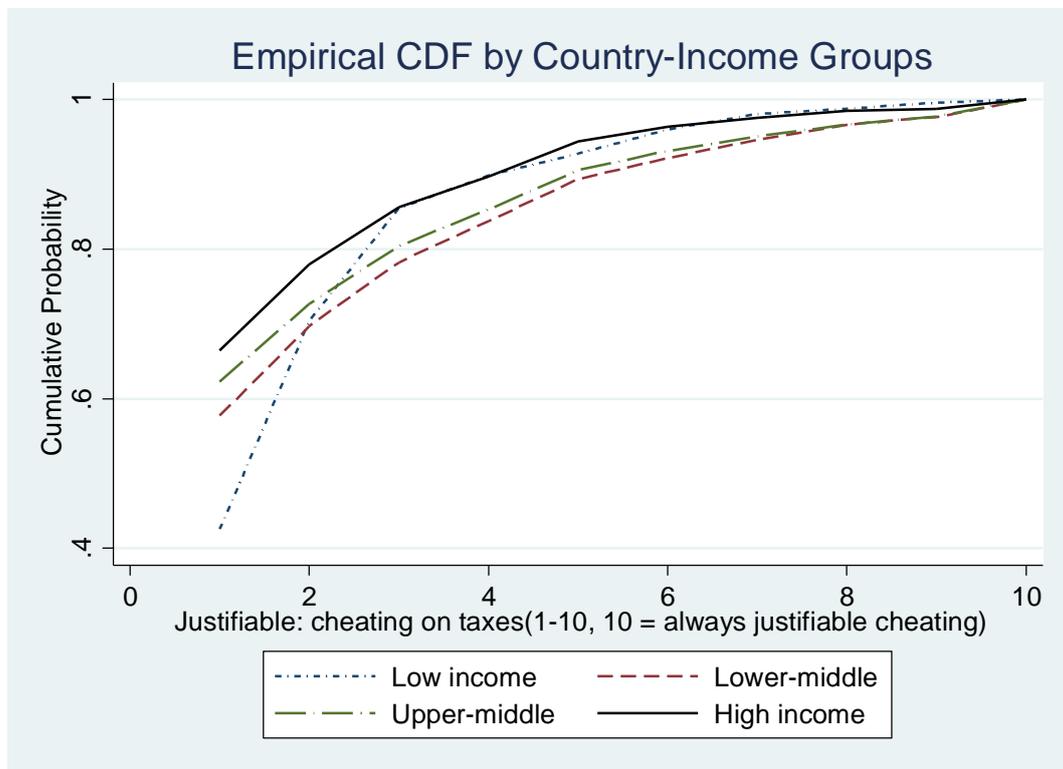
Source: Own computations based on WVS.

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



Source: Own computations based on WVS.

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



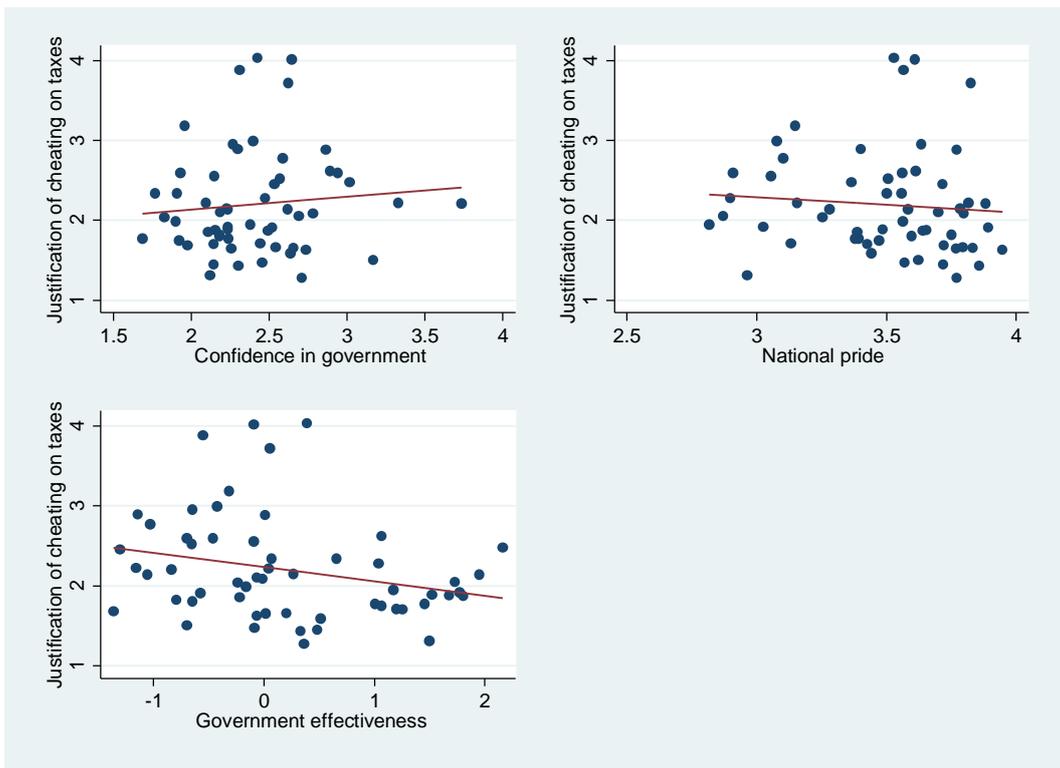
Source: Own computations based on WVS.

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



Source: Own computations based on WVS.

Figure 6: Tolerance to 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 to tax evasion (0 = “never justifiable”, 1 = otherwise). Random intercept.

Covariates (a)	(1)		(2)	
	Coefficients	Odds ratios	Coefficients	Odds ratios
<i>income</i>	0.0597***	1.061***	0.0597***	1.062***
	(0.0102)	(0.0108)	(0.0102)	(0.0108)
<i>luck</i>	0.400***	1.491***	0.400***	1.491***
	(0.0431)	(0.0643)	(0.0431)	(0.0643)
<i>luck squared</i>	-0.0324***	0.968***	-0.0324***	0.968***
	(0.00363)	(0.00351)	(0.00363)	(0.00351)
<i>no choice</i>	0.203***	1.225***	0.203***	1.225***
	(0.0272)	(0.0333)	(0.0272)	(0.0333)
<i>no choice squared</i>	-0.0182***	0.982***	-0.0182***	0.982***
	(0.00313)	(0.00308)	(0.00313)	(0.00308)
<i>confidence in government</i>	-0.00874	0.991	-0.00868	0.991
	(0.0317)	(0.0315)	(0.0317)	(0.0314)
<i>pride</i>	-0.249***	0.780***	-0.249***	0.780***
	(0.0314)	(0.0245)	(0.0314)	(0.0245)
<i>government effectiveness</i>	-0.229*	0.795*	-0.182***	0.834***
	(0.129)	(0.103)	(0.0578)	(0.0482)
<i>woman</i>	-0.105*	0.900*	-0.105*	0.900*
	(0.0545)	(0.0491)	(0.0546)	(0.0491)
<i>education</i>	-0.0250***	0.975***	-0.0249***	0.975***
	(0.00779)	(0.00759)	(0.00775)	(0.00756)
<i>fair</i>	0.186***	1.204***	0.186***	1.204***
	(0.0335)	(0.0403)	(0.0334)	(0.0402)
<i>fair squared</i>	-0.0165***	0.984***	-0.0165***	0.984***
	(0.00285)	(0.00280)	(0.00284)	(0.00279)
<i>gdp</i>	0.00405	1.004		
	(0.00568)	(0.00570)		
<i>age30_39</i>	-0.0873**	0.916**	-0.0872**	0.916**
	(0.0394)	(0.0361)	(0.0394)	(0.0361)
<i>age40_49</i>	-0.159***	0.853***	-0.159***	0.853***
	(0.0449)	(0.0382)	(0.0448)	(0.0382)
<i>age50_59</i>	-0.294***	0.746***	-0.293***	0.746***
	(0.0453)	(0.0338)	(0.0453)	(0.0338)
<i>age60_69</i>	-0.383***	0.682***	-0.383***	0.682***
	(0.0601)	(0.0410)	(0.0601)	(0.0410)
<i>age70_</i>	-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
<i>divorced</i>	0.211*** (0.0440)	1.235*** (0.0543)	0.211*** (0.0440)	1.235*** (0.0544)
<i>separated</i>	0.211*** (0.0817)	1.235*** (0.101)	0.211*** (0.0818)	1.235*** (0.101)
<i>widowed</i>	0.126** (0.0603)	1.134** (0.0684)	0.126** (0.0603)	1.134** (0.0684)
<i>never_married</i>	0.113*** (0.0361)	1.120*** (0.0404)	0.113*** (0.0361)	1.120*** (0.0404)
<i>Constant</i>	-1.368*** (0.248)	0.255*** (0.0632)	-1.289*** (0.211)	0.276*** (0.0582)
<b>Number of units</b>				
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				
<b>Variances and covariances of random effects</b>				
<i>country</i>	0.303		0.306	
<i>rho</i>	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.				