

Factors affecting tax compliant attitude in Africa: Evidence from Kenya, Tanzania, Uganda and South Africa

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Abstract: *In this study, we explore factors that determine citizens' tax compliance behavior in Kenya, Tanzania, Uganda and South Africa using attitude and perception data from the new round 5 of Afrobarometer surveys. Using a binary logit regression, we find some similarities, but also differences in factors that are correlated with tax compliance attitude in the four countries. An increase in the perception of individuals about the difficulty of evading taxes is found to increase the likelihood of tax compliant attitude in Kenya and South Africa. We also find evidence that individuals who are more satisfied with public service provision are more likely to have a tax compliant attitude in all the four countries. However, frequent payment to non-state actors, e.g. to criminal gangs in exchange for protection, reduces individual's tax compliant attitude. Furthermore, those individuals who perceive that their ethnic group is treated unfairly are less likely to have a tax compliant attitude in Tanzania and South Africa. Tax knowledge is also significantly correlated with tax compliant attitude in Tanzania and South Africa. These findings are robust for different econometric specifications.*

1. Introduction

Raising more domestic revenue is a priority for most sub-Saharan African countries (Drummond *et al.* 2012). Mobilizing revenue is a way for governments' to create fiscal space, provide essential public services, and reduce foreign aid and single resource dependence. However, the domestic tax bases in most African countries are undermined by widespread tax avoidance and evasion (IMF 2011). Although taxpayer non-compliance is a continual and growing global problem (McKerchar and Evans 2009), many indications suggest that developing countries, many of them in Sub-Saharan Africa, are the hardest hit (Cobham 2005; Fuest and Riedel 2009).

Dealing with the problem of tax evasion requires at least some understanding of the factors underlying the individual taxpayer's decision whether to pay or evade taxes. However, little is known about tax compliance behavior in developing countries (Andreoni *et al.* 1998; D'Arcy 2011; Fjeldstad and Semboja 2001). This study attempts to explore factors that determine citizens' tax compliance behavior in selected African countries using attitude and perception

data from a new round of Afrobarometer surveys (Round 5; 2011/12)¹. This survey includes a series of questions about tax that are new and not included in previous rounds of Afrobarometer. This allows for a more comprehensive empirical analysis of tax compliance attitudes based on nationally representative public opinion survey data from the selected African countries.

Studying what factors determine tax compliance attitude and behavior in Africa is not only of academic interest; it is also important from a policy perspective. Attempts to broaden the tax base must build on insights into how citizens experience and perceive the tax administration and enforcement, and whether and how their tax behavior is correlated with how they perceive the state. More systematic and coherent information on taxpayer attitudes are therefore required for better analysis and a more informed tax policy design. By empirically establishing which factors affect tax compliance in the selected countries, the paper derives feasible policy recommendations for policy makers and revenue administrations.

In the study, we use an indirectly phrased question to capture tax compliance attitude of individuals in order to avoid direct implication of “wrongdoing” by the respondent. In the questionnaire, respondents were asked to state their opinion about other people who do not pay taxes that they owe on their income. They were asked to state whether they think the action of other people who do not pay taxes on their income is “not wrong at all”, “wrong but understandable” or “wrong and punishable”. Based on these responses, individuals are considered as having a tax compliant attitude if their response is “wrong and punishable” and non-compliant attitude if their response is either “not wrong at all” or “wrong but understandable”. Using a binary logit regression, we find some similarities, but also differences in factors that are correlated with tax compliance attitude in the four countries. An increase in the perception of individuals about the difficulty of evading taxes is found to increase the likelihood of tax compliant attitude in Kenya and South Africa. We also find evidence that individuals who are more satisfied with public service provision are more likely to have a tax compliant attitude in all the four countries. However, frequent payment to non-state actors, e.g. to criminal gangs in exchange for protection, reduces individual’s tax compliant attitude. Furthermore, those individuals who perceive that their ethnic group is treated unfairly are less likely to have a tax compliant attitude in Tanzania and South Africa. Tax knowledge is also significantly correlated with tax compliant attitude in Tanzania and South Africa. These findings are robust for different econometric specification, where we include all the three responses of individuals regarding other people’s action about tax in an ordered logit regression.

The remainder of the paper is structured as follows: The next section provides a brief presentation of theoretical perspectives on tax compliance. Section 3 presents the data and research design. Sections 4 and 5 present the results. Finally, section 6 summarizes and concludes.

¹ Afrobarometer is an independent, nonpartisan research project which consists of national sample surveys on the attitudes of citizens in selected countries towards democracy, markets, civil society and other aspects of development. Because the instrument asks a standard set of questions, countries can be systematically compared. For further details, see www.afrobarometer.org

2. Understanding taxpayer attitudes and behavior: theoretical foundations

Models of taxpayer behavior, including the decision whether or not to pay taxes, tend to reflect one of five theories that can be referred to as: (1) economic deterrence; (2) fiscal exchange; (3) social influences; (4) comparative treatment; and (5) political accountability. These are to some extent interconnected, and some represent an evolution of others.

Economic deterrence

The economic deterrence theory states that taxpayer's behavior is influenced by factors such as the tax rate determining the benefits of evasion, and the probability of detection and penalties for fraud which determine the costs (Allingham and Sandmo 1972; Becker 1968).² This implies that if detection is likely and penalties are severe, few people will evade taxes. In contrast, under low audit probabilities and low penalties, the expected return to evasion is high. The model then predicts substantial noncompliance. Although the model has been criticized for focusing exclusively on the coercive side of compliance, at the expense of the consensual (Sandmo 2005)³, there is some evidence to support the relevance of deterrence strategies to addressing non-compliance (McKerchar and Evans 2009). For example, the fear of getting caught, or the probability of detection, has been found in some contexts to be an effective strategy to induce truthful behavior. The theoretical principles of economic deterrence have also been widely adopted by tax administrations when developing enforcement strategies that rely principally on penalties and the fear of getting caught.

Fiscal exchange

The fiscal exchange theory suggests that the presence of government expenditures may motivate compliance and that governments can increase compliance by providing goods that citizens prefer in a more efficient and accessible manner (Cowell and Gordon 1988; Levi 1988; Tilly 1992; Moore 2004; 1998). Alm *et al.* (1992) note that compliance increases with (perceptions of) the availability of public goods and services. Accordingly, the main concern of taxpayers is what they get directly in return for their tax payments in the form of public services (*quid pro quo*). In this perspective, taxation and the provision of public goods and services are interpreted as a contractual relationship between taxpayers and the government (Moore 2004). Individuals may pay taxes because they value the goods provided by the government, recognizing that their payments are necessary both to help finance the goods and services and to get others to contribute (Fjeldstad and Semboja 2001). The existence of positive benefits may increase the probability that taxpayers will comply voluntarily, without direct coercion. Although most taxpayers cannot assess the exact value of what they receive from the government in return for taxes paid, it can be argued that they have general impressions and attitudes concerning their own and others' terms of trade with the government (Richupan 1987). It is then reasonable to assume that a taxpayer's behavior is affected by his/her satisfaction or lack of satisfaction with his/her terms of trade with the government. Thus, if the system of taxes is perceived to be unjust, tax evasion may, at least partly, be considered as an attempt by the taxpayer to adjust his

² Nearly all economic approaches to tax evasion are based on this economics-of-crime framework (Becker 1968). Cowell (1990) offers an insightful review of this analytical framework.

³ For instance, empirical data from Western countries reveal that taxpayers pay much more tax than what could be accounted for even by the highest feasible levels of auditing, penalties and risk-aversion. The question therefore has switched from "why do people not evade taxes" to "why do people pay?" Alm, J., G. H. McClelland & W. D. Schulze 1992. Why do people pay taxes? *Journal of Public Economics*, 48, 21-38, Slemrod, J. 1992. Why people pay taxes: tax compliance and enforcement. *In*: Slemrod, J. (ed.). Ann Arbor: The University of Michigan Press..

terms of trade with the government. The fiscal exchange theory has received much attention and is well established theoretically. Empirical evidence to support the theory is, however, ambiguous (D'Arcy 2011: 5-6).

Social influences

In the social influence model, compliance behavior and attitudes towards the tax system is thought to be affected by the behavior and social norms of an individual's reference group (Snavely 1990). It is reasonable to assume that human behavior in the area of taxation is influenced by social interactions much in the same way as other forms of behavior (ibid). Compliance behavior and attitudes towards the tax system may therefore be affected by the behavior of an individual's reference group such as relatives, neighbors and friends. Therefore, if a taxpayer knows many people in groups important to him who evade taxes, his/her commitment to comply will be weaker. On the other hand, social relationships may also help deter individuals from engaging in evasion in fear of the social sanctions imposed once discovered and revealed publicly. Theoretical research on herd behavior in economic situations (Banerjee 1992; Sah 1991) also indicates that social influences may affect compliance, in particular by affecting the perceived probability of detection. One of the most consistent findings about taxpayer attitudes and behavior in Western countries is that those who report compliance believe that their peers and friends (and taxpayers in general) comply, whereas those who report cheating believe that others cheat (Yankelovich *et al.* 1984). Evidence suggests that perceptions about the honesty of others may affect compliance behavior.

Comparative treatment

The comparative treatment model is based on equity theory and posits that addressing inequities in the exchange relationship between government and taxpayers would result in improved compliance (McKerchar and Evans 2009). Citizens may not consider their relationship with the state in a vacuum where both parties are the only actors. Likewise, they may not think about their fellow citizens without considering their own relationship with the state. They may also consider how the state treats them relative to their fellow citizens. This judgment is likely to affect not only their judgment of the state, but also how they view their fellow citizens (D'Arcy 2011: 7). If the state treats certain groups preferentially, this may color the citizen's relationship with the state and the group receiving favors. A crucial variable is then not just what a person gets from the state, but what the person gets from the state (and how the state treats the person) relative to those who are in the person's wider national community. This social psychology model highlights the importance of equity theory in the study of compliance and taxpayer behavior.

Political legitimacy

Finally, according to the political legitimacy theory, tax compliance is influenced by the extent that citizens trust their government (Tayler 2006; Kirchler *et al.* 2008; Fauvelle-Aymar 1999). Legitimacy could be described as belief or trust in the authorities, institutions, and social arrangements to be appropriate, proper, just and work for the common good. Political scientists have addressed how political legitimacy and civic identification are fostered. (Persson 2008) argues that African countries that upon independence emphasized building national over ethnic identity have been more successful than those who allowed ethnicity to become the main animus of politics.

In the following empirical analysis we will examine the extent to which the different theories of taxpayer compliance contribute to explaining people's attitude towards taxation in the selected African countries.

3. Data and descriptive analysis

The main source of data for the analysis is the 5th round of Afrobarometer survey collected in 2011-2012. The survey collects data on public attitudes on democracy, governance, markets, taxation and civil society, in more than 20 African countries. The questionnaire also includes a series of questions about tax, derived from the theories outlined in the previous section. Most of these questions are new and not included in the previous rounds of Afrobarometer. Because the questionnaires are similar across countries, the data allows a comprehensive empirical analysis of taxation theory in African societies and for testing the relevance of the various theories about taxpayer compliance. Nationally representative samples of individuals who are more than 18 years old are selected both in rural and urban areas of the different countries. 2399 randomly selected individuals were interviewed from 8 and 9 districts in Kenya and South Africa each, respectively. In Tanzania and Uganda, the sample size is 2400 in each countries and the respective number of districts is 26 and 5.

Kenya, Tanzania and Uganda were chosen for this study because they are situated in the same geographic region and are all members of the East African Community (EAC).⁴ Looking at similarities and disparities in attitudes towards taxation in these three countries could provide useful information about where they can make a collective effort to improve tax compliance and where country specific policies are needed. South Africa makes an interesting comparison because it has a more developed and extensive tax system as well as significantly higher GNI per capita than the East-African countries (see Table 1). As depicted in Table 1, there are also institutional and structural differences between the four countries. Though South Africa is rated as the richest and most democratic country, it is also the most income unequal. Kenya has the second highest GNI per capita, but scores second worst in terms of democracy and inequality, while Tanzania is the second most democratic and has the lowest inequality. Uganda has the lowest GNI per capita, scores second best on inequality and second worst on the democracy index.

[Table 1 here]

Whit tax revenues accounting for 29% of GDP, South Africa has the highest tax to GDP ratio of the four countries. Since the abolishment of apartheid in 1994, the country has gone through major tax reforms (OECD-DAC 2012). The ratio of tax to GDP rose from 25% in 2004 to 29% in 2010. Although tax avoidance and evasion are still considered to be major challenges, the implementation of popular taxpayer outreach and education programs by the South African Revenue Service (SARS), combined with new enforcement techniques, have led to improvements in public attitudes to the importance of paying taxes (OECD-DAC 2012: 31; SARS 2011). Kenya has the second largest share of collected tax revenues with 19.5% of GDP. Although this is relatively high compared to many other African countries (World Bank 2012), the tax burden is unevenly distributed, leaving a large fraction of the economy untaxed (Waris *et al.* 2009).

⁴ We do not have access to data from the two other members of EAC, Burundi and Rwanda.

Large efforts to improve taxpayer compliance have been made by Tanzania Revenue Authority in recent years. Despite this, the country comes third with a tax to GDP-ratio of 14% in 2010. Tax evasion is a major challenge and coarse estimates suggest that loss in tax revenue due to tax evasion amounted to one sixth of the entire Tanzanian budget in the fiscal year 2009/10. As a result, the country remains heavily dependent on aid which, according to the African Development Bank, accounts for about 34% of the government's budget (AfDB 2010a) .

With 12% of GDP accruing from tax revenue, Uganda has the lowest tax to GDP-ratio of the studied countries. While the tax share is almost doubled from 1991/92 when the ratio was only 6.7%, the growth in tax revenue collection has been slow the last decade (AfDB 2010b).

3.2 Measuring tax compliance attitude

In the questionnaire, respondents were asked directly if they have refused to pay taxes or fees that they owed to the government during the last year. However, studies show that individuals tend to answer untruthfully when asked questions about sensitive issues such as their own tax payment. Tax compliance is therefore likely to be over-reported in survey data using such measures. While some authors argue that obtaining reliable quantitative information about tax compliance behavior is practically impossible, others (Kaufmann (1997) and Reinikka and Svensson (2006)) maintain that application of appropriate survey methods and interview techniques comes a long way in solving the problem. Following the works of Reinikka and Svensson (2006) on their work on corruption, we use an indirectly phrased question to capture tax compliance in order to avoid direct implication of “wrongdoing” by the respondent. In the questionnaire, respondents were asked to state their opinion about other people who do not pay taxes that they owe on their income. They were asked to state whether they think the action of other people who do not pay taxes on their income is “not wrong at all”, “wrong but understandable” or “wrong and punishable”. Based on these responses, individuals are considered as having a tax compliant attitude if their response is “wrong and punishable” and non-compliant attitude if their response is either “not wrong at all” or “wrong but understandable”.

Figure 1 shows the share of respondents with tax compliant attitudes against the natural logarithm of GNI per capita in the four countries together with Benin, Ghana, Malawi and Zimbabwe. The figure depicts that there is positive correlation between GNI per capita and share of individuals with tax-compliant attitude, with relatively richer countries having a higher share. Figure 2 is equivalent to figure 1, but without the outlier, South Africa, which has a much higher GNI per capita than the other countries.

[Figure 1 here]

[Figure 2 here]

Table 2 further shows the share of respondents with compliant and non-compliant attitudes across different socioeconomic indicators. The first row shows the share of respondents with a compliant and non-compliant tax attitude in the countries of investigation. In both South Africa and Kenya, more than 50% of the respondents have a tax compliant attitude. In Tanzania and Uganda, on the other hand, the majority have a non-compliant attitude and 54% of the respondents in Tanzania, and as many as 68% of the Ugandans think that not paying taxes is “not wrong at all” or “wrong, but understandable”.

[Table 1 here]

Gender, employment statuses and urban location are measured in percentages, while age is measured in mean years. Level of schooling is measured by a range variable where 0= “no formal schooling” and 9= “postgraduate qualifications”, and wealth is measured by a composite variable consisting of ownership of radio, TV, car, water, latrine and roof material (0=respondent has none of the items, 1=respondent has all items). The only finding consistent in all four countries is the tendency towards a higher mean level of schooling among respondents with a compliant tax attitude. In all countries except Uganda, we also find that respondents with a compliant tax attitude are older, relatively wealthier and to a larger degree live in urban areas than individuals with a non-compliant attitude.

In the questionnaire, respondents are also asked what they think is the main reason that some people evade taxes. As can be seen in Table 3, in all the four countries, “taxes are too high” and “taxes are unaffordable” are the most frequently stated reasons, the former ranging from 22% in South Africa to 28% in Uganda and the latter from 25% in Tanzania to 29% in Uganda. This indicates that tax rates are perceived as too high both in terms of what respondents can afford and in terms of what is reasonable. Another frequently mentioned reason is “poor public services”. In Tanzania as many as 16% of the respondents consider poor public services to be the main reason why some people evade taxes. The corresponding percentages are 12%, 11% and 9% in South Africa, Uganda and Kenya, respectively. “Unfair tax system” and “government waste/steal taxes” are also given as main reasons why people avoid taxes by more than 8% of the respondents in all the countries. Very few respondents, 1% in South Africa and Uganda and 2% in Kenya and Tanzania, state “people know they won’t get caught”.

[Table 3 here]

4. Correlates of factors affecting tax compliance attitude: regression model and variables

In this section, we will look at factors that are correlated with tax compliance attitude in Kenya, Tanzania, Uganda and South Africa. We will specifically examine the extent to which the different theories of taxpayer compliance briefly outlined in section 2 contribute to explaining people’s attitude towards taxation.

In order to capture factors that correlate with tax compliance attitude, we estimate the following logit model.

$$\text{Probability}(\text{Tax_compliance_attitude}_i) = \alpha_1 + \alpha_2 X_1 + \alpha_3 Y_1 + \alpha_4 Z_1 + \varepsilon_i \quad (1)$$

$\text{Tax_compliance_attitude}_i$ is the dependent variable which is a dummy with a value of 1 for tax-compliant attitude and a value of 0 for non-compliant attitude as measured in section 2 above. X_1 is a vector for individual level characteristics; age, sex, education, employment status, wealth, ethnicity of the respondent and whether the individual is urban/rural resident; Y_1 is a vector for variables that capture different factors affecting tax compliance attitude; Z_1 is a vector for variables capturing regional fixed effects. The α_i ’s are the respective coefficients and ε_i is the error term. The variables used to examine the different theories of tax compliance are described below.

Economic deterrence

As a measure of economic deterrence, we use a rank variable based on individuals' responses to the question "Based on your experience, how easy or difficult is it to avoid paying the income or property taxes that you owe to the government?". The variable ranges from 1="very easy" to 4="very difficult".

Fiscal exchange

A handful of variables are included in the regression to capture respondent's satisfaction with government's provision of different goods and services that citizens prefer and that may motivate compliance attitude. These include satisfaction with i) government's provision of basic health services and addressing educational needs; ii) infrastructure (government provision of water and sanitation services, maintaining roads and bridges, and provision of reliable supply of electricity); and iii) government's handling of crime, conflict and corruption. In addition to these variables, we also control for overall satisfaction with ease of getting basic services from the government such as issuing identity card, household services and police services. These variables all range from 1="very badly" to 4="very well".

Non-state actors as service providers

Non-state actors such as powerful people or groups other than the government may provide basic infrastructure to citizens when governments become weak and fragile (Sacks 2012). This in turn may affect the tax compliant attitude of individuals, especially if individuals are making payments to non-state actors in exchange for protecting them, their business and property. The role of non-state actors like donors and NGO's in providing basic infrastructure and how that in turn affects tax attitudes is explored in previous research (Fjeldstad 2001; Sacks 2012). However, the provision of public services by criminal organizations and gangs and its relation to tax compliance attitude has, to our knowledge, not been studied.⁵ In this paper, we include a variable that captures tax to non-state actors, particularly to criminal organizations and gangs. The variable is measured by how often individuals make a payment to powerful people or groups other than the government, such as criminals or gangs in their community in return for protecting them, their property or their businesses. The variable ranges from 1= "never made payment"; 2= "only once"; 3= "a few times; and 4= "often".

Political legitimacy

We use range of variables to capture political legitimacy such as trust in tax officials, corruption of tax officials, overall level of satisfaction with politicians, and individual's perception about their country's level of democracy. Trust in tax officials is measured as a rank response for the extent of trust that individuals have in tax officials. The variable ranges from 1= "no trust at all" to 5= "trust a lot". Corruption is captured by individuals' response to how many tax officials they think are involved in corruption. The variable ranges from 1= "none of them" to 5= "all of them". Overall satisfaction with politicians is captured as a rank response on individual's opinion whether they approve or disapprove of the way the president, member of parliaments, the

⁵ There is a large literature on how 'protection' or 'security' money can be extorted in the classical, well-known mafia style, where organised criminals use insecurity, harassment and intimidation to extort money from individual citizens, private businesses and public officials (Gambetta, 1993; Grossman, 1995). However, this literature does not address how these practises may impact on tax compliance.

premium of the provinces and elected local officials performed their job in the past 12 months. The responses range from 1= “strongly disapprove” to 4= “strongly approve”. Based on these responses, factor analysis is made in order to have an indicator for individual’s satisfaction with politicians. Democracy is captured as a rank response on individual’s opinion on how much of a democracy their country is. The response ranges from 1= “no democracy” to 5= “a full democracy”.

Social influence

To measure the influence of other people’s behavior on tax compliance attitude, we use a dummy that has a value of 1 if individuals think that other people avoid taxes and 0 otherwise.

Comparative treatment

In order to capture inequities in the exchange relationship between government and taxpayers, we use a variable that is measured as a rank response on how often individuals believe that their own ethnic group is treated unfairly by the government. The variable ranges from 1= “never” to 4= “always”.

Knowledge about taxes

In addition to the above stated factors, the knowledge base of individuals regarding the types of taxes to pay may also matter in affecting compliance attitude. We therefore control for tax knowledge, which is measured as a rank response for the extent of difficulty to know the type of taxes to pay. The response ranges from 1=very easy to 4=very difficult.

4.1 Results

Results in table 4 show the marginal effects of the logit regression for the four countries. The standard errors are presented in brackets and are clustered at the district level. Table 5 further shows the Wald-test for the fit of the logit model of the four countries. As can be seen in table 5, the null hypothesis that all the regressing coefficients are jointly zero is rejected at 1% level of significance. This implies that the variables included in the regression create a statistically significant improvement in the fit of the model for all the countries.

[Table 4 here]

Although there are some similarities in factors that are correlated with tax compliant attitude across the four countries, there are also differences. While employed people in Uganda are 7% more likely to have tax compliant attitude, we find the opposite effect in Kenya by almost the same percent. More years of schooling is found to increase the probability of having a tax compliant attitude by about 3% both in Kenya and Tanzania. We do not find significant variation in tax compliant attitude between male and female, with increased age or wealth of individuals in any of the four countries.

An increase in the perception of individuals about the difficulty of evading taxes of one unit increases the likelihood of tax compliant attitude by 5% and 8% in Kenya and South Africa, respectively. This gives suggestive evidence for the economic deterrence theory, which posits that the perception of increased enforcement that makes more evasion difficult will increase tax compliance attitude at least in Kenya and South Africa.

[Table 5 here]

In Kenya, individuals who are more satisfied with government provision of infrastructure such as roads and electricity are more likely to have tax compliant attitude by about 10%. In Uganda and Tanzania, individuals who are more satisfied with the government's provision of basic health services and educational needs are more likely to have compliant attitude by 8% and 10%, respectively. In addition to basic health services and education, satisfaction with government's handling of crime, conflict and corruption increases the likelihood of having a compliant attitude in Uganda with 7%. In South Africa, individuals who are more satisfied with the ease of getting various services from the government such as issuing of identity card, household services and police services are more likely to have a tax-compliant attitude by about 8%. The different results from the four countries suggest that government expenditures may motivate compliance and that governments can increase compliance by providing goods that citizens prefer in a more efficient and accessible manner (Cowell and Gordon 1988; Levi 1988; Tilly 1992; Moore 2004).

Frequent payment to non-state actors such as criminals and gangs reduces the likelihood of having a tax compliant attitude in all the four countries. The effect ranges from a decline in compliant attitude from 6% in Kenya, to 8% in Uganda and South Africa and as high as 12% in Tanzania.

We do not find strong evidence on political legitimacy except for a few variables in South Africa and Tanzania. Corruption of tax officials is found to reduce the likelihood of tax compliant attitude by 5% in South Africa. In Tanzania, increased level of satisfaction with the overall performance of politicians is found to increase the likelihood of tax compliant attitude by 3%.

The extent to which individuals think that their own ethnic group is treated unfairly compared to others is also significantly correlated with compliant attitude in Tanzania and South Africa. As the extent to which individuals think that their own ethnic group is treated unfairly increases by one point, the probability of having a tax compliant attitude decreases by 5% and 4% in Tanzania and South Africa, respectively. This may provide indication towards the comparative treatment model, which is based on equity theory and posits that addressing inequities in the exchange relationship between government and taxpayers matters for tax compliance (Persson, 2008; Rothstein 2003).

Tax knowledge is significantly correlated with tax compliant attitude in Tanzania and South Africa. An increase in the extent of difficulty to know the type of taxes to pay by one point reduces the probability of tax compliance attitude by 4% and 10% in Tanzania and South Africa respectively. This is equivalent to reducing the current share of people with tax compliant attitude, which is 54% in Tanzania and 57% in South Africa, to close to 51% in both countries due to lack of appropriate tax knowledge.

5. Robustness check

In our previous measure of tax compliance attitude, we use a dummy variable where we categorize individuals who responded that not paying tax is "not wrong" and "wrong, but understandable" as having a non-compliant attitude. However, it could also be the case that individuals who responded that not paying tax is "wrong and understandable" have a compliant attitude. In this section we conduct a robustness check where we include all the three responses: "not wrong at all", "wrong, but understandable" and "wrong and punishable" in a regression. Given the ordinal nature of the responses, we use ordered logit model.

We re-formulate the econometric model in equation (1) as follows. The dependent variable ($Tax_compliance_attitude_i$) in equation (2) is an ordered categorical variable which ranges from 1 to 3 (1=not wrong at all, 2=wrong but understandable, and 3=wrong and punishable). We assume that there is a latent variable $Tax_compliance_attitude_i^*$ given by the following expression;

$$Tax_compliance_attitude_i^* = \alpha_1 + \alpha_2 X_1 + \alpha_3 Y_1 + \alpha_4 Z_1 + \varepsilon_i \quad (2)$$

Assuming that ε_i is a random, normally distributed, variable, the link between the observed and the latent variable is given by;

$$P(Tax_{compl}_i = 1|V_i) = \Phi(\mu_1 - V_i\gamma)$$

$$P(Tax_{compl}_i = 2|V_i) = \Phi(\mu_2 - V_i\gamma) - \Phi(\mu_1 - V_i\gamma)$$

$$P(Tax_{compl}_i = 3|V_i) = 1 - \Phi(\mu_2 - V_i\gamma),$$

where Φ is a cumulative normal distribution function of ε_i , $\gamma = [\alpha_1, \alpha_2, \alpha_3, \alpha_4]$ are the coefficients of the explanatory variables in equation 2, and μ_1 and μ_2 are the unknown threshold parameters that differentiate the categories. The model is estimated by maximum likelihood for each country.

5.1 Results

Table 6 shows the marginal effects of the ordered logit regression for the three responses of the four countries. Most of our results are consistent with the findings of the binary logit regression presented in table 5. However, we find even stronger evidence for the economic deterrence theory for all the four countries in the regression. An increase in the perception of individuals about the difficulty of evading taxes by one point increases the likelihood of responding “wrong not to pay taxes” by 4% in Kenya, 5% in Uganda, 6% in Tanzania and 7% in South Africa. On the other hand, an increase in difficulty of evasion reduces the likelihood of responding “wrong but understandable” and “not wrong at all” in all the four countries.

Similar to findings in the logit regression, in Tanzania and Uganda individuals who are more satisfied with the government’s provision of basic health services and addressing educational needs are more likely to respond “wrong not to pay taxes”, and are also less likely to respond “wrong but understandable” and “not wrong at all”. In Uganda, satisfaction with government’s handling of crime, conflict and corruption is more likely to make individuals respond “wrong not to pay taxes”, and less likely to respond “wrong but understandable” and “not wrong at all”. Again, similar to the findings in the logit regression, respondents in Kenya who are more satisfied with government handling of infrastructure such as roads and electricity are more likely to respond “wrong not to pay taxes” and less likely to respond “wrong and understandable” and “not wrong at all”. In South Africa, satisfaction with government provision of basic services such as issuing identity card, household services and police services make people more likely to respond that “wrong not to pay taxes” and less likely to respond “wrong and understandable” and “not wrong at all”.

[Table 6 here]

Consistent results are also found with non-state actors as in the logit regression. Individuals who make frequent payment to non-state actors such as criminals and gangs are less likely to respond “wrong not to pay taxes” and more likely to respond “wrong and understandable” and “not wrong at all”.

In the ordered logit regression, we do not find much evidence on political legitimacy except for corruption in South Africa, which depicts similar results as in the logit regression. Individuals who think that tax officials are corrupt are less likely to respond “wrong not to pay taxes” and more likely to respond “wrong and understandable” and “not wrong at all”.

Knowledge about tax is still important and an increase in the extent of difficulty to know the type of taxes to pay reduces the likelihood of individuals to respond “wrong not to pay taxes” and increases the likelihood to respond “wrong and understandable” and “not wrong at all” in South Africa, Kenya and Tanzania, although the latter is significant only at 10%.

6. Conclusion

In this paper, we explore factors that determine citizens’ tax compliance behavior in Kenya, Tanzania, Uganda and South Africa using attitude and perception data from the new round 5 of Afrobarometer surveys. The survey includes a series of theoretically rooted questions about citizens’ views about taxation. A main challenge was to find an accurate proxy for taxpayer compliance since individual’s reporting of own compliance is likely to be over-reported. Thus we used an indirectly phrased question on respondent’s opinion about other people’s action of whether not paying taxes is wrong or not.

Results from the logit regression provide robust results for two determinants of tax compliance. We find that individuals are more likely to express tax compliant attitude if they perceive that enforcement makes evasion more difficult in South Africa and Kenya. This is in line with the prescription of the standard economic theory of deterrence. The analysis also finds evidence that those who are more satisfied with public service provision are more likely to support the government’s right to tax in all the four countries, supporting certain elements of the fiscal exchange theory. However, the link between tax compliance attitude and public service provision depends on the specific service in question and differs between countries. While access to infrastructure such as roads and electricity encourage tax compliant attitude in Kenya, respondents in Tanzania and Uganda refer to education and health services as key to their tax compliance. In South Africa, government provision of issuing identity cards and police services are more likely to support tax compliant attitude.

A key finding of the study that applies to all the selected countries is that payment to non-state actors such as criminal gangs for protection reduces tax compliant attitude. Previous research suggests that the way the state treats individuals or groups relative to their fellow citizens is an important factor in determining taxpayer compliance attitude (D’Arcy 2011). We have tested this hypothesis by examining how citizens’ perceive their ethnic group is treated by the government compared to other groups. Only in South Africa and Tanzania this seems to matter for tax compliant attitude. The study finds no strong evidence that political legitimacy, e.g. trust in government policy and institutions, impacts on taxpayers’ compliance attitude. These findings are robust for a different econometric estimation, where we include all the responses of individuals regarding other people’s action about tax in an ordered logit regression.

The study provides us with some directions for further research. For an improved understanding of tax compliance attitude and behavior in Africa, there is a need for a more thorough examination of the concept of fairness in fiscal exchange, i.e., the contractual relationship between taxpayers and the government. In this context it is also relevant to analyze if – and when – user charges are to be preferred instead of general taxes to finance public services. Critical factors in this respect are citizens' perceptions about the role of the state, how the tax law is administrated, perceptions about enforcement, government trustworthiness, and impacts of payments to non-state actors may have on tax compliance. Furthermore, there is a need for research focusing on fairness in tax collection and comparative treatments of taxpayers. Can, and under what conditions, compliance be established in African countries without an extensive and costly enforcement apparatus? This question is important because it is likely that governments, seeking power on the basis of popular consent, face restrictions in their use of coercion in tax collection. Thus, the challenge for taxation in Africa is to raise domestic revenues from consenting citizens.

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Tables

Table 1: Macroeconomic indicators

Indicator ⁶	South Africa	Kenya	Tanzania	Uganda	SSA
Population (million)	50	41	45	33	840
GNI per capita (current USD)	6 090	790	530	500	1 127
Tax revenue of GDP (%)	29	19.5	14	12	187
Urban population (% of total)	62	22	26	13	37
Gini index	0.63	0.48	0.38	0.44	...
Democracy index ⁸ , 2011	7.8	4.7	5.6	5.1	4.3

Table 2: Differences in background variables between respondents with tax compliant and non-compliant attitude

	South Africa		Kenya		Tanzania		Uganda	
	Non-compliant attitude	Compliant attitude						
Total	43 %	57 %	46 %	54 %	54 %	47 %	68 %	32 %
Male	50 %	50 %	47 %	53 %	51 %	51 %	52 %	49 %
Employed	35 %	39 %	47 %	45 %	39 %	34 %	48 %	51 %
Self-employed	15 %	13 %	68 %	65 %	52 %	55 %	83 %	77 %
Urban	68 %	69 %	38 %	40 %	30 %	35 %	16 %	13 %
Age (mean)	37.7	40.5	35.4	36.2	38.1	39.1	35.4	34.4
Level of schooling (mean)	4.2	4.4	3.8	4.1	2.9	3.2	3.3	3.4
Wealth	0.58	0.65	0.49	0.54	0.39	0.41	0.21	0.20

⁶ All numbers are from World Development Indicators 2012 (World Bank 2012) unless else is specified

⁷ World Development Indicators 2011 (World Bank 2011)

⁸ Economist Intelligence Unit (EIU) democracy index 2011, 0 = authoritarian regime and 10= full democracy (EIU 2011: 30)

Table 3: Reasons why some people evade taxes, %

	South Africa	Kenya	Tanzania	Uganda
Unfair tax system	8	8	11	11
Taxes are too high	22	23	25	28
Taxes are unaffordable	27	26	25	29
Poor public services	12	9	16	11
The government waste / steal taxes	11	10	9	8
People know they won't get caught	1	2	2	1
Other	20	23	12	12
Total	100	100	100	100

Table 4: Wald test for binary logit regressions

	South Africa	Kenya	Tanzania	Uganda
Chi2	578	542	610	1348
Degrees of freedom	34	33	52	31
Prob > chi2 =	0.00	0.00	0.00	0.00

Table 5: Binary logistic regressions with marginal effects

	South Africa	Kenya	Tanzania	Uganda
<i>Individual characteristics</i>				
Age	-0.00 (0.01)	0.00 (0.01)	0.01* (0.01)	0.00 (0.01)
Age2	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Male (d)	0.02 (0.03)	0.01 (0.03)	-0.03 (0.02)	-0.02 (0.03)
Self-employed (d)	-0.01 (0.04)	-0.01 (0.04)	-0.00 (0.03)	-0.08 (0.07)
Employed (d)	0.02 (0.04)	-0.08** (0.04)	-0.05 (0.03)	0.07** (0.04)
Schooling	0.00 (0.01)	0.03** (0.01)	0.03** (0.01)	-0.01 (0.01)
Wealth	0.07 (0.05)	0.10 (0.06)	0.03 (0.08)	0.08 (0.08)
Urban (d)	-0.02 (0.04)	-0.04 (0.04)	-0.02 (0.04)	-0.06 (0.06)
<i>Economic deterrence</i>				
Difficulty of evading tax	0.08*** (0.03)	0.05** (0.02)	0.04 (0.03)	0.03 (0.02)
<i>Fiscal exchange</i>				
Health and education	0.00 (0.03)	-0.01 (0.03)	0.10*** (0.02)	0.08*** (0.02)
Infrastructure	0.00 (0.04)	0.09*** (0.03)	-0.00 (0.03)	0.01 (0.03)
Crime, conflict and corruption	0.04 (0.04)	-0.03 (0.03)	0.01 (0.03)	0.07** (0.03)
Basic services from the government	0.08*** (0.02)	-0.03 (0.03)	-0.01 (0.03)	0.01 (0.02)
<i>Social influence</i>				
Perceived compliance of others	-0.05 (0.03)	0.01 (0.04)	-0.09*** (0.03)	0.02 (0.04)
<i>Comparative treatment</i>				
Unfair treatment of own ethnic group	-0.04* (0.02)	-0.02 (0.01)	-0.05** (0.02)	0.03 (0.03)
<i>Political legitimacy</i>				
Trust	0.01 (0.02)	0.02 (0.02)	-0.01 (0.01)	-0.01 (0.01)
Corruption	-0.05*** (0.01)	0.02 (0.02)	0.00 (0.01)	-0.02 (0.02)
Satisfaction with politicians	-0.01 (0.02)	0.01 (0.02)	0.03* (0.02)	0.01 (0.03)
Democracy	-0.02	0.02	0.01	0.00

	(0.02)	(0.02)	(0.01)	(0.02)
<i>Non-state actors</i>				
Payments to non-state actors	-0.08**	-0.06**	-0.12***	-0.08**
	(0.04)	(0.03)	(0.04)	(0.04)
<i>Knowledge about taxes</i>				
Difficulty finding out what taxes to pay	-0.10***	-0.03	-0.04**	0.00
	(0.03)	(0.02)	(0.02)	(0.02)
Value added tax	0.19***	0.30***	0.17***	0.17***
	(0.05)	(0.05)	(0.04)	(0.04)
Region fixed effects	Yes	Yes	Yes	Yes
Ethnicity fixed effects	Yes	Yes	Yes	Yes
Religion fixed effects	Yes	Yes	Yes	Yes
Number of observations	1308	1452	1900	1410
Pseudo R2	0.12	0.13	0.12	0.10

Table 6 : Ordered logistic regressions with marginal effects

	South Africa			Kenya			Tanzania			Uganda		
	Wrong	Wrong, but understandable	Not wrong	Wrong	Wrong, but understandable	Not wrong	Wrong	Wrong, but understandable	Not wrong	Wrong	Wrong, but understandable	Not wrong
Individual fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Economic deterrence</i>												
Difficulty of evading tax	0.07**	-0.06**	-0.01**	0.05***	-0.04***	-0.01**	0.06***	-0.03***	-0.03***	0.05**	-0.02**	-0.03*
	(0.03)	(0.02)	(0.00)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.03)	(0.01)	(0.02)
<i>Fiscal exchange</i>												
Health and education	-0.01	0.01	0.00	0.01	-0.01	-0.00	0.08***	-0.04***	-0.04***	0.07***	-0.03***	-0.04***
	(0.03)	(0.02)	(0.00)	(0.03)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Infrastructure	0.01	-0.01	-0.00	0.09***	-0.06***	-0.02***	-0.00	0.00	0.00	0.01	-0.01	-0.01
	(0.04)	(0.03)	(0.01)	(0.03)	(0.02)	(0.01)	(0.03)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Crime, conflict and corruption	0.03	-0.02	-0.00	-0.02	0.01	0.01	-0.02	0.01	0.01	0.08**	-0.04**	-0.05**
	(0.04)	(0.03)	(0.01)	(0.03)	(0.02)	(0.01)	(0.03)	(0.01)	(0.01)	(0.03)	(0.02)	(0.02)
Basic services	0.08***	-0.07***	-0.01***	-0.04	0.03	0.01	0.02	-0.01	-0.01	-0.02	0.01	0.01
	(0.02)	(0.02)	(0.00)	(0.03)	(0.02)	(0.01)	(0.03)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)

<i>Social influence</i>												
Compliance of others	-0.05	0.04	0.01	0.04	-0.03	-0.01	-0.08**	0.04**	0.04**	0.02	-0.01	-0.01
	(0.03)	(0.03)	(0.01)	(0.04)	(0.03)	(0.01)	(0.03)	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)
<i>Comparative treatment</i>												
Own ethnic group treated unfairly	-0.06**	0.05**	0.01*	-0.02	0.01	0.01	-0.03	0.01	0.02	0.03	-0.01	-0.01
	(0.03)	(0.02)	(0.00)	(0.01)	(0.01)	(0.00)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
<i>Political legitimacy</i>												
Trust	0.01	-0.01	-0.00	0.02	-0.01	-0.01	-0.01	0.00	0.00	-0.01*	0.01	0.01
	(0.02)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
Corruption	-0.04***	0.04***	0.01***	0.01	-0.00	-0.00	0.01	-0.00	-0.00	-0.02	0.01	0.01
	(0.01)	(0.01)	(0.00)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Satisfaction with politicians	0.01	-0.01	-0.00	0.01	-0.01	-0.00	0.02	-0.01	-0.01	0.01	-0.00	-0.00
	(0.02)	(0.02)	(0.00)	(0.01)	(0.01)	(0.00)	(0.02)	(0.01)	(0.01)	(0.03)	(0.01)	(0.02)
Democracy	-0.02	0.01	0.00	0.03	-0.02	-0.01	0.02	-0.01	-0.01	-0.01	0.01	0.01
	(0.01)	(0.01)	(0.00)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
<i>Non-state actors</i>												
Payments to non-state actors	-0.09***	0.08***	0.01***	-0.07**	0.05*	0.02**	-0.12***	0.06***	0.07***	-0.06**	0.02*	0.03**

	(0.03)	(0.02)	(0.00)	(0.04)	(0.03)	(0.01)	(0.04)	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)
<i>Knowledge about taxes</i>												
Difficulty finding out what taxes to pay	-0.11***	0.09***	0.02***	-0.07***	0.05***	0.02***	-0.03*	0.01*	0.02*	-0.00	0.00	0.00
	(0.03)	(0.02)	(0.00)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Value added tax	0.20***	-0.16***	-0.04***	0.29***	-0.18***	-0.11***	0.19***	-0.09***	-0.10***	0.20***	-0.10***	-0.10***
	(0.04)	(0.04)	(0.01)	(0.05)	(0.03)	(0.03)	(0.04)	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Religion fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1308	1308	1308	1452	1452	1452	1900	1900	1900	1410	1410	1410
Pseudo R ²	0.11	0.11	0.110	0.11	0.11	0.11	0.09	0.09	0.09	0.08	0.08	0.08

Figures

Figure 1: Tax compliant attitude and GNI per capita

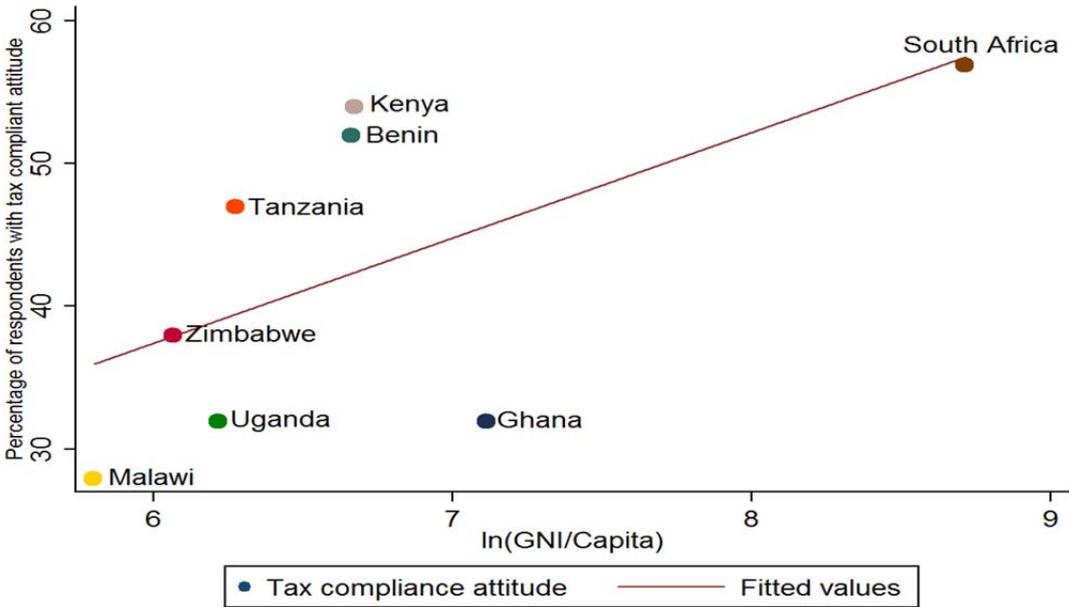
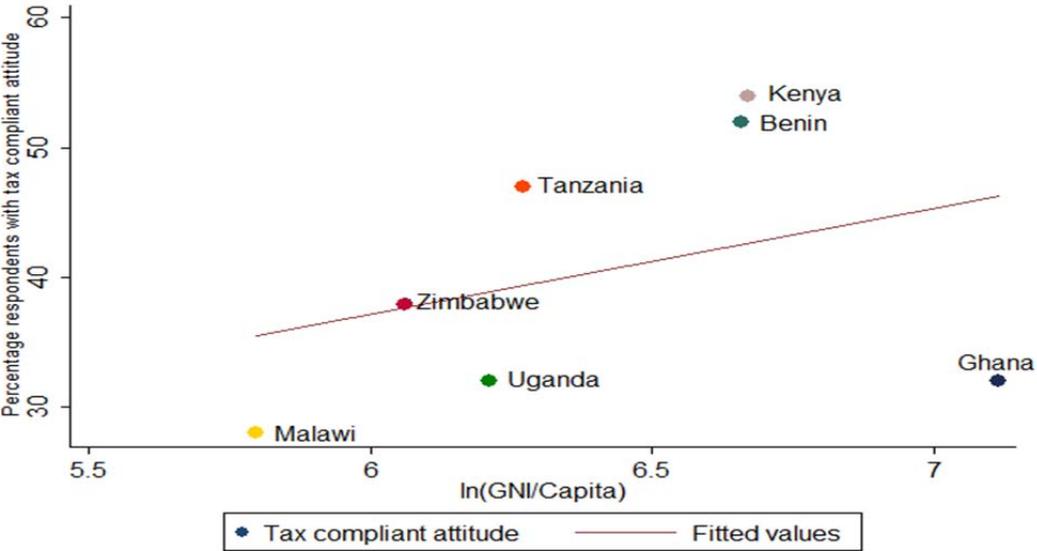


Figure 2: Tax compliant attitude and GNI per capita without South Africa



Appendix 1

Table A1: Descriptive statistics for all variables

		South Africa				Kenya				Tanzania				Uganda			
Description		Mea n	Std. Dev.	Mi n	Ma x	Mea n	Std. Dev.	Mi n	Ma x	Mea n	Std. Dev.	Mi n	Ma x	Mea n	Std. Dev.	Mi n	Ma x
<i>Dependent variable</i>																	
Tax compliant attitude	Dummy = 1 if individual think it is <i>wrong and punishable</i> not to pay taxes, 0 otherwise	0.57	0.49	0	1	0.54	0.50	0	1	0.47	0.50	0	1	0.32	0.47	0	1
<i>Individual characteristics</i>																	
Age	Age of respondent	39.2	15.9	18	95	35.8	13.5	18	93	38.6	14.3	18	99	35.2	12.8	18	84
Male	Dummy = 1 if respondent is male	0.50	0.50	0	1	0.50	0.50	0	1	0.50	0.50	0	1	0.50	0.50	0	1
Self-employment	Dummy1 = if self-employed, 0 otherwise	0.13	0.34	0	1	0.65	0.48	0	1	0.53	0.50	0	1	0.80	0.40	0	1
Employment	Dummy = 1 if employed, 0 if unemployed	0.37	0.48	0	1	0.45	0.50	0	1	0.36	0.48	0	1	0.48	0.50	0	1
Schooling	9 = postgraduate qualifications, 0 = no formal schooling,	4.27	1.56	0	9	3.91	1.81	0	9	3.01	1.39	0	9	3.28	1.86	0	9
Wealth	Index for ownership of radio, TV, car, water, latrine and roof material. 1= respondent has all items and 0 = respondent has none	0.62	0.33	0	1	0.51	0.25	0	1	0.39	0.23	0	1	0.20	0.23	0	1
Urban	Dummy = 1 if household is located in urban area	0.67	0.47	0	1	0.38	0.49	0	1	0.32	0.47	0	1	0.14	0.35	0	1
<i>Economic deterrence</i>																	
Ease of evasion	1 = very easy, 4 = very difficult	2.96	0.80	1	4	3.25	0.76	1	4	3.22	0.79	1	4	3.26	0.80	1	4
<i>Fiscal exchange</i>																	
Health and education	Factor for satisfaction with health and educational services. 4 = Very well, 1 = very badly, 0 = don't know	2.73	0.79	0	4	2.69	0.79	0	4	2.38	0.82	0	4	2.58	0.72	0	4
Infrastructure	Factor for satisfaction with	2.64	0.73	0	4	2.59	0.91	0	4	2.18	0.71	0	4	1.94	0.69	0	4

Crime and conflict	water, roads, electricity and environment. 4 = Very well, 1 = very badly, 0 = don't know Factor for satisfaction with crime, conflict, corruption and terrorism. 4 = Very well, 1 = very badly, 0 = don't know	2.14	0.78	0	4	2.11	0.74	0	4	2.33	0.70	0	4	2.16	0.73	0	4
Infrastructure	Factor for satisfaction with electricity, water, sewage, cell phone services and paved road. 4 = Very well, 1 = very badly, 0 = don't know	2.64	0.73	0	4	2.59	0.91	0	4	2.18	0.71	0	4	1.94	0.69	0	4
<i>Social influence</i>																	
Tax compliance of others	Perceived tax avoidance of others 1 = <i>never</i> or <i>rarely</i> , 0 = <i>always</i> or <i>often</i>	0.61	0.49	0	1	0.72	0.45	0	1	0.70	0.46	0	1	0.75	0.43	0	1
<i>Comparative treatment</i>																	
Unfair treatment of own ethnic group	Perceived frequency of discrimination against own ethnic group. 4 = always, 1 = never	1.67	0.94	1	4	1.97	1.02	1	4	1.48	0.79	1	4	2.13	1.01	1	4
<i>Political legitimacy</i>																	
Trust	Trust in tax department. 5 = a lot, 1 = not at all	3.55	1.31	1	5	2.99	1.34	1	5	3.15	1.34	1	5	2.74	1.37	1	5
Corruption	Perceived corruption among tax officials. 5 = all, 1 = none	2.48	1.12	1	5	2.98	1.13	1	5	2.84	1.17	1	5	3.11	1.24	1	5
Satisfaction with politicians	Factor for satisfaction with president, prime minister, MP and local government. 5 = Strongly approve, 1 = strongly disapprove.	3.22	1.01	1	5	2.86	1.14	1	5	3.45	1.09	1	5	3.19	1.04	1	5
Democracy	Perception/satisfaction with democracy. 5 = full democracy/very satisfied, 1 = not a democracy/not satisfied	3.39	1.13	1	5	2.96	1.10	1	5	3.70	1.06	1	5	3.08	1.18	1	5
<i>Non-state actors</i>																	

Payments to non-state actors	Payments to powerful people/groups other than the government. 4 = Often and 1 = Never	1.18	0.57	1	4	1.24	0.68	1	4	1.17	0.50	1	4	1.25	0.62	1	4
<i>Knowledge about tax</i>																	
Ease of finding out which taxes to pay	4 = Very difficult and 1 = very easy	2.68	0.81	1	4	3.10	0.83	1	4	3.14	0.88	1	4	3.10	0.89	1	4
Required to pay VAT	Dummy = 1 if respondent is required to pay value added tax	0.76	0.43	0	1	0.73	0.44	0	1	0.42	0.49	0	1	0.39	0.49	0	1
Number of observations		2399				2399				2400				2400			