

THE TAXMAN COMETH:  
A virtuous cycle of compliance and state legitimacy in  
the D.R. Congo

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## 1 Abstract

How do states in a low-tax, low-capacity equilibrium spur citizens to start paying taxes? Public-finance models hinge on citizen perceptions of enforcement, while political scientists emphasize the legitimacy of the state in generating voluntary compliance. This paper examines the determinants of payment in the first-ever citizen property tax campaign in a large Congolese city that raised average compliance from 0% to 10%. Aside from ability to pay, prior beliefs about the legitimacy of the provincial government are the strongest predictor of tax payment. Legitimacy is itself influenced by tax collectors' identities: tax compliance is higher when collectors work in the areas in which they live; minority ethnic citizens are more likely to pay to minority ethnic collectors. Further, on average the tax campaign leads individuals to update positively about the legitimacy of the provincial government, indicating a positive feedback loop of state building and citizen tax compliance.

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## 2 Introduction

A rudimentary level of state capacity is thought to be a precondition for economic development (Huntington, 2006; Besley and Persson, 2009). Tax capacity, in particular, enables states to provide public goods and is associated with more accountable, responsive governance (Kaldor, 1963; Besley and Persson, 2013; Prichard, 2015). But the transition to becoming a “tax state” is perhaps the greatest challenge of state building (Schumpeter, 1918). Many states are caught in a low-capacity trap: the state has insufficient revenue to provide public goods; citizens refuse to pay taxes until the state provides public goods. How can low-capacity states escape this trap?

One strategy is to raise tax compliance today to provide more public goods tomorrow. To do this, rulers must understand what factors shape citizens’ decisions to pay or evade taxes. Scholars have identified four possible factors. First, public-finance models of tax compliance hinge on individuals’ *perceptions of the probability of punishment* for tax evasion (Allingham and Sandmo, 1972). Second, political scientists and historians have long emphasized the *perceived legitimacy of the state* in engendering intrinsic motivation to pay taxes and thus raising compliance (Daunton, 1998; Lieberman, 2003; Tyler, 2006). Third, individuals might choose to pay taxes because they expect to derive certain future from government-provided public services funded by tax revenue — what some call *fiscal exchange* (Fjeldstad and Semboja, 2001). Fourth, individuals might pay due to *social norms and peer effects*, which could directly impact citizens’ decisions by creating a feeling of shame if they evade (Besley et al., 2015). Peer effects could also have an indirect impact by shaping other factors, such as the perceived probability of punishment (Del Carpio, 2013).

In addition to citizen-side determinants of tax compliance, rulers must also consider state-side determinants. That is, they must weigh the costs and benefits of different collection strategies. Levi (1989) argues that the transaction costs of tax collection are typically too high in low-capacity states to sustain centralized collection. Hence the decision of many such states to farm out tax collection responsibilities to local elites. Principal-agent problems between the government and its tax collectors are also likely more severe due to limited use of information technology and primarily cash-based economies. For instance, Khan et al. (2015) show that tax collector incentives have large effects on revenues collected from the property tax in Pakistan. Moreover, citizen-state interactions in many developing countries are personalized, patronage-based, and clientelistic (Wantchekon, 2003; Fukuyama, 2011; Stokes et al., 2013). Whom the state chooses to collect taxes, and how it monitors them, could thus have large impacts on whether citizens choose to pay.

This paper assesses the role of these citizen- and state-side determinants of compliance in the context of the first-ever citizen tax collection campaign in Kananga, Democratic Republic of Congo. In collaboration with the Provincial Government of Kasai Central, I randomly assigned the city’s 431 neighborhoods to receive the tax program (treatment) or to remain in the old ‘declarative’ system in which tax compliance was effectively zero (control). In treated neighborhoods, tax collectors went door to door in groups of three, first registering all property owners and then making in-person tax appeals. They collected the \$2 property tax on the spot, issuing receipts using handheld receipt printers. Collectors had roughly two

weeks to work in each neighborhood.

The tax campaign increased average property tax compliance from 0% in control areas to 10% in treatment areas. The treatment effect is more pronounced among wealthier and more educated households, highlighting the importance of liquidity constraints in tax compliance in resource-poor settings. Compared to other tax interventions in poor, low-capacity states, this is a large increase in compliance.

That said, it is striking that even when tax collectors come to their door and ask them to pay, 90% of individuals in treated neighborhoods manage to evade the tax. Why then do the 10% of individuals pay? To test the importance of the citizen-side factors noted above, I examine heterogeneous effects of the tax campaign on compliance by pre-treatment beliefs collected during a baseline survey before the campaign. Perceptions of punishment probabilities appear to have a modest effect on compliance at best. This is not surprising in a setting like Congo, in which the state has weak enforcement capacity. Indeed, no 2016 property tax evaders were sanctioned.

A more important determinant of compliance is the perceived legitimacy of the state and its tax collectors. Compliance among individuals with above-median approval of the government at baseline is 19.6%, nearly double the average rate across the city. There is little evidence supporting the ‘fiscal exchange’ motivation. Finally, although I do not detect a social norm of tax compliance — unsurprising given the novelty of the program — I find large peer effects. Individuals who know personally another individual who paid the property tax are themselves 13.1 percentage points more likely to pay. Ultimately, the campaign shows that reducing the transaction costs of compliance — soliciting citizens to pay at their households — substantially raises revenues by activating citizens’ tax morale.

Given that individuals’ baseline perceptions of state legitimacy impacts their compliance decisions, I examine what effect the tax campaign has on such perceptions at endline. I find that the campaign raises average government approval and perceptions that money collected by the state will be spent on public goods. I further demonstrate that this effect appears to be driven by exposure to tax collectors using new technologies (tablets and receipt printers). These results imply a virtuous cycle in which citizen compliance is a function of perceived legitimacy, and the tax campaign increases legitimacy.

The paper then investigates how collector characteristics affect tax compliance. This vein of analysis leverages the fact that tax collectors were randomly assigned to neighborhoods, enabling estimation of the causal impact of collector characteristics on outcomes of interest. I first document substantial variation in the effort levels and effectiveness of tax collectors. I measure effort by the number of visits households report from tax collectors and effectiveness as the amount of taxes collected. To estimate the effect of collector effort on effectiveness, I exploit random variation in household-level bonuses available to collectors. Where Khan et al. (2015) vary incentives across tax collectors, I vary the incentives collectors have to tax different households to generate random variation in collector effort. Households randomly selected for a double collector bonus are 4.4 percentage points more likely to pay the tax, indicating that collector effort is a major determinant of citizen compliance.

I then explore how the social identities of tax collectors impact citizen compliance. First, I

test if compliance is higher when citizens and collectors are of the same ethnicity. There is no average coethnic effect. However, when minority ethnic citizens are visited by minority ethnic collectors, they are 7 percentage points more likely to pay the property tax. Second, I examine if collectors are more efficient when randomly assigned to neighborhoods near where they live. Assignment to an additional ‘local’ collector raises average compliance by 4 percentage points. Local collectors are likely more productive because they solicit taxes from households more frequently and because they are viewed as more legitimate among citizens.

This paper makes several contributions. First, it is the first experimental study of tax compliance in a population unaccustomed to paying formal taxes previously and thus affords a chance to test classic theories about the role of legitimacy in building tax capacity (Schumpeter, 1918; Tyler, 2006). Although there is a growing experimental literature exploring pecuniary and non-pecuniary facets of citizens’ compliance decisions, to my knowledge no extant study provides quantitative evidence about why citizens pay taxes the first time they are solicited by the state.<sup>1</sup> Moreover, most prior studies achieve identification by randomizing information interventions, such as mailing tax letters supplemented with enforcement information, moral suasion messages, or statistics about peer behavior (Blumenthal et al., 2001; Fellner et al., 2013; Dwenger et al., 2016; Hallsworth et al., 2017; Mascagni et al., 2017). In contrast, this paper exploits the random assignment of tax collection interacted with baseline citizen beliefs about the government.

Second, the paper is unique in estimating causal effects of citizen-side and collector-side factors on tax compliance in the same setting. Most papers examine why citizens comply with taxes, holding constant the state’s efforts to collect and enforce the tax. A handful of papers explore the causal effects of different tax collection regimes historically (Banerjee and Iyer, 2005; Iyer, 2010) as well as the role of collector incentives (Khan et al., 2015) and bureaucrat management more generally (Rasul and Rogger, 2018). Examining both citizen- and collector-side determinants of compliance in the same setting allows me to make valid comparisons about the magnitudes of detected effects.

Third, the paper contributes to our understanding of how the social identities of government bureaucrats affect their choices and productivity in delivering services (Callen et al., 2015; Finan et al., 2017). Although the impact of ethnic politics on taxation has been studied on a macro level (Kasara, 2007), I provide the first estimate the effect of coethnicity and social proximity between tax collector and citizen on compliance. Finally, the paper contributes to the literature on the effects of information technology on governance and state capacity in developing countries (Grossman et al., 2014; Muralidharan et al., 2016).

Section 3 provides a theoretical framework for studying tax compliance. I then review the context (Section 4), experimental design (Section 5), and data (Section 6), before turning to results in Section 7.

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<sup>1</sup>See Luttmer and Singhal (2014) and Mascagni (2018) for a review of recent work. The great majority of this literature focuses on developed countries with high prior rates of compliance (Blumenthal et al., 2001; Fellner et al., 2013; Hallsworth et al., 2017). Studies in developing countries are also concentrated in areas with moderate initial compliance, such as Peru (Del Carpio, 2013) and Rwanda (Mascagni et al., 2017).

## 3 Why do people pay taxes?

### 3.1 Citizen-side determinants

Imagine a citizen choosing whether or not to pay a lump-sum property tax. This section reviews the likely terms in the citizen’s utility function.

1. **Perceived probability of punishment for tax evasion.** In the seminal public-finance model of compliance, a citizen trades off the pecuniary costs and benefits of tax compliance and evasion. The citizen’s decision is thus determined by the (1) tax rate, (2) the perceived probability of detection, (3) the penalty for evasion, and (4) the probability that the penalty will be enforced (Allingham and Sandmo, 1972). With a lump-sum property tax, detection is no longer uncertain because the government perfectly observed households’ compliance. (There is no margin on which to hide assets, as there is for the income tax in the model.) There is also (5) a transaction cost of compliance, which may require the citizen to learn how to pay the tax and absorb any associated shoe-leather costs. Finally, citizens have a budget constraint. In an impoverished setting like the D.R. Congo, many citizens simply might not be able to pay the tax on certain days because they are liquidity constrained.

In addition to these pecuniary motivations, citizens may derive non-pecuniary utility from paying taxes. So called “tax morale” can be broken down into the following components.<sup>2</sup>

2. **Perceived legitimacy of the state.** First, citizens may have intrinsic motivation to pay taxes because they view the state as legitimate and tax payment as their civic duty. We can think of this as a kind of “warm-glow” utility that citizens feel when they pay taxes.

Political scientists and historians highlight how rulers boost tax compliance not by increasing enforcement but by appealing to the common good and generating a sense of legitimacy among citizens (Levi, 1989; Tyler, 2006).<sup>3</sup> This is easiest in times of crisis. Invariably the largest upticks in tax compliance occur at wartime, when the state’s legitimacy as a defender of the public good is unambiguous (Schumpeter, 1918; Tilly, 1985; Daunton, 2007; Scheve and Stasavage, 2016). Other political turning points can also confer legitimacy and trigger changes in tax compliance (Lieberman, 2003; Mitchell, 2006).

For instance, Schumpeter (1918) describes how, with Ottoman armies at their doorstep and no remaining creditors, Austrian princes went begging to the estates for tax revenues. “Out of the ‘common exigency’ the state was born,” he writes (Schumpeter,

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<sup>2</sup>Scholars use the term tax morale in different ways. I follow Luttmer and Singhal (2014), using the term as “an umbrella term capturing nonpecuniary motivations for tax compliance as well as factors that fall outside the standard, expected utility framework.”

<sup>3</sup>Levi (1989) argues that such compliance is not fully voluntary on the part of citizens because there is still a shadow of the threat of sanctions. She therefore argues that states seek “quasi-voluntary compliance.” She writes: “It is voluntary because taxpayers choose to pay. It is quasi-voluntary because the noncompliant are subject to coercion—if they are caught” (Levi, 1989, 52).

1918, 106). United by crisis, people began to view the state as a legitimate agent acting in their interests. Their willingness to pay taxes was bound to this new legitimacy of the state. Similarly, tax compliance rose in other European countries during the wars of the 18th and 19th centuries (Tilly, 1985; Daunton, 2007). In allied countries, income tax compliance further spiked during the first and second world wars (Scheve and Stasavage, 2016; Mitchell, 2006).

In the absence of war, states have a more difficult time maintaining legitimacy as a tax collector. When the Napoleonic Wars ended, tax revenues in Britain dropped sharply (Daunton, 2007). Other changes in regime legitimacy invariably affect tax compliance. For instance, the collapse of democracy in the mid 1950s triggered a fall in direct tax receipts (Mitchell, 2006, 148). Such reversals highlight the co-movement of legitimacy and tax compliance. It is harder to explain these trends as a function of changes in citizens' perceptions of tax enforcement.

In generating a sense of peacetime legitimacy, historians of taxation note in particular that citizens must perceive the tax code to be fair (Román, 2012; Daunton, 1998). Scheve and Stasavage (2016) argue that fairness considerations explain the rise in demand for progressive taxation in the United States and Europe in the twentieth century. Major political turning points can also generate state legitimacy. The end of Apartheid in South Africa was one such historical moment in which the African National Congress was endowed with sufficient legitimacy to expand taxation (Lieberman, 2003). Additionally, governments can leverage nationalist sentiment to justify taxation, as did leaders in Nigeria's Lagos State in the early 2000s. Governor Bola Tinubu exploited Igbo nationalism to achieve much larger tax receipts, which he quickly used on observable public good projects like trash collection (Olowookere and Fasina, 2013).

These historical examples underscore the importance of state legitimacy and other non-pecuniary factors in convincing citizens to pay taxes. A growing empirical literature explores the importance of intrinsic motivation in citizens' compliance decisions.

3. **Fiscal exchange: expectations of future public services.** Beyond the intrinsic motivation to pay taxes to a state that one views as legitimate, citizens might pay out of reciprocal motivations—what some term “fiscal exchange” (Fjeldstad and Semboja, 2001). The idea is that citizens pay taxes in part because they expect to derive certain benefits, such as better street lighting or greater security, from government spending funded by tax revenue. These benefits might not be commensurate with taxes paid, i.e. the effective “price” of public goods might be high (Ross, 2004). But nonetheless citizens may expect to gain from the reciprocal quid-pro-quo exchange of taxes for public goods.
4. **Social norms and peer effects.** Social influences may also shape tax compliance, as individuals seek to signal their type to peers by paying taxes (Luttmer and Singhal, 2014). Citizens could also earn disutility if they feel shame admitting to not paying taxes to their peers. For instance, Besley et al. (2015) find strong evidence of social norms in studying taxpayer responses to a historical change to Britain's tax policies. By contrast, most field experiments in developed countries find null results from interventions providing information about the compliance decisions of peers (Blumenthal et

al., 2001; Fellner et al., 2013), though Hallsworth et al. (2017) find that UK taxpayers submit more timely payments when reminded that others have already paid. A recent study from a setting with lower levels of tax compliance (Peru) does find a positive effects from a social norms intervention (Del Carpio, 2013).

Peer effects could impact taxpayer behavior by shaping the other parameters mentioned above. For example, if citizens observe none of their neighbors paying taxes, they might infer that the probability of punishment for evasion must be low. Alternatively, if they view many of their citizens paying taxes, then government promises to use tax revenue to provide public goods will likely be more credible.

### 3.2 Collector-side determinants

Levi (1989) notes that the strategies that states choose to maximize revenue may vary based on the transaction costs of collection, the bargaining power of the state relative to that of society, and the ruler's time preferences. "Where the return is predictable and where deviations from the required payments can be detected relatively easily and cheaply, the state uses its own agents. Otherwise, it resorts to contracts with tax farmers" (Levi, 1989, 73). For instance, Republican Rome largely relied on tax farmers. However, when Augustine centralized the empire, the transaction costs of collection declined and Rome's monitoring capacity improved, making centralized taxation more attractive than tax farming.

This example highlights the importance of collector-side determinants of tax compliance. The collector side is likely to be particularly important in Kananga given that the 2016 property tax campaign is the first time the government has solicited its citizens to pay the tax. I focus on two collector-side factors.

1. **Collector effort.** One clear way in which the types and incentives of tax collectors could shape compliance is the effort levels of collectors. Khan et al. (2015) find that varying the incentives of tax collectors can increase their effort levels (and the equilibrium bribe), ultimately leading to revenue gains for the government. Increased collector effort could boost compliance for several reasons. First, if collectors make more visits, they may have a greater chance at meeting citizens when they have cash on hand to pay the tax. Second, collectors making more visits or spending longer during each visit could impact citizens' beliefs about enforcement. Third, collectors might exert more effort to convince citizens that paying taxes is a duty and important for the development of the province rather than making a half-hearted request.
2. **The social identity of collectors.** A small experimental literature explores the effects of bureaucrats' social identities and personal characteristics on the quality of services they provide (Callen et al., 2015; Finan et al., 2017). Most relevant in the current context are the ethnicity and local neighborhood of collectors.

Ethnic bias in politics and public goods provision has been well documented in Africa (Miguel and Gugerty, 2005; Habyarimana et al., 2007; Cederman and Girardin, 2007; Burgess et al., 2015). In the context of taxation, state collectors could have reason to target coethnics or non-coethnics. On the one hand, if collectors feel greater altru-

ism toward coethnics, as is often assumed (Horowitz, 2001; Vigdor, 2002), then they might experience disutility from taxing them. According to this logic, we might expect collectors to avoid taxing coethnics and instead to target non-coethnics. It is worth noting that coethnic bias has been previously documented in Kananga (Lowe et al., 2015).<sup>4</sup>

On the other hand, if tax collectors receive a share of what they collect, they should seek out households they deem most likely to pay. If they can more easily persuade coethnics to pay the tax, then collectors have reason to target coethnics. Similarly, if collectors are chiefly concerned with minimizing the political costs of taxation (i.e. the probability that a citizen will threaten them), they might also target coethnics.<sup>5</sup>

Another relevant aspect of collectors' identities is where they live, and in particular, if they live near the community where they are collecting taxes. If collectors must generate trust among citizens to convince them to pay taxes, we might expect collectors to be more effective in their own communities. Similarly, if citizens only pay taxes if they think they might benefit from future public goods spending, local collectors might be better able to convince citizens to pay because they presumably have the same preferences over the location of public goods provision. On the other hand, if being an anonymous agent of the state enables collectors to threaten punishment more credibly, then we might expect 'local' collectors to be *less* productive than collectors who live farther from assigned neighborhoods.

## 4 Context

This paper examines tax compliance in the first-ever citizen property tax collection campaign in the city of Kananga (population 1 million), the provincial capital of Kasai Central in the Democratic Republic of Congo. The Provincial Government, despite having a share of executive power in Congo's decentralized political system, has little state capacity. Its annual tax receipts from 2010-2015 totaled \$2 million, relative to the 6 million people in the province. Most of these receipts come from 'gatekeeper'-style taxes on trade and transport as well as rental taxes paid by a clutch of firms in the city center.<sup>6</sup> Citizens are largely outside the tax net. For example, only 40% of a random sample of individuals could provide the name of the tax ministry at baseline, and fewer than 6% knew of the property tax. The main national tax to which citizens are in theory liable is the income tax. However,

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<sup>4</sup>In other unpublished work, we also find evidence of coethnic bias in trust game and dictator game data. This contrasts with studies in Kenya and elsewhere that fail to detect coethnic bias (Berge et al., 2015).

<sup>5</sup>Kasara (2007) makes a similar argument, noting that rulers often tax cash-crop farmers in coethnic areas *more* than non-coethnic areas.

<sup>6</sup>According to the law, landlords are also liable for a rental tax: 20% of monthly rent, deducted before this payment is made from tenant to landlord such that the burden of payment falls on the landlord. However, because most individual renters have informal contracts and may pay rent in kind, this tax is not often enforced among private citizens. Commercial renters, on the other hand, are pursued assiduously by the tax ministry; but firms are not part of the sample for this project. The tax ministry also enforces taxes on transportation, with tolls at the four major roads, the airport, and the train station. Most citizens seldom have occasion to pass by one of these taxed areas.

the national tax ministry branch in Kananga only enforces this tax among employees of the government and of large firms. Moreover, most government employees are unaware that this tax is withheld from their salaries: 1% of a random sample of government workers report paying the income tax. Low rates of tax enforcement and compliance are common among low-capacity post-conflict settings, especially in sub-Saharan Africa (Bird, 2010; Moore and Wilson, 2017).

This is not to say that individuals are free from petty harassment by the police and other officials. For example, vehicles are often stopped by police seeking bribes; street vendors can dodge the daily market fee by bribing the relevant officer. However, informal payments are less common in Kasai than in Kinshasa and other larger Congolese cities (Paler et al., 2016). Only 8.8% of individuals report paying any payments — formal or informal — to government agents in 2016 (not including the property tax).<sup>7</sup> Moreover, citizens are under no delusion that informal payments will end up in the state coffers. When the treasury ran out and he couldn't pay the vast Zairean civil service, former President Mobutu Sese Seko famously instructed the police and army “*débrouillez-vous*” (‘live off the land’), tacitly condoning bribe taking as a substitute for the tardy payment of public-sector salaries. The official badge as a license to bribe remains ingrained in the norms of the civil service and citizens' expectations (Stearns, 2012).

The Provincial Government did not attempt more tax collection in the past because it thought the costs would outweigh revenue gains. In low-capacity settings, transaction costs of collection are high. Levi (1989) argues that until states have modern tax bureaucracies with databases of taxpayer information and systems to monitor collectors, it is optimal for states to rely on tax farming rather than collect taxes centrally. The costs of monitoring field-based collectors were of particular concern to top officials in the Provincial Government of Kasai Central. Moreover, there are political costs to tax collection as citizens demand more from the government in response to increased tax enforcement (Ross, 2004; Paler, 2013; Martin, 2014; Prichard, 2015; Weigel, 2018). In light of these costs, the government had never attempted a citizen property tax collection effort until 2016. What changed was a fiscal crisis induced by national politics. In particular, the 2015 *découpage*, or administrative splitting, of Kasai Occidental into two provinces cut the revenue base of the provincial government in Kananga by roughly 40% because the diamond-rich area around Tshikapa became part of another province. This decentralization initiative, which increased the number of provinces from 11 to 26, was part of President Joseph Kabila's strategy of *glissement* — slippage — that entailed creating administrative holdups to postpone presidential elections. In the midst of the fiscal crisis that ensued, the provincial government in Kananga turned to the property tax to try to recoup the revenue losses resulting from the *découpage*.

The property tax, like a lump-sum ‘hearth’ or ‘hut’ tax, is 2,000 Congolese Francs (CF), about \$2 in 2016 exchange rates. Every property owner in Kananga is by law supposed to pay the tax annually to the Provincial Government of Kasai Central by reporting to the government's headquarters.<sup>8</sup> Yet as noted, citizen compliance with the property tax was

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<sup>7</sup>A survey module asked participants to describe all formal and informal payments to any government agents. It named one-by-one each of the taxes and fees that focus-group participants identified as most commonly paid in Kananga.

<sup>8</sup>The 2,000 CF rate applies for 95% of compounds in Kananga. Roughly 4% of larger compounds that are

near zero at baseline, and very few individuals knew of the tax. Based on a random sample of households in Kananga, 2,000 CF approximates the median household’s daily income in the sample. So this tax is a non-trivial burden in the context.

Although the government has becoming increasingly authoritarian in recent years — canceling all elections in 2016 and 2017 — citizens reported high levels of trust in government institutions at baseline (Appendix Figure 13). Roughly 56% of the sample said they have “a great deal of trust” in the provincial government; in Botswana, a comparatively high-performing state, the corresponding statistic was 52% in 2014 (Afrobarometer, 2014).<sup>9</sup> Positive attitudes of the provincial government may reflect that Kananga has escaped much of the bloodshed that engulfed the East during the First and Second Congo Wars from 1996 to 2003. In Congo, the city had the nickname “the oasis of peace.” That said, a recent uptick in militia activity around Kananga has since spread mistrust and frustration with all levels of government.

## 5 Experimental design

The intervention is the phased rollout of the first-ever property tax collection campaign, randomized at the neighborhood level, in the city of Kananga. Because the provincial government did not have a map of the administrative unit known as the “locality,” I partitioned a satellite map into 431 polygons to approximate these units (Appendix Figure 17). Polygon borders are coterminous with roads and ravines to be easily recognizable from the ground. Of the 431 polygons in Kananga, I assigned 253 to treatment in 2016. Control neighborhoods were to receive the tax program in 2017.<sup>10</sup>

Before the tax campaign, every fifth compound (in all neighborhoods of Kananga) received informational fliers. These fliers announced the campaign and communicated to citizens that its revenues would go toward promoting “the economic development of the province.” Fliers contained the identical message in French and Tshiluba, one of the DRC’s national languages and the lingua franca in Kananga.<sup>11</sup>

Treated neighborhoods were assigned to groups of three tax collectors. Collectors were a mix of (i) bureaucrats previously employed by the tax ministry, and (ii) interns who had applied for a job at the tax ministry prior to any announcement about the 2016 property

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build in cement and other “modern materials” are supposed to pay 6,600 CF. Finally, so-called “villas”, which are large Belgian-built compounds must be measured and face a proportional rate. These villas constitute less than 1% of the compounds in Kananga. For simplicity, the sample is restricted to the 95% of households facing the 2,000 CF rate.

<sup>9</sup>Interestingly, citizens appear to trust the tax ministry considerably less (at baseline) than the provincial and national governments and even the policy. This likely reflects low rates of familiarity with the tax ministry.

<sup>10</sup>However, due to the violence in Kananga and elsewhere in the province, the provincial government cancelled all property tax collection in 2017. The government is resuming collection in 2018.

<sup>11</sup>Some randomly selected neighborhoods received a treatment flier with additional information about (i) the amount of the tax, and (ii) an example of a printed receipt. The main goal of this cross-randomized intervention was to measure if this information enables citizens to avoid extortion. This hypothesis will not be examined in this paper.

tax campaign. Section 7.5 reports further details about the collectors. The specific group of collectors assigned to a given neighborhood was random, as was the timing when the collectors began work in the neighborhood. Collectors had two weeks per neighborhood to complete two tasks.

First, they conducted a census, registering all property owners in the neighborhood who should be liable for the property tax. During this census visit, collectors assigned a unique code to each compound, written on the house in chalk. They also reminded households about the tax rate and the penalties if for evasion. Collectors often made plans to return at future dates when households would plan to have the money on hand.

Second, collectors returned to households to make in-person appeals and collect the tax, issuing printed receipts using handheld tablets and receipt printers. Appendix Figure 18 shows example receipts. Collectors left the receipt with the taxpayer, with a copy saved in the tablet’s memory. When they returned to the tax ministry to deposit the money, their tablet data was downloaded automatically to the tax database.

After the two-week collection period expired, tax collectors were reassigned to new polygons (and new groups). The campaign ran from April to December in 2016.

Collectors received performance-based bonuses to be consistent with the standard operating procedure in the provincial tax ministry. They received a share (18%) of the total tax revenue they personally collected.<sup>12</sup> The average weekly bonus was about \$4. However, there was considerable variation in collector effort and quality, as will be discussed below, such that some collectors earned more than \$10 per week while others earned less than \$1.

To measure the impact of the tax collection campaign, a separate group of independent enumerators from Kananga administered a baseline survey before the campaign, a monitoring survey ongoing with the campaign, and an endline survey after the campaign. Details of these surveys are discussed in the next section. Table 1 summarizes the timing of the interventions and measurement strategy.

**Table 1: Timing of interventions and data collection**

<b>Activity</b>	<b>Treated</b>	<b>Control</b>	<b>Timing</b>	<b>N</b>	<b>J</b>
<b>Tax collectors</b>					
Census	Yes	No	Apr-Dec 2016	N/A	253
Tax collection	Yes	No	Apr-Dec 2016	N/A	253
<b>Enumerators</b>					
Baseline survey	Yes	Yes	Mar-Apr 2016	2,384	431
Monitoring survey	Yes	Yes	Apr-Dec 2016	27,596	431
Endline survey	Yes	Yes	Jan-May 2017	2,913	356

Notes: N = sample size, J = number of clusters.

<sup>12</sup>Additionally, 40% of compounds were randomly selected for a double bonus (36%) to randomly shock collector effort levels.

## 6 Data

The analysis uses several datasets.

1. **Administrative data.** I received the universe of property tax payers from the private company (Hologram Identification Services) that manages the government’s tax database. I link these data to the field surveys using the unique household codes assigned during the census component of tax collector visits. In control neighborhoods, I link records by matching property-owner names within neighborhoods. This process is simplified by the fact that there are only 214 records of non-campaign property-tax payments in 2016. Of these, less than 10% were from private individuals (the rest by firms).
2. **Baseline survey.** The enumerators administered a baseline survey to 1,238 randomly sampled property owners before the launch of the tax campaign in March-April of 2016. Random sampling occurred by calculating a skip pattern that enumerators followed while walking up through neighborhoods. After administering a survey, they would skip  $X$  houses before administering the next survey. I determined  $X$  using estimates of the population of each neighborhood to yield five baseline surveys per neighborhood.

Enumerators successfully tracked 642 of these individuals were at endline, enabling my matching their baseline surveys to administrative data on tax compliance. Attrition was high due to the time lag (9-14 months) and the conflict that occurred in Kananga during the administration of the endline survey. However, attrition is balanced across treatment and control.

I use these data chiefly to examine heterogeneous treatment effects on tax compliance by baseline beliefs. I primarily examine heterogeneity by individual-level baseline characteristics, such as wealth and education, and beliefs, such as views about government quality or the probability that tax evaders will be sanctioned. However, at times I also examine heterogeneity by polygon-level baseline characteristics, such as the average wealth level of the neighborhood.

3. **Monitoring survey.** Enumerators administered a five-minute monitoring survey to every property owner in Kananga ( $N=27,596$ ). This survey verified that the collectors were working in the right neighborhoods and that they were using their technologies correctly. I link this dataset with administrative data on tax payment to estimate compliance rates in the universe of potential taxpayers in Kananga.
4. **Endline survey.** Enumerators administered a 90-minute endline survey to 3,600 randomly sampled property owners after the tax campaign, from January to May 2017. Enumerators randomly sampled following the same procedure described above for the baseline survey. The survey asked a wide range of questions about citizens’ experiences with the tax program and their beliefs about the government.

I use these data to estimate causal effects of the program on individuals’ beliefs about the government. In analyses for which I need more covariates about households, I use endline data matched with administrative data on tax compliance. Finally, I also

examine correlations between tax payment and various attitudes to generate suggestive evidence about the determinants of compliance. Although payment is an outcome of treatment, observing the extent to which certain beliefs and compliance status covary at endline can bolster other forms of evidence about why some individuals pay and others do not. I compare payers and non-payers *in treated neighborhoods only*, so the sample size is 2,150. This comparison is between compliers and never-takers.<sup>13</sup> On the other hand, the same analysis in the full sample (including control neighborhoods) would compare compliers in treatment neighborhoods to a mix of compliers and never-takers in control neighborhoods. This latter comparison would be more difficult to interpret. As such, I only compare payers and non-payers within treated neighborhoods.

5. **Tax collector survey.** In early 2017, enumerators conducted a survey with 52 of the 54 collectors who worked on the property tax campaign. (Two collectors had since left Kananga and proved impossible to reach.) The survey asked the tax collectors about their experiences during the tax campaign. It also asked them for basic characteristics (age, education level, ethnicity, etc) as well as information about motivation and habits. I use these data to examine how the ethnicity and home neighborhood of collectors impacts whom they target and whom they tax.

The analysis at times considers standardized indices, which I construct as follows. First, I standardize each component variable by subtracting by the mean and dividing by the standard deviation. Then I sum each standardized sub-variable. Finally, I standardize the resulting synthetic variable following the same procedure.

## 7 Results

Before examining the determinants of compliance in the 2016 citizen property tax campaign, the next section documents the average causal effect of the campaign on tax payment.

### 7.1 Effects of the campaign on tax compliance

To estimate the effect of the tax campaign on compliance, I estimate the following equation with OLS:

$$Compliance_{ijk} = \beta_1 I_{ijk}^{Program} + \alpha_k + \mathbf{X}_{ijk}\boldsymbol{\Gamma} + \varepsilon_{ijk} \quad (1)$$

where  $i$  indexes individuals,  $j$  indexes neighborhoods, and  $k$  indexes the 33 strata used during randomization. Here  $\beta_1$  is the coefficient of interest in estimating the causal effect of the tax collection program on compliance or other outcomes of interest.

The results of this estimation are summarized in Table 2. The campaign increases tax compliance by 10 percentage points on average (column 1). Compliance in control neighborhoods

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<sup>13</sup>I assume away the existence of always-takers because the rate of payment in the control group is statistically indistinguishable from zero.

is statistically indistinguishable from zero, as it was in the past when the whole city had a similar ‘declarative’ tax system.

**Table 2: Effect of the tax program on compliance**

	Paid property tax		
	(1)	(2)	(3)
Program	0.102*** (0.007)	0.082*** (0.008)	0.081*** (0.009)
Program X Baseline wealth (high)		0.042*** (0.013)	
Baseline wealth (high)		-0.007 (0.007)	
Program X Baseline education (high)			0.044*** (0.015)
Baseline education (high)			-0.011 (0.008)
Stratum FE	Yes	Yes	Yes
$R^2$	0.054	0.057	0.057
Observations	27596	27596	27596
Clusters	360	360	360
Control Mean	0.001	0.001	0.001

Standard errors clustered by polygon. \* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Data source: administrative data. *Baseline wealth (high)* is an indicator variable for neighborhoods with above-median wealth levels, according to an index constructed using baseline survey data on the quality of randomly sampled houses’ roofs, floors, and toilets, their access to electricity, and their ownership of any motorized vehicle. *Baseline education (high)* is an indicator variable for neighborhoods with above-median education levels, according to baseline data.

This average increase in compliance masks considerable variation by neighborhood. In roughly 14% of neighborhoods, tax compliance was <1% (Appendix Figure 19). To examine what neighborhood characteristics explain this variation in compliance rates, I use data from the baseline survey to construct neighborhood-level measures of wealth and education.<sup>14</sup> The effect of the program is more pronounced (about 12.5 percentage points) in neighborhoods with above-median wealth and education levels (Table 2, columns 2-3). Figure 1 plots neighborhood-level property tax compliance rates as a function of average wealth levels. Although there is a (statistically significant) positive relationship, there is considerable variation in compliance rates at all wealth levels.

Moreover, as a map of compliance rates by neighborhood reveals (Figure 20), there is surprisingly little spatial clustering of compliance. Individuals all across Kananga are paying the property tax. The intraclass correlation (ICC) for tax payment within treated neighborhoods is 0.077, compared to the ICC for household wealth (0.34), for example. Other

<sup>14</sup>I proxy for wealth using an index constructed using baseline survey data on the quality of randomly sampled houses’ roofs, floors, and toilets, their access to electricity, and their ownership of any motorized vehicle.

individual-level factors clearly play a large role in individuals’ compliance decisions.

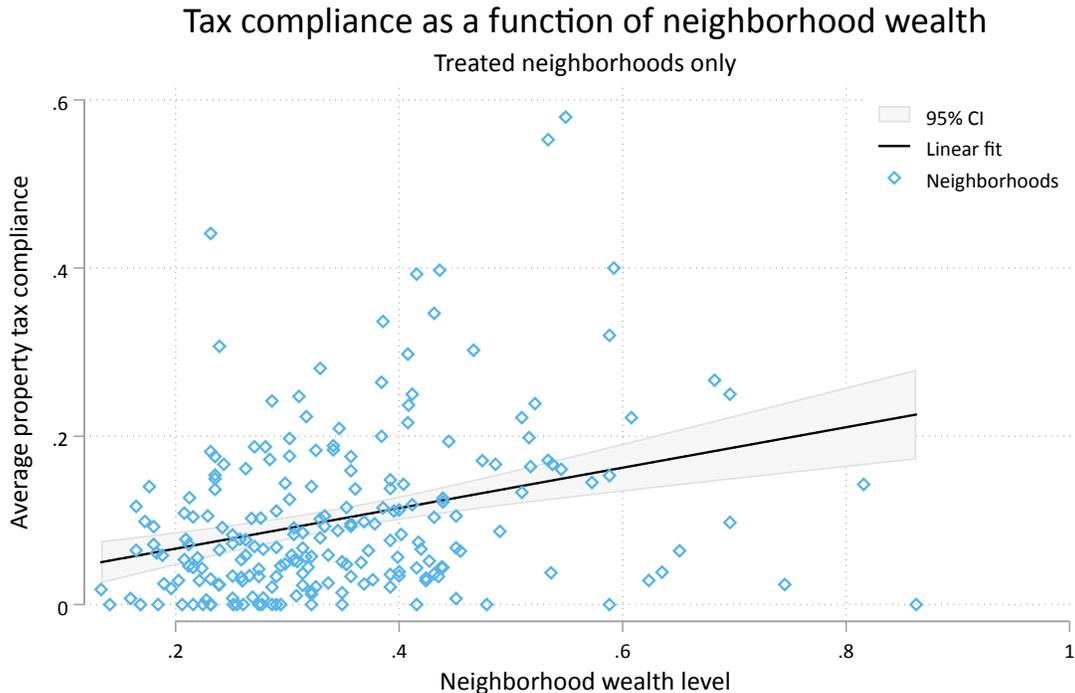


Figure 1: *Neighborhood-level compliance as a function of baseline wealth levels (treatment group only).*

## 7.2 Characterizing tax compliers

Typically, it is difficult to characterize the complier population in the instrumental variables sense—individuals who paid the tax because of the program but would not have paid absent the program—because the group of people who receive the treatment is a mix of compliers and always-takers whose type is unobserved. In this case, however, we could assume away the existence of always-takers because the rate of tax compliance in control polygons is not statistically different from zero.

Nonetheless, to be conservative, I report complier characteristic ratios in the spirit of Abadie’s (2003)  $\kappa$ -weighting method (Abadie, 2003). Specifically, these are the ratio of the treatment effect on tax compliance for individuals of the characteristic to the overall treatment effect:

$$ComplierRatio = \frac{E(Y|T = 1, X = x) - E(Y|T = 0, X = x)}{E(Y|T = 1) - E(Y|T = 0)} \quad (2)$$

where  $Y$  is tax compliance,  $T$  indicates treatment status, and  $X$  is the characteristic of interest. In essence, these ratios tell us if tax compliers are more likely to be male or college-educated, for example, than are average individuals in the sample. I estimate these ratios using endline survey data because this the largest sample in which I have household head

**Table 3: Complier characteristics**

	Complier characteristic ratio
Age above median	0.999
Migrant	0.974
Majority ethnic group (Luluwa)	0.969
Literate	1.194
University graduate	1.223
Income above median	1.279
Wealth above median	1.308
Has electricity	1.549
Unemployed	0.868
Business owner	0.859
Government worker	1.314
Paved or improved road outside house	1.102
Public lighting outside house	1.169

Data: endline survey matched with administrative data on tax compliance.

characteristics matched with administrative data on compliance.

Table 3 shows that socioeconomic status is highly correlated with tax compliance. Tax payers are wealthier, more educated, and live in more developed neighborhoods with paved or improved roads and even access to public lighting (very rare in Kananga). Individuals working for the government are also considerably more likely to be tax compliers, though this could be a function of having a steady income source. Individuals without jobs and those who run small businesses (including selling produce in the market) are less likely to be tax compliers.

It is unsurprising that liquidity constraints are a first-order issue in determining who pays taxes in destitute settings (Fjeldstad and Semboja, 2001). Indeed, when asked why other citizens in Kananga do *not* pay the property tax, the main reason respondents offer is that they simply lack the money (Appendix Figure 23). This response is credible given the well known challenges of saving even modest amounts of money in impoverished settings (Ashraf et al., 2006; Duflo et al., 2011). When a collector shows up at their doorstep unannounced and solicits payment of the property tax, it is likely true that the majority of households simply do not have their median household daily income on hand in cash.

## 7.3 Heterogeneous effects by baseline beliefs about the government

### 7.3.1 Estimation and hypotheses

This section investigates citizen-side determinants of compliance by estimating heterogeneous responsiveness to treatment by individual characteristics collected in the baseline survey. I estimate the following equation using OLS:

$$\begin{aligned}
Compliance_{ijk} = & \beta_1 I_{jk}^{Program} + \beta_2 I_{jk}^{Program} X BaselineCharacteristic_{ijk} \\
& + \beta_3 BaselineCharacteristic_{ijk} + \alpha_k + \mathbf{X}_{ijk} \mathbf{\Gamma} + \varepsilon_{ijk}
\end{aligned} \tag{3}$$

where the subscripts are the same as Equation 1. Here,  $\beta_2$  is the coefficient of interest in examining how baseline characteristics and beliefs affect citizens' responsiveness to treatment. The hypotheses to be tested are as follows.

- **Hypothesis 1:** *citizens who perceive a greater probability of punishment for evasion will be more responsive to treatment.*
- **Hypothesis 2:** *citizens who view the government as more legitimate will be more responsive to treatment.*
- **Hypothesis 3:** *citizens who expect more tax money to be spent on public goods will be more responsive to treatment.*
- **Hypothesis 4:** *citizens who personally know other taxpayers will be more likely to pay themselves.*

### 7.3.2 Testing Hypothesis 1: perceptions of the probability of punishment for evasion

As noted, the key parameters in classic models of tax compliance are the size of the tax, the probability that the government will detect noncompliance, and the size of the penalty enforced upon detection (Allingham and Sandmo, 1972). In this case, the magnitude of the property tax does not vary across citizens in the sample, and compliance is perfectly observed by the government. The penalty for evasion, roughly 2.5 times the tax, was also communicated to citizens during the tax campaign. The key variable, then, is the perceived probability that the government will enforce this penalty if households fail to pay the property tax.

In Kananga, almost no one paid property taxes before 2016, and there was *de facto* no punishment for evasion. The tax campaign of 2016 was the first time the government solicited the tax from its citizens. Collectors often reminded households that they could face penalties if they did not pay. Ultimately, however, the government did not pursue sanctions among evaders in 2016. Nonetheless, as demonstrated in Appendix Figure 15, citizens varied considerably in their beliefs about the probability of punishment just before and during the tax campaign.

To test if beliefs about punishment probabilities shaped compliance decisions during the campaign (Hypothesis 1), I estimate heterogeneous effects of the campaign by prior beliefs about the likelihood of sanctions if individuals fail to pay the property tax. Specifically, baseline respondents reported whether they thought government sanctions would be 'very likely', 'likely', 'unlikely', or 'very unlikely' if a neighbor refuses to pay a property tax collector

who comes to their house.<sup>15</sup> Among property owners, 57% report that punishment is likely or very likely, with the rest reporting that it is unlikely or very unlikely.

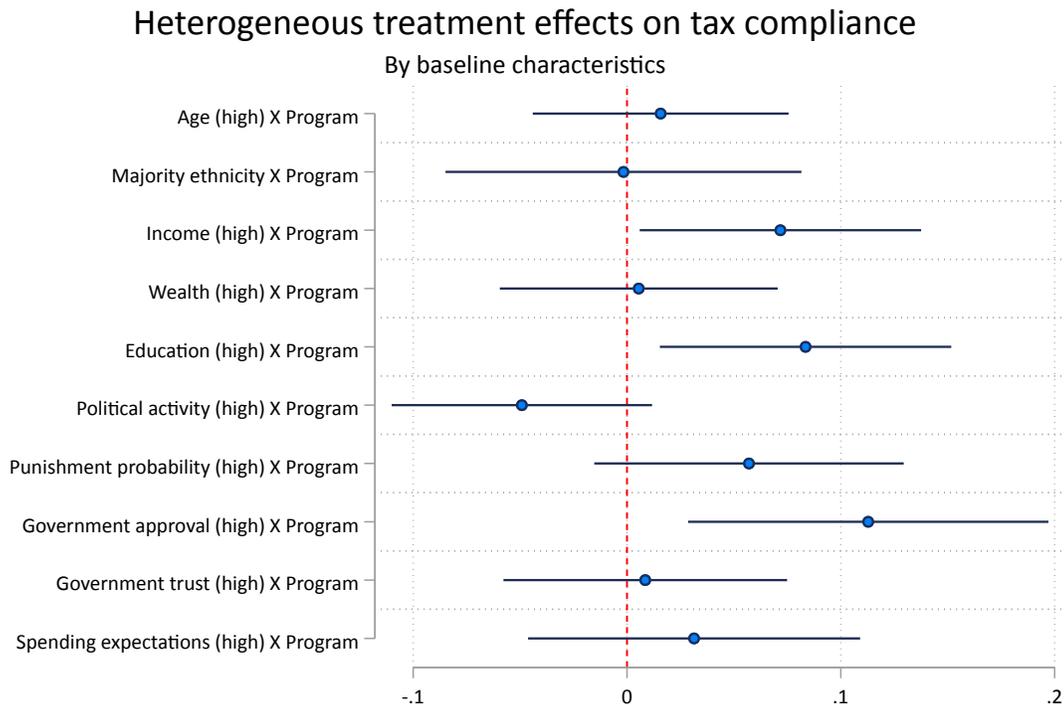


Figure 2: *Heterogeneous effects of the tax collection program by baseline individual-level characteristics, knowledge, and beliefs. Each variable is an indicator for individuals above the median for the indicated characteristic. The point estimate for the coefficient on the interaction term,  $\beta_2$ , in Equation 3 is shown. Table 13 summarizes the same regressions.*

Figure 2 plots the point estimates and 95% confidence intervals for the interaction term,  $\beta_2$ , in estimating Equation 3 with this and other baseline characteristics.<sup>16</sup> It demonstrates a positive but statistically insignificant interactive effect between prior beliefs about punishment and tax compliance. Appendix Table 13, column 2, summarizes the full regression, confirming the positive point estimate (with a magnitude of 0.057 percentage points) and statistical insignificance.

Another source of (suggestive) evidence about the importance of perceived punishment probabilities in individuals' compliance decisions comes from endline survey data. Endline survey participants answered two questions concerning the likelihood that a neighbor would be sanctioned if (s)he refused payment or bribed a collector who visited the household.<sup>17</sup> Figure 3 shows that, in treated neighborhoods, payers generally think punishment is more likely

<sup>15</sup>The exact question text is: "Now, imagine that next week a tax collector comes and visits your neighbor, but he refuses to pay. In your opinion, what is the probability that the government will pursue and enforce the sanctions?"

<sup>16</sup>Consistent with Table 3, the treatment effect is more pronounced among individuals with higher incomes and more education.

<sup>17</sup>The exact question text is as follows: (1) "Now, imagine that next week a tax collector comes and visits one of your neighbors. Imagine he absolutely refuses to pay. In this case, what is the probability that the

relative to non-payers. These differences in beliefs are statistically significant (see Appendix Table 10).

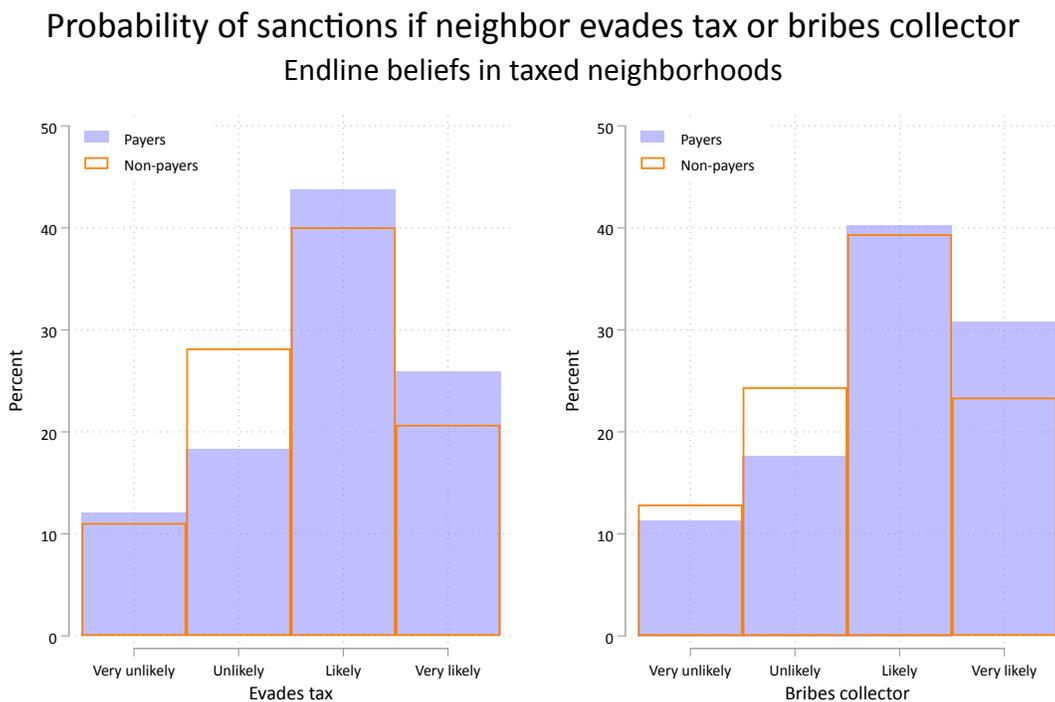


Figure 3: *Perceived probability of sanctions if neighbor refuses to pay the property tax or bribes the tax collector.*

Additionally, respondents were asked why they think in general people in Kananga pay the property tax. They were listed six reasons why people might pay taxes and for each indicated whether they think this is a ‘very important’, ‘important’, ‘somewhat important’, or ‘not important’ reason. The reasons included: (1) to avoid punishment, (2) to realize their duty as citizens, (3) to promote development, (4) to achieve status and a good reputation, (5) to obtain advantages with the government, and (6) to avoid future time-consuming visits with tax collectors.<sup>18</sup> Figure 22, in the Appendix, shows that ‘avoiding punishment’ is thought to be the second most important reason why people in Kananga pay taxes; tax payers are slightly more likely to view this reason as important compared to non-payers (see Figure 4). However, when asked to perform the same exercise but about why people evade the tax, that they ‘expect no sanctions’ is deemed an unimportant reason by nearly 70% of the sample (Figure 23).

Ultimately, individuals’ perceptions about the probability of punishment for tax evasion appear to play a minor role in citizens’ compliance decisions. Although there is suggestive

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government will pursue and enforce sanctions?” (2) “Now imagine the neighbor pays the collector a bribe instead of paying the tax. What is the probability that the government will punish the person for paying a bribe?”

<sup>18</sup>This list was generated during a focus group before rollout of the endline survey. See Figure 22 in the Appendix for the percentage of respondents who say each reason is ‘very important’ or ‘important’.

evidence in examining correlations in the endline data, payment is an endogenous outcome of treatment. Individuals could well be engaged in justificatory reasoning after having paid the tax.

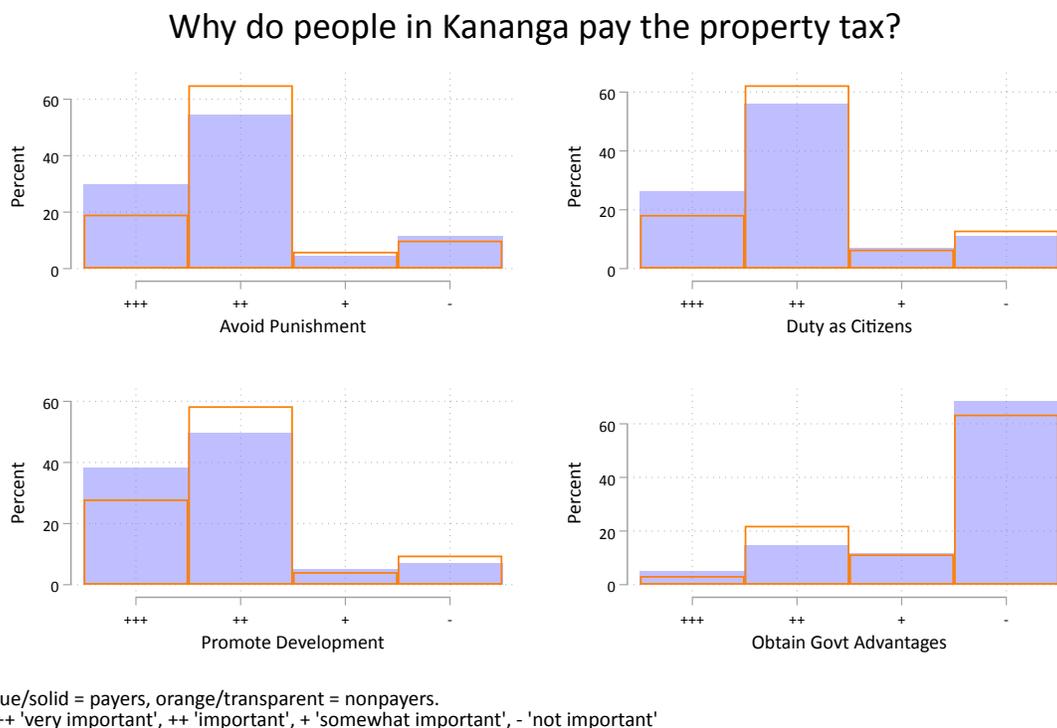


Figure 4: *Percentage of respondents who deemed the above reasons ‘very important’ or ‘important’ in explaining why some people pay the property tax.*

The relative unimportance of perceived punishment probabilities in compliance behavior is unsurprising in the context of the first-ever citizen tax campaign in a city governed by a low-capacity state. It does not take a highly sophisticated agent to call the government’s bluff about the probability of future sanctions. Consider the case of a single noncompliant taxpayer. The cost of enforcement (to the government) very likely exceeds the gain in tax revenue (about \$7.50) that could be achieved pursuing tax evaders.<sup>19</sup> Among the <1% of large houses (‘villas’) subjected to a proportional property tax, the government’s calculus might look different. However, among the vast majority of households in Kananga, which constitute this paper’s sample, it is difficult to imagine that pursuing individual evaders will be a revenue-positive activity unless it has improbably large externalities on compliance by generating fear and leading individuals to update their priors about the probability of punishment.<sup>20</sup>

Moreover, this narrative — that perceptions of punishment play only a minor role in gener-

<sup>19</sup>As Levi (1989) points out, the transaction costs of enforcement are high in low-capacity settings without modern tax bureaucracies.

<sup>20</sup>For example, the Rwandan tax authority, which is a much more competent body compared to the provincial tax ministry in Kananga, widely publicizes cases of taxpayer audits and sanctions to boost compliance (Tourek, 2018).

ating initial tax compliance — aligns with most historical evidence. As noted, historically states have managed to raise taxes mainly at times when the role of the state in providing essential public goods, such as security in times of conflict, is unquestionable and salient in the minds of citizens (Schumpeter, 1918; Tilly, 1985; Daunton, 2007; Scheve and Stasavage, 2016). Even in times of peace, states chiefly raise tax compliance by demonstrating legitimacy and building trust among citizens, not by enforcing sanctions against the defiant (Levi, 1989; Tyler, 2006; Mitchell, 2006; Daunton, 2007).

In short, non-pecuniary motivations for tax compliance, to which we turn next, are likely to be first order in a setting like Kananga, in which citizens are unaccustomed to paying taxes.

### 7.3.3 Testing Hypothesis 2: the perceived legitimacy of the state

As noted in Section 3.1, citizens might get warm-glow utility from paying the property tax if they view the government that receives this money to be legitimate. In this case, citizens were informed that all revenue collected in the property tax campaign would go to the provincial government. I therefore examine how citizens' pre-treatment beliefs about government legitimacy affect their responsiveness to the tax campaign.

Specifically, to test Hypothesis 2, I examine participants' responses to the baseline survey question: "How would you evaluate the performance of the [provincial government / tax ministry] in Kananga?" The question was posed separately for each institution, and responses were coded on a seven-point scale from 'excellent' to 'terrible.' These questions offer a measure of the perceived legitimacy of the government and its revenue authority. *Government approval* is a standardized index of both questions, and *Government approval (high)* is an indicator for individuals with above-median beliefs. Appendix Figure 14 reveals that about half of all respondents choose the third highest option ('good') regarding both institutions, with considerable dispersion around this mode.

As demonstrated in Figure 2, the program has a larger effect on compliance among individuals whose baseline approval level of the government is above the median. Table 13, in the Appendix, shows that the rate of compliance among individuals with above-median approval of the government is 19.6%, nearly double the average rate across the city. This difference is significant at the 1% level. This large increase in compliance suggests that perceptions of state legitimacy play an important role when citizens are choosing whether or not to pay the tax.

A second possible measure of citizens' perceptions of state legitimacy is their reported level of trust in the provincial government and tax ministry. Enumerators read the following text in the baseline survey: "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, some confidence, not very much confidence or none at all?" They then asked respondents about (in this order): the police, the national government (in Kinshasa), the provincial government, the tax ministry. As with the approval questions, I construct a standardized index using citizens' responses for the provincial government and the tax ministry, and define an indicator, *Trust government (high)* for individuals with above-median trust. Interestingly, the campaign does

not appear to have a larger impact on tax compliance among this high-trust subgroup (Figure 2 and Table 13, column 4).

These divergent results are likely explained by two factors. First, the order in which institutions were named in the trust question might have primed people about the police and national government, both of which are mistrusted and unpopular in Kananga (a stronghold for the opposition UDPS party). Joint evaluation led individuals to report more favorably about the provincial-level institutions, thereby inflating responses and making noisier the comparison of high and low trust types. Raw averages bear out this interpretation: 84% and 61% of respondents say they trust the government and tax ministry, respectively, while for approval the corresponding averages are 59% and 58%.<sup>21</sup> Despite the similar responses for the approval questions, citizens were asked these questions at different points in the survey.

Second, eliciting trust in survey questions, much less translating the notion of trust in different languages poses many challenges, and Tshiluba is no different (Levi and Stoker, 2000; Glaeser et al., 2000; Naef and Schupp, 2009). The approval questions were simpler to translate and are less open to interpretation. This difference could again imply that the trust questions are a noisier proxy for the perceived legitimacy of the state.

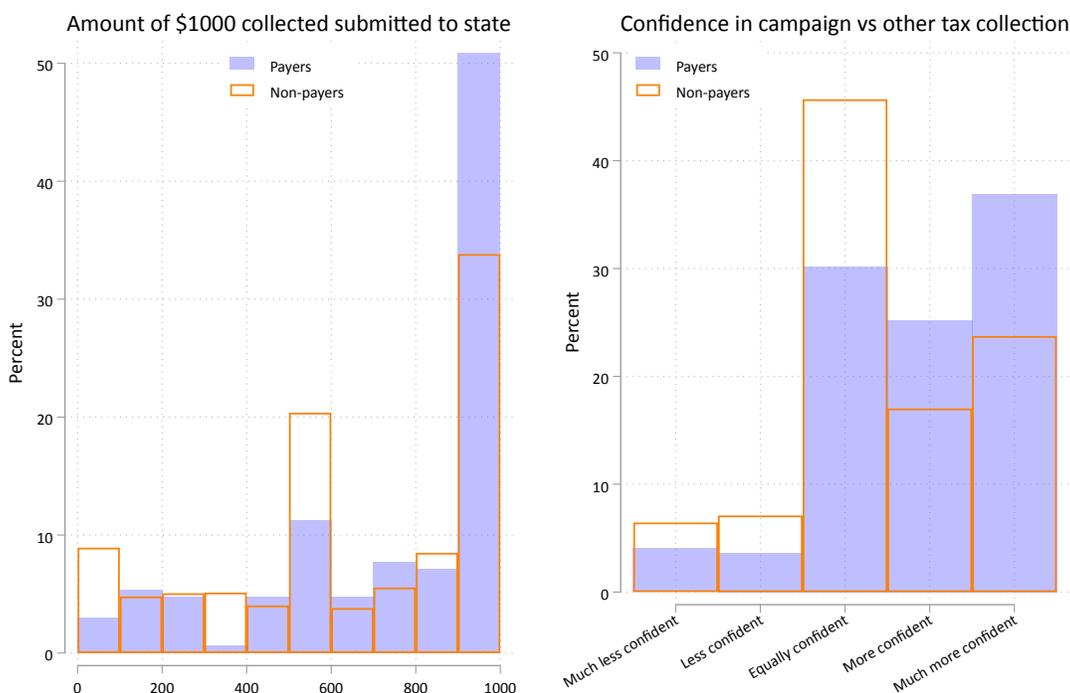


Figure 5: *Participants' estimates of share of \$1000 collect in property taxes that will reach state account (left) and self-reported confidence in property tax campaign relative to other tax collection in Kananga (right).*

<sup>21</sup>Here I examine binary versions of these variables to make them comparable, i.e. if citizens reporting 'a great deal of confidence' or 'some confidence' for the trust questions, and any positive response for the approval variables.

To generate further evidence on the role of perceived state legitimacy in citizens' compliance decisions, I examine correlations in endline data. Over 80% of participants said that 'duty as citizens' is an 'important' or 'very important' reason why people in Kananga pay the property tax (Figure 22). Payers are more likely to emphasize this as a 'very important' reason, relative to non-payers (Figure 4).

An important component of legitimacy in this context is the perceived legitimacy of the tax collectors themselves. To measure this, the endline survey contained a question asking respondents how much of the money collected in property taxes they thought would actually reach the state account. The exact question text was as follows: "In general, think of what the tax collectors will do with the money they collect during this 2016 property tax campaign. Imagine the tax collectors collect \$1000 thanks to the campaign. How much of this money will they submit to the state account?" Comparing payers and non-payers within treated neighborhoods, one would expect the former to be more optimistic about the destination of taxpayer money if tax collector legitimacy matters in citizens' decisionmaking. Figure 5 (left panel) confirms this intuition: nearly 50% of taxpayers are sure that all of the \$1000 will reach the state account, while less than 30% have this same level of confidence. Indeed, payers estimate that an additional \$141 will reach the state account relative to non-payers (Table 4, column 1).

In a separate question, endline respondents compared their confidence levels in the property tax campaign relative to other forms of tax collection in Kananga, such as toll taxes. Figure 5 (right panel) shows that, again, the distribution for payers is shifted to the right relative to that of non-payers — an average difference of 0.4 standard deviations (significant at the 1% level).

These endline survey questions are post-treatment and could thus reflect motivated reasoning to justify having paid the tax. Nonetheless, they provide suggestive evidence about the ways in which perceptions of the legitimacy of the state and its tax collectors impact citizens' decisions about paying the property tax.

If citizens had high intrinsic tax morale, then why weren't they paying before this tax campaign, and why weren't they paying in control neighborhoods? One likely explanation is that the utility citizens get from intrinsic motivation must exceed the transaction costs of payment. Absent the program, this is never the case. But once transaction costs drop by sending tax collectors door to door, then citizens pay due to tax morale. It is also very likely true that many citizens did not pay in the past because they lacked information on the property tax. The lack of information cannot, however, explain the low rate of compliance in the control group given that information about the property tax was distributed before the campaign.

### **7.3.4 Testing Hypothesis 3: expectations of future public services**

Citizens' expectations about future tax-funded public goods provision could also shape their compliance decisions (Hypothesis 3). If such expectations matter, one would expect individuals who are optimistic about taxpayer dollars turning into public goods to be more

responsive to the tax campaign.

Again estimating heterogeneous treatment effects by baseline beliefs, I examine a question gauging respondents' beliefs about how much of the tax campaign revenues would be spent on public goods and other "good uses."<sup>22</sup> Participants responded with a dollar amount. *Spending expectations (high)* is an indicator for above-median responses to this question. Figure 2 and Table 13 (column 4) reveal that the coefficient on the interaction term in Equation 3 is positive, but not statistically different from zero.

Additional evidence comes from an analogous question in the endline survey. Under the hypothesis that the fiscal exchange motivation influences citizen decisionmaking, one would expect payers to estimate that a greater portion of the \$1000 would be spent on public goods. However, as seen in Figure 27, there is not a clear pattern in comparing the responses of payers and non-payers. If anything, payers appear to be more polarized (on either end) in their responses — separated between pessimists, who say none of this money will be spent on public goods, and optimists, who say all of the money will be spent on public goods. But there is not an average difference between payers and non-payers on this margin (Table 4, column 2).

Nonetheless, on net, combining endline participants' estimates for (1) the amount of \$1000 that will reach the state account (Figure 5, left panel), and (2) the proportion of the remaining money that be spent on public goods, payers remain more optimistic about future public spending than the non-payers. Appendix Figure 26 shows the distribution of respondents' overall expectations about money collected in property taxes: 19% of payers think all \$1000 will be spent on public goods, while 14% of non-payers share this opinion. Put differently, there is a (marginally significant) average difference of \$55 between payers and non-payers concerning how much money they believe will ultimately go to public goods (Table 4, column 3). This suggests a role, albeit a small one, for reciprocal motivations in affecting citizens' compliance decisions.

In another endline survey question, payers also appear more likely to believe that the money will be used on road construction, relative to other possible sectors.<sup>23</sup> This aligns with citizen preferences. Poor-quality roads are the most common grievance of Kananga's inhabitants, and they hold the provincial government responsible.<sup>24</sup>

Additionally, in the endline survey 'promoting development' is thought to be the most important reason why citizens pay the property tax (Figure 22). This view is more pronounced

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<sup>22</sup>The exact question text is: "Now I would like to ask you what you think the provincial government will do with the money it receives from this 2016 property tax campaign. Imagine that the provincial government of Kasai Central receives \$1000 thanks to this campaign. How much of this money will be put to good use, for example providing public goods?"

<sup>23</sup>See Figure 28 (in the Appendix), which reports individuals' beliefs concerning the specific sector in which they think the government will spend the majority of the money raised in the campaign. Before the tax program, enumerators distributed fliers announcing the campaign throughout the city. As for the intended use of the money, the fliers contained the following statement: "The money they collect will support the efforts of the provincial government to provide security in the province, to kickstart economic development, and to support the well being of the Kasaiian peoples."

<sup>24</sup>Indeed, in the baseline survey, over 40% of the sample thought road maintenance should be chiefly provided by the provincial government.

**Table 4: Perceptions about uses of tax revenues**

	Amount of \$1000 collected in campaign submitted to state	Amount of \$1000 received by state spent on public goods	Net amount of \$1000 collected in campaign spent on public goods
	(1)	(2)	(3)
Payer	141.218*** (25.295)	3.813 (31.490)	55.160* (31.840)
Covariates	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes
$R^2$	0.058	0.072	0.067
Observations	2005	2031	2003
Clusters	215	215	215
Outcome Mean	622	475	352

Standard errors clustered by polygon. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Data: Endline survey matched with administrative data on compliance.

among payers (Figure 4). The revealed importance of ‘promoting development’ in the minds of citizens and taxpayers in particular underscores the importance of a fiscal exchange of taxes for public services (since presumably the only way taxes could promote development is through a public goods channel). Moreover, when asked why some people in Kananga evade the property tax, nearly 60% rank ‘the government provides too little’ as a ‘very important’ or ‘important’ reason (Figure 23).

Although payers appear slightly more hopeful, on net, that their tax money will go to public goods, and they generally emphasize the fiscal exchange motivation in the endline survey, ultimately this evidence is only suggestive at best. It is very possible that people pay for other reasons and then justify their actions to themselves by reporting more optimistic beliefs at endline. The lack of a (statistically significant) interaction between the tax campaign and baseline expectations about public goods spending (Figure 2) suggests that such reciprocal motivations play a modest role at most in shaping compliance in Kananga.

### 7.3.5 Testing Hypothesis 4: social norms and peer effects

Social norms and other peer influences could affect citizens’ choices to pay or evade the property tax. In the presence of a social norm of compliance, individuals might be ashamed not to pay. When asked if people in Kananga pay taxes to maintain their reputation, endline respondents largely respond negatively (see Figure 22 in the Appendix). More than 60% of payers and non-payers say this is an unimportant reason why people pay taxes in Kananga. This is unsurprising given the novelty of the program. Social norms of tax compliance likely take shape over time.

Even in the absence of a social norm of compliance, one might expect citizens to coordinate their compliance decisions. Given the uncertainty about enforcement in Kananga (in the

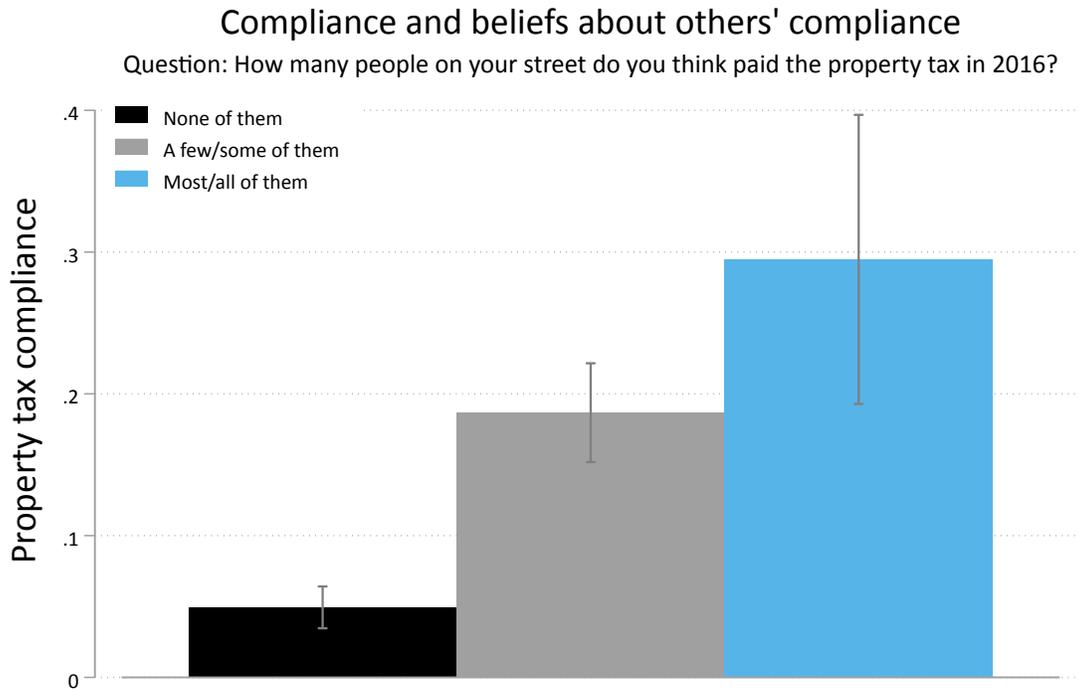


Figure 6: *Property tax compliance as a function of endline beliefs about the number of people on the same street who also paid the tax.*

first-ever citizen tax campaign), peer behavior might be particularly informative in this environment as individuals seek to learn the likely outcomes for paying or evading. For instance, individuals might estimate a lower probability of punishment if they observe all of their neighbors also evading. Citizens could also coordinate with peers if they are moved by the fiscal exchange motivation and believe that, if enough of their neighbors pay, the government will improve the road in their neighborhood.

Thus, a more reasonable hypothesis is that individuals who personally know other taxpayers will themselves be more likely to pay the tax (Hypothesis 4). A first question in investigating this hypothesis is to what extent taxpayer behavior is correlated within versus between neighborhoods. As noted, the intraclass correlation of compliance in treated neighborhoods is 0.077.<sup>25</sup> To make this within-neighborhood correlation of compliance behavior easier to interpret, I run a regression of the individual-level payment indicator on a variable counting the number of other payers in the neighborhood, controlling for individual- and neighborhood-level determinants of compliance. One additional other payer in a neighborhood is associated with a 3.2 percentage-point increase in the probability that a given individual in that neighborhood also pays the property tax (Table 5, column 1).

More telling evidence comes from examining citizens' perceptions of others' compliance decisions. Endline participants responded if they know personally any other individuals who had paid the property tax in 2016. Within treated neighborhoods, individuals who claim to

<sup>25</sup>In the full sample, the ICC of compliance is 0.11.

know a payer personally are 16.8 percentage points more likely to pay themselves. Those who claim to know a neighbor who paid the property are 21.7 percentage points more likely to pay.

Of course, these large differences likely reflect neighborhood characteristics, including notably the tax collectors who were assigned to work there. If a neighborhood is randomly assigned a more assiduous group of tax collectors, then the correlation between neighbors' compliance decisions will appear higher but could have nothing to do with social influences. To hold constant all neighborhood-level variables, I estimate this model again including neighborhood (polygon) fixed effects. This strategy isolates within-neighborhood variation in the extent to which individuals report knowing other payers. Knowing a payer is still associated with a 13.1 percentage-point increase in the probability of payment, knowing a paying neighbor with a 18.5 percentage-point increase.

**Table 5: Compliance as a function of beliefs about others' compliance**

	Paid the property tax in 2016						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Number other payers	0.032*** (0.009)						
Know any payer		0.168*** (0.033)	0.131*** (0.035)				
Know neighbor payer				0.217*** (0.039)	0.185*** (0.042)		
Some neighbors paid						0.122*** (0.020)	0.106*** (0.021)
Most neighbors paid						0.214*** (0.051)	0.165*** (0.056)
Indiv. covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stratum FE	Yes	Yes	No	Yes	No	Yes	No
Neighborhood FE	No	No	Yes	No	Yes	No	Yes
$R^2$	0.062	0.073	0.198	0.077	0.203	0.109	0.309
Observations	2147	2147	2147	2147	2147	1388	1388
Clusters	215	215	215	215	215	212	212
$F$ -stat						.073	.3

Standard errors clustered by polygon.  $F$ -test  $p$ -value reported. Treated neighborhoods only.

Data: endline survey matched with administrative data on compliance.

Another endline question asked respondents how many of the individuals in their neighborhood they think paid the property tax in 2016. As shown in Figure 5, tax compliance increases substantially in the number of neighbors individuals estimate as having paid. In a specification with neighborhood fixed effects, individuals who think 'a few' or 'some' of their neighbors paid (27% of the sample) are 10.6 percentage points more likely to pay compared to individuals who think 'none' of their neighbors paid (68% of the sample). Individuals who think 'most' or 'all' of their neighbors paid (5% of the sample) are 16.5 percentage points

more likely to pay, though an  $F$ -test fails to reject a difference between these latter two coefficients.

These survey questions about others' compliance decisions are post-treatment and thus only suggestive. In particular, in answering how many of the people in their neighborhood paid, payers likely inflate their responses to justify to themselves their own decision, a form of motivated reasoning (Festinger, 1962; Rabin, 1994; Bénabou and Tirole, 2004). They don't want to feel like the 'sucker' who paid when others managed to evade, so they hold an exaggerated belief about others' compliance.

However, such concerns are less likely to affect individuals' responses to questions about *knowing other payers personally*. Because these are precise, factual questions, motivated reasoning is less of a concern. I therefore view the point estimates in Table 5 columns 3 and 5 as reasonable estimates of the impacts of social influences on compliance behavior in Kananga.

### 7.3.6 Comparing the importance of different factors

The estimates of  $\beta_2$  summarized in Figure 2 and Table 13 provide one estimate of the relative importance of each of these four factors as determinants of compliance behavior in the Kananga property tax campaign. By this metric, intrinsic motivation tied to government legitimacy is the clearest determinant of the decision to pay taxes.

Another strategy is to examine changes in  $R^2$  as each of these factors is added into a regression with tax compliance on the lefthand side. Specifically, restricting the sample to treated neighborhoods, I estimate a model with a payment indicator as the dependent variable and each standardized belief as the independent variable. I control for wealth and education in these regressions since both explain variation in the dependent variable and could be correlated with the beliefs of interest.

In the bottom row of Appendix Table 15, I note the changes in  $R^2$  from the least restricted model to the most. Individuals' perceived punishment probabilities are positively correlated with payment (marginally significant); including this variable on the right-hand side increases the  $R^2$  by 0.009. Approval of the government is more strongly correlated with compliance, as evidenced by the larger coefficient and the larger jump in  $R^2$  (0.015). The point estimates on other beliefs are not statistically different from zero. This pattern of results is also borne out in a racehorse regression with all of these factors on the righthand side.

## 7.4 A positive feedback loop of taxation and legitimacy?

To conclude the discussion of citizen-side determinants of compliance, this section examines the average impacts of the tax campaign on citizen beliefs about the government. Consider, first, the effect of the campaign on the perceived probability of punishment for evasion. Luttmer and Singhal (2014) pose an important question: could efforts to alter beliefs about tax enforcement backfire and lower future compliance if citizens do not observe a corresponding increase in the detection and punishment of tax evasion?

Exploiting the random assignment of the tax program, I regress each belief (standardized to mean zero and unit standard deviation) on a program indicator with stratum fixed effects and the familiar controls. Table 16 contains the results.

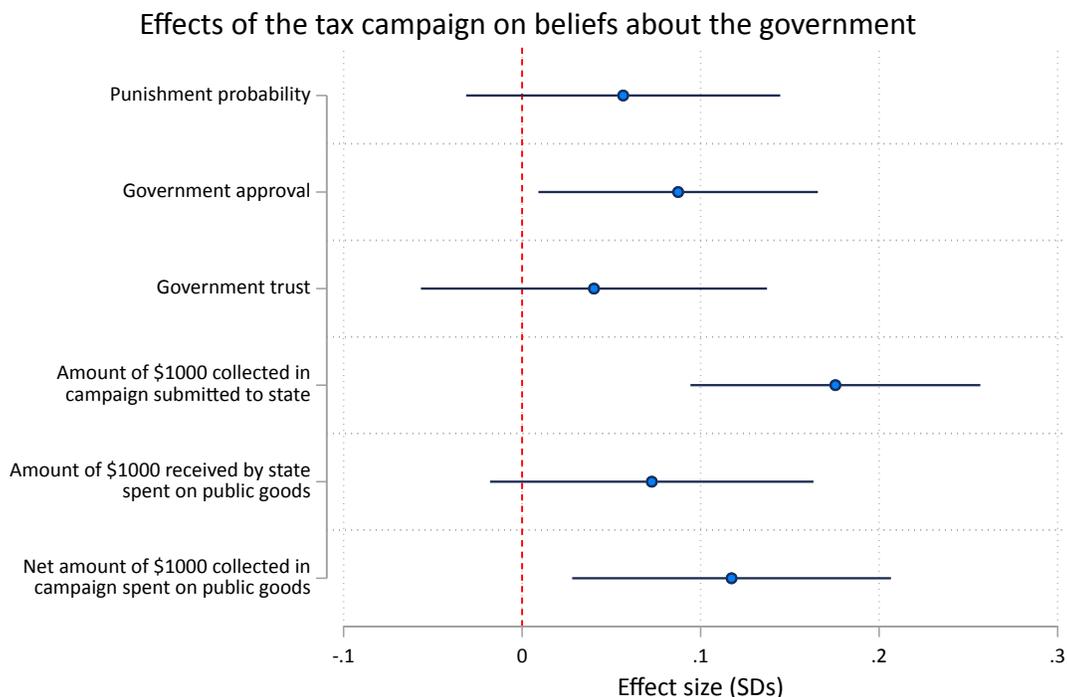


Figure 7: *Causal effects of the property tax campaign on beliefs about the government.*

The tax campaign does not have an impact on perceptions of the probability of punishment that I am able to detect (although this null average effects masks an increase among tax compliers, observed in Figure 3). This null is perhaps surprising given the lack of observed punishment for noncompliance. The evidence from Kananga suggests that citizens do not negatively update about punishment probabilities despite a complete absence of government sanctions of tax evasion.

Concerning government legitimacy, the most obvious hypothesis is that a tax campaign would undermine views of the government if it perceived as unfair and arbitrary or if citizens do not observe the government increasing public services in response. However, on average, the tax campaign leads to a 0.087 standard-deviation increase in approval for the provincial government (Table 16, column 2). Although there is not a corresponding (detectable) increase in self-reported trust in the government (column 3), this null aligns with the null heterogeneous effect of the tax campaign by trust.

The program also causes an average increase in the perceived legitimacy of tax collectors (Table 17, column 1). Treated individuals think collectors will deliver on average \$59 dollars more to the government. There is no effect on the perception that the government will spend the money on public goods (column 2). But calculating the net amount of money that will reach the state and then be spent on public goods, treated individuals are still

more optimistic about future public spending than control individuals (column 3).

Recall that individuals who at baseline approved of the government were more responsive to the tax campaign (Figure 2). This finding combined with the average effect of the program on government approval indicate a possible positive feedback loop, in which individuals pay taxes if they view the government as legitimate, and the tax campaign itself leads more people to view the government as legitimate.

Why would a tax collection program improve citizens perceptions of the government? This increase must be understood in the political equilibrium in Kananga. The provincial government provides very few services. Most residents have little contact with the state or the formal sector altogether. In this context, it is reasonable that the tax campaign sent a positive signal about the government and its capacity. Put simply, in a setting with an all but inactive government, the fact that the government administered a citywide door-to-door tax campaign sends a signal that it has more capacity than citizens might have previously assumed. I examine this argument in depth in Weigel (2018).

To parse which aspects of the tax campaign raised individuals' views of the government, I examine correlations between endline beliefs and the experiences of individuals in treated neighborhoods.

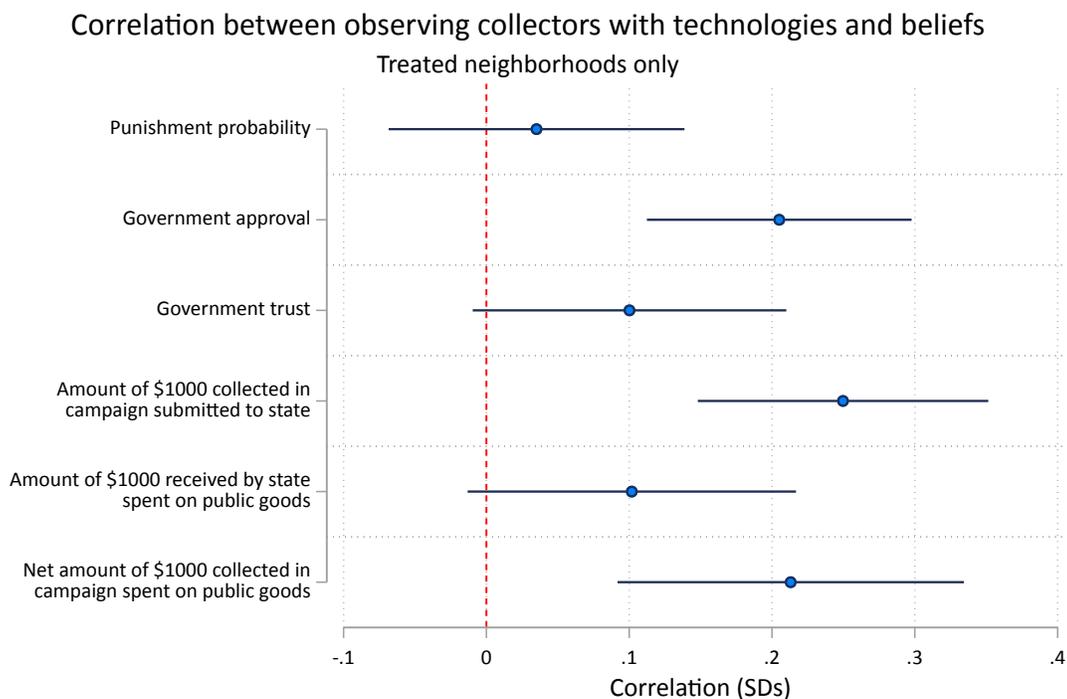


Figure 8: *Correlations between beliefs about the government and observing collectors using the tablets and receipt printers. Sample restricted to treated neighborhoods only.*

One aspect of the collectors' perceived legitimacy could be the technologies they used. Collectors were each equipped with tablets and handheld receipt printers. Although such technologies had been used by the tax ministry at tolls, the train station, and the airport previously,

average citizens had likely never before observed state agents using modern technologies. The technologies could confer a sense of legitimacy upon collectors. To measure this, the endline survey included the following question: “To what extent do you think the use of tablets and portable printers helps the government monitor and sanction collectors who put state money in their own pockets?” In response, 84% of endline participants thought it ‘helps’ or it ‘helps very much.’ The government also shares this view that technologies reduce tax collector corruption by creating a paper trail.<sup>26</sup>

Observing tax collectors using tablets and receipt printers is positively but not significant correlated with individuals’ estimations of the probability of punishment for tax evasion (Table 18, column 1). But it is significantly correlated with endline government approval (column 2) and government trust (column 3). Moreover, those who observed the collector using these technologies are considerably more optimistic about the integrity of tax collectors (Table 19, column 1) and the percentage of money raised in the tax campaign that will translate into future public goods spending (Table 19, columns 2-3). Plotting endline government approval by treatment status, exposure to technology, and payment status reveals that exposure to the new technologies fully explains the treatment effect of the tax campaign on government approval observed in Table 16. Treated individuals who did not observe collectors using the technologies have indistinguishable views about the government. Interestingly, among those who witnessed collectors using the technology, there is no difference in endline approval of the government between payers and non-payers. These relationships hold even when controlling for the number of visits households received from tax collectors. It is therefore unlikely that the correlations are simply explained by which households collectors did and did not revisit after the census.

The differences noted in the previous paragraph emphasize the importance of tax collector compliance with the rules and procedures. Although monitoring is a challenge in low-capacity settings, governments seeking to maximize this positive feedback loop between taxation and government legitimacy must ensure that their collectors are actually using the technologies intended for the task. The next section explores the collector-side of compliance explicitly.

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<sup>26</sup>In fact, the use of receipt printers was a *sine qua non* in the government’s decision to launch the property tax campaign. They had already acquired most of these technologies before I approached them to suggest a randomized evaluation of the campaign.

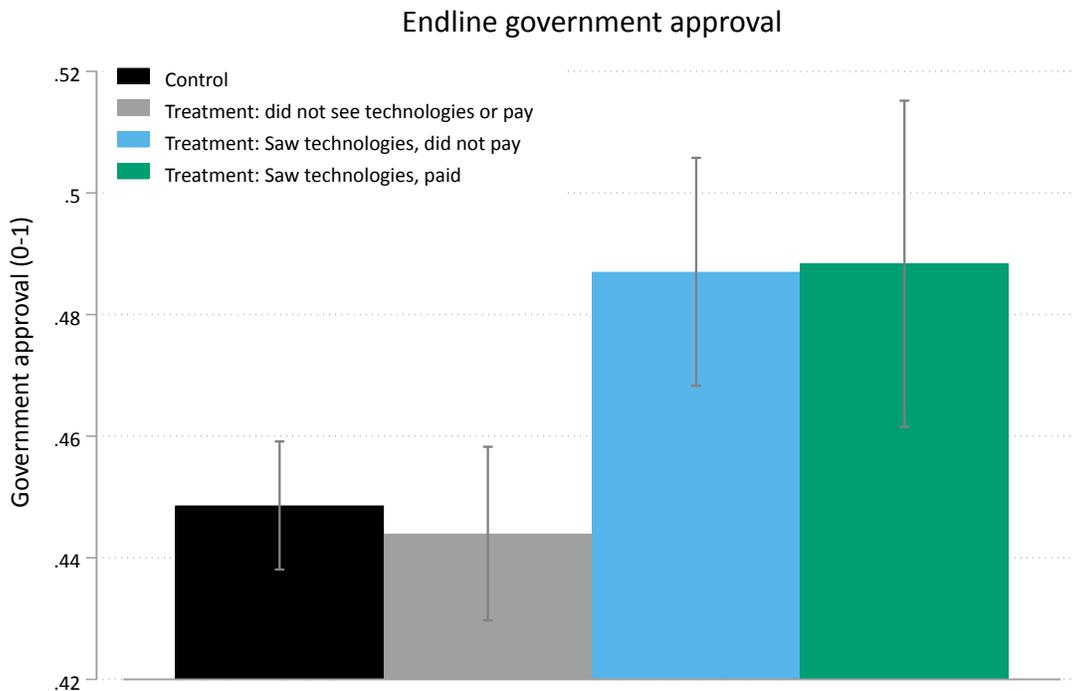


Figure 9: *Endline government approval by treatment status and exposure to technology.*

## 7.5 Collector-side determinants of compliance

The collection strategies of the government, as well as its capacity, are likely also determinants of tax compliance in a setting with near-zero prior payment of formal taxes (Levi, 1989).

As a first indication of the importance of collector-side determinants, consider the variation in compliance over time. Neighborhoods were randomly assigned to collection during a two-week period, during which collectors went door to door soliciting property taxes. Figure 21 shows a drop in compliance among neighborhoods assigned to taxation in the middle of the campaign (periods 10 - 20). Compliance increases again toward the end of the campaign. This pattern corresponds to the morale and effort levels of tax collectors. After the first few months of the campaign, a number of collectors became dispirited with the job and began dropping out.<sup>27</sup> The government recruited new collectors to replace them, leading to a second uptick in collection after period 20. Understanding the heterogeneity among assigned tax collectors is clearly essential to explaining variation in compliance with the property tax campaign.

One way to measure the heterogeneity across collectors is to estimate fixed effects for each of them. If collectors were of consistent quality, then neighborhood-level differences in will-

<sup>27</sup>Tax collection is difficult work. Collectors spent all day walking in the heat through hilly neighborhoods with bad roads asking people to pay taxes for the first time. Some collectors were threatened by citizens. It is not surprising that midway through the campaign, a number of collectors chose to stop working on the campaign.

ingness to pay taxes should average out across collectors due to the random assignment of collectors to different neighborhoods throughout Kananga. However, by plotting collector-specific fixed effects, Appendix Figures 32, 33, and 34 reveal large (and often significant) differences across tax collectors in terms of how much money they collected. For example, if a neighborhood is assigned Crispin as a collector, it is predicted to have a 0.45 standard-deviation increase in compliance; if instead Camile is assigned, the same neighborhood is predicted to have no detectable increase in compliance.

This variation in collector effectiveness is some function of effort and intrinsic quality (i.e. persuasiveness). I measure effort by examining how many visits households report. If the variation in tax compliance is perfectly explained by how many visits households received from tax collectors, then intrinsic qualities would seem not to matter. I thus plot the collector-specific fixed effects for reported visits in Appendix Figures 32, 33, and 34. Both the payment and visits variables are standardized to enable comparisons of magnitudes. These collector-specific fixed effects move together, implying that the effort collectors put into visiting households multiple times is an important component of their success in collecting taxes.

That effort and compliance are highly correlated aligns with what the collectors themselves said about the best strategy for collecting taxes. They highlighted that many individuals do not have the cash on hand when the collector visits. Thus, collectors who visited households repeatedly — scheduling appointments when taxpayers would have the money ready — were often more successful in raising revenues.

That said, for certain collectors, there is a large (and statistically significant) gap between the estimated fixed effect on visits and that on tax compliance. For some collectors, such as Alphonse, the fixed effect for visits is large and significant, while that for compliance is negative and significant. Despite being persistent in his revisiting of taxpayers, Alphonse appears to have been ineffectual in convincing individuals to pay. In contrast, the point estimate for Crispin on compliance is larger than that for visits, implying perhaps more persuasive powers than Alphonse. Overall, though, the fixed effects for visits and for compliance are seldom statistically distinguishable, implying that simply making an effort to visit households numerous times is a first-order determinant of effectiveness in collecting taxes. I use several strategies to isolate the effect of collector effort on revenues raised in order to test the following hypothesis:

- *Hypothesis 5: tax compliance is a function of collector effort.*

To test this hypothesis, I exploit random household-level variation in bonuses. As noted, collecting taxes from all houses generated for collectors a bonus of 18% of revenue collected. In addition, 40% of households were randomly selected for a double bonus treatment, in which collectors receive a bonus equivalent to 36% of the revenues they collect. If households selected for the double bonus are more likely to pay, this could only be a function of collector effort.

I therefore run a regression of the payment indicator on an indicator for households randomly selected for the double bonus plus stratum fixed effects in the administrative data from treated neighborhoods:

$$Compliance_{ijk} = \beta_1 I_{ijk}^{DoubleBonus} + \alpha_k + \varepsilon_{ijk} \quad (4)$$

Table 6 that selected households are 4.4 percentage points more likely to pay the tax (significant at 1%). Collectors responded to the higher bonus available at these households by systematically targeting and taxing them.

Collectors' success in taxing these double-bonus households could result from their making more visits (extensive margin) or them simply being more persuasive when they make a visit (intensive margin). To distinguish between these possibilities, I re-estimate the same model with the number of reported visits as the dependent variable. Although the coefficient is positive, it is not significant. Collectors are not making many more visits to double-bonus households, it seems, but rather they are able somehow to convince these households to pay more so than average households

**Table 6: The impact of effort on collector effectiveness**

	Paid property tax (1)	Number collector visits (2)	Bribed (3)
Double Bonus	0.044*** (0.012)	0.051 (0.042)	-0.007 (0.004)
Stratum FE	Yes	Yes	Yes
Observations	17774	17774	17774
$R^2$	0.026	0.063	0.008
Outcome Mean	0.104	1.004	0.035

Standard errors clustered by polygon. Treated neighborhoods only.

Data: monitoring survey matched with administrative data on compliance.

It is possible that the effect reported in Table 6 overestimates the true effect of effort if collectors are substituting effort from regular bonus households to double bonus households. In other words, if collectors have a fixed amount of effort that they must allocate across households, once the double bonus is introduced they could exert systematically less effort at regular bonus households than they would have if the double bonus had not existed. I can test this possibility by exploiting the fact that the double bonus was introduced as an incentive for collectors midway through the campaign. There is thus within-collector variation in the exposure to the single versus double bonus system. I therefore compare the rates of compliance among single-bonus households before and after the introduction of the double bonus using collector fixed effects. There is not a statistically significant difference in compliance across this threshold. This suggests that rather than substituting effort away from single-bonus households, collectors are simply increasing effort toward double-bonus households after this incentive is introduced.

The average effort and effectiveness of tax collectors might mask heterogeneity by other aspects of collectors' social identity. The next section investigates this hypothesis.

### 7.5.1 Social identity and tax compliance

As noted in Section 3.2, one might expect that collectors would adopt different strategies when matched with households of varying social distance from the collector. Specifically, I seek to test the following hypothesis.

- **Hypothesis 6:** *collectors will collect more taxes from households whose social identities are closer to their own.*

To examine this relationship, I exploit the random assignment of tax collectors to different neighborhoods to estimate the effect of social identity on citizens' compliance decisions. The general form of the estimations is as follows.

$$Compliance_{ijk} = \beta_1 I_{ijk}^{IdentityMatch} + \beta_2 CitizenIdentity + \beta_3 CollectorIdentity + \alpha_k + \varepsilon_{ijk} \quad (5)$$

I examine two dimensions of collector identities: their ethnicity and the neighborhoods in which they reside.

First, to examine the role of coethnicity in tax collection, I use self-reported ethnicity information from citizens and collectors. I define an indicator variable *Coethnic* if the ethnicity of the respondent matches that of *any* of the randomly assigned collectors. Because Kananga has one majority ethnic group — the Luluwa, who make up about 70% of the population — I also examine coarser measures: *Co-majority*, which indicates that the citizen and all collectors are ethnically Luluwa, and *Co-minority*, which indicates that the citizen and at least one collector is not ethnically Luluwa. In regressions, summarized in Table 7, I include citizen tribe fixed effects (or minority/majority ethnic dummies) and collector fixed effects.

The estimated effect of coethnicity is not statistically distinguishable from zero (column 1), nor is the effect of a Luluwa-Luluwa citizen-collector group match (column 2). However, when ethnic minority collectors are matched with an ethnic minority citizen, the citizen is 7 percentage points more likely to pay the property tax compared to the modal case of ethnic majority citizens and collector groups. Given the average payment rate in treated neighborhoods of roughly 10%, this co-minority effect is large in magnitude. Nearly 15% of minority-ethnic matches paid the tax (Figure 10). Although the confidence interval is large, more than 10% of the sample (228 observations) satisfies these criteria for a co-minority ethnic match. Note that minority ethnic collectors do not appear to collect less tax from Luluwa citizens (relative to what Luluwa collectors collect from Luluwa citizens); rather, the co-minority effect stems from the higher rate of compliance when a non-Luluwa collector visits a non-Luluwa household.

There is also suggestive evidence that this effect is driven by instances when minority ethnic collectors are collecting taxes alone, rather than in a group. Although collectors are randomly assigned to neighborhoods in groups of three, there is variation in whether those collectors actually showed up to work in the neighborhood. This variation is non-random, but it is unlikely to be related to the ethnicities of collectors or citizens. The main reasons for collector

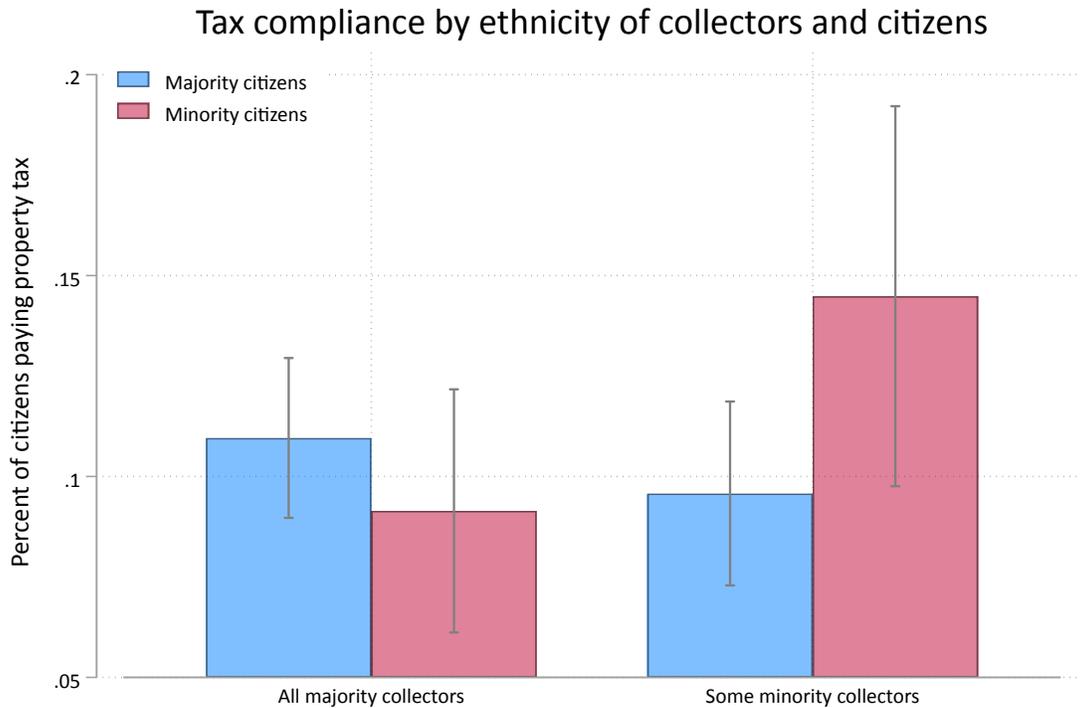


Figure 10: *Property tax compliance rates by ethnicity of citizens and of randomly assigned collector groups.*

absences were illness and working other jobs simultaneously. I examine whether the co-minority ethnic effect is larger when collectors worked alone or in groups. Appendix Figure 35 shows that the effect is more pronounced when collectors are alone, though the standard errors are large. This provides suggestive evidence that the higher rates of compliance observed when non-Luluwa collectors visit non-Luluwa citizens come from instances when the collectors were working alone when presumable ethnicity would have been more salient to both collector and citizen.

This co-minority effect could arise if collectors systematically *target* minority citizens — visiting them more often — or if they are simply better able to *persuade* them to pay when they happen to visit them. To distinguish these two possible mechanisms, I estimate whether co-minority households also report more visits from collectors. Although the point estimate is positive, it is not statistically significant. This finding suggests that minority ethnic collectors are not selecting whom they visit based on ethnicity. Indeed, targeting tax visits based on ethnicity would be difficult for collectors since it is not immediately apparent to what ethnic group individuals belong. However, according to the tax collectors, ethnicity can sometimes be detected by speaking (to detect dialects of Tshiluba or their accents) and exchanging names with a citizen.

Rather than targeting based on ethnicity, minority-ethnic collectors appear better able to convince other ethnic minorities to pay the tax once they come across them. This could be because minority collectors are more trusted by minority citizens. A collector who is not the

**Table 7: Effects of coethnicity on compliance and collector visits**

	Paid property tax			Number of collector visits		
	(1)	(2)	(3)	(4)	(5)	(6)
Coethnic	0.006 (0.021)			-0.026 (0.075)		
Co-majority		-0.036 (0.040)			0.027 (0.143)	
Majority ethnic collector		0.018 (0.037)			-0.140 (0.137)	
Majority ethnic citizen		0.022 (0.037)			-0.093 (0.123)	
Co-minority			0.070** (0.030)			0.100 (0.119)
Minority ethnic collector			-0.012 (0.021)			0.013 (0.094)
Minority ethnic citizen			-0.020 (0.017)			0.040 (0.071)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes	Yes	Yes	Yes
Tribe FE	Yes	No	No	Yes	No	No
Collector FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2149	2150	2150	2144	2145	2145
$R^2$	0.087	0.081	0.082	0.113	0.091	0.090
Treatment group mean	0.106	0.106	0.106	1.485	1.485	1.485

Standard errors clustered by polygon. Treated neighborhoods only.

Data: endline survey matched with administrative data on compliance.

dominant ethnic group in the area can more credibly promise that revenues raised during the tax campaign will not just benefit the Luluwa but all ethnic groups in Kananga.

To investigate further the mechanism behind the higher level of compliance observed when a minority ethnic household is visited by a minority ethnic collector, I re-estimate the specification shown in Table 7 column 3 with endline beliefs as the dependent variable. Specifically, I examine each of the factors discussed in Section 3.1. There are no significant coefficients on the co-minority ethnic indicator (Table 20). I am unfortunately not able to say anything more about the mechanism other than that it is more a function of the persuasiveness of collectors rather than their effort levels.

### 7.5.2 Local tax collectors

Another salient aspect of collectors' identities is where they live in Kananga. The assignment of collectors to Kananga's 360 geographically defined neighborhoods was random, and no collectors were assigned to their exact neighborhoods. However, some collectors were assigned

to work in neighborhoods near to where they themselves live.

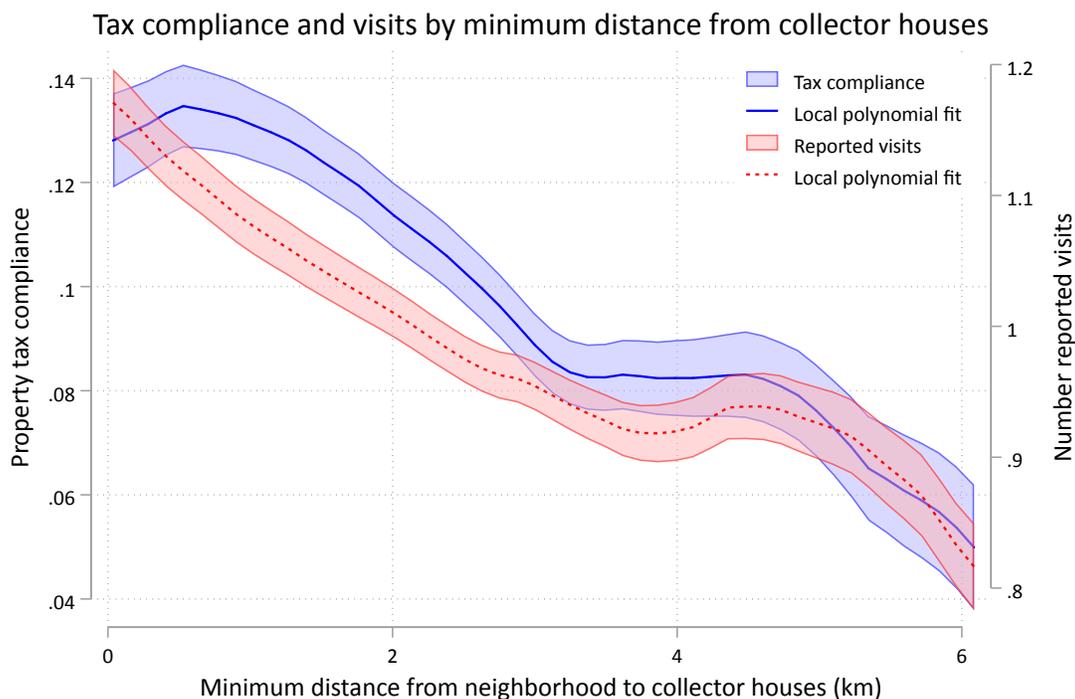


Figure 11: *Property tax compliance rates as a function of the minimum distance to the houses of the assigned collectors.*

To test Hypothesis 6 along this dimension of social identity, I measure the distance from each assigned collector’s house to the assigned neighborhood (polygon). I think use the minimum such distance, *Minimum distance*, as an independent variable in an OLS regression with the payment indicator as the dependent variable. There is a highly significant negative relationship between the minimum distance to a collector’s house and property tax payment (Table 8, column 1). Figure 8 demonstrates the downward sloping relationship between tax compliance and the minimum distance to one of the assigned collectors’ houses. To make this relationship easier to interpret, I also define an indicator variable, *Any collector <500m*, for neighborhoods assigned to any collector who lives within 500 meters, and a count variable, *Number collectors <500m*, equal to the number of collectors who live within this radius.<sup>28</sup> An additional collector within this radius increases the probability of property tax payment by nearly 4 percentage points (column 3).

There are several possible mechanisms through which living near communities enables collectors to collect more taxes. The most obvious mechanism is that collectors visit these households more often because it is less costly for them to do so. Given the substantial time variation in liquidity in resource-poor settings, by soliciting payment at different times, collectors are more likely to find households with cash on hand to pay the tax. Moreover, making repeated visits to households could affect households’ beliefs about enforcement.

<sup>28</sup>A total of 1,584 observations in 17 clusters (polygons) are assigned to a collector who lives within 500

**Table 8: Effects of assigning local collectors on tax compliance and reported visits**

	Paid property tax			Visits from collectors		
	(1)	(2)	(3)	(4)	(5)	(6)
Minimum distance	-0.012*** (0.003)			-0.050** (0.020)		
Any collector < 500m		0.034 (0.023)			0.307*** (0.105)	
Number collectors < 500m			0.039** (0.018)			0.265*** (0.086)
Stratum FE	Yes	Yes	Yes	Yes	Yes	Yes
Commune FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17769	17769	17769	17769	17769	17769
$R^2$	0.031	0.027	0.028	0.078	0.078	0.079
Outcome Mean	0.104	0.104	0.104	1.004	1.004	1.004

Standard errors clustered by polygon. Treated neighborhoods only.

Notes: monitoring survey matched with administrative data.

To test this possibility, I estimate the same models using the number of reported visits as the dependent variable. Table 8 demonstrates that this relationship is even stronger than that for payment. If any assigned collector lives within 500 meters, the average number of reported visits increases by 0.307. Figure 8 demonstrates how closely the relationship between collector proximity and visits mirrors that between proximity and payment. Clearly, a major reason why collectors are more successful in raising compliance in neighborhoods nearby their own homes is that they simply visit households there more often.

Beyond simply making more visits, local collectors might be perceived differently by households with regard to the beliefs about the government discussed in Section 3.1. To examine this possibility, I re-estimate the models in Table 8 using beliefs about the government as the dependent variable. Because I only collected these beliefs in the endline survey, these estimations use a smaller sample. However, the relationship between collector proximity and payment mirrors that estimated in the full administrative data (see Appendix Table 21). The results are summarized in Figure 12. The random assignment of a local collector does detectably raise beliefs about the government except for government approval. Table 9 reveals that neighborhoods assigned to a collector who lives within 500 meters approve more of the provincial government (by 0.189 standard deviations).

In short, the random assignment of local tax collectors appears to boost compliance for two reasons. First, they make more visits — because visiting households is less costly for them. Second, they appear to be perceived as more legitimate by households, leaving citizens with an overall more positive view of the provincial government.

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meters.

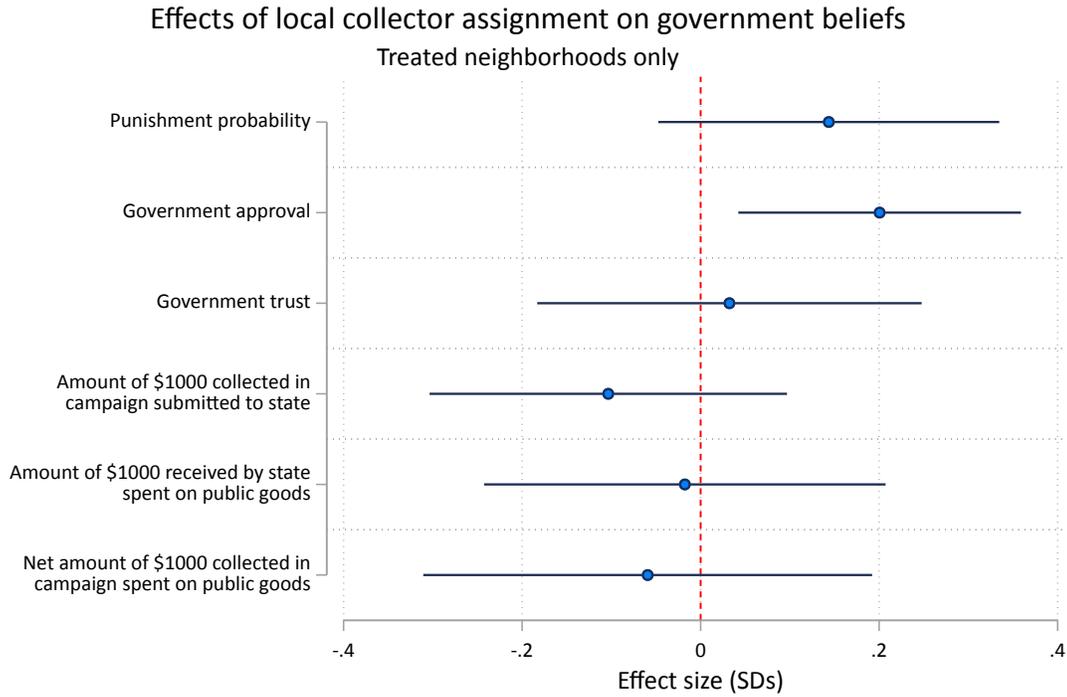


Figure 12: *Effects of the assignment of local collectors on beliefs about the government.*

**Table 9: Effects of assignment of local collector on government approval**

	Government approval		
	(1)	(2)	(3)
Minimum distance	-0.007 (0.016)		
Any collector <500m		0.189** (0.076)	
Number collectors <500m			0.168*** (0.056)
Covariates	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes
Observations	2001	2001	2001
$R^2$	0.034	0.036	0.036
Outcome Mean	0.035	0.035	0.035

Standard errors clustered by polygon. Treated neighborhoods only.

Data: endline survey.

## 8 Conclusion

This paper contributes to the growing literature on the pecuniary and non-pecuniary factors determining tax compliance. Its setting in an environment with effectively zero prior taxation is unique in the extant literature. Moreover, the source of variation it exploits — the random assignment of the 2016 property tax campaign interacted with baseline beliefs — differs from past experimental work, which relies primarily on information treatments mailed to taxpayers. The paper also makes a contribution by uniting estimates of citizen-side and collector-side determinants of compliance in the same setting. Finally, the paper advances knowledge of the impacts of bureaucrats’ social identities on performance by estimating the effect of social distance between tax collectors and households on compliance.

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# 9 Appendix

## 9.1 Baseline beliefs

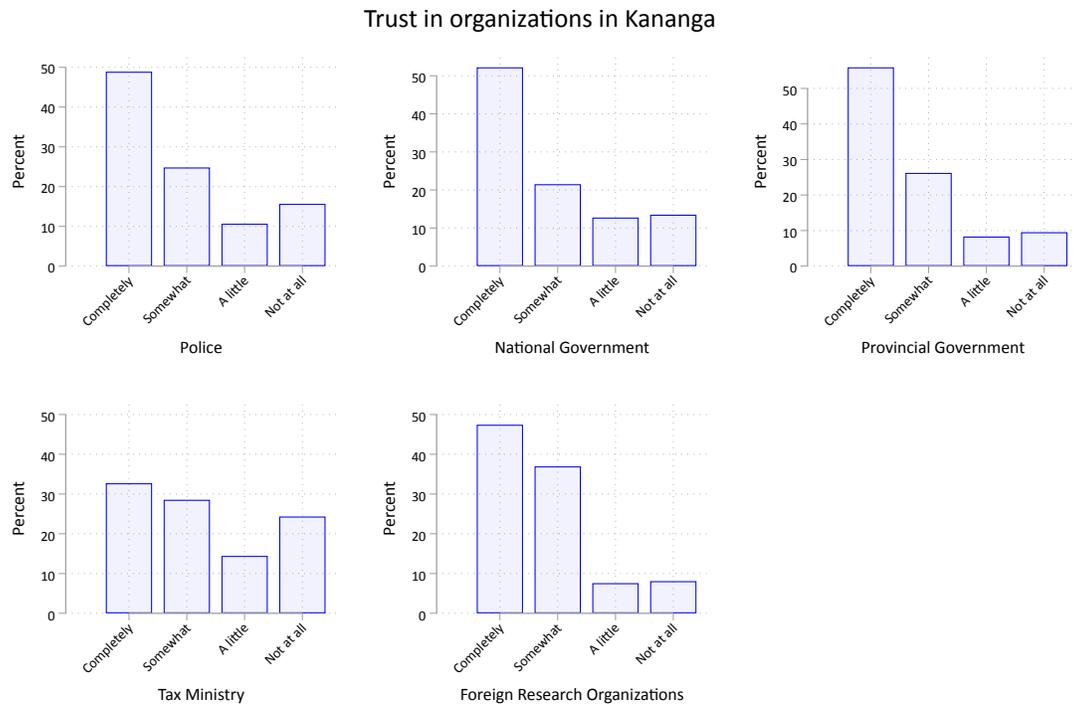


Figure 13: *Baseline trust in government and other organizations.*

### Performance of tax ministry and provincial government

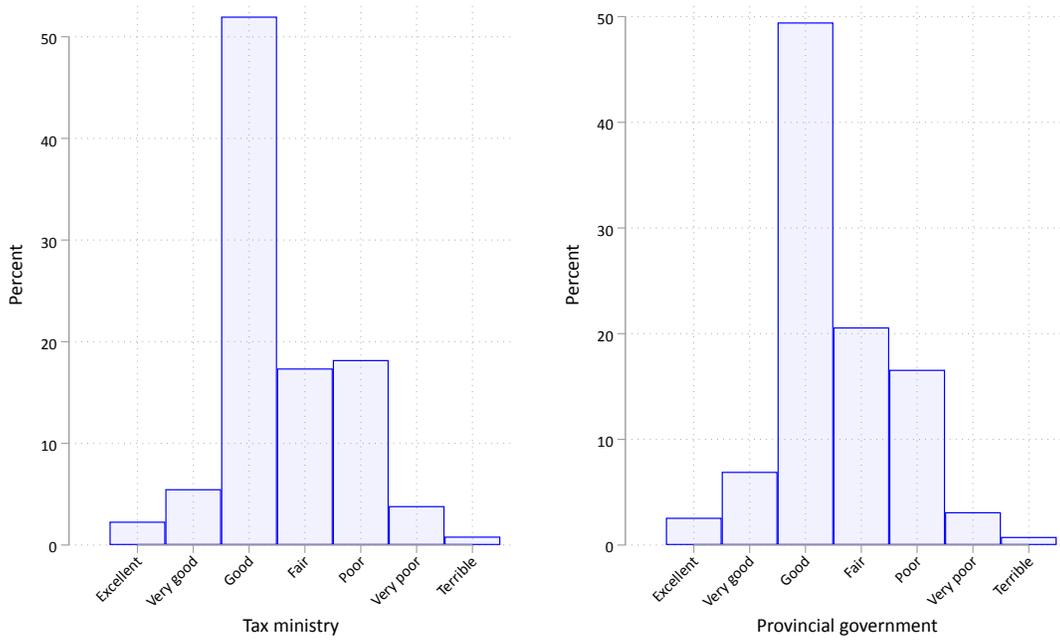


Figure 14: *Baseline approval for tax ministry and provincial government.*

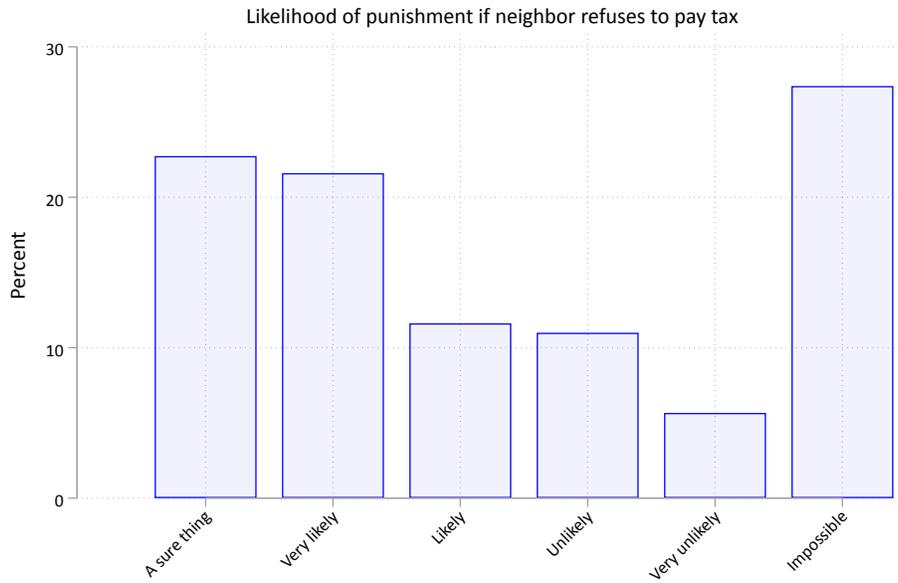


Figure 15: *Baseline views of punishment probability for tax evaders.*

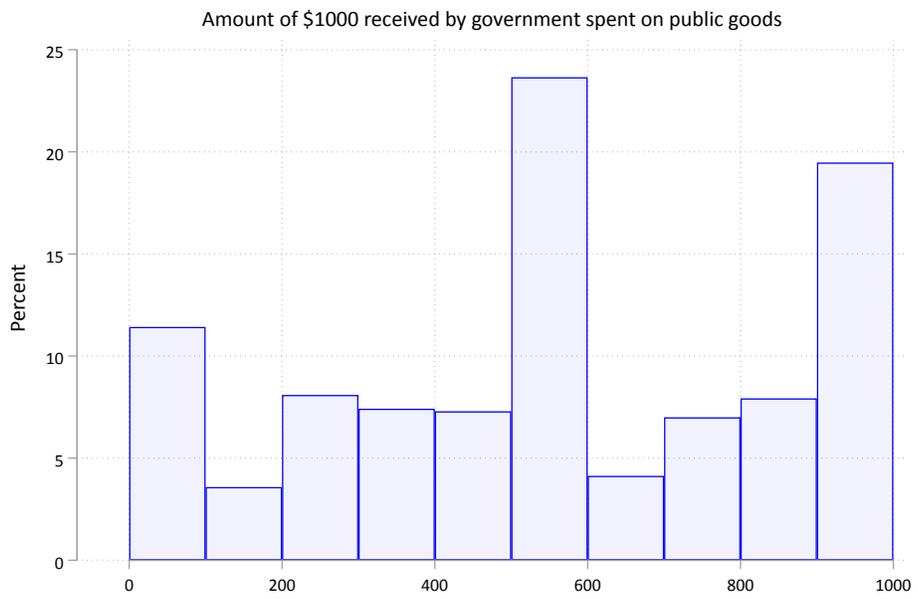


Figure 16: *Baseline perceptions of about how much of \$1000 received by the provincial government will be spent on public goods and not be stolen or wasted.*

## 9.2 The 2016 property tax campaign

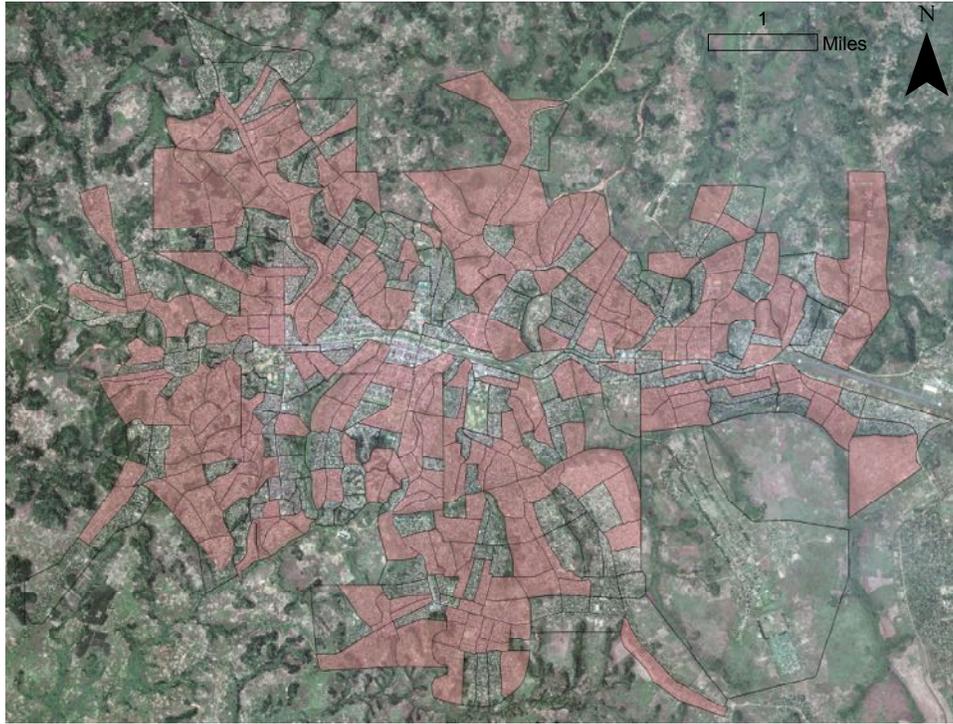


Figure 17: *Defining neighborhoods (the unit of randomization) in Kananga. Treated neighborhoods are shaded red.*

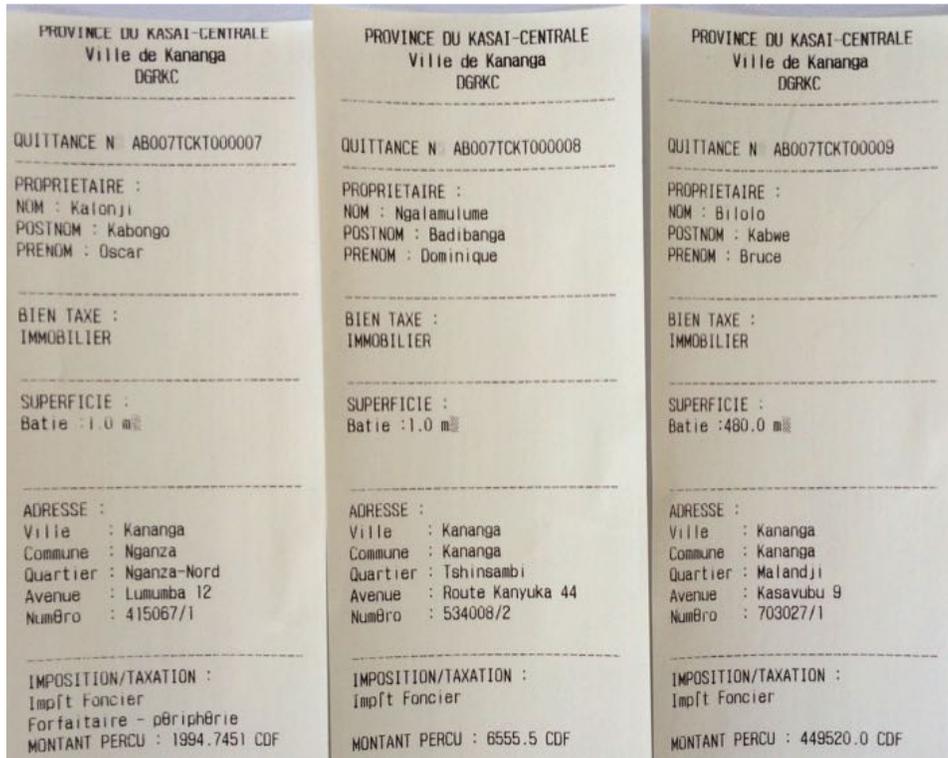


Figure 18: *Example receipts from the 2016 property tax campaign in Kananga.*

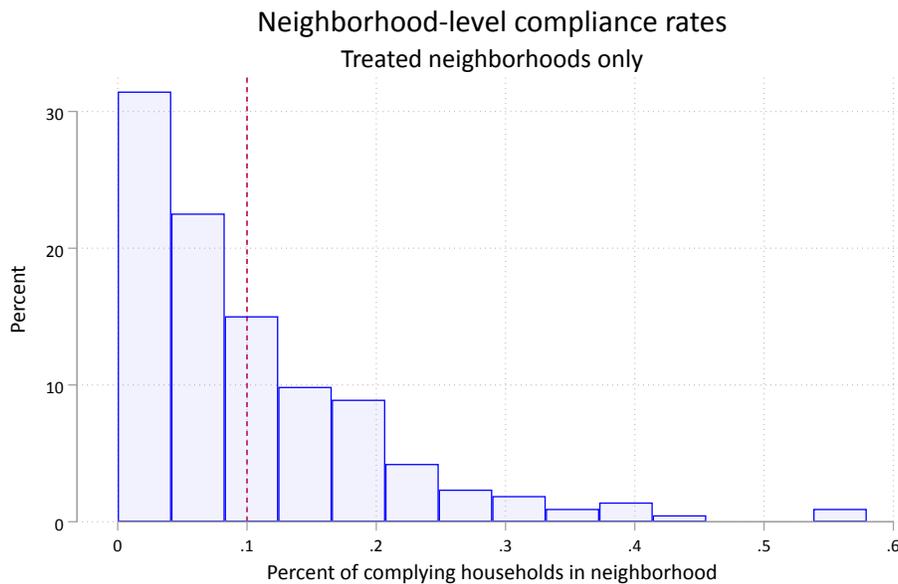


Figure 19: *Histogram of property tax compliance rates by neighborhood, excluding control neighborhoods.*

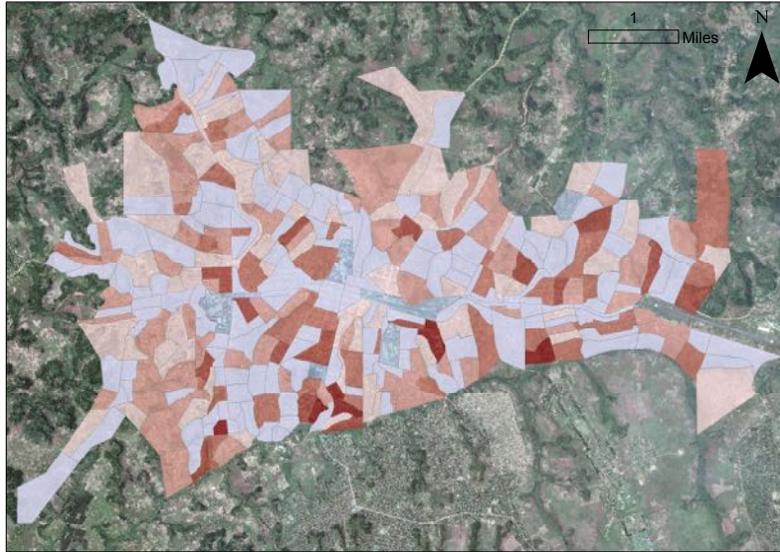


Figure 20: *Property tax compliance rates by neighborhood. Red neighborhoods received the tax program (treatment), with color intensity indicative of the proportion of payers. Blue neighborhoods are the control group.*

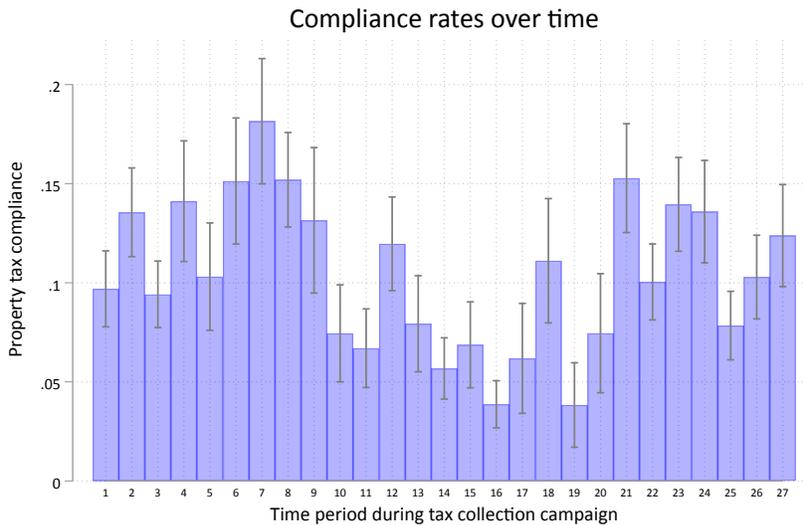


Figure 21: *Property tax compliance rates over time. Neighborhoods were randomly assigned to two-week collection periods during which collectors went door to door conducting the census and collecting the property tax.*

### 9.3 Endline beliefs about compliance

Table 10: Perceived probability of sanctions for evading or bribing collector

	Probability of punishment if neighbor:	
	Evades tax (1)	Bribes collector (2)
Payer	0.148** (0.066)	0.165** (0.069)
Covariates	Yes	Yes
Stratum FE	Yes	Yes
$R^2$	0.066	0.071
Observations	2094	2100
Clusters	215	215
Outcome Mean	2.7	2.8

Standard errors clustered by polygon. Treated neighborhoods only.

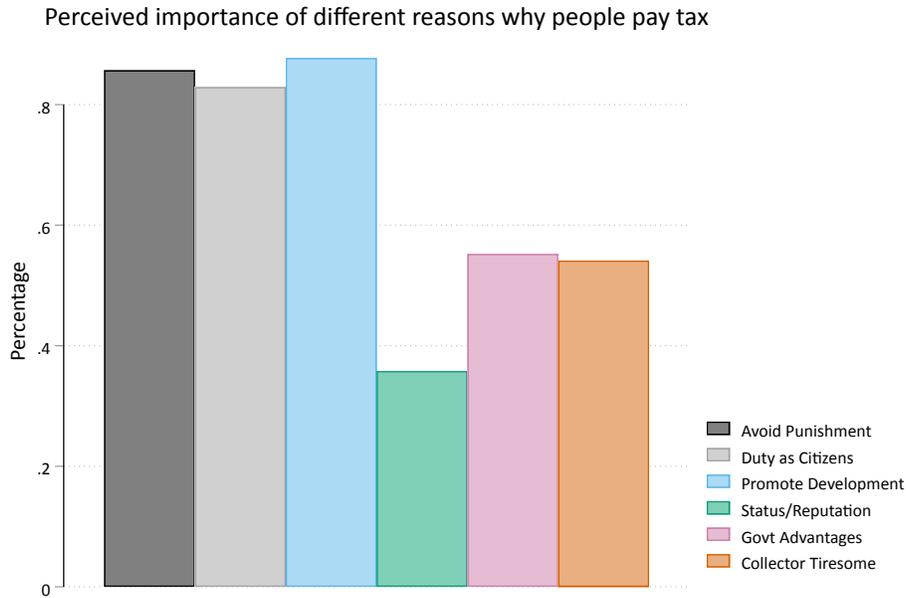


Figure 22: Percentage of respondents who deemed the above reasons ‘very important’ or ‘important’ in explaining why some people pay the property tax.

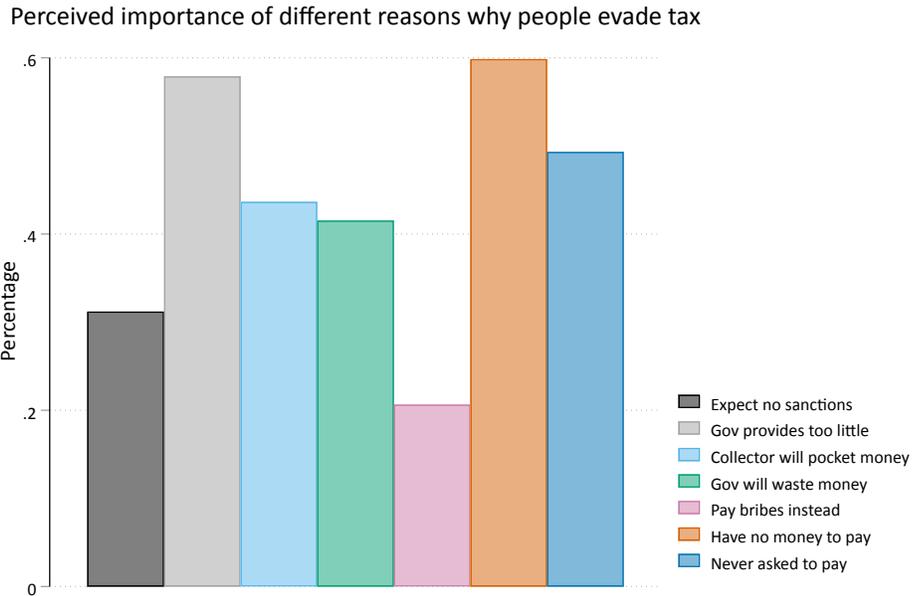


Figure 23: Percentage of respondents who deemed the above reasons ‘very important’ or ‘important’ in explaining why some people evade the property tax.

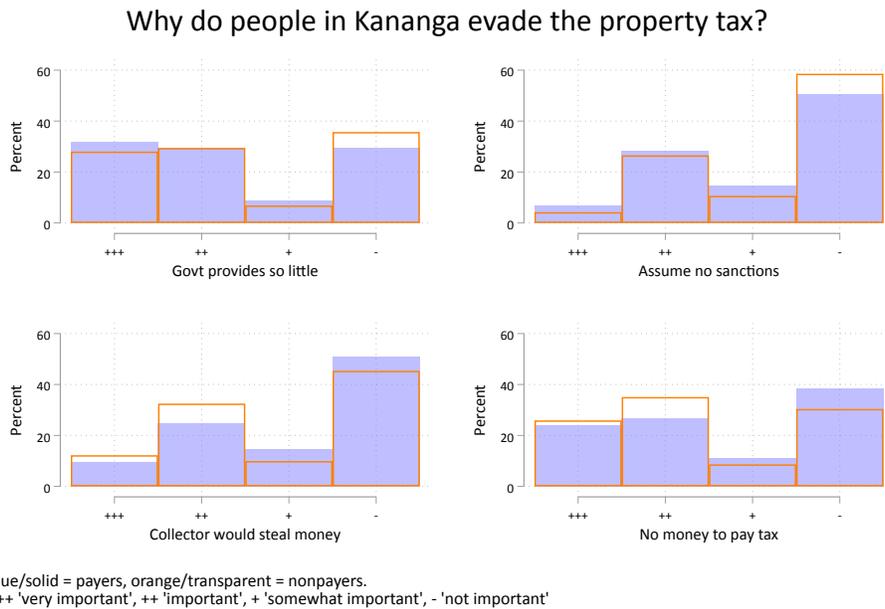


Figure 24: Percentage of respondents who deemed the above reasons ‘very important’ or ‘important’ in explaining why some people evade the property tax.

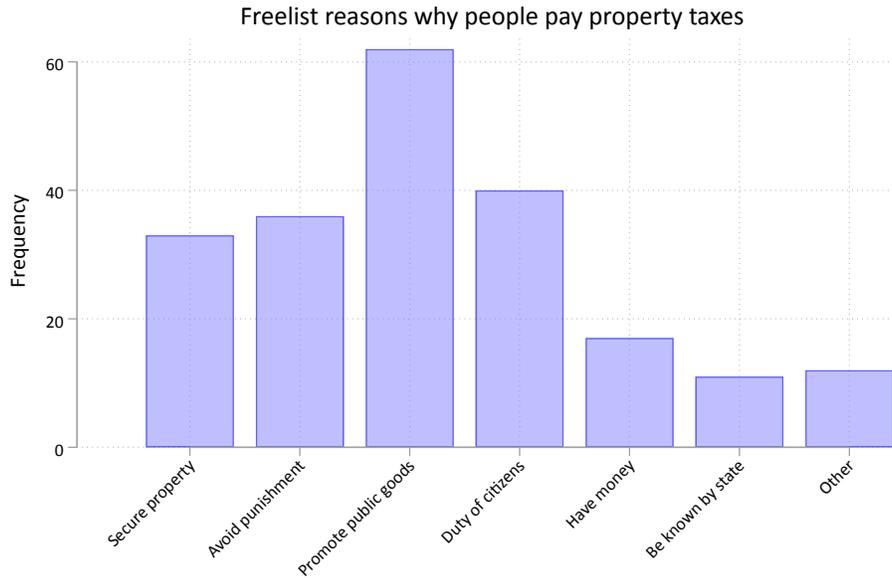


Figure 25: *Frequency of reasons why people pay property taxed when asked in a freelist question about ‘other reasons why the citizens of Kananga pay?’*

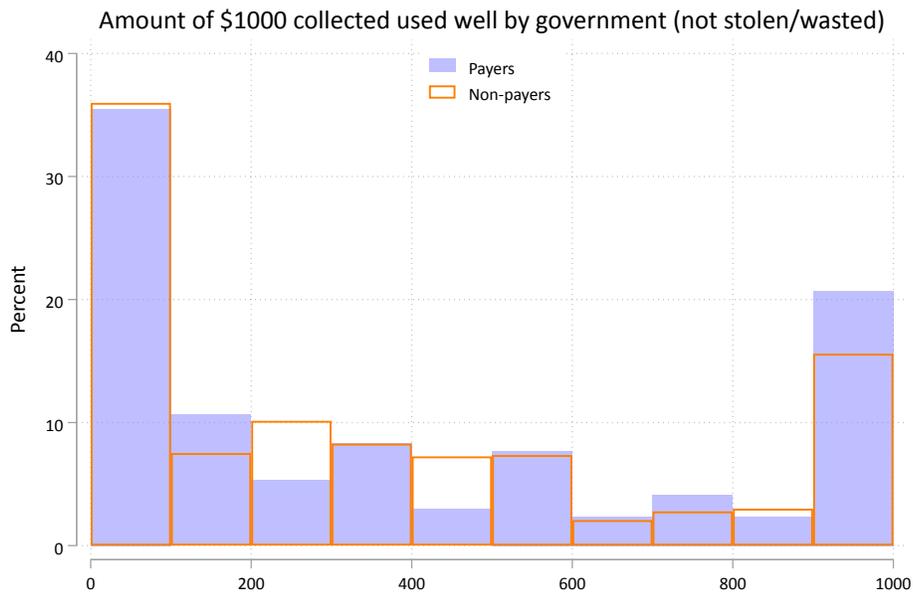


Figure 26: *Endline perceptions of how much of \$1000 collected will be put to good use (rather than waste or theft).*

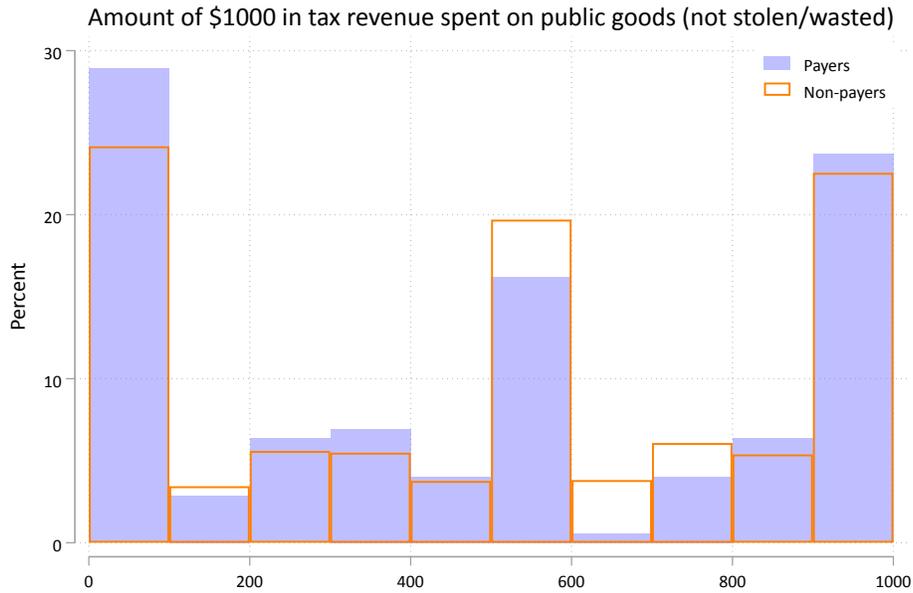


Figure 27: *Endline perceptions of how much of \$1000 submitted to the government will be spent on public goods (rather than wasted or stolen).*

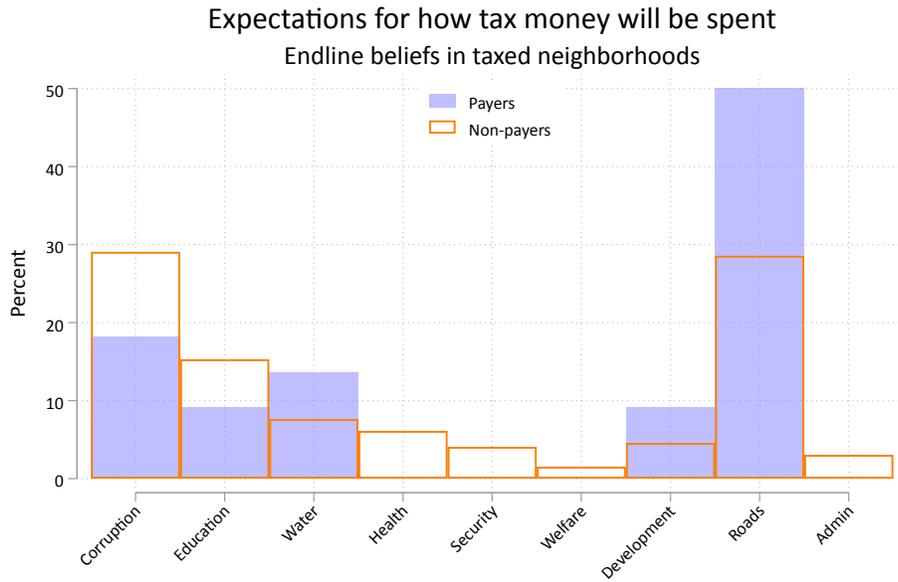
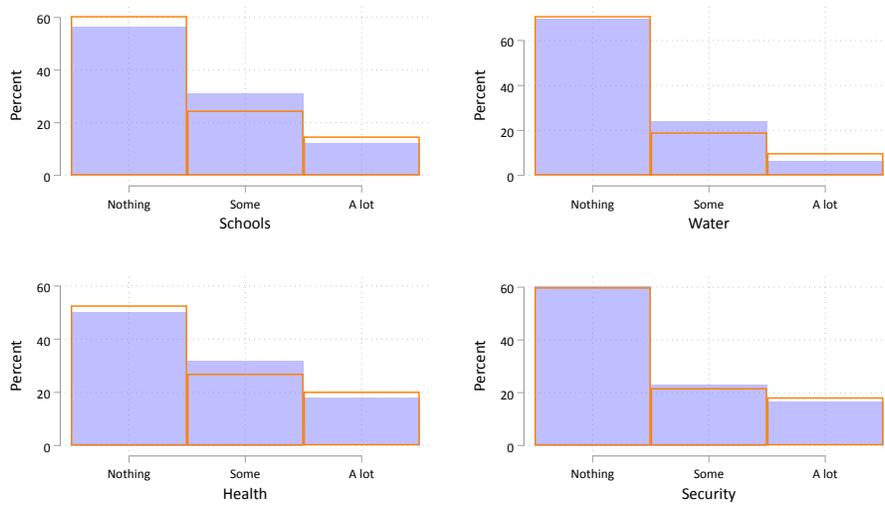


Figure 28: *Expectations for how money raised for the property tax campaign will be spent.*

### Perception of current public goods provided by government



Blue/solid = payers, orange/transparent = nonpayers.

Figure 29: *Endline beliefs about the current level of services provided by the provincial government.*

## 9.4 Heterogeneous effects by baseline individual-level characteristics

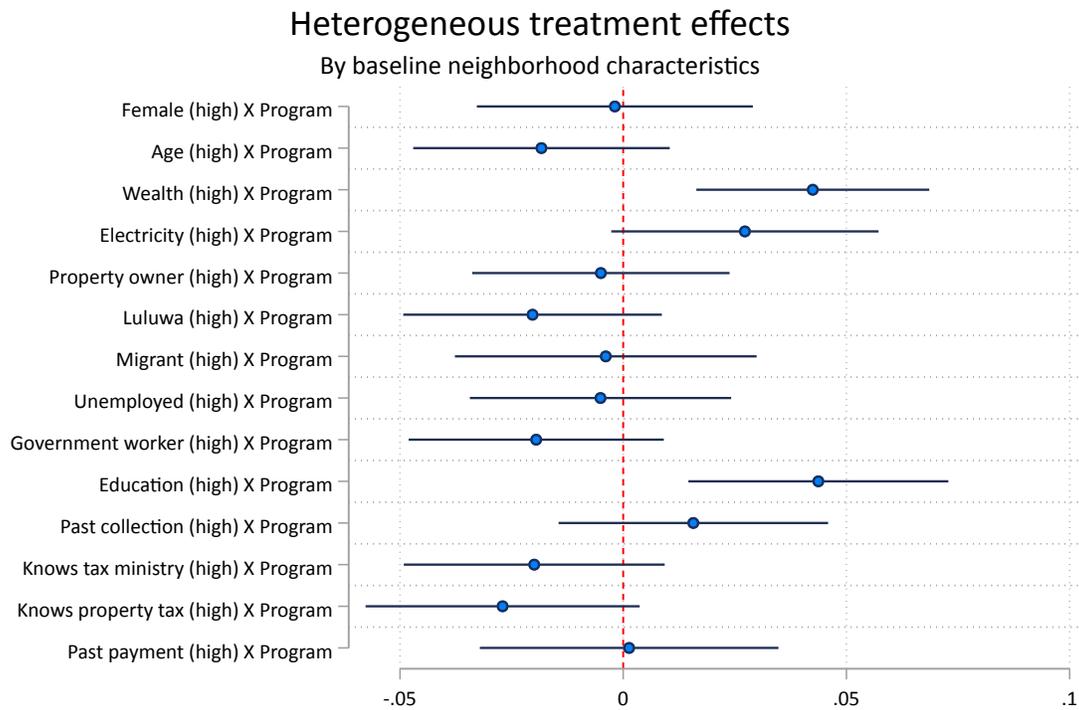


Figure 30: *Heterogeneous effects by baseline characteristics: coefficient plot for interaction terms.*

**Table 11: Heterogeneous effects by baseline characteristics**

	Paid	Paid	Paid	Paid
Program	0.115*** (0.018)	0.107*** (0.025)	0.078*** (0.022)	0.113*** (0.021)
Age (high) X Program		0.016 (0.030)		
Age (high)		0.011 (0.029)		
Income (high) X Program			0.072** (0.033)	
Income (high)			-0.011 (0.014)	
Wealth (high) X Program				0.005 (0.033)
Wealth (high)				0.019* (0.011)
Covariates	Yes	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes	Yes
$R^2$	0.101	0.102	0.110	0.103
Observations	642	642	642	642
Clusters	312	312	312	312
OutcomeMean	0.000	0.000	0.000	0.000

Standard errors clustered by polygon. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Data: baseline survey matched with administrative data on tax compliance.

**Table 12: Heterogeneous effects by baseline education and political activity**

	Paid	Paid	Paid
Program	0.115***	0.070***	0.130***
	(0.018)	(0.020)	(0.022)
Education (high) X Program		0.084**	
		(0.035)	
Education (high)		-0.009	
		(0.015)	
Political activity (high) X Program			-0.049
			(0.031)
Political activity (high)			0.002
			(0.011)
Covariates	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes
$R^2$	0.101	0.113	0.106
Observations	642	642	642
Clusters	312	312	312
OutcomeMean	0.000	0.000	0.000

Standard errors clustered by polygon. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Data: baseline survey matched with administrative data on tax compliance.

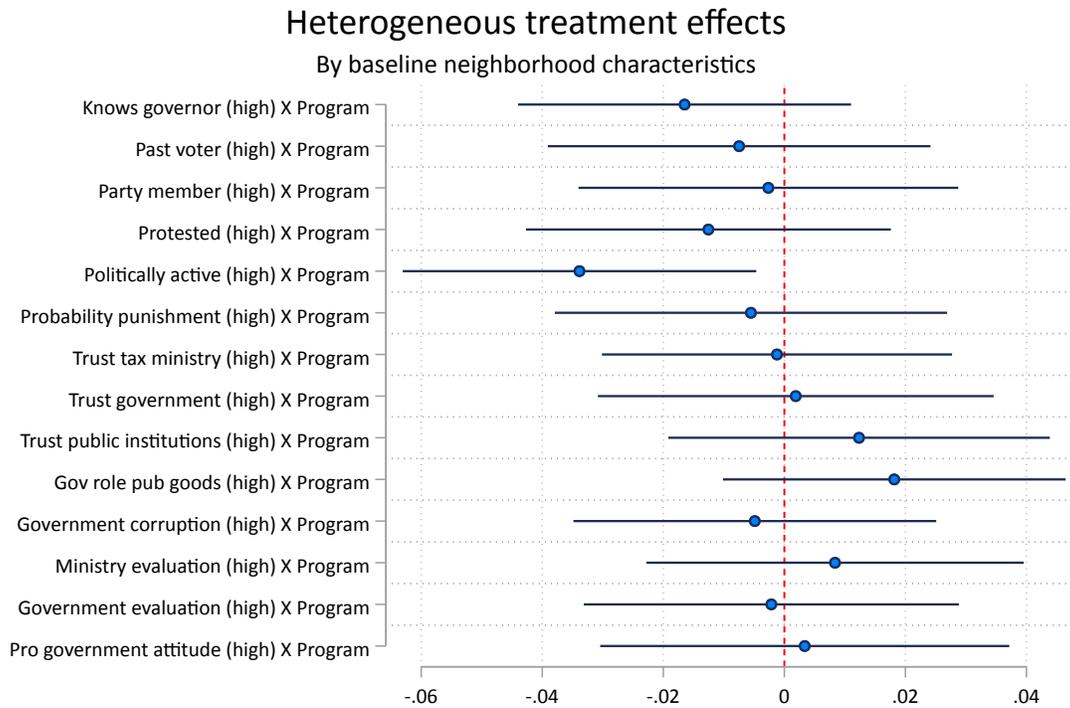


Figure 31: *Heterogeneous effects by baseline characteristics: coefficient plot for interaction terms.*

**Table 13: Heterogeneous effects by baseline beliefs about the state**

	Paid	Paid	Paid	Paid	Paid
Program	0.115*** (0.018)	0.091*** (0.023)	0.083*** (0.018)	0.111*** (0.022)	0.103*** (0.021)
Punishment probability (high) X Program		0.057 (0.037)			
Punishment probability (high)		-0.005 (0.011)			
Government approval (high) X Program			0.113*** (0.043)		
Government approval (high)			-0.014 (0.013)		
Government trust (high) X Program				0.009 (0.034)	
Government trust (high)				-0.001 (0.011)	
Spending expectations (high) X Program					0.031 (0.039)
Spending expectations (high)					-0.005 (0.010)
Covariates	Yes	Yes	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes	Yes	Yes
$R^2$	0.101	0.107	0.120	0.101	0.103
Observations	642	642	642	642	642
Clusters	312	312	312	312	312
OutcomeMean	0.000	0.000	0.000	0.000	0.000

Standard errors clustered by polygon. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Data: baseline survey matched with administrative data on tax compliance.

**Table 14: Heterogeneous effects by baseline wealth indicators**

	Paid	Paid	Paid
Program	0.090*** (0.009)	0.081*** (0.009)	0.082*** (0.008)
Program X Baseline electricity (high)	0.027* (0.015)		
Baseline electricity (high)	-0.005 (0.007)		
Program X Baseline education (high)		0.044*** (0.015)	
Baseline education (high)		-0.011 (0.008)	
Program X Baseline wealth (high)			0.042*** (0.013)
Baseline wealth (high)			-0.007 (0.007)
Stratum FE	Yes	Yes	Yes
$R^2$	0.055	0.057	0.057
Observations	27596	27596	27596
Clusters	360	360	360
ControlMean	0.001	0.001	0.001
Ftest	0.000	0.000	0.000

Standard errors clustered by polygon. \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . p-value of interaction F test shown.

Notes: Polygon level analysis.

**Table 15: Comparing the impact of baseline beliefs on compliance**

	Paid property tax					
	(1)	(2)	(3)	(4)	(5)	(6)
Wealth	0.118 (0.117)	0.115 (0.116)	0.130 (0.116)	0.112 (0.117)	0.121 (0.117)	0.127 (0.117)
Education	0.177* (0.090)	0.172* (0.090)	0.200** (0.091)	0.203** (0.093)	0.177** (0.090)	0.199** (0.092)
Punishment probability		0.089* (0.047)				0.081* (0.047)
Government approval			0.306** (0.136)			0.275* (0.141)
Government trust				0.078 (0.057)		0.015 (0.057)
Spending expectations					0.026 (0.051)	0.001 (0.051)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	416	416	416	416	414	414
Clusters	192	192	192	192	192	192
$R^2$	0.108	0.117	0.123	0.113	0.109	0.131
Change in $R^2$		0.009	0.015	0.005	0.001	0.023

Standard errors clustered by polygon. Treated neighborhoods only.

Data: baseline survey merged with administrative data on tax compliance.

## 9.5 Effects of the program on beliefs

**Table 16: Effects of the tax campaign on beliefs about the government**

	Punishment probability (1)	Government approval (2)	Government trust (3)
Program	0.029 (0.041)	0.087** (0.040)	0.040 (0.049)
Covariates	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes
$R^2$	0.037	0.039	0.073
Observations	3513	3414	3468
Clusters	360	360	360
Outcome Mean	-.0089	-.059	-.045

Standard errors clustered by polygon.

Data: endline survey.

**Table 17: Effects of the tax campaign on beliefs about the government spending**

	Amount of \$1000 collected in campaign submitted to state (1)	Amount of \$1000 received by state spent on public goods (2)	Net amount of \$1000 collected in campaign spent on public goods (3)
Program	59.273*** (13.944)	26.437 (16.753)	40.488** (15.666)
Covariates	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes
$R^2$	0.043	0.056	0.052
Observations	3395	3436	3384
Clusters	360	360	360
Outcome Mean	555	438	300

Standard errors clustered by polygon.

Data: endline survey.

**Table 18: Effects of technology of collector and government legitimacy**

	Punishment probability (1)	Government approval (2)	Government trust (3)
Saw collector with technologies	0.052 (0.052)	0.205*** (0.047)	0.100* (0.056)
Covariates	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes
$R^2$	0.086	0.063	0.099
Observations	1376	1298	1309
Clusters	211	210	210
Outcome Mean	.006	.041	.031

Standard errors clustered by polygon. Treated neighborhoods only.

Data: Endline survey matched with administrative data on compliance. All dependent variables are standardized to mean zero and unit standard deviation. The ‘outcome mean’ is the average of each variable in the treatment group, which is the sample used for these estimations. The nonzero average in the treatment group is a reflection of the higher approval and trust levels in the treatment group relative to the control group.

**Table 19: Effects of technology of collector and government legitimacy**

	Amount of \$1000 collected in campaign submitted to state (1)	Amount of \$1000 received by state spent on public goods (2)	Net amount of \$1000 collected in campaign spent on public goods (3)
Saw collector with technologies	84.341*** (17.423)	37.041* (21.216)	73.515*** (21.217)
Covariates	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes
$R^2$	0.080	0.072	0.074
Observations	1282	1303	1280
Clusters	209	209	209
Outcome Mean	.6	.61	.6

Standard errors clustered by polygon. Treated neighborhoods only.

Data: Endline survey matched with administrative data on compliance.

## 9.6 Collector-level analysis

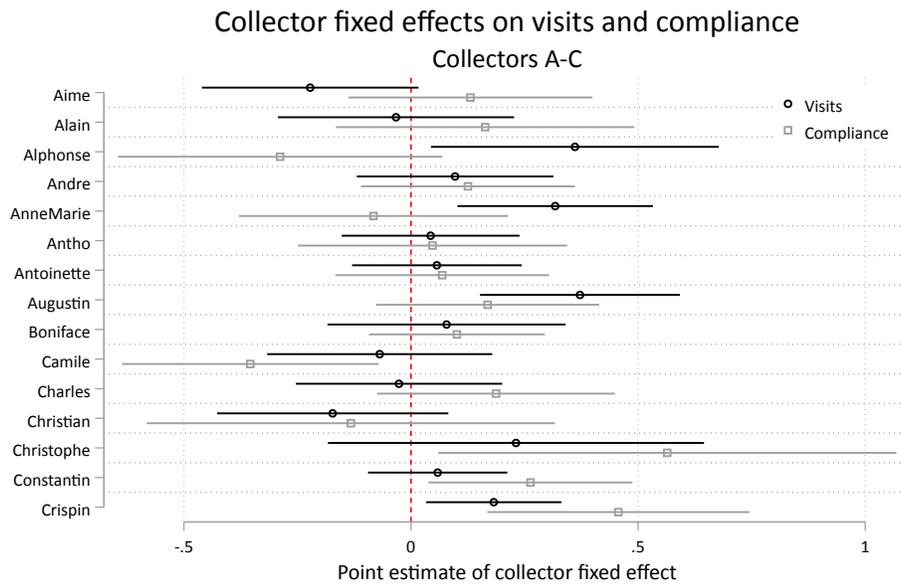


Figure 32: *Collector fixed effects on compliance rates and visits (collectors A-C).*

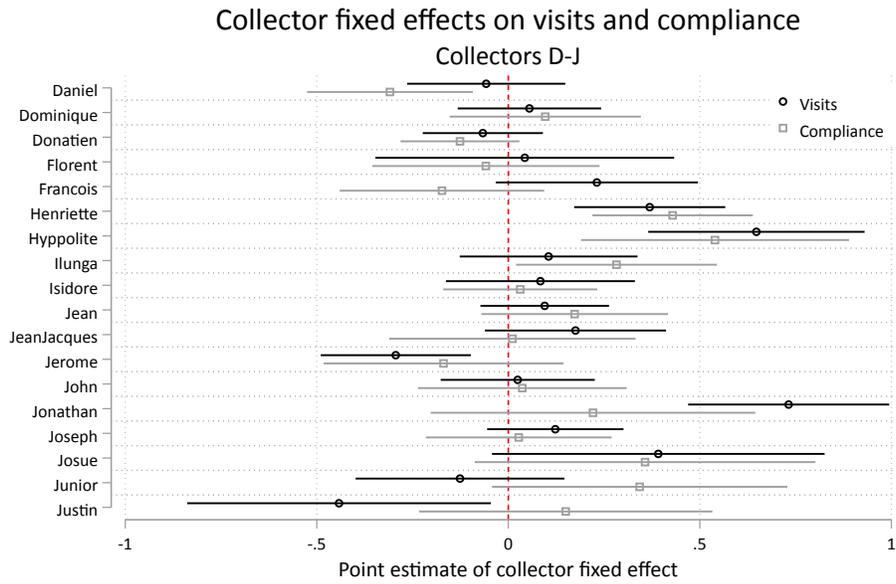


Figure 33: *Collector fixed effects on compliance rates and visits (collectors D-J).*

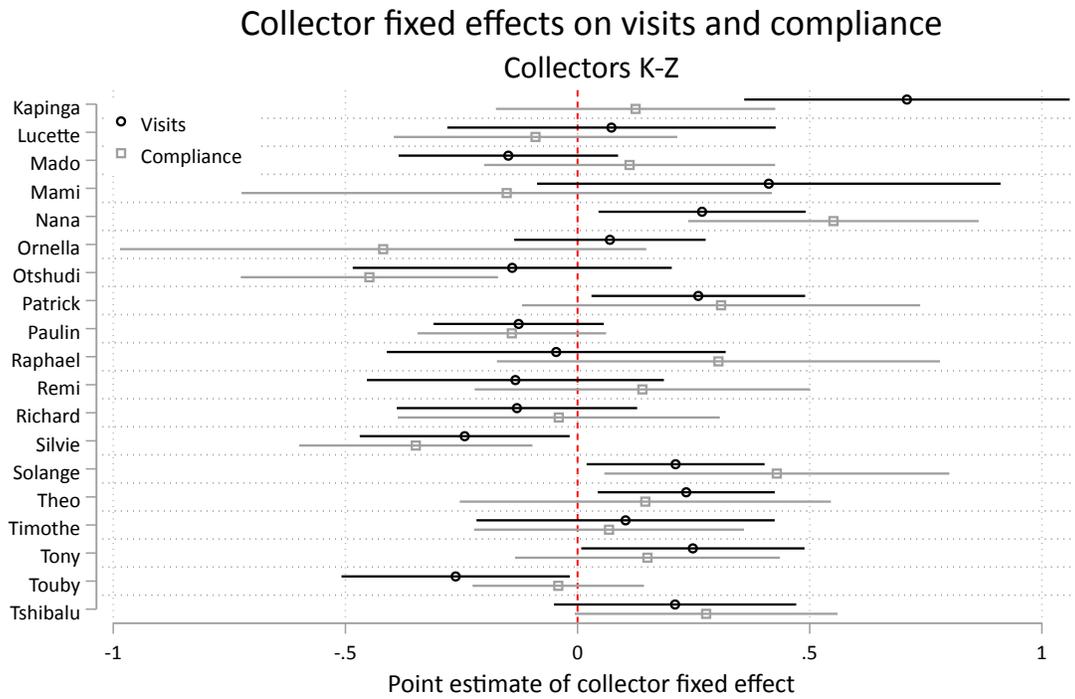


Figure 34: *Collector fixed effects on compliance rates and visits (collectors K-Z).*

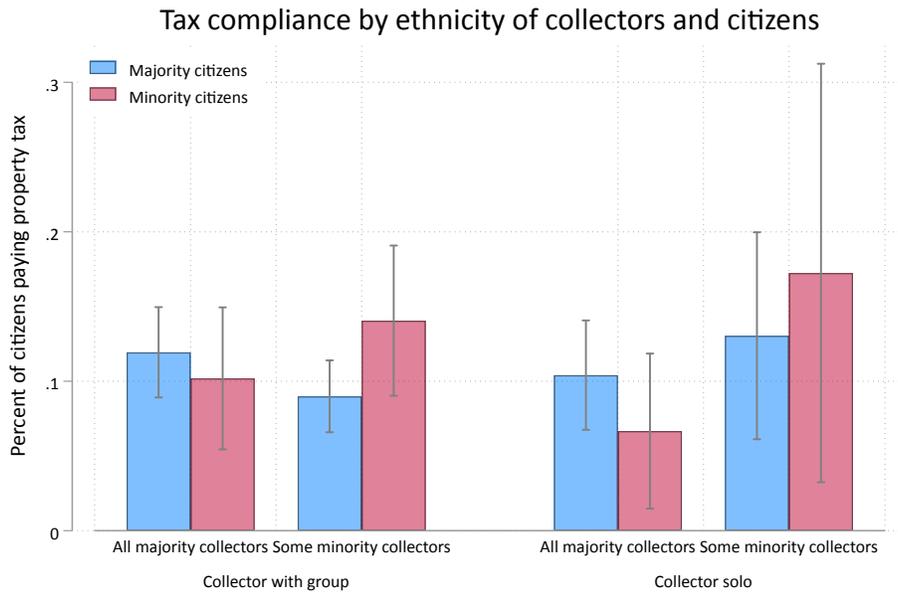


Figure 35: *Property tax compliance rates by ethnicity of citizens and of randomly assigned collector groups.*

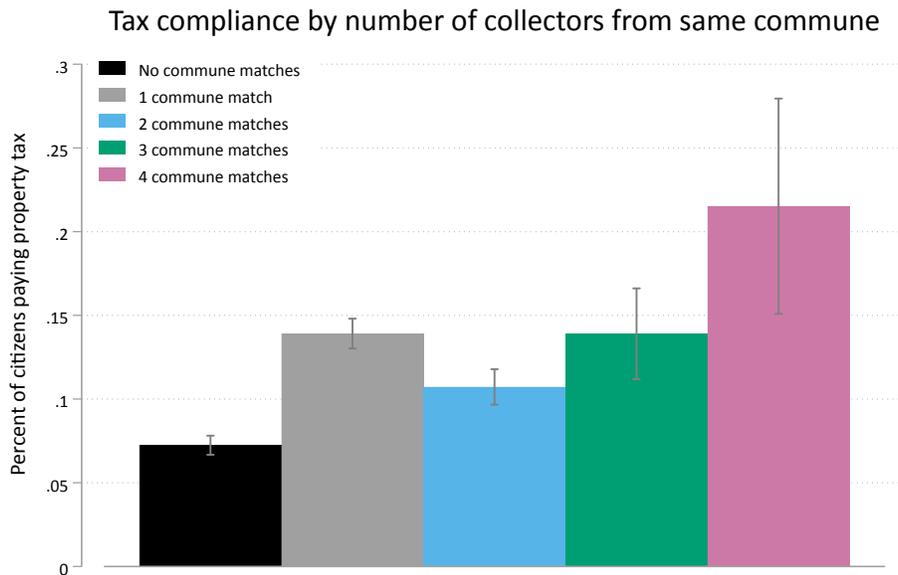


Figure 36: *Property tax compliance rates by number of collector-commune matches.*

**Table 20: Minority ethnicity and endline beliefs about the government**

	Punishment probability (1)	Government approval (2)	Government trust (3)	Amount of \$1000 collected deposited (4)	Amount of \$1000 deposit to public goods (5)
Co-minority	-0.007 (0.100)	0.067 (0.102)	-0.021 (0.103)	0.144 (0.109)	0.068 (0.107)
Minority ethnic collector	-0.047 (0.083)	-0.054 (0.062)	0.004 (0.096)	-0.077 (0.080)	-0.065 (0.089)
Minority ethnic citizen	0.034 (0.058)	0.186*** (0.066)	0.036 (0.068)	-0.168** (0.069)	-0.007 (0.064)
Covariates	Yes	Yes	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes	Yes	Yes
Collector FE	Yes	Yes	Yes	Yes	Yes
Observations	2077	1965	1988	1953	1978
$R^2$	0.115	0.078	0.114	0.065	0.091
Outcome Mean	0.013	0.039	0.029	0.077	0.039

Standard errors clustered by polygon. Treated neighborhoods only.

Data: endline survey.

**Table 21: Tax collectors in their own areas (endline survey)**

	Paid	Paid	Paid
Minimum distance	-0.010** (0.005)		
Any collector <500m		0.042 (0.035)	
Number collectors <500m			0.048* (0.027)
Covariates	Yes	Yes	Yes
Stratum FE	Yes	Yes	Yes
Commune FE	Yes	Yes	Yes
Observations	2133	2133	2133
$R^2$	0.061	0.059	0.060
OutcomeMean	0.106	0.106	0.106

Standard errors clustered by polygon.

Notes: