

Building State and Citizen: A Property Tax RCT in the D.R. Congo

Pre-Analysis Plan

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1 Summary

This pre-analysis plan (PAP) outlines a randomized evaluation of the first citywide property tax campaign led by the Provincial Government in Kananga, Democratic Republic of Congo (DRC). The primary intervention randomly assigns certain neighborhoods to receive the door-to-door tax collection program, aided by tablet computers and handheld receipt printers. Because collecting taxes on the ground also creates new opportunities for corruption, two cross-randomized interventions are used to study how to limit bribe taking. First, a collector monitoring ('audit') intervention is randomly assigned among neighborhoods that receive the program. Second, a citizen-level information intervention is randomly assigned among all neighborhoods in the city.

There are four broad strands of the analysis: (1) the effect of the tax program on citizens'

*Part 6 (page 61) was updated and re-published on March 1, 2017, the second day of enumeration of the tax collector survey, a side project described toward the end of the pre-analysis plan. Note that nothing outside of Part 6 ("Topic 3") has been modified since the original submission.

beliefs about the government and their efforts to hold it accountable; (2) the effects of the top-down audit intervention and the bottom-up information intervention on bribe taking associated with the program; (3) the determinants of productivity, honesty, and effort among state agents in the field; and (4) the citizen-side determinants of tax compliance in poor urban settings. These four topics could each become independent papers, though there will be a certain degree of overlap in the setup of the analysis. For example, the corruption interventions will chiefly be used in (1) to identify separately the effect of paying bribes from paying taxes, while in (2) these are the treatments of interest and will be studied or their ability to reduce bribe taking in the field. This PAP will first describe the experimental design, then it will discuss the intended analysis for each of these four topics in turn.

Tax collection started in April 2016 and concluded in December 2016. An endline survey will be administered in January-March, 2017. This PAP was published after a four-day pilot of the endline survey before the start of endline data collection.

2 Overview of tax program and interventions

The primary intervention is the on-the-ground tax collection program itself. Collectors go door to door in groups of three collecting taxes in treated neighborhoods using tablets and handheld receipt printers. In contrast, tax collection in control neighborhoods functions according to the old system: citizens are supposed to themselves go to the bank to pay taxes. However, paying the property tax (and other taxes) is seldom enforced among private individuals. This system in control neighborhoods is how all tax collection occurred in Kananga prior to 2016. The result was near-zero property tax compliance among private citizens, and near-zero enforcement of the law by the government. The new program will randomly raise the probability that households pay property taxes in treated neighborhoods.¹ This variation in taxes paid will be used to test the hypothesis that making citizens pay taxes

¹Note that the study exploits the randomized roll-out of the tax program. In the next phase of the program, the government plans to send tax collectors to control neighborhoods, too.

will increase their expectations about what the government should provide and their efforts to hold it accountable.

Even as the property tax campaign increases the probability that households pay taxes, it might also increase the probability that they pay bribes. This study therefore includes two additional interventions targeting corruption. First, there is a fairly standard government audit treatment. In half of the neighborhoods that receive the the program, quarterly reports from surveys conducted by independent enumerators are shared with tax ministry leadership. These reports compare official program data to households' self reports to estimate if money is missing from each selected neighborhood. The tax ministry publicly pledged to sanction collectors found to be pocketing money during the campaign. The fear of such sanctions should increase honesty in audited polygons if these threats are credible. Independent enumerators will also collect information in non-audited, treated polygons and in control polygons. But they will not transmit this information to the government.

Second, a citizen-level information treatment is also cross-randomized in all polygons. During administration of a short baseline survey before tax collection began, enumerators handed out fliers in French (spoken by everyone with some schooling) and Tshiluba (the most widely spoken local language) to every fifth house in the city. There were two versions of this flier. The control flier (Figure 1) announced that tax collectors would be starting this campaign in the coming months to help boost revenues for the government's development policies. The treatment flier (Figure 2) contained the same information plus (1) the tax rate that households face, and (2) a photograph of the type of printed receipt households should receive upon payment under the new program. In addition to handing out the fliers, enumerators randomly selected 2,384 houses to conduct short baseline surveys, during which they read the flier aloud to participants. This read-out version of the intervention will be analyzed separately, as it will likely have stronger effects than simply assignment to a polygon with a given flier.

Half of all polygons (taxed and non-taxed) were selected to receive the flier with more

information. Such information should limit the ability of collectors to take advantage of the information asymmetry associated with the roll out of a property campaign for the first time. If a collector claims that a citizen owes 2τ , the citizen will detect the lie and may demand the true rate. Moreover, simultaneously intervening on the citizen-side and the collector-side in a tax-collection transaction creates an opportunity to test for complementarities between these approaches to reduce corruption.

NOTICE

Please take note of the following information:

- The DGRKOC collectors will start to collect property and rental taxes this year. They might come to your household for this reason in the following months.
- The money that they collect will support the efforts of the provincial government to secure the province, to kickstart economic development, and to protect the well being of the population of Kasai Central.
- If you have any questions or complaints, please contact 0827316243 or 0974982998. These are the telephone lines of Harvard-RDC, an independent NGO of scientific researchers who will transmit your messages to the leaders of the DGRKOC and to the governor. They will keep your identity confidential.

Figure 1: Control flier for information intervention.

Table 2 summarizes the three main interventions (the on-the-ground tax program, audits, and informational fliers).

The unit of randomization, the ‘neighborhood’, was defined by dividing a satellite map of the city into 431 polygons according to boundaries like roads, ravines, or other natural

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Please take note of the following information:

- The DGRKOC collectors will start to collect property and rental taxes this year. They might come to your household for this reason in the following months.
- The amount due for the property tax is 2,000 CF, unless you live in a large house or a multi-storied house. The property tax should be paid only one time per year.
- The amount due for the rental tax is 20% of monthly rent, retained at the source. The rental tax should be paid each month.
- The DGRKOC tax collectors should give you a receipt printed by a portable printer in front of you. See the example to the right. You have the right to ask for such a receipt to avoid paying two times.
- The money that they collect will support the efforts of the provincial government to secure the province, to kickstart economic development, and to protect the well being of the population of Kasai Central.
- If you have any questions or complaints, please contact 0827316243 or 0974982998. These are the telephone lines of Harvard-RDC, an independent NGO of scientific researchers who will transmit your messages to the leaders of the DGRKOC and to the governor. They will keep your identity confidential.

EXAMPLE RECEIPT

PROVINCE DE KASAI CENTRAL	
Ville de Kananga	
DGRKOC	

QUITTANCE N 001TCK1000001	

PROPRIETAIRE :	
NOM :	Mutombo
POSTNOM :	Dikembe
PRENOM :	Jean-Jacques

BIEN TAXE :	
IMMOBLIER	

SUPERFICIE:	
Batie:	20m ²
Non batie:	10m ²

ADRESSE:	
Ville	: Kananga
Commune	: Kananga
Quartier	: Malanji
Avenue	: Goma

IMPOSITION/TAXATION:	
Impôt Foncier	
Forfait	
MONTANT PERCU: 2.000 FC	

Designed by Hologram (HIDS)	

Figure 2: Treatment flier for information intervention.

features that would be easily identifiable from the ground. Among these 431 polygons, 253 were selected randomly to receive the tax program (see Figure 3). The audit and information treatments were also randomly assigned on the polygon level.

Using baseline data, we can test for balance for all three interventions: the tax program, the audit intervention, and the information intervention. The subsequent tables first consider socioeconomic variables: (1) education of the respondent measured in years, (2) whether the household has any source of electricity, (3) whether the household rents or owns, (4) the quality of the house based on the quality of the roof and floor, (5) the number of adults in the household, and (6) whether the respondent migrated to Kananga or was born there. Then, the balance tables consider political variables: (1) confidence in the provincial

	Program		
	Audit	No Audit	Control
Info	65	62	88
No Info	60	66	90

Table 1: Polygons (clusters) in each treatment cell

government, (2) expectations of what the provincial government should provide (the sum of whether the respondent indicated the provincial government as the provider of infrastructure, education, water, health care, poverty reduction, economic development, and security), (3) a 1-5 assessment of the provincial government, (4) whether the individual has ever paid property taxes in the past, (5) whether the individual voted in the 2011 election, and (6) whether the individual belongs to a political party.

Balance over socioeconomic variables: Tax program:

	Education	Electricity	Renter	House_quality	HH_size	Migrant
Program	-0.326	-0.019	-0.007	-0.005	-0.063	0.026
	(0.185)	(0.017)	(0.020)	(0.022)	(0.089)	(0.019)

Balance over political variables: Tax program:

	Confidence	Expectation	Evaluation	Taxed	Vote2011	Pol_Party
Program	-0.045	-0.076	0.015	0.024	0.046*	-0.016
	(0.046)	(0.081)	(0.059)	(0.022)	(0.020)	(0.020)

Balance over socioeconomic variables: Audit Treatment:

	Education	Electricity	Renter	House_quality	HH_size	Migrant
Audit	0.123	0.017	0.013	0.043	0.040	-0.061*
	(0.259)	(0.023)	(0.027)	(0.027)	(0.128)	(0.025)

Balance over political variables: Audit Treatment:

	Confidence	Expectation	Evaluation	Taxed	Vote2011	Pol_Party
Audit	0.057	0.032	-0.058	-0.040	-0.015	0.011
	(0.058)	(0.111)	(0.079)	(0.029)	(0.025)	(0.024)

Balance over socioeconomic variables: Information Treatment:

	Education	Electricity	Renter	House_quality	HH_size	Migrant
Info	0.035	-0.015	0.020	0.025	-0.083	-0.008
	(0.189)	(0.017)	(0.020)	(0.021)	(0.091)	(0.019)

Balance over political variables: Information Treatment:

	Confidence	Expectation	Evaluation	Taxed	Vote2011	Pol_Party
Info	-0.024	0.063	0.012	-0.022	-0.009	0.006
	(0.045)	(0.082)	(0.059)	(0.022)	(0.019)	(0.019)

2.1 Tax campaign details

Before collecting taxes, collectors complete an initial census visit, which serves two purposes. First, during this visit, tax collectors map out the assigned polygons, assisted by members of the research team who have received cartography and GPS training and make sure the collectors do not stray beyond polygon boundaries. Collectors assign a unique code to each house in the polygon, written in chalk on the wall or door. These codes enable collectors to return to the polygon alone but knowing clearly the boundaries of the polygons based on the codes (all of which begin with the three digits of the polygon). These codes will also be printed on receipts, enabling us to match household data collected subsequently with official program data. Second, also during this first visit, the tax collectors complete a short censusing survey that asks households if they are renters or property owners, if they are exempt from paying taxes, and a few other similar questions. This information will then be printed for collectors so they know which households should pay property taxes in the polygon before they begin collection.

The 59 tax collectors working on this campaign were randomly assigned to polygons in groups of 3. Each collector works in 10-20 randomly assigned polygons throughout the city. Among the 59 collectors, 26 were full-time employees of the tax ministry, and the remaining 33 were interns taken on to work on this program. This differential job security status with

the tax ministry will be exploited as an instrument in the subsequent analysis because the interns are likely to be more worried about being caught taking bribes than the full-time workers.

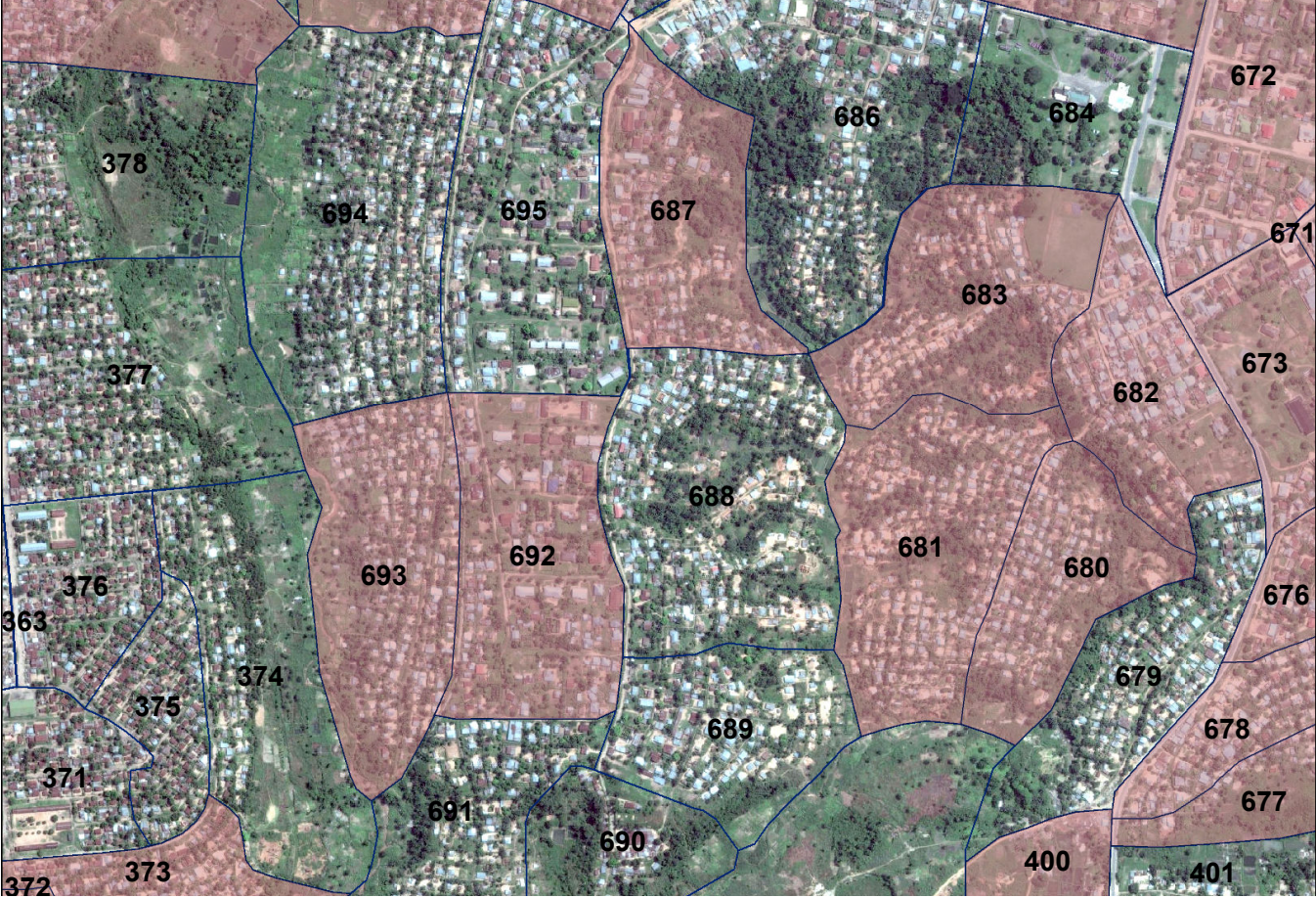


Figure 3: Treated Polygons in Kananga

Upon completion of the census surveys in a treated polygon, tax collectors begin collection. They have about ten work days to complete each polygon before they are supposed to move to the next one on their assignment sheets. The 10-day window was determined by the constraint of finishing all 253 polygons in 2016, as desired by the government. However, collectors are always free to return to an older polygon to attend to appointments made with households if they arrange this with their partners in the current polygon.

When an individual pays the tax, collectors use a tablet application to generate a receipt,

which they print on portable printers. See Figure 4 for several receipt examples. Collectors leave the receipt with the taxpayer, with a second copy saved in the tablet’s memory. Collectors then deposit the money at the bank, where the tablet data is downloaded, enabling the program supervisors to check if the amount deposited equals the amounts on all receipts issued.

Over 90% of the population faces a flat annual property tax rate of 2,000 Congolese Francs (CF), about \$2. Larger houses in the center city built with materials other than mud bricks face a flat rate of 6,600 CF. Finally, ‘villas’ must be measured, and their owners typically are supposed to pay more than 25,000 CF. Rental taxes—20% of monthly rent, deducted before this payment is made from tenant to landlord such that the burden of payment falls on the landlord—are also technically part of the on-the-ground campaign. However, because most individual renters have informal contracts and may pay rent in kind, this tax is not often enforced among private citizens. Indeed, rental taxes account for less than 5% of total receipts from the program.² Furthermore, liability for the rental tax is a source of contention in Kananga. By law, the landlord should bear the cost of the tax through the 20% deduction in monthly rent. However, landlords are often reported to disrespect this rule and impose the burden of the tax on the renter. Given this ambiguity about who ultimately bears the cost of the tax, and the fact that this tax is seldom enforced among private citizens, this project focuses on the property tax, which was the focus of the campaign since the beginning.³

To incentivize tax collectors to follow the procedures of this campaign (e.g. respect the boundaries of polygons), a performance-based bonus is paid out at the start of each week. Collectors receive small compensation based on the amount of taxes they collect (18% of total bank deposits), the number of houses at which they have completed the census visit, and the percentage of houses they revisit during tax collection. Additionally, 40% of non-exempt property owners in each taxed polygon were randomly sampled after the census visit

²Commercial renters are not part of the campaign; they are a large source of revenue for the tax ministry.

³Another reason that rental taxes were poorly attended to is that the tablet application created by Hologram could not print receipts for the rental tax for the first few months of the campaign.

to be eligible for a double bonus.⁴ That is, collectors receive 36% of the money they collect from these randomly chosen households, instead of 18% for other households. This double bonus was created to (i) create another level of random variation in the likelihood that households pay taxes and not bribes,⁵ and (ii) encourage tax collectors to work everywhere in the polygon, even the harder-to-reach areas. The average weekly bonus is about 4,500 CF, though more productive collectors earn more than 10,000 CF.

During the campaign, enumerators conduct ‘monitoring’ surveys among randomly sampled households in treatment and control polygons. For treated polygons, enumerators wait until at least two weeks after a collector has finished work. These surveys have two goals. First, they verify the work of tax collectors. For example, the questionnaire asks about the number of visits by tax collectors, the amount paid (if anything), and whether a receipt was issued. Selected results from these surveys will be reported to the tax ministry in audited polygons. Second, some individuals are randomly chosen for a slightly longer survey about trust in and expectations of the government to enable analysis of changes in these variables over time as the program is rolled out. Upon publication of this PAP, the author is blind to treatment in the dataset that contains these variables. After the first version is published, the author will examine some of these variables to inform endline survey development. A revised PAP will be published alongside the original following this preliminary analysis. This longer version of the monitoring survey includes a wealth module that will be used to identify which types of individuals are targeted by tax collectors, and which are most likely to pay. The author is *not* blind to treatment in this dataset, as this information will be used to inform the sampling strategy for the endline survey

In sum, enumerators will administer three surveys in treated and control polygons (see Table 2). First, all polygons are visited for a 10-15 minute baseline survey to collect pre-treatment covariates among a handful of randomly chosen households and to deliver the

⁴Exemptions include the disabled, the elderly, churches, and active state employees. About 5% of the population is exempt from the property tax.

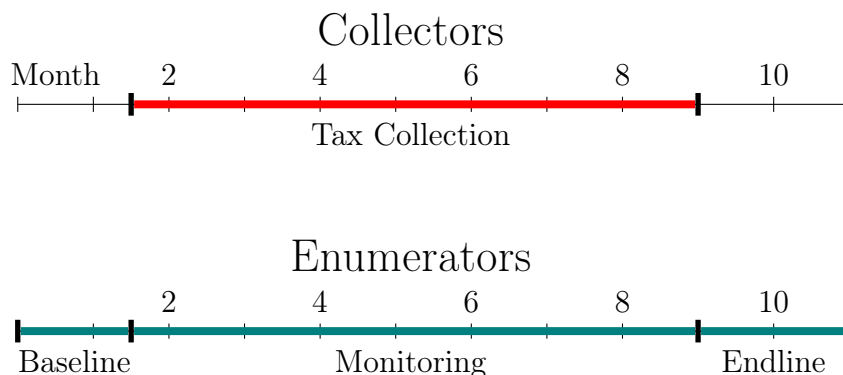
⁵As such, this will be used as an instrument to try to identify the effects of taxation from the effects of bribery.

information intervention. The second ‘monitoring’ survey, described in the previous paragraph, checks the work of tax collectors and collects several basic outcomes and covariates in a random sub-sample of participants. Finally, the endline survey will be administered in the early months of 2017, after the conclusion of the tax campaign. As noted, a four-day pilot of the endline survey was conducted from January 18-21, 2017, before the publication of this pre-analysis plan. For completeness, future analysis will include results with and without these four days of data (115 surveys).

Visit #	Components	Timing	N	Clusters
Visit 1	Baseline survey / information intervention	Mar-Apr 2016	2384	431
Visit 2	Monitoring survey	May-Dec 2016	2500	431
Visit 3	Endline survey	Jan-Mar 2017	3500	431

Table 2: Enumerator surveys

The campaign began in mid April 2016 and will finish in December 2016. Beginning in April 2017, control polygons will also be visited by tax collectors, according to the government. The following timeline summarizes the main activities of the program.



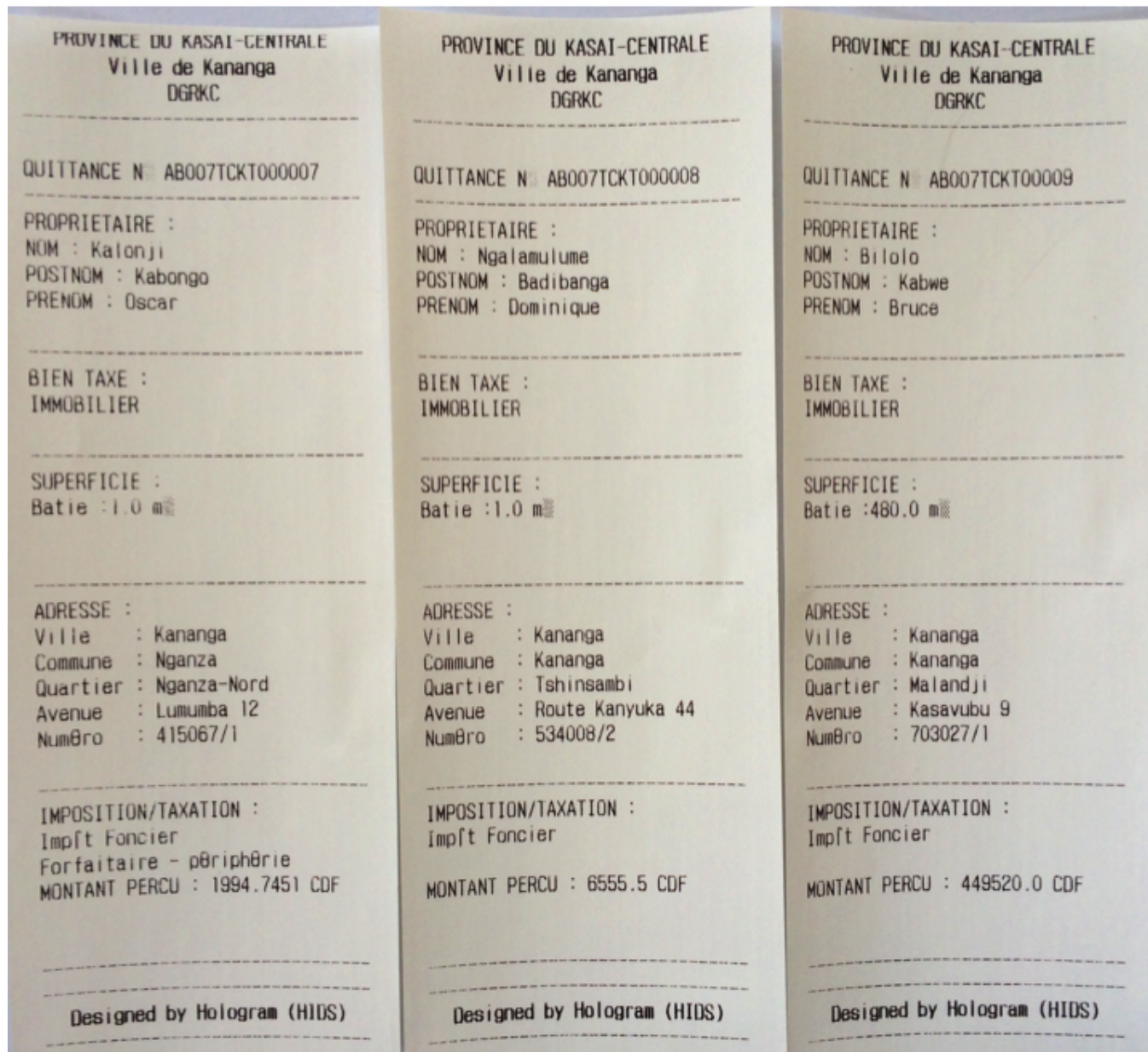


Figure 4: Three examples of printed receipts from the property tax campaign

3 Measurement of taxes and bribes

Payment of taxes will be measured in two ways. First, household self reports will be coded as tax payment if the citizen can produce a valid printed receipt. Second, household codes will be matched with official bank data to estimate which households in the sample paid taxes. Binary and continuous measures of tax payment will be considered, with preference for the former given that tax rates are progressive and thus tax payment likely reflects a similar sized burden on those who pay the different rates.

Two special cases involved individuals who own businesses and individuals who own multiple properties. These individuals might face higher tax liability than that noted above. The endline survey will ask respondents detailed questions about both issues to determine if they are also liable for rental taxes on a commercial property, or if they pay property taxes on multiple plots in the same neighborhood, or in different neighborhoods. Because it will be difficult to determine the treatment status of properties in other neighborhoods, an individual's treatment status will be determined by the property in which he or she resides. The primary analysis will include dummies for both of these cases, allowing them to have their own intercepts. Furthermore, robustness checks will be run excluding all such individuals. Extensions of the analysis will update the continuous measure of tax payment by including other properties owned by the respondent on which he or she payed taxes.

Payment of bribes will follow a similar logic. Individuals who say they paid tax collectors but cannot produce a receipt and cannot be matched with a proven payment in the bank data will be coded as having paid a bribe. In case citizens are not comfortable admitting such payments to enumerators, they will use a 'secret ballot' method of bribe reporting in which they circle the amount paid on a small sheet of paper and put this in a ballot box unobserved by the enumerator (but observed by the research office).

To detect bribes that exploit the different tax rates—the collector codes the household for a lower tax rate in return for a bribe on top of the lower tax payment—a property tax expert at the tax ministry who is unaffiliated with the project will independently assess the tax rate

for all houses in the sample based on their location and photograph. This individual is the chief inspector of the tax ministry whose job it is to verify the work of its agents. He will be shown photos of all of the houses in the sample without knowing to whom they belong or which tax collectors were assigned to them. Using these photos, he will rate them on a scale corresponding to the official tax schedule. Conditional on such evaluations, the measures above should pick up lowered-rate bribes of the type described above. These evaluations enable measurement of cases of extortion as well.

Consider the following coding assumptions:

- Let τ_1 and τ_2 be the two main tax rates with $\tau_1 < \tau_2$.
- Let b be a bribe, where $0 \leq b \leq \tau_1$ and $b \leq \tau_2 - \tau_1$.
- Assume the true tax rate is τ_2 . Data will be coded as follows:

Amount Reported	Amount in Bank	Coded as
$\tau_2 + b$	τ_2	Extorted
τ_2	τ_2	Taxed
$\tau_1 + b$	τ_1	Bribed
τ_1	τ_1	Taxed
$\tau_1 + b, \tau_1 - b$	0	Bribed

- The same decisions will be made if the true tax rate is τ_1 , except that if the amount reported is $\tau_1 + b$ and the amount in the bank is τ_1 (row 3), this will be interpreted as extortion.

As with all studies that involve corruption, measurement error is a concern. In this context, reporting the amount paid to tax collectors cannot influence the probability of sanctions, nor can it influence future tax liability. So rationally citizens have no reason to hide bribe payments or to lie about tax payments. Nonetheless, it may occur and I intend to follow standard methods to detect whether such error is systematically differently distributed

across the various treatments, in which case it is endogenous. If not, such measurement error should not seriously jeopardize the estimations proposed in the next section.

Secondary measures of bribery include (i) results from a list experiment, (ii) survey questions about the frequency of bribe payment in the neighborhood, (iii) survey questions and hypotheticals about the going rate to bribe the tax collector, and (iv) survey questions about whether the respondent made an ‘arrangement’ with the collector, regardless of the amount he or she claimed paying. These alternative measures will be considered, alongside the primary measure proposed above, in the estimations that follow.

4 Hypotheses and estimation

4.1 Topic 1: taxation and political engagement

4.1.1 Reduced-form analysis

This paper seeks to test the theory that expanding taxation increases citizens’ expectations about public goods provision and their efforts to hold the government accountable. More specifically, the central hypotheses are as follows:

- **H1:** Expanding tax collection increases the perceived capacity of the government in the minds of citizens.
- **H2:** Expanding tax collection causes citizens to expect more public goods provision from the government.
- **H3:** Expanding tax collection causes citizens to exert greater effort to monitor the government and hold it accountable.

The first model I anticipate running estimates the reduced-form effects of the program on political behavior outcomes:

$$y_{ijk} = \beta_1 I_{jk}^{Tax} + \alpha_k + \mathbf{X}_{ijk} \mathbf{\Gamma} + \mathbf{X}_{jk} \mathbf{\Phi} + \varepsilon_{ijk} \tag{1}$$

where i indexes individuals, j indexes polygons (clusters), and k indexes strata used during randomization. α_k are strata fixed effects, and \mathbf{X}_{ijk} and \mathbf{X}_{ijk} are individual- and polygon-level covariates included to increase precision. I_{jk}^{Tax} is an indicator for polygons that receive the on-the-ground tax program, meaning that β_1 estimates the average effect of the tax program on outcomes of interest, y_{ijk} , such as survey-based measures of citizen expectations of the government, or participation in individually costly activities like town-hall meetings. The full list of possible outcomes can be found in a bulleted list on Page ???. The full list of covariates can be found in a bulleted list on Page 42. Models including fixed effects for tax collectors (59 total) and for enumerators (12 total) will be fit as a robustness check. Standard errors will be clustered at the polygon level.

This quantity, β_1 , is of interest because all aspects of the tax program—the census survey and the experience of being made legible to the state, the reduced transaction cost of tax compliance, the sight of government agents in the neighborhood using tablet computers and portable printers and what this conveys about state capacity—may plausibly affect individuals’ political attitudes and behavior. Although this is a package of treatments, it is the theory-relevant package: these are the constituent parts of a state campaign to build its tax base, and it is therefore of interest to learn what effect such a campaign as a whole has on how individuals perceive the capacity and responsibilities of the local government and how they choose to engage with it.

Perhaps a more informative quantity of interest is the average effect of the program on those households targeted intensively by tax collectors. Although all houses in a polygon receive at least one visit (for the census survey), the number of subsequent visits depends on the discretion and effort of the tax collectors. Indeed, using preliminary data from the monitoring survey (not the endline survey, which will contain the ultimate outcome data), there is considerable variation in the number of subsequent visits by tax collectors that households report, from zero visits to 12 visits (see Section 4.4.1). In particular, preliminary regressions using these monitoring survey data show that individuals who live in houses with

nicer roofs, toilets, and floors receive more visits from tax collectors than do individuals who live in lower-quality houses.

Thus, the second estimation will also include the treatment interacted with a measure of house quality (Ω):

$$y_{ijk} = \beta_1 I_{jk}^{Tax} + \beta_2 I_{jk}^{Tax} * \Omega_{ijk} + \beta_3 \Omega_{ijk} + \alpha_k + \mathbf{X}_{ijk} \mathbf{\Gamma} + \mathbf{X}_{ijk} \mathbf{\Phi} + \varepsilon_{ijk} \quad (2)$$

In this specification, β_2 is the effect of the tax program on individuals who live in higher-quality houses and thus are more likely to have been asked to pay taxes by the collectors. This is a natural covariate with which to interact the treatment because, as noted, households' exposure to the tax program is in large part a function of house quality. This is also a relevant subgroup because, more generally, states seeking to boost their tax base are unlikely to target the abject poor, but rather those with some means to pay. Thus the average effect of the program on the middle and upper quartiles of the population is arguably a more valuable quantity than the average effect on the entire population because it is these segments of the population who were exposed to a more intense version of the treatment.

The simplest version of Equation 2 will use a binary Ω , which equals 0 if a house is constructed with mud bricks and 1 if a house is constructed with cement or any other modern material. A second version of Ω includes more information about house quality, including the quality of the roof, fence, and the accessibility of the compound. A third version will be based on the evaluations of a property tax expert not affiliated with the program. However, the relationship between house quality and collector effort—not to mention tax compliance—is likely nonlinear. Although individuals with the lowest-quality houses may be less likely to be visited by tax collectors, so too may be individuals with the highest-quality houses, who are likely also better connected politically and may be left alone by tax collectors. I plan to test for such non-linearity by including a squared house quality term in the corresponding equation. Also, I plan to run a fully saturated version of this regression that includes a

dummy for each house quality type (except the lowest) and also the relevant interaction terms with the treatment indicator. My hypothesis is that the effect size will be greatest when the treatment is interacted with dummies for middle levels of house quality, since collectors are likely to exert more effort among these strata.

The average effect of the program estimated in Equations 1 and 2 is difficult to interpret because the program could cause an increase in bribes as well as an increase in taxes. The net effect estimated by Equation 1 could therefore be driven by either of these factors—taxes or bribes—and thus it would be difficult to know exactly what the estimates capture. A preliminary strategy for resolving this issue within the reduced-form framework is by first estimating equation 1 with the outcome as an indicator for (i) tax payment, (ii) underpayment (bribery), and (iii) overpayment (extortion).

As noted above, cases of bribery (in which the taxpayer pays less than the official amount and splits the surplus with the collector) should be distinguished from cases of extortion (in which the taxpayer pays *more* than the official rate, with the surplus pocketed by the collector) because they likely have different effects on individuals' political attitudes and behaviors. Paying a bribe likely reduces citizens' interest in holding the government accountable because they may feel complicit in perpetuating the corrupt status quo. Whereas, cases of extortion might be thought to have the same effect, or perhaps a stronger effect, as paying taxes since citizens may be unaware that they were extorted. Specifically, extortion may arise if tax collectors are able to exploit information asymmetries, such as uncertainty over the true tax rate. For example, imagine a citizen who pays 6,600 CF, but the independent property evaluation reveals that she should have paid 2,000 CF.⁶ Estimating three supplementary reduced-form equations—with tax payment, underpayment, overpayment on the left-hand side—will reveal on average how the program affects legitimate and illegitimate tax behavior, thereby shedding light on the channel through which the program affects citizens' political

⁶Extortion is also possible if the tax collectors have coercive power over the taxpayer. In this context, this appears highly unlikely, as evidenced by the 17% compliance rate.

engagement (Equation 1).⁷

A second approach to disentangling these potentially heterogeneous effects is by unpacking the treatment cells of Table 2. The corresponding estimation equation is as follows.

$$y_{ijk} = \beta_1 I_{jk}^{Prog} + \beta_2 I_{jk}^{Prog} * I_{jk}^{Audit} + \beta_3 I_{jk}^{Info} + \beta_4 I_{jk}^{Prog} * I_{jk}^{Info} + \beta_5 I_{jk}^{Prog} * I_{jk}^{Audit} * I_{jk}^{Info} + \alpha_k + \mathbf{X}_{ijk}\mathbf{\Gamma} + \mathbf{X}_{jk}\mathbf{\Phi} + \varepsilon_{ijk} \quad (3)$$

	Program		
	Audit	No Audit	Control
Info	β_5	β_4	β_3
No Info	β_2	β_1	β_0

Table 3: Coefficients of interest in Equation 3

Consider first the key intermediate outcomes mentioned in the previous paragraph: taxation and bribery. Hypotheses about the effect on tax payment are as follows.

Tax payment on the LHS:

1. $\beta_3 = 0$: no effect of information treatment in control.
2. $\beta_1 \geq 0$: program increases tax payment
3. $\beta_2 \geq 0$: audit treatment further increases tax payment
4. $\beta_4 \geq 0$: info treatment further increases tax payment
5. $\beta_5 \geq 0, \beta_5 \geq 0$: audit and info treatments together still further increase tax payment.

Hypotheses about the effect on bribe payment are as follows.

Bribe payment on the LHS:

⁷This four-reduced-form-equations approach will produce only suggestive evidence, but it is retained because of the appealing simplicity of interpreting reduced-form estimates. More sophisticated approaches to isolating the channel will be discussed below.

1. $\beta_3 \leq 0$: info treatment decreases bribes in control.
2. $\beta_1 \geq 0$: program increases bribes.
3. $\beta_2 \leq 0, \beta_1 + \beta_2 \geq 0$: Audits decrease bribes relative to program without audits, but still a net increase in bribes relative to control.
4. $\beta_4 \leq 0, \beta_1 + \beta_4 \geq 0$: Info decreases bribes relative to program without info, but still a net increase in bribes relative to control.
5. $\beta_5 \leq 0, \beta_1 + \beta_2 + \beta_5 \geq 0, \beta_1 + \beta_4 + \beta_5 \geq 0$: audit and info treatments together further decreases bribes, but still a net increase in bribes relative to control.

Now consider the final, political-behavior outcomes of particular interest to this paper. Hypotheses are as follows.

Political participation on the LHS:

1. $\beta_3 = 0$: no effect of information treatment in control.
2. $\beta_1 \geq 0$: program increases political participation
3. $\beta_2 \geq 0$: audit treatment further increases political participation because relatively more taxes and fewer bribes paid.
4. $\beta_4 \geq 0$: info treatment further increases political participation because relatively more taxes and fewer bribes paid.
5. $\beta_5 \geq 0, \beta_5 \geq 0$: audit and info treatments together still further increase political participation because of yet further increase in tax-bribe ratio.

Identifying the coefficients on these interaction terms is demanding of the sample, and given the number of clusters in this experiment, these estimations might be underpowered. As such, I will also estimate the impacts of each cell relative to the control. The equation in this framework is shown below.

$$y_{ijk} = \beta_1 I_{jk}^{ProgramOnly} + \beta_2 I_{jk}^{Audit} + \beta_3 I_{jk}^{Info} + \beta_4 I_{jk}^{AuditXInfo} + \mathbf{X}_{ijk} \boldsymbol{\Gamma} + \mathbf{X}_{jk} \boldsymbol{\Phi} + \varepsilon_{ijk} \quad (4)$$

	Program		
	Audit	No Audit	Control
Info	β_4	β_3	β_0
No Info	β_2	β_1	β_0

Table 4: Coefficients of interest in Equation 4

Hypotheses for estimating Equation 4 with tax payment as the outcome variable are as follows.

Tax payment on the LHS:

1. $\beta_1 \geq 0$: program increases tax payment
2. $\beta_2 \geq \beta_1$: program with audits has larger positive effect on tax payment.
3. $\beta_3 \geq \beta_1, \beta_2 \leq \beta_3$: program with information treatment has larger positive effect on tax payment; information treatment more effective than audits at increasing taxes.
4. $\beta_4 \geq \beta_2, \beta_4 \geq \beta_3$: program has largest positive effect on tax payment with both information and audit treatments.

Hypotheses for estimating Equation 4 with bribe payment as the outcome variable are as follows.

Bribe payment on the LHS:

1. $\beta_1 \geq 0$: program increases bribe payment
2. $\beta_2 \geq 0, \beta_2 \leq \beta_1$: program with audits increases bribes less, but still an increase relative to control.

3. $\beta_3 \geq 0, \beta_3 \leq \beta_1, \beta_3 \geq \beta_2$: program with audits increases bribes less, but still an increase relative to control; audits more effective than information at reducing bribes.
4. $\beta_4 \geq 0, \beta_4 \leq \beta_2, \beta_4 \geq \beta_3$: program with audits and information leads to fewest bribes among polygons with the program; still more bribes than control.

Finally, hypotheses for estimating Equation 4 with bribe payment as the outcome variable are as follows.

Political participation on the LHS:

1. $\beta_1 \geq 0$: program increases political participation.
2. $\beta_2 \geq \beta_1$: program with audits has larger positive effect on participation because relatively more taxes and fewer bribes are paid.
3. $\beta_3 \geq \beta_1, \beta_3 \geq \beta_2$: program with information has larger positive effect on participation because relatively more taxes and fewer bribes are paid; more participation in information only cells relative to audit only cells.
4. $\beta_4 \geq \beta_2, \beta_4 \geq \beta_3$: program has largest positive effect on political participation with both information and audit treatments.

Ultimately, the information gleaned from estimation Equation 3 and 4 is very similar, but having both specifications will be helpful for understanding the estimated magnitudes of any effects.

4.2 Instrumental variables estimation

Equations 1 and 2 estimate the reduced-form effects of the tax program (or its constituent treatment cells), and Equations 3 and 4 should provide suggestive evidence about the channel behind this effect. However, to better pin down mechanisms behind any reduced-form effects of the program, I aim to identify separately the effect of *paying taxes* and *paying bribes* on

citizens’ political attitudes and engagement. According to the hypotheses discussed above, it is when individuals contribute money to the government that they begin to exert greater effort to monitor that government to try to ensure that sure that their money is being well spent. Conversely, individuals who pay bribes instead of taxes pay feel complicit in a low-monitoring equilibrium and choose to exert less such effort.

However, paying taxes and paying bribes are choice variables and therefore endogenous. The standard solution would be to use instrumental variables (IV) regression with tax and bribe payment as endogenous regressors and assignment to the different treatment cells (from Table 2) the excluded instruments. The problem is in this setting the exclusion restriction is likely violated. The on-the-ground tax program itself will probably have direct effects on individuals’ political attitudes and behavior that do not operate through the channel of tax payment. For example, participating in the census survey with tax collectors, or simply catching sight of the tablets they use, might lead individuals to update their beliefs about the capacity of the government. These direct effects mean that the standard IV setup is invalid.

Fortunately, a two-stage least squares estimation with four endogenous regressors—dummies for taxation, bribery, extortion, and a count variable for the number of tax collector visits to the household—and four or more excludable instruments should be sufficient to independently identify the effects of each of these variables on the outcomes of interest.⁸ Consider the equation:

$$y_{ijk} = \beta_1 Visits_{ijk} + \beta_2 I_{ijk}^{Taxed} + \beta_3 I_{ijk}^{Bribed} + \beta_4 I_{ijk}^{Extorted} + \alpha_k + \mathbf{X}_{ijk} \mathbf{\Gamma} + \mathbf{X}_{jk} \mathbf{\Phi} + \varepsilon_{ijk} \quad (5)$$

In this equation, households that pay the correct amount will have I_{ijk}^{Taxed} equal to 1.

⁸This is analogous to how Angrist and Acemoglu add a second endogenous regressor to shut down an exclusion restriction violation in work on peer effects. See Acemoglu D and Angrist D, How Large Are the Social Returns to Education?, NBER Macroeconomics Annual (2000), eds. Bernanke B and Rogoff K, MIT Press: Cambridge. See also Angrist J and Pischke JS, Mostly Harmless Econometrics (2000), pp. 193-195.

I_{ijk}^{Bribed} equals 1 if a household claims to have paid money to the collector but no matching account is found in the official program data, or if the household pays less than it should have paid according to an expert assessment (indicative of bribery). Similarly, $I_{ijk}^{Extorted}$ equals 1 if a household pays more than it should have paid according to the expert assessment (indicative of extortion). Alternative versions of these variable definitions will also be considered, as noted in the previous section about measuring taxes and bribes. $Visits_{ijk}$ counts the number of visits by tax collectors that households report.

The main hypotheses that the estimations in this section will test are summarized in the table below. Outcomes are as follows: *CAPACITY* measures citizens' perceptions of the capacity of the provincial government; *EXPECTATIONS* measures citizens' expectations about the level and distribution of public goods provision; and *ENGAGEMENT* measures citizens' willingness to exert effort to monitor the government and try to hold it accountable for providing public services. A positive (negative) sign indicates a positive (negative) expected coefficient. Note in particular that β_2 and β_3 are predicted to be of opposite sign, illustrating the monotonicity problem described earlier. Note also that β_4 is expected to mirror β_2 because citizens are unlikely to realize that they were victims of extortion.

	<i>CAPACITY</i>	<i>EXPECTATIONS</i>	<i>ENGAGEMENT</i>
β_1	+	+	+
β_2	+	-	-
β_3	+	+	+
β_4	+	+	0

Table 5: Hypotheses for IV analysis

There are a number of candidate instruments, owing to the random assignment of the interventions and of the tax collectors. The most obvious instruments are dummies for the main treatments and corruption interventions, including a specification with the full set of interactions in Equation 4. To increase the strength of these instruments (and the other proposed instruments below), I will consider a first-stage specification interacting them each

with Ω_{ijk} , the house quality variable.⁹ These will be relevant instruments (correlated with the endogenous regressors of interest) if they succeed in exogenously shifting the probability of citizens paying taxes versus paying bribes or being extorted, as posited in the previous sub-section.

Equally promising are jackknife instrumental variables (JIVE)-style instruments that exploit the random assignment of tax collectors to polygons.¹⁰ In essence, JIVE or "leave-one-out" instruments for the tax, bribe, extortion, and effort propensities of the assigned tax collectors can be constructed as follows:

- Predict a score, $\hat{\lambda}_{i,-j}$, for the i^{th} collector in polygon j by regressing the endogenous variable of interest, say $I_{i,-j}^{Bribed}$, on collector fixed effects. In other words, we generate fitted values for the bribe-collection propensity level of each collector working in polygon j using their observed bribery rate at collecting taxes in all polygons other than j that they worked in.
- Using these fitted values, we then take a linear combination of these collector-specific bribe propensity scores to construct a polygon-level instrument $Z_{jk}^{Bribe} = \sum_{i=1}^3 \delta_j * \hat{\lambda}_{i,-j}$, where δ_j weights the collector scores based on the number of days each individual worked in the polygon.

Due to the underlying random assignment of tax collectors, the resulting instrument is exogenous but should provide a first stage for the endogenous taxation indicator, I_{ij}^{Bribed} , in Equation 5 above. It should be possible to construct analogous leave-one-out estimators for each of the endogenous variables in Equation 5 above, following the same procedure but substituting each of these variables in the place of $I_{i,-j}^{Bribed}$, such that we estimate randomly assigned collector-group-specific propensity scores for (i) collecting taxes, (ii) collecting bribes,

⁹I expect that interacting these instruments with Ω_{ij} will increase the R^2 in the first stage equation, thereby also shrinking standard errors in the second-stage regression.

¹⁰See, for example, Angrist J et al, "Jackknife Instrumental Variables Estimation" NBER Technical Working Paper No. 172, 1995

(iii) extorting households, (iv) visitation rates (collector effort). Interacting each of these instruments with Ω_{ij} , as I intend to do in one specification, will likely further strengthen the first stage.

It is possible that these instruments will be correlated with one another—since each is constructed based on (different) revealed characteristics of the same three tax collectors—which could in an extreme case lead to perfect collinearity in the first stage regressions. The more likely concern is whether different instruments will do the work in each of the four reduced forms. That is, if only one JIVE estimator built using collector characteristics in polygons other than j appears to meaningfully predict behavior in several of the reduced form equations for the endogenous regressors, then I will not actually have four exogenous instruments, and the 2SLS estimators will be inconsistent.

However, it is not obvious to what degree these instruments will be correlated. Is a collector who is highly productive at generating tax revenue more or less likely to also collect bribes? One might imagine that those who collect lots of taxes collect less bribes: that tax propensity and bribe propensity are negatively correlated within collectors. On the other hand, one could also imagine that some individuals are more effective at convincing people to pay, regardless of whether the money is for the state account or for their own private consumption. In this case tax propensity and bribe propensity would be positively correlated. Ultimately, the resulting polygon-level instrument, Z_{jk}^{Bribe} , is a linear combination of all three collectors' propensities, which may weaken these correlations further. Whether each leave-one-out instrument independently identifies the corresponding endogenous variable in its first stage is ultimately an empirical question.

Alternative versions of these collector-propensity instruments will use collector characteristics measured through surveys and behavioral experiments in the lab. Instead of estimating the bribe propensity of a given collector by looking at the bribes he or she has collected in all other polygons, this instrument would exploit a lab-based measure of cheating. A number of

studies have correlated behavior in the lab with real-world outcomes.¹¹ For example, Hanna and Wang (2015) finds that cheating in the lab predicts corrupt behavior in among public-sector nurses in India. Building on this evidence, collector characteristics will be gathered to create several candidate instruments. To predict corruption, the random-allocation game (RAG)¹² will be administered amongst the tax collectors. Similarly, to predict effort levels during tax collection, which is the chief determinant of the *Visits* variable, a tablet-based task will be administered to measure persistence.¹³ To predict the probability of tax payment, collectors will complete survey modules aimed at measuring emotional quotient and other ‘soft skills’ that are likely important in encouraging compliance among citizens in assigned polygons.¹⁴ These experimental and survey measures will then be combined linearly for the three collectors in the assigned group for each of the aforementioned instruments in a procedure similar to that discussed above for the leave-one-out JIVE instrument.

Another useful instrument for this estimation is an individual-level indicator, I_{ijk}^{Bonus2} , that equals 1 if a household was randomly sampled to be eligible for the double tax collector bonus. Because these households offered a 36% bonus, instead of an 18% bonus, tax collectors were likely to have exerted more effort in attempting to collect taxes from them. Tax collectors should also have been less likely to collect bribes from these houses because the relative cost of collecting taxes (compared to bribes) is lower due to the double bonus. The individual-level variation of this instrument is appealing also in light of the fact that the other instruments

¹¹See, for example, Hanna R and Wang SY, "Dishonesty and Selection into Public Service: Evidence from India" Mimeo (2015), and Finan F and Schechter L, "Vote-Buying and Reciprocity," *Econometrica*, 80(2012), 863-881.

¹²In private, participants will receive two envelopes—one for them and one for a player 2—and a die with three white sides and three black sides. Each round, they choose one of the envelopes in their mind and then rolled the die once. If the black (white) side comes up, they put 100 Congolese Francs in the envelope they chose (did not choose) before rolling. Repeating this game many times unobserved, participants will that they can allocate the money however they like. The research team will never know which envelope they chose in their mind before each roll, and extreme allocations are possible for any individual participant. With the aggregate data, however, we can compare treatment and control group averages and detect differences in cheating levels.

¹³This task involves following a moving dot on the tablet screen with one’s finger. It is boring for the participant to complete. The time before giving up will be a measure of persistence.

¹⁴Relevant survey modules include: emotional quotient, locus of control, extroversion-introversion status, aggressiveness, IQ-style questions, Raven’s matrices, the ‘big five’ performance indicators, time preferences, risk preferences, and views about the provincial government.

discussed up to this point vary on the polygon level.

Still another instrument exploits the fact that some collectors were full-time employees of the tax ministry while others were interns. The full-time employees were likely more secure in their jobs. As such, they might respond less to the threat of sanctions if bribes are discovered in audited polygons. On the other hand, interns were explicitly told that their probability of getting a job would depend on their performance during this property tax campaign. They were thus incentivized to produce as much revenue as possible for the government. They also were likely to be more concerned about being caught accepting bribes. We can therefore construct an instrument, Z_{jk}^{Intern} , that equals the fraction of the randomly assigned collector team in a given polygon that is interns. This quantity varies from 0 to 1, and, following the logic above, should be decreasing in bribe propensity.

Another plausibly exogenous source of variation in who pays taxes is whether the government has recently paid its employees. As the provincial capital of the Kasai Central Province, a large proportion of the citizens are paid by the state (or belong to redistributive networks with someone who is paid by the state). Thus, among the most common reasons for refusal to pay taxes was liquidity constraints stemming from the fact that the provincial government was late in paying its salaries. Anecdotally, people are considerably more likely to pay in the weeks after the government pays its salaries. Interestingly, there is great uncertainty about the pay day. The ostensible pay day—the twentieth day of each month—has not been respected a single time in 2016 according to tax ministry officials. Thus, when the government pays is plausibly exogenous. To exploit this variation, polygons that were worked on in the ten days after the government paid will be assigned a value of 1 for an indicator variable, I_{jk}^{GovPay} ; other polygons will receive a zero.

Finally, I plan to interact polygon-level instruments with Ω_{ijk} (house quality) to strengthen the first stage, for the same reasons discussed concerning Equation 2. In the same vein, two further individual-level instruments exploit variation in the accessibility of households in a given polygon: the more difficult-to-reach a household is, the lower the likelihood that the

tax collectors will make repeated visits. Kananga is built on a moderate plateau, with most neighborhoods spilling down ravines in their extremities. Many collectors were reluctant to walk all the way to the bottom of these ravines. As such, the accessibility of house i likely predicts the probability of being re-visited by a tax collector. Two measures of accessibility will be used: distance to nearest avenue and elevation, both of which are measured on the individual level. On their own, the exclusion restriction would likely be violated for these instruments, since remoteness may be correlated with other factors affecting political beliefs and participation. However, interacting these accessibility proxies with the program indicator, or other randomly assigned interventions varying at the polygon level, yields excludable instruments.

In summary, here is a list of all candidate instruments:

1. I_{jk}^{Prog} - a dummy for treated polygons;
2. I_{jk}^{Audit} - a dummy for audited polygons;
3. I_{jk}^{Info} - a dummy for polygons that received the information intervention;
4. I_{ijk}^{Bonus2} - an individual-level dummy for households randomly selected to be eligible for the 36% collector bonus;
5. Z_{jk}^{Tax} - a linear combination of the estimated (JIVE) tax propensities of the randomly assigned tax collectors in the j^{th} polygon;
6. Z_{jk}^{Bribe} - analogous to above but for bribery propensity;
7. Z_{jk}^{Extort} - analogous to above but for extortion propensity;
8. Z_{jk}^{Effort} - analogous to above but for effort propensity;
9. $InternProp_{jk}$ - the proportion of the randomly assigned collector team who are interns;
10. $LabCheat_{jk}$ - a linear combination of the lab-measured cheating propensity of the randomly assigned tax collectors in the j^{th} polygon;

11. $LabPersistence_{jk}$ - a linear combination of the lab-measured persistence levels of the randomly assigned tax collectors in the j^{th} polygon;
12. $LabConvince_{jk}$ - a linear combination of the lab-measured ‘soft skills’ of the randomly assigned tax collectors in the j^{th} polygon;
13. I_{jk}^{GovPay} - a dummy for polygons visited in the ten days after the provincial government paid salaries;
14. $Z_{jk}X\Omega_{ijk}$ - the observable quality of household i interacted with a polygon-level excluded instrument from the list above;
15. $Z_{jk}XAccessibility_{ijk}$ - the accessibility of household i measured either by elevation or distance to the nearest car-passable avenue, interacted with a polygon-level excluded instrument from the list above.

Including all of these instruments may lead to an over-identification problem, which I will test for using the standard methods. I will optimize over this set of instruments to choose the set of instruments that produces the strongest first stage for each of the endogenous regressors in Equation 5.

With the right set of valid instruments, this 2SLS set up is capable of identifying independently the effects of tax payment, underpayment (bribery), overpayment (extortion), and other direct effects of the program associated with being visited by tax collectors at one’s house. An alternative specification replaces the tax payment indicator with include dummies for each tax rate (2,000 CF, 6,555 CF, and measured cases typically of 25,000 CF and higher) or include a continuous measure. However, these approaches are likely to be underpowered. Also, it is reasonable to assume a constant effect across these different tax rates since the rate is a function of wealth. So taxpayers across these tax rate categories should face a comparable relative cost given their wealth level.

A secondary strategy for detecting direct effects of the tax program separate from tax payment is to control for participants’ self-reported experiences with the tax collectors: the

number of total visits from tax collectors, the estimated total time spent with the tax collector, the familiarity with the collector (can the participant remember the name or identify the photo of the collector), whether the collector had the tablet and receipt printer, the number of days spent in the polygon in total (from administrative records). These are all ‘bad controls’ in that they are potentially affected by treatment. As such, this is not a preferred approach. Nonetheless, it might provide suggestive evidence for the effects of tax payment net of other observable direct effects of the program. If the proposed IV framework above were insensitive to these observable program elements, that would provide further suggestive evidence that the effect of the program on outcomes is driven by the act of paying taxes per se. If it is very sensitive, and the point estimate goes toward zero once these controls are added, then this would suggest that the primary effects of the program come not through tax payment, but rather through the full package of deploying tax collector on the ground—and that there are direct effects of the program that may not be captured by the proposed instruments in the list above.

4.3 Outcomes

Each of the estimation approaches discussed above will use several outcomes aimed at picking up citizens’ views about the government and their efforts to hold it accountable for the provision of public services.¹⁵ The majority of survey-based variables will be standardized and put into indices based on the substantive issue behind the question to decrease the probability of type 1 errors. For such indices, AES coefficients will be reported, as in Clingingsmith et al (2009).¹⁶

As noted, there are three families of anticipated outcomes: expectations of the government, effort exerted in holding the government accountable, and perceived government

¹⁵Additionally, a small set of survey-based outcomes are also collected over time, embedded in the monitoring surveys conducted by enumerators during the tax campaign. These outcomes will be used to study dynamics that would be masked in the endline data alone. The researcher is blinded to treatment in these data upon publication of this PAP.

¹⁶Clingingsmith D, Khwaja AI, Kremer K. Estimating the Impact of the Hajj: Religion and Tolerance in Islam’s Global Gathering, *Quarterly Journal of Economics*: August 2009, 1133-1169.

capacity.

4.3.1 Expectations of the provincial government

1. Government evaluation form:

- Anonymous report-card style evaluations of government performance (e.g. Paler 2013).¹⁷ The substantive content of these evaluations will be coded up to measure citizens' expectations of the government. Following Paler (2013), the card includes the following questions:
 - First, please choose which of the following options you agree with most: (1) I am satisfied with the provincial government of Kasai Central and don't want to change anything about how it works, (2) I want the provincial government of Kasai Central to do a better job.
 - Now please indicate if you strongly agree, agree, disagree, or strongly disagree with the following propositions.
 - * The provincial government should provide more opportunities for public participation in provincial government decisions.
 - * The provincial government should provide better and easier access to information about provincial government programs and policies.
 - * The provincial government of Kasai Central should spend more money on public goods and development and less money on administration.
 - * The provincial government should provide a central location where I can freely report problems with public services.

2. Survey questions concerning the appropriate role of the provincial government in public good provision.

¹⁷Paler L. Keeping the Public Purse: An Experiment in Windfalls, Taxes, and the Incentives to Restrain Government. *Am. Pol. Sci. Rev.* Vol. 17, No. 4, 2013.

- Example: “I am going to list some services/infrastructure many communities have. Tell me who you think should be primarily responsible for providing each one in our community. This does not need to be the current provider of these services/infrastructure. Schools, Water system/wells, Health care, Keeping people safe, Helping poor people, Economic development, Road maintenance.” The extent to which individuals think the provincial government should be in charge of providing these services will be included in indices about expectations of the government.
- Example: “Point of view 1: Some people say the government should take more responsibility to ensure that everyone is provided for. Point of view 2: Other people say that people should take more responsibility to provide for themselves.”
- The role of foreign aid organizations in providing public goods will also be examined, especially vis-a-vis the provincial government as a potential provider. Example survey questions (choose between these points of view) include:
 - “Point of view 1: foreign aid is necessary for Congo to become peaceful and prosperous. Point of view 2: foreign aid is not necessary in Congo; we have everything we need to achieve peace and prosperity.”
 - “Point of view 1: foreign aid organizations should provide more services in the health and education sectors in Congo. Point of view 2: foreign aid organizations should provide fewer services like health care and education; that is the responsibility of the government.”
- Respondents will also be asked for their perception of the current level of public goods provision in Kananga. This information will be used to gauge whether effects detected on individuals’ expectations for public goods provision truly concern their beliefs about what the government *should* be providing and not simply differences in their beliefs about what the government is currently providing. In short, expectations of public goods provision will be conditioned on beliefs about

current public goods provision.

- Example: “Now let’s talk about what services the provincial government currently provides to the citizens of Kananga. In your opinion, what level of public services does the provincial government of Kasai Central currently provide? Please choose one of the following options [The government provides a lot / a little / nothing in this sector] for each area below: Schools, Water system/wells, Health care, Keeping people safe, Helping poor people, Economic development, Road maintenance.”

3. **Survey questions concerning the quality of governance in the province.** The study the effects of the tax program on the view of the government among citizens, several more general questions will be asked. These seek to measure the tradeoff between taxing the people and political unpopularity—a central concern for states at any level of capacity and development. Questions include the following:

- Example: “Overall, how would you rate the performance of the provincial government [tax ministry] in Kananga?”
- Example: “How hard does your chef d’avenue work on behalf of the people in your commune?”
- Example: “I am going to name a number of organizations. For each one, could you tell me how much confidence you have in them: is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all? Local political leaders, The national government (in Kinshasa), The provincial government, The tax ministry.” (Note that these levels of confidence will be compared to reported confidence in NGOs and foreign research organizations.)

4. **Survey questions concerning citizens’ efforts to obtain services from the government.** If individuals’ expectations increase concerning what the government should provide, they might increase their effort to access such services. The endline

survey will thus contain questions asking to what extent individuals have tried to obtain formal services from the government. Such actions demonstrate revealed expectations of the government.

- Example: “In 2016, did you try to get an identity document like a birth certificate, driver’s license, passport or voter’s card from the government?”
- Example: “In 2016, has someone from your household applied for a license to sell goods in town?”
- Example: “Do your family have an official title for this compound? [If no:] Are you considering obtaining one in 2017?”
- Example: “Do you have an official business permit? [If no:] Are you considering obtaining an official permit for this business in 2017?”

5. Survey questions concerning the perceived transparency of the government.

One particular aspect of citizens’ evaluations of the government that might be affected by the program is their perceptions of its transparency. In particular, I expect the program—and more specifically, the information intervention—will cause individuals to believe that the state does a better job communicating its laws to the people. However, at the same time, I expect it will cause them to demand more transparency about government spending and budgeting. Questions include the following:

- “The provincial government of Kasai Central frequently and effectively informs the public about the laws and obligations of citizens.” [Strongly agree, agree, disagree, or strongly disagree] I expect the information treatment to cause more individuals to agree with this statement.
- “The provincial government of Kasai Central is sufficiently transparent and open about its spending and operations.” [Strongly agree, agree, disagree, or strongly disagree] I expect the tax program to cause more individuals to disagree with

this statement because they demand more information sharing and transparency about spending. In considering an index of these two questions, I expect the program will have a negative effect (higher likelihood of disagreement).

4.3.2 Efforts to hold the government accountable

1. **Participation in town-hall meeting** on tax collection and budgeting, sponsored by government. Town-hall meetings will be organized in collaboration with the provincial government to facilitate transparency and citizen participation.¹⁸ Show-up rates and participation will be recorded outcomes.¹⁹ Participants would have to spend their own money on transport to the site.
2. **Submission of government evaluation forms.** As noted in the previous section, participants will be given anonymous evaluation forms of the provincial government's performance. Enumerators will explain these forms and help participants fill them out. But the delivery of these forms to a dropbox will be the responsibility of the participant. Whether she is willing (or not) to absorb the cost of delivering the suggestion form to the drop off will be a measure of participants' interest in trying to hold the government accountable. The forms and a report summarizing their contents will be shared with the governor and with the prime minister of the national government.
3. **Signing a petition-style list showing satisfaction with the provincial government.** After completing the government evaluation form, which will be anonymous, participants will be invited to add their names and their evaluation of the provincial government to a list that will be submitted to the governor along with the individual evaluation forms and a summary of their contents. This petition-style document will

¹⁸Such meetings are in the spirit of the participatory budgeting exercises in Brazil. See Smith, Graham. 2009. *Democratic Innovations: Designing Institutions for Citizen Participation*. Cambridge: Cambridge University Press.

¹⁹Participation in the meeting would be used as an outcome in the spirit of Gottlieb, J. *Greater Expectations: A Field Experiment to Improve Accountability in Mali*. Mimeo, 2014.

have two columns: one for those individuals who say they are satisfied with the provincial government, and one for those who are unsatisfied with it. The decision to submit one's non-anonymous evaluation of the government to the governor, particularly when this evaluation is negative, is a measure of civic engagement.

4. **Responses to SMS vote-style questions** about government spending priorities. This outcome is similar to the evaluation form, but organized via SMS for the subset of participants who have cell phones. The choice to respond (and thus incur a cost) to an SMS asking citizens to vote on a budget-related issue indicates willingness to exert effort to hold the government accountable.
5. **Survey questions concerning political participation.** Questions will be asked about: retrospective and intended future participation in political parties, rallies, protests, elections, marches; consumption of news about politics; frequency of complaining to local authorities (in absolute terms and relative to complaining to other, non-governmental authorities). These questions will be coded into an index of political participation.
6. **Survey questions concerning knowledge of the government.** This will be measured through a quiz-type module. Extensive knowledge about the provincial government reveals an interest in monitoring and holding it accountable. The following questions will be used to create an index:
 - “Do you know the name of the current governor of Kasai Central? If yes, what is it?”
 - “Do you know how many provincial deputies there are in Kasai Central?”
 - “Do you know the name of your chef d’avenue? If yes, what is it?”
 - “Can you name the territories that make up Kasai Central?”
 - “Do you know the name of the provincial tax ministry in Kananga?”

7. Survey questions concerning interest in learning about the government.

A survey module will provide subjects with a chance to receive information about the provincial government (read by the enumerator) or another topic. Choosing the government topic will proxy for desire to monitor the government. Here are the choices (the order is random):

- "Information 1: The total budget of the provincial government in 2016. Information 2: The total budget of UNICEF in Kasai Central in 2016."
- "Information 1: The percentage of the population that works for the state. Information 2: The percentage of the population who is Catholic, Protestant, and Pentacostal."
- "Information 1: The percentage of Kananga's public lighting that currently functions. Information 2: The percentage of Kananga's residents who own a diesel generator."

8. Survey questions concerning the importance of monitoring the government.

These question seek to measure the extent to which individuals think the government should be monitored by citizens and other elected representatives, especially with regard to its budget and spending.

- Example: Choose between the following. "Point of view 1: Some people say that citizens should have an active role in monitoring the actions of leaders and how the government spends its money. Point of view 2: Other people say that citizens should have more respect for authority and trust the government to spend its money in the best possible way."
- Example: Choose between the following. "Point of view 1: It is more important to have a government that make decisions quickly, even if we the citizens have no influence over what it does. Point of view 2: It is more important for citizens to

have a voice and some influence in politics, even if that means it makes decisions more slowly.”

- Example: Choose between the following. “Point of view 1: The Provincial Assembly should ensure that the Governor explains to it on a regular basis how his government spends taxpayers’ money. Point of view 2: The Governor should be able to devote his full attention to developing the country rather than wasting time justifying his actions.”

9. **Survey questions concerning the responsibilities of citizens.** Is it the duty of citizens to pay taxes? I hypothesize that the program will increase the extent to which individuals view tax payment as a responsibility of all inhabitants of Kananga. Questions include the following.

- “Now I’d like to ask about the main reasons for which other people in Kananga pay the property tax. For each of the following possible reasons, please tell me if you think this reason was very important, important, somewhat important, or not important in people’s decision to pay the property tax... Because it is their duty as citizens.”
- “Now, imagine that next week a tax collector comes and visits one of your neighbors. Imagine he absolutely refuses to pay. In your opinion, how acceptable is this?”

10. **Survey questions concerning citizens’ efforts to contribute to local public goods provision.** The launch of a universal tax program could trigger civic behavior among individuals in different ways. For instance, some individuals may contribute more to local public goods (such as helping maintain the roads in one’s neighborhood) instead of paying the property tax. That is, individuals might conceptualize taxes and participation in public goods projects as substitutes. Indeed, some low-capacity states give individuals a choice between contributing money or labor. To measure if

the program might increase individuals' participation in local public goods projects, the following question is included in the endline survey:

- Example: "In 2016, did someone from your house contribute to a public good project in your neighborhood, for example improving a road or building a bridge?"

11. **Survey questions concerning the responsiveness of public institutions on the provincial level.** If citizens are demanding more services from the government, it is possible that the government will begin to respond to these demands and provide more. This is the next step in the theory about a virtuous cycle between taxation and accountable governance. Although it is unlikely that I will be able to measure this, a few survey questions will nonetheless attempt to detect if such changes are underway:

- Example: "When is the last time you saw the chef d'avenue?"

4.3.3 Perceived government capacity

- **Survey questions about capacity to provide public goods.** As noted, it will be important to distinguish between effects on citizens' belief about what the government can provide (its capacity) from what the government *should* provide (its responsibility). The following questions will be used to measure this.

– Example: "If the provincial government of Kasai Central wants to improve a road outside of Kananga, it will do this quickly and without problems."

– Example: "If the provincial government of Kasai Central wants to build a new school in Kananga, it will do this efficiently and without problems."

- **Survey questions about coercive capacity.** Another aspect of perceived capacity that might well be affected by the launch of a large-scale tax program is citizens' views about the likelihood of punishment upon breaking a law. Survey questions are as follows.

- Example: “In this case [individual refuses tax payment], what is the probability that the government will pursue and enforce sanctions? Choose one of the following options.”
- Example: “In this case [individual bribes tax collector], what is the probability that the government will pursue and enforce sanctions? Choose one of the following options.”
- Example survey questions: “If the provincial government of Kasai Central wants to find and imprison a criminal in Kananga, it will do this efficiently and without problems.”

• **Survey questions about information held by provincial government.** Finally, I aim to measure if the program causes individuals to update about how much information the government has about its citizens. As noted, the program will substantially increase the legibility of the population to the state. Are citizens aware of this? Do they accurately predict the facts the government knows about them? Alternatively, do they assume the government has *more* information about them than in fact it has? The first two questions among the following are pieces of information the government does in fact have in places selected for the tax program. The latter two questions are pieces of information the government does not have in its database.

- Example: “Do you think the provincial government knows the address of your house?”
- Example: “Do you think the provincial government knows which of your neighbors did not pay the property tax in 2016?”
- Example: “Do you think the provincial government knows what you do for a living?”
- Example: “Do you think the provincial government knows how much money you make each month?”

4.3.4 Covariates and heterogeneity

A list of covariates for examination and potential inclusion in \mathbf{X}_{ijk} or \mathbf{X}_{jk} , includes the following.

Individual-level covariates

- Age and age squared
- Gender
- Education
- Wealth²⁰
- Income²¹
- Business owner status²²
- Multiple plot owner indicator²³
- Government worker (respondent or family) indicator.²⁴

The first four covariates will be included in all regressions. Alternate models will also

²⁰Wealth will be coded up as an index based on (i) house quality characteristics (floor, roof, walls, fence, location/accessibility), (ii) ownership of certain vehicles and household assets, (iii) access to electricity.

²¹Income will likely be measured with more error than wealth, and as such it will not always be included as a covariate. Income will be estimated with the following survey questions: What was the household's total earnings this past month? What was the household's total earnings this past week? How much money have you spent on transport in the past seven days? How much money have you spent on airtime in the past seven days? How much money does your household receive from rental income?

²²Business owners are a special case in the tax campaign because these individuals might be also liable for paying the monthly rental tax on their business property. Because of this double liability, it is useful to let business owners have their own intercept (including interactions with the treatment variables of interest). Alternate specifications will simply drop business owners.

²³Similar to the previous footnote, owners of multiple plots could be taxed several times depending on the locations of these plots. The survey will try to pinpoint the locations of the other plots. Nonetheless, allowing such individuals to have their own intercept is sensible as they might, in effect, have been exposed to a stronger form of treatment.

²⁴Government workers might have different beliefs about the government compared to other individuals in Kananga. These groups will thus be allowed to have separate intercepts to improve precision.

be fit with the expanded set of coefficients above.²⁵ Finally, alternate models will include enumerator fixed effects and collector fixed effects.

Polygon-level covariates

- Pre-treatment estimate of average wealth levels, using baseline data.
- Average road quality
- Availability of public lighting
- Percentage of households that had ever reported a visit from a tax collector, or paying the property tax, before the start of the campaign.
- Polygon-round dummies to control for effects of information spreading about the program over time.
- Pre-treatment measures of civic participation and political beliefs in the polygon (from baseline data).

These polygon-level covariates should help increase the precision of my estimates. Models with and without these covariates will be considered.

Covariates with which to consider heterogeneity in response to treatment

- Pre-treatment public goods provision. One might anticipate a different response to the tax program in areas with initially higher levels of public goods provision, such as higher road quality or better public lighting. Ex ante, I hypothesize that individuals in such areas would respond less (in the outcomes mentioned above) to the tax program compared to individuals in areas with worse public goods provision initially. In addition to polygon-level measures, individual-level measures include altitude and distance to

²⁵Additional covariates for examination include (i) employment status and (ii) years living in the city. Individuals who have spent most of their lives in villages and recently came to the city might have quite different political beliefs and engagement compared to those who were born in Kananga, or have lived here a long time. As such, it might make sense to allow these individuals to have their own intercept. Similarly, individuals who are unemployed might view the government more negatively. Including a separate intercept for the employed might soak up some noise in the measurement of key outcomes.

the nearest avenue, both of which are predictive of worse access to the city's public goods.

- Majority ethnicity individuals. I hypothesize that individuals from the governor's ethnicity and region will respond more positively to the program, such that they will want to engage more according to the proposed outcomes. Individuals who feel like outsiders in Kananga are likely to have more negative responses to the program, while individuals who feel like insiders are likely to exert greater effort to try to engage with the government and to demand their lot.
- Trust of enumerators. Enumerators will ask respondents who they think the research team works for. Among those who think we work for the government, I hypothesize a more muted response to the program because such respondents will likely mask/underreport their true behaviors and beliefs. An alternate mode of measuring trust in the research team is a survey question asking for trust levels in 'foreign research organizations.' A less explicit measure is whether the individual gives a fake phone number at the end of the survey (something the enumerators will check).
- Respondents' social networks (and their payment status). I hypothesize that effects of the program will be stronger for individuals who know other friends and family who have also paid taxes. Similarly, I expect effects on individuals in control polygons who have close friends who have paid tax. This type of information spillover would bias toward zero the effects of the program if it is widespread. I do not expect it to be large enough to bias coefficients to such an extent. Example survey questions include:
 - "Do you know personally other individuals who paid the property tax in 2016? "
 - "Think of the person you know best who paid the property tax in 2016. How do you know this person?"
 - "In your opinion, how many of your neighbors have paid the property tax in 2016?"

- The spread of information about the tax campaign. I plan to measure how different modes of learning about the program might affect individuals' responses to the treatment. Specifically, I hypothesize that individuals who received the information flier will update more about the legitimacy, transparency, and capacity of the government. Moreover, those individuals who participated in the baseline survey effectively received a read-out version of the information treatment. (The enumerators read out-loud the information on the flier to randomly selected individuals, some of whom will be tracked in the endline survey.) Thus, I expect these individuals to update still more about the government as a result of this stronger version of the information treatment. In addition, I plan to consider heterogeneity by self-reported knowledge of the property tax and the on-the-ground campaign. Although such information is endogenous to treatment, examining heterogeneity by what individuals profess to know about the campaign could provide suggestive evidence about the channel behind any estimated effects. Specifically, I anticipate stronger effects (in the directions predicted above) of treatment among individuals who know more about the property tax program.

4.4 Other analyses

While the majority of these outcomes will be analyzed using the estimation approaches mentioned in the previous section. There are a handful of survey questions for which it will be possible to measure changes within individuals over time. Those 2,384 individuals who participated in the baseline survey answered survey questions about the perceived quality, capacity, and responsibilities of the government. Although attrition will likely be high, I aim to track baseline survey participants who are (i) property owners, (ii) heads of the household (or their spouses) to enable analysis within individuals (i.e. including individual fixed effects).

I plan to do other analyses related to mechanisms and additional findings other than those specified here. In particular, regardless of whether main effects are detected in the principal

estimations noted in this section, other analysis will probe further into potential channels behind an observed effect (or behind a null effect). For example, a series of questions in the endline survey seeks to unpack exactly how individuals understood the tax program and our independent research team’s data collection efforts—to gauge how such beliefs may mediate their responses to the program as measured by the proposed outcomes above. Examples of such questions are as follows:

- “Now I’d like to ask about the main reasons for which other people in Kananga pay the property tax. For each of the following possible reasons, please tell me if you think this reason was very important, important, somewhat important, or not important in people’s decision to pay the property tax.”
 - Because they did not want to be punished or have penalties.
 - Because it is the law.
 - Because it is their duty as citizens.
 - Because they want to promote the development of the province.
 - Because they want to maintain a good reputation among friends and people in the neighborhood.
 - Because they want to receive advantages and benefits from the government.
 - Because the tax collectors were bothering them, and they wanted to be left alone.
 - Because they want to maintain good property rights.

- “Now I’d like to ask about the main reasons for which other people in Kananga pay the property tax. For each of the following possible reasons, please tell me if you think this reason was very important, important, somewhat important, or not important in people’s decision to pay the property tax.”
 - Because I doubt that the government will fine me or sanction me in any way.

- Because the government has done so little for me and my neighborhood.
 - Because the tax collector would just steal the money.
 - Because the government would waste the money.
 - Because I had an arrangement with the tax collector / at the tax ministry.
 - Because I didn't have any money to pay the tax.
 - Because I was never asked to pay.
- “Now, think of all the money from the 2016 property tax campaign that the provincial government spends. In what sectors will it spend this money? Choose the sector in which you think it will spend the most money. Now choose the sector in which you think it will spend the second most money.”

A secondary hypothesis I hope to examine is that the program might strengthen individuals' beliefs about the importance of property rights. In focus groups, some Kananga residents suggested that what moves individuals to pay property taxes is the desire to have proof that a compound belongs to you. Official land tenure documents are rare (about 15% according to pilot data), so a simple receipt for a property tax could help prevent being expropriated by the government or another party.²⁶ As such, a series of questions in the endline survey ask gauge the strength to which individuals perceive property rights as inviolable, or whether they have more of a customary concept of property rights in which all land ultimately belongs to the state or to one's ancestors. Such questions include:

- “If a family owns a piece of land that is not using, how acceptable is it if the government uses it for a temporary project?”
- “If a family owns a piece of land that is not using, how acceptable is it if another family occupies it for a time?”

²⁶It is not uncommon in Kananga for individuals to try to sell the compounds of others while the owners are away on a trip. Often one sees “this compound is not for sale” written in large font on the walls of houses in the city to try to prevent others from engaging in such chicanery.

- “Now I’d like to ask about the main reasons for which other people in Kananga pay the property tax. For each of the following possible reasons, please tell me if you think this reason was very important, important, somewhat important, or not important in people’s decision to pay the property tax. Item: Because they want to maintain good property rights.”

These pre-specified regressions do not constitute the full intended domain of the analysis and merely constitute the primary regressions related to evaluating the average direct effect of the treatments on outcomes.

4.4.1 Preliminary analysis of monitoring survey data

Although the author remains blind to treatment in the full monitoring dataset—not to mention the endline survey data, which has not yet been collected—a few preliminary analyses were undertaken to construct the quarterly audit reports for the government and to plan for the endline survey. The author thus descrambled treatment in an abbreviated monitoring dataset that contains (i) information about tax collector visits, taxation, and bribery, (ii) the wealth and income information about respondent households.

The reason for (i) was primarily to publish the quarterly audit reports demanded by the government and the basis of the Audit Intervention mentioned above. For these reports, the total amount of money households reported paying in taxes was reported to the government on the polygon level. This amount was then compared to the amount in the bank’s database for each polygon. The total amount missing was then noted, along with the names of the assigned collectors. No comparisons were made across audited and non-audited polygons, as all data collected from the latter type polygon remained unknown to the government in accordance with the audit intervention.

Additionally, this information was examined during the development of the endline survey and this pre-analysis plan to test the anticipated strength of the ‘first stage’ for this paper—the effect of the program on collector visits, tax payment, and bribe payment—given this

small, preliminary sample. Results from these regressions are shown in the first table below. Households in treated polygons receive on average 1.5 more visits than households in control polygons. Such households are also more likely to pay taxes and to pay bribes. This exercise informed the planned analysis of the endline survey (see Section 4.2). In particular, the instrumental variables approaches were devised to try to identify separately the effect of paying taxes from the effect of paying bribes, since both appear to increase with the program.

The second table reveals that, at least in this sample, the audit and information treatments do not appear to radically shift the distributions of tax payments and bribe payments. The coefficients on the Program - Information interaction has a negative coefficient, suggesting a decrease in bribes, but this is not statistically significant. The coefficients on the Program - Audit interaction are unambiguously zeros, except in the Visits column: the threat of audits appears to reduce the number of visits that collectors make. Of course, these results may look dramatically different when run on the final sample. Still, they were informative in suggesting a need to consider other instruments to exogenously shift taxes vis-a-vis bribes, as discussed in Section 4.2.

	Visits	Visits	Taxed	Taxed	Bribed	Bribed
Program	1.504***	1.404***	0.164***	0.105***	0.026**	0.010
	(0.061)	(0.072)	(0.025)	(0.027)	(0.010)	(0.009)
ProgXNiceHouse		0.305**		0.125***		0.012
		(0.119)		(0.044)		(0.021)
NiceHouse		-0.080		-0.004		-0.008
		(0.078)		(0.016)		(0.007)
Constant	0.115	0.204	-0.038	-0.034	0.014	-0.005
	(0.121)	(0.145)	(0.030)	(0.033)	(0.024)	(0.005)
Stratum FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	544	490	544	490	544	490
R^2	0.561	0.571	0.131	0.161	0.048	0.061

Standard errors clustered by polygon.

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

	Visits	Taxed	Bribed
Program	1.647*** (0.099)	0.144*** (0.039)	0.043** (0.019)
ProgXAudit	-0.361*** (0.096)	0.001 (0.042)	-0.005 (0.016)
Info	0.019 (0.070)	0.005 (0.022)	0.010 (0.009)
ProgXInfo	0.056 (0.129)	0.039 (0.043)	-0.029 (0.019)
Constant	0.122 (0.102)	-0.040 (0.033)	0.009 (0.024)
Stratum FE	Yes	Yes	Yes
Observations	544	544	544
R^2	0.579	0.134	0.053

Standard errors clustered by polygon.

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

The reason for de-blinding myself to the wealth module data, (ii) above, was to understand the composition of households who are being visited by collectors and who are paying taxes. This information will inform the sampling strategy of the endline survey. As noted in the first table, houses that are above-median quality (based on enumerators' judgments of the roof and wall materials) are both more likely to receive subsequent visits by tax collectors and more likely to pay taxes. This confirms the author's suspicions that in particular the collector spend more effort trying to collect taxes from more well-to-do households.

Note that this random sub-sample of monitoring survey data is distinct from the final endline survey data that will be used for the analysis. The data used here are effectively a pilot with which to plan future sampling and analysis strategies. Apart from the tables reported in this section, no further analysis of these data has been conducted before the

publication of this PAP.

5 Topic 2: top-down versus bottom-up approaches to corruption

The second proposed paper focuses on the effects of the audit and information interventions on corruption in the context of the tax program. As noted, sending tax collectors on the ground to produce revenues increases opportunities to collect bribes or extort citizens. Although the government hopes that tablets and printers will diminish this possibility, collectors might still find ways of collecting money on the side. For example, collectors could tell households that if they give them a bribe b instead of the tax τ , where $b < \tau$, they will leave them alone. They would not issue a receipt in this case, so no record of this transaction would exist. Alternatively, collectors could exploit uncertainty about the tax rate, due to the novelty of this campaign, to extort tax payers. They could, for example, claim the tax is 2τ , issue a receipt for τ , and pocket the difference. Finally, they could exploit uncertainty about the procedures of the tax campaign, in particular the fact that only *printed* receipts are considered valid. With hand-written receipts, citizens may think they have participated in a legitimate transaction when in fact the money will not end up in the state account.

One point of consensus in the corruption literature is that top-down government audits are moderately effective in reducing bribe taking. For example, Olken's (2007) audits reduced estimated missing expenditures by 8% in the context of road-building projects in Indonesia.²⁷ This study therefore includes a government audit treatment. In half of the neighborhoods that receive the the program, quarterly reports from surveys conducted by independent enumerators are shared with tax ministry leadership. As noted, these reports compare official program data to households' self reports to estimate if money is missing from each selected neighborhood. The tax ministry publicly pledged to sanction collectors found to be pocketing money during the campaign. The fear of such sanctions should increase honesty in audited polygons if these threats are credible. Independent enumerators will also collect

²⁷Olken, Benjamin, "Monitoring Corruption: Evidence from a Field Experiment in Indonesia," *Journal of Political Economy*, 115 (2007), 200-249.

information in non-audited, treated polygons and in control polygons. But they will not transmit this information to the government.

However, such audits are often expensive to conduct and require a certain amount of state capacity that some provincial administrations lack in the absence of external partnerships. Their effectiveness also depends on the credibility of the threat of sanctions. If those who receive the audit results are also viewed as corrupt, such forms of monitoring may have limited impact. In fact, the magnitudes of the estimated effects reported in evaluations of similar interventions are often somewhat modest. In the Olken paper, for example, increasing the probability of audit to 100% reduced missing public money by 8% but the level still remained at 19% in audited sites.

One area that has attracted recent interest is targeting the information asymmetries that lie at the heart of many opportunities for corruption.²⁸ As noted above, when an official has more information about the tax rate and the procedures associated with paying the tax, he or she can exploit these to extort citizens or convince them to pay bribes instead of taxes. Could simply providing citizens information about the tax rate and the collection procedure offer an inexpensive way to reduce corruption?

To try to answer this question, the citizen-level information treatment (described above) is also cross-randomized in all polygons. This information treatment is cheaper and considerably easier to implement than the audit treatment, so comparing their effect sizes will be meaningful. Moreover, simultaneously intervening on the citizen-side and the collector-side in a tax-collection transaction creates an opportunity to test for complementarities between these approaches to reduce corruption. Perhaps the combination of these interventions could lead to larger or longer-term reductions in bribery and extortion, as both parties—collector and citizen—adjust their expectations, and a new, more honest equilibrium is reached.

The main estimating equation is:

²⁸See, for example, Banerjee A et al. Tangible Information and Citizen Empowerment: Identification Cards and Food Subsidy Programs in Indonesia. Mimeo, 2016.

$$\begin{aligned}
y_{ijk} = & \beta_1 I_{jk}^{Prog} + \beta_2 I_{jk}^{Prog} * I_{jk}^{Audit} + \beta_3 I_{jk}^{Info} + \beta_4 I_{jk}^{Prog} * I_{jk}^{Info} \\
& + \beta_5 I_{jk}^{Prog} * I_{jk}^{Audit} * I_{jk}^{Info} + \alpha_k + \mathbf{X}_{ijk} \mathbf{\Gamma} + \mathbf{X}_{jk} \mathbf{\Phi} + \varepsilon_{ijk} \quad (6)
\end{aligned}$$

This is the same set up as Equation 3, but here y_{ijk} is bribe payment or extortion.²⁹ These were intermediate outcomes in the analysis for Paper 1, in which it is necessary to try to net out the effects of paying bribes on political outcomes, in order to try to unpack the effects of taxation itself. For this paper, corruption is the outcome of interest. As noted, hypotheses for the effects of the different corruption interventions on bribe payment are as follows.

Bribe payment or extortion on the LHS:

1. $\beta_3 \leq 0$: info treatment decreases bribes (and extortion) in control.
2. $\beta_1 \geq 0$: program increases bribes (and extortion).
3. $\beta_2 \leq 0, \beta_1 + \beta_2 \geq 0$: Audits decrease bribes (and extortion) relative to program without audits, but still a net increase relative to control.
4. $\beta_4 \leq 0, \beta_1 + \beta_4 \geq 0$: Info decreases bribes (and extortion) relative to program without info, but still a net increase relative to control.
5. $\beta_5 \leq 0, \beta_1 + \beta_2 + \beta_5 \geq 0, \beta_1 + \beta_4 + \beta_5 \geq 0$: audit and info treatments together further decreases bribes (and extortion), but still a net increase in relative to control.

It is assumed that bribes and extortion will move together and respond in the same direction to the corruption interventions. In short, I hypothesize that both corruption interventions will decrease bribes and decrease extortion. The key difference is that the information should affect extortion more powerfully than in affects bribes. It is easier for

²⁹I will also estimate a version of this equation with dummies for each treatment cell instead of these interactions, as in Equation 4, for the same reasons (of power) discussed above.

collectors to extort individuals who are uninformed about the tax rate. Thus, I hypothesize that the coefficient $\beta_4^{Extorted} \leq \beta_4^{Bribed}$: there will be a larger reduction in extortion due to the information treatment (relative to areas that get the program but do not receive the information treatment) than in bribery. The reason for this is that information should counter information asymmetries that can be exploited by tax collectors to charge more than the correct tax—in other words, to exploit taxpayers. Information could also decrease bribes if it reduces uncertainty about the tax rate and if citizens have a preference for paying the true rate. However, the prediction for extortion is stronger.

5.0.1 Outcomes

The primary outcomes are the rate of bribery and of extortion, which will be measured as proposed in section 3. More specifically, it will consider as indicators of corruption: (1) amount missing (continuous), (2) any money missing (binary), (3) amount taken in cases of bribery, (4) any case of bribery, (5) amount taken in cases of extortion, and (6) any case of extortion. Due to measurement error concerns additional measures include individuals' estimates regarding how many of their neighbors have paid bribes. The following questions seek to measure this: “In your opinion, how people on your street have paid a bribe to avoid paying the property tax in 2016?” Although individuals might hide if they paid bribes, suggesting that their neighbors paid bribes provides an estimate of bribe payment that could be measured with less error. Similarly, I will ask the going rate for bribes to measure the magnitude of the equilibrium bribe: “If you had to guess, how much would one have to bribe a tax collector to avoid paying the property tax?”

In addition to these main outcomes, I plan to consider several related secondary outcomes.

- **Total bribes paid in Kananga.** Exposure to legitimate government tax collection could have spillovers on other informal bribe payments. Citizens who pay their taxes officially might update about the capacity and legitimacy of the state in such a way that leads them to reject other bribe payments they might have made elsewhere in

Kananga (at tolls, for example, or at the passport office). I plan to test for such externalities by collecting the full set of formal and informal payments to state agents. Survey questions are as follows:

- Example: “Now, putting aside the property tax campaign of 2016, I would like to ask about other payments that one must make to government officials in Kananga.’ What other payments to government officials did you make in 2016?”
 - Example: “How much do you think you paid in total to government officials in 2016?”
 - Example: “Now, please compare money paid during the property tax campaign of 2016 with tablets and printers to the other payments made by citizens to the government. In which of these do you have more confidence that the money will go into the state account instead of the officials’ pockets?”
- **The perceived acceptability of corruption.** A combination of survey questions and vignettes seek to determine participants’ views about the legitimacy of paying bribes and of embezzlement. It is possible that the program might simultaneously cause an increase in bribes—because tax collectors are on the ground for the first time—while also leading other individuals to view such transactions less favorably because they have been exposed to more legitimate practices involving state agents. That is, my hypothesis is on net the program will decrease the perceived acceptability of bribe taking. Questions seeking to measure individuals views about to what extent it is acceptable to pay bribes / collect bribes include the following:
 - Example: “Now imagine your neighbor pays a bribe instead of paying the tax. In your opinion, how acceptable is this?”
 - “How acceptable do you think it is when an agent of the provincial government reduces the price of a tax, putting the money in his pocket instead of the state account?”

Note that survey questions consider both sides of the bribe transaction: whether it is acceptable when a state agent accepts a bribe and whether it is acceptable when a taxpayer pays a bribe. My hypothesis is the program will have a stronger effect on the former: individuals will view collection of bribes by state agents less favorably. However, I hypothesize that both sides of the bribe-taking transaction will be viewed less positively due to the increased state legitimacy represented by the tax program.

- **The perceived prevalence of corruption.** Survey questions and vignette experiments will ask participants how prevalent they believe high- and low- level corruption to be in Kananga. I hypothesize individuals will view corruption to be less frequent in Kananga due to the experience of seeing tax collectors using tablets and receipt printers that leave a paper trail. Such questions include:
 - Example: “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? How much of this money will they put in their pockets?”
 - Example: “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? Diversion of funds and waste?”
 - Example: “How honest do you think the provincial government agents are?”
 - Example: “In your opinion, how many people on your street have paid a bribe to avoid paying the property tax in 2016?”
- **Information about property taxes and the on-the-ground collection campaign.** Individuals will report their familiarity with the property tax, included details such as the amount due, the type of receipt that one should receive upon payment, and

the name of the tax ministry administering the program. I hypothesize that individuals in polygons that received the information treatment will have more information about the property tax and the on-the-ground program. Further, I hypothesize that individuals who received the read-out version of the treatment will have more such information.

5.0.2 Heterogeneity

In addition to the analysis of Equation 6, I also plan to consider heterogeneous treatment effects based on the following covariates.

- **Read-out information treatment.** I plan to test for heterogeneous effects based on whether households received the read-out version of the treatment. As noted, a handful of households in every polygon were randomly selected for baseline surveys, during which the enumerator read out the information contained on the treatment flier or the control flier. Given that illiteracy rates are high, and that individuals might not have taken the time to read the flier carefully, this read-out version of the treatment is likely to have a stronger effect than simply living in a polygon that receives a given flier. The hypothesis is thus that the coefficient for read-out households will be greater in magnitude (more negative) than the coefficient on non-read-out households. Similarly, I hypothesize that non-literate individuals will see smaller effect sizes for the information treatment, unless they received the read-out version.
- **Ethnic homogeneity of the neighborhood.** Recent research suggests that ethnic homogeneity facilitates the flow of information.³⁰ Using data on the ethnic makeup of different polygons in Kananga, I will test the hypothesis that more ethnically homogeneous neighborhoods are likely to have been better informed about the tax campaign. In such neighborhoods, then, I hypothesize that the information treatment will have a stronger effect (a more negative coefficient).

³⁰See for example Larsen J and Lewis J, "Ethnic Networks" American Journal of Political Science (2016).

- **Compound layout within the neighborhood.** Certain neighborhoods tend to have compounds with more dwellings than do compounds in other neighborhoods. I will test if the flow of information, and the consequent effect on corruption, is mediated by such neighborhood characteristics. My hypothesis is that the many-people-per-compound construction layout will foster communication flow and increase the impact of the information intervention.
- **Collector characteristics.** Much of this will be discussed in section 6, but it bears referencing briefly here due to overlap. I will measure if bribe payments are more likely when households share the same ethnicity and/or home village as the tax collectors randomly assigned there. I hypothesize that bribe payment increases with co-ethnicity or co-village status. However, I predict that this will occur alongside an increase in legitimate payment. Thus, when household heads are from the same village and/or ethnicity as the tax collector, both bribe and tax payments will increase. Furthermore, I will measure if bribe payments are more likely when a collector is working in his or her own neighborhood. I hypothesize that, again, both tax and bribe payment will increase.

6 Topic 3: bureaucrat performance

A related topic, which might naturally fit with the analysis proposed in the previous section or emerge as a separate paper, concerns how tax collector characteristics affect the probability of tax collection and bribe collection.³¹ Exploiting the fact that collectors were randomly assigned to neighborhoods (in groups), this paper seeks to identify what characteristics appear to predict tax collector effectiveness and honesty. Surveys and behavioral experiments will be administered to the tax collectors *after* the campaign to measure certain traits and propensities that are unlikely to have been affected by working on the campaign. This line of analysis seeks to contribute to the literature about bureaucrat effectiveness, bureaucrat selection, and the correspondence of lab-based measurements and public-sector performance.³²

The estimation of the principal outcomes will be similar to that discussed above:

$$y_{ijk} = \beta_1 \zeta_{jk} + \alpha_k + \mathbf{X}_{ijk} \mathbf{\Gamma} + \mathbf{X}_{jk} \mathbf{\Phi} + \varepsilon_{ijk} \quad (7)$$

Here, ζ_{jk} is the collector characteristic of interest (see below), combined linearly for the three randomly assigned collectors. β_1 estimates the change in the outcome associated with a unit increase in characteristic ζ_{jk} for the team of collectors assigned to polygon j . The sample here is therefore restricted to those 253 polygons that received the tax program. Most outcomes will be on the individual level, while these collector characteristics were randomly assigned on the polygon level. The rest of the notation is analogous to that used above.

The main outcomes to be considered in this paper are (1) tax collection, (2) bribe collection and/or extortion, (3) collector effort, (4) citizen satisfaction with and beliefs about tax collectors. Outcomes 1-3 are standard ways of evaluating the work of bureaucrats: the

³¹As noted above, this section was modified and re-published on March 1, 2017, on the second day of enumeration for the collector survey. No other sections of the PAP were changed in this re-publication.

³²See Callen M et al, "Personalities and Public Sector Performance: Evidence from a Health Experiment in Pakistan," Working Paper, 2014; Ashraf N, Bandiera O, and Lee S, "Do-gooders and Ladder Climbers: Career Incentives, Selection and Performance in Public Service Delivery," Working paper, 2014; Hanna and Wang "Dishonesty and Selection into Public Service: Evidence from India" Working Paper, 2015.

amount of outputs, the amount of leakage, and some observable implication of effort (in this case, citizens' reports about the number of home visits paid by tax collectors). The fourth outcome seeks to gauge citizens' reactions to different tax collector characteristics. This is included due to multi-tasking concerns: perhaps the most 'productive' collectors, in terms of raising revenues, also harass citizens such that their views of the government deteriorate.³³ This is particularly a concern in this case due to the fact that collectors received bonuses based on revenue generation, and thus they had high-powered incentives which could have crowded out other desirable qualities such as professionalism and respect for citizens during collection.

A number of collector characteristics will be collected and tested. The following set of characteristics was collected prior to the program; associated hypotheses are also described.

- **Ethnicity and village of origin.** As noted in the previous section, I will consider the effect of coethnicity (and common home village status) between tax collector and citizen on tax or bribe payment. Ex ante, it is not clear whether coethnicity will increase or decrease the probability of corruption. On the one hand, perhaps collectors favor coethnics and so would not consider extorting them. On the other hand, perhaps they can use their common ethnicity to get these individuals to pay more, making extortion more likely. This latter hypothesis is consistent with Kasara (2007).³⁴ As noted above, I hypothesize that sharing ethnic or geographic family heritage will be associated with an increase in both bribes and taxes.
- **Experience as a tax collector.** One question I can answer is: are more experienced tax collectors more professional and less likely to be corrupt? Or, alternatively, are they safer in their jobs and thus less fearful of consequences if their bosses find out they have pocketed tax money? My hypothesis is that experience is associated, in this setting,

³³Homgstrom B and Milgrom P, "Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design," *Journal of Law, Economics, and Organization*, Vol 7, 1991: 24-53.

³⁴Kasara K. "Tax me if you can: Ethnic geography, democracy, and the taxation of agriculture in Africa," *Am. Pol. Sci. Rev.* 101; 1, 2007.

with worse outcomes: fewer tax receipts, more corruption, lower effort levels, and less citizen satisfaction. Note that this relationship might be conditional on employment status. Some of the collectors were salaried employees of the tax ministry; others were interns who depended on the tax program's bonus structure for remuneration. Thus, years of experience will be interacted with employment status at the tax ministry. Similarly, I expect those who were fully employed (compared to the interns) will have worse outcomes, on average. The rationale is that interns had stronger incentives to work hard on the campaign because they did not receive regular compensation outside of the bonus system described above; tax ministry leadership also told interns that high performers in the campaign would be prioritized among new hires. Anecdotally, interns appeared more motivated than full-time employees, who often started work later in the day and/or returned earlier. I have weaker priors about whether citizen approval of tax collectors will be higher for interns; it is possible that because they are responding more to the bonus-based incentives that they treat households worse than do salaried employees.

- **Test score during training.** Tests were administered among all collectors during training for the program. Collectors needed to achieve a minimum score to participate. The material on the test was based on comprehension of the rules of the program. This comprehension is a proxy for intelligence and is analogous to evaluations from standard job screening processes. As such, it will be informative to see if those individuals who performed best during the training—and whom correspondingly most impressed the managers of the program—turned out to be the best collectors? Did they bring in more tax revenue and collector fewer bribes? My hypothesis, based on anecdotes and observation, is that there will be no correlation between such test scores and performance. In fact, some of the subjectively best performers in training turned out to be desultory tax collectors. A null result here would provide interesting evidence for how public-sector workers are recruited in developing countries.

- **Political connections.** The pre-program survey included collectors' political connections—that is, whether they got their job at the tax ministry thanks to a family connection with the government, and if so, what connection.³⁵ While most everyone has some family connection, the centrality of the connection varies from being in the nuclear family of a provincial legislator to being the cousin of a technician. How such centrality affects collector quality will be examined. My hypothesis is that centrality of political connections will be associated with worse outcomes: fewer tax receipts, more corruption, lower effort levels, and less citizen satisfaction. The logic is the same for that above: better connected individuals are likely to respond less to program incentives because they benefit from other political rents; they will be less likely to exert effort on the tax campaign.
- **Group monitoring.** Similarly, I plan to explore whether collectors appear to be more or less honest when working in pairs. Again, it is not clear *ex ante* what to expect. It is possible to imagine that tax collectors will monitor each other when they are working together, such that corruption will fall. On the other hand, working in pairs gives each collector plausible deniability if caught in addition to a sense of 'strength in numbers', and may in fact embolden collectors to try to extract *more* bribes than they otherwise would have. Unfortunately, I do not have random assignment of pairs or solo collectors due to the logistical challenges this would have represented. However, I do have detailed daily information on which collectors were in which polygons each day of the campaign. Variation in whether collectors worked alone or in pairs was driven chiefly by (i) the partner working in a different polygon that day to cover more ground or attend to existing appointments, or (ii) the partner being unavailable to work for the day (for example, because he or she was sick). Although not exogenous, this variation in whether or not tax collectors worked together or in pairs was highly idiosyncratic and worth exploiting to generate suggestive evidence on the effect of group monitoring

³⁵These connections will be verified by questionnaires filled out by several individuals in the tax ministry.

on productivity and collector honesty. Seldom did the collectors plan ahead to work together (many don't have cell phones), but rather showed up at arbitrary times and then figured out what they were supposed to do that day. So in the majority of cases, it did not appear to be premeditated whether a given collector would be working alone or in a pair on a given day. Also several collectors missed work for weeks at a time due to illness or deaths in the family, which creates more plausibly random variation in this measure.

- **Peer effects.** The random assignment of collectors potentially enables analysis of peer effects in tax collection. As noted above, I will predict leave-one-out propensity scores for each collector's bribe propensity, tax propensity, and effort level. I aim to test if being assigned to one or two other collectors with higher bribe propensities, say, make a given collector more likely to collect bribes. More generally, I will examine how the characteristics of collectors j and k affect the observed outcomes of collector i when they were randomly assigned to work together. My hypothesis is that peer effects will be observed in this setting with a given collector's actions being influenced toward the mean propensity level of his or her partners.
- **Gender and peer effects.** An extension of the above question considers whether being paired with a female collector increases honesty. There is some evidence that female bureaucrats are less corrupt than their male counterparts.³⁶ I will first test if this is true in these data using the random assignment of female tax collectors. Additionally, I will test if randomly being assigned to being in a pair with a woman increases male collectors' honesty (i.e. reduces their likelihood to collect bribes or extort citizens).

The following variables will be collected in surveys and experiments conducted with collectors *after* the tax campaign was completed.

³⁶See for example Dollar D et al. "Are women really the 'fairer' sex? Corruption and women in government." JEBO 46;4, 2001.

- **Honesty measured in the lab.** The random-allocation game using unobserved die rolls to measure cheating will be administered. See section 4.2 for details on this game, which is consistent with prior work that has noted correlations between lab-measured honesty and corruption among public servants.
- **Work ethic measured in the lab.** I will employ two methods for measuring the work ethic of tax collectors. First, tax collectors will respond to a series of standard survey questions about what motivated them to work on the property tax campaign.³⁷ The second measure of work ethic will be based on collector persistence in a mildly tedious tablet game. In the first round of the game, collectors will play without any monetary payouts, but with only the encouragement ‘to try their best’ to touch as many dots as possible over the course of five minutes. In the second round of the game, they play the exact same game, but this time, each dot they successfully touch will give them a payout of 10 FC. I predict that collectors who have a higher score in the first round of the game—who demonstrate stronger intrinsic motivation to work hard—will exhibit greater effort on the tax campaign and will collect more taxes relative to those with lower game scores. Because first-round scores are unincentivized, I predict no effect on bribes; the game plausibly isolates intrinsic motivation. The second round of the game is a proxy for extrinsic motivation. I predict that collectors with high scores in the second round of the game will collect more taxes and more bribes. I will code up collectors’ extrinsic motivation in two ways: (1) their absolute scores in the second round of the game, and (2) their relative scores in the second round compared to the first round.
- **Soft skills.** A survey module will try to measure collectors so-called ‘soft skills’, such as their ability to communicate and connect with others. Namely, each collector will be

³⁷These survey questions will be analyzed in indices for (1) intrinsic motivation, (2) external regulation, (3) introjected regulation, and (4) amotivation. This formulation follows Tremblay et al, “Work Extrinsic and Intrinsic Motivation Scale: Its Value for Organizational Psychology Research,” *Canadian Journal of Behavioural Science*, 2009, Vol. 41, No. 4, 213-226. Three additional questions were added to ask collectors about more context-specific, idiosyncratic reasons they felt motivated to work on the tax campaign.

asked to evaluate their conscientiousness, extroversion, optimism, and aggression in a series of survey questions, which will ultimately be put into indices for each characteristic in the subsequent analysis. Questions on conscientiousness and extroversion come from the literature on the “Big Five” Personality Traits.³⁸ Questions on optimism come from Laajaj and Macours’ forthcoming (2017) paper on farmers in Kenya.³⁹ Finally, aggression questions come from the physical aggression, verbal aggression, and anger sub-sections of the Buss-Perry Scale.⁴⁰ All survey questions were translated from the original English into French and Tshiluba, the most commonly spoken languages in Kananga.

Since not everyone pays taxes—and the probability of punishment by the state is revealed to be less than 1—collectors have a role in *convincing* citizens to pay. As such, I hypothesize that those with stronger soft skills, such as extroversion, optimism, and conscientiousness, will be better at convincing households to pay taxes. I also predict that they will be more likely to exert effort in the campaign and will visit more households. I do not have a strong prediction for the effects of these traits on bribe collection, though this could mechanically increase from increased effort. Similarly, I hypothesize that aggressiveness will correlate with higher rates of tax and bribe collection. Aggressive tax collectors might be able to trick citizens into thinking that the probability of punishment for non-payment is higher than it really is, which could induce them to pay more frequently.

- **IQ.** Standard intelligence quotient questions will be administered, including basic math questions and reading comprehension tests. The basic math questions assess the tax collectors’ ability to add, subtract, multiply, and figure out percentages—skills that in theory could be useful to tax collectors. Reading comprehension tests consist of two

³⁸The specific questions asked were inspired by Callen et al’s (2014) work on public-sector workers in Pakistan.

³⁹Laajaj R and Macours K, “Measuring Skills in Developing Countries,” Working Paper, 2017

⁴⁰Buss A and Perry P, “The Aggression Questionnaire,” *Journal of Personality and Social Psychology*, 1992, Vol 92.

paragraphs, one in French and one in Tshiluba. The tax collectors will be asked to read each paragraph, and enumerators will rate the quality of their reading and the confidence with which they read the paragraphs. Consistent with the prediction about the training test, I anticipate no correlation between these measures of intelligence and cognitive ability and the collector performance indicators of interest.

- **Locus of control.** In the survey, tax collectors will choose between two to three statements gauging the extent to which the respondents attribute outcomes in life to luck or to effort. These questions will be combined into a locus of control index. I predict individuals with a stronger sense of being in control of their life will collect more taxes and exert greater effort.
- **Discounting.** A series of standard discounting questions ask tax collectors to choose between payoffs of different amounts and delivery times. The more immediate payoff is for less money, the more distant for more money. To motivate participants to take the choices seriously, they are told that after answering all of the questions, one of them will be randomly selected and paid out according to the choice. I predict that those who discount the future more, according to this measure, will be more likely to collect bribes rather than taxes.
- **Household size and income.** I predict that collectors with (i) larger families, and (ii) lower household income may face more binding liquidity constraints and thus will be more likely to collect bribes. This will be measured with error since it is time dependent, and I will be measuring it at endline. Nonetheless, even level differences in the incomes of collectors and in household size might be predictive of the extent to which liquidity constraints bind in general for these individuals. I also measure collectors' other sources of income—for instances, if a given collector runs a store on the side. Those with multiple sources of income are expected to spend less time on the campaign and collect fewer taxes.

- **Confidence in the government.** Trust in government institutions will be measured by survey questions on (1) how tax collectors perceive the government will spend the money they collect, (2) if tax collectors believe that those who pocket taxpayer money will be punished, and (3) whether tax collectors have confidence that the best interns will be hired as promised by the tax ministry. I predict that high levels of confidence in the government will correlate with greater effort and tax collection and with less bribe collection. In particular, collectors who believe theft will be punished by the government are predicted to collect fewer bribes than those who think the threat of such sanctions are not credible.
- **Habits.** Measures of sleep quantity and quality, as well as alcohol consumption will be included in the survey with tax collectors. I predict that tax collectors who sleep more and/or attain a higher quality of sleep will collect more taxes. I predict tax collectors who drink more will collect fewer taxes but accept or ask for more bribes.

Although it is possible that these traits could have been affected by the program—and would therefore be endogenous as independent variables—this is unlikely. The experiment-based measurement strategy seeks to pick up intrinsic traits and propensities. For instances, it is difficult to imagine how participation in the program could meaningfully impact the intelligence quotient or emotional quotient of collectors. As such, these variables are plausibly exogenous and will be analyzed as such.

6.1 Effects of the program on tax collectors

An extension of this subject looks explicitly at how tax collectors themselves might have been shaped by the program. Although I have no way to identify the average effects of the program—because assignment of collectors to the program was done non-randomly by the tax ministry—it is possible measure how the random assignment to different polygons and to different teams affected individual collectors. In addition to estimating peer effects, as

noted above, I will measure test the following hypotheses.

- **Assignment to poor polygons decreases perceived legitimacy of the government.** Due to randomization, all tax collectors were assigned to work in poor neighborhoods and some relatively richer neighborhoods. However, there is variation in the number of very poor polygons in which collectors worked. With survey data, I will construct an average wealth measure for each polygon. I will then measure what percentage of a given collector's polygons were below the median wealth level. I will then use this as a regressor to study how working in poor neighborhoods affects the morale of tax collectors. Outcomes include a series of survey questions about the provincial government and its efforts to build a tax base in Kananga. These questions will be put into indices and analyzed in an average-effect size (AES) framework.
- **Time working on the tax campaign decreases collectors' belief in mission.** Due to variation in the start and end time of different collectors, there is also variation in the number of polygons in which collectors worked. Collectors who worked during the entirety of the campaign worked in 20 polygons; some interns joined for the final three months and only worked in 8-10 polygons. This variation will be used to study how time spent working on the campaign affects collectors' beliefs about the government. I hypothesize that more time spent working on the campaign leads collectors to believe less strongly in the mission behind the program. That is, I expect the longer collectors worked on the program, the lower will be their evaluations of the government's goals in launching the campaign.

7 Topic 4: citizen-side determinants of tax compliance

A final tack of the analysis focuses on the puzzle that individuals pay taxes at all. As noted, the 16% compliance rate reveals that the collectors actually have little coercive power to extract taxes if people are unwilling to pay. In fact, for the majority of taxpayers (who

face a rate of 2,000 CF), it would probably cost the government more to send the police to extract the tax than they would gain if the person paid. Anticipating this, many citizens may be calling the bluff of the government by refusing to pay. They know that the threat of sanctions is not credible. (This is likely untrue for individuals in the higher tax brackets.)

The puzzle then becomes: why does anyone in the bottom bracket actually pay taxes if the probability of facing sanctions or fines after refusal is low? Of course, who pays taxes is partly determined by collector covariates, as discussed in the previous section. Some individuals do not pay because they are not revisited by tax collectors after the census survey. The effort and skill level of tax collectors is thus a key determinant of compliance. As such, it may make sense to merge this and the previous section into a single paper that focuses on both sides—collector and citizen—of the tax compliance function. For clarity in this PAP, citizen-side determinants of are discussed in this section as they are not identified by the randomized structure of the experimental design. But they are still worth analyzing and might shed light on the puzzle of why some individuals choose to pay taxes in a low-capacity, low-compliance setting (conditional on being visited by tax collectors).

Perhaps the most obvious hypothesis worth exploring is that income or wealth determine the probability of payment. Despite the progressive tax schedule, it may well be that paying the property tax is a smaller burden to relatively well-to-do individuals in Kananga. If citizens are trading off this cost with the anticipated probability of sanctions if they don't pay, the solution might simply be different for those with greater means. A detailed income and wealth module will be administered to explore this issues. Relatedly, a consumption module will be administered to participants to try to identify what the tax money comes out of. That is, for those individuals who have no slack in their budgets, what do they consume less of to accommodate paying the tax? This will have implications for understanding the distortions caused by the first-ever widespread enforcement of the property tax.

But conditional on a given wealth and income level, there is still unexplained variation in tax payment. The notion of “tax morale” may help: a culture or norm of compliance

might offer a more apt description of individuals' motivations for paying taxes in many settings.⁴¹ One might operationalize the notion of tax morale as an individually varying intrinsic propensity to pay taxes. Alternatively, tax morale might operate on a group level. For example, Besley et al (2014) also include a social reputation term in the decision whether or not to pay taxes.⁴²

Building on the insight about possible reputational motives to paying taxes from Besley et al 2014, I will asked participants if social esteem factored into their decision. Paying taxes in this context is unlikely to be a private transaction. Tax collectors with tablets and portable printers was surely an unlikely sight, especially in the more remote corners of Kananga. When an individual pays taxes, it might be directly observed by neighbors; if not observed, it is likely that word about tax payment probably will spread among other nearby property owners, who are deciding whether or not to pay themselves. There are two points to emphasize here. The first is that there might be positive externalities to tax payment in the form of increased tax payment among neighbors. If individual i hears that her neighbor paid the tax, then she might update about the probability of punishment or about the social importance of payment, thereby increasing her own willingness to pay.

The second point is that individuals might get utility from paying taxes through these reputational mechanisms. In cultures that value public displays of wealth and "big man" status, it is natural to hypothesize that some will seek to pay in order to demonstrate that they can pay to their neighbors or others who will learn about the transaction. Although trying to measure the importance of social esteem is difficult, it could provide suggestive evidence about the role of this motivation in the decision to pay taxes in the average household in Kananga. Another observable implication of this hypothesis is that individuals who are better connected socially will be more likely to pay. A social network module will therefore be administered with the goal of measuring connectedness and investigating if this appears correlated with tax payment.

⁴¹See, for example, Luttmer EFP and Singhal M, "Tax Morale" Journal of Economic Perspectives, 2015.

⁴²Besley T, Jensen A, Persson T, "Norms, Enforcement, and Tax Evasion", Mimeo 2014.

A more general question about tax compliance is how it interacts with other forms of civic participation. On the one hand, citizens might contribute to the public good in other ways that they view as substitutes for tax payments. For example, across Congo, Sundays are the time of *salongo*, street sweeping conducted by the members of the neighborhood. Do individuals who participate in *salongo* feel exempt from paying taxes because they already contribute to the public good? Or, conversely, are certain individuals more inclined to pay taxes and to participate in *salongo*? In other words, is taxation and participation in local public goods provision substitutes or complements? Some African states appear to take the former point of view, offering citizens a choice between contributing money or labor (toward a local public goods project like latrine building) as their civic duty.

I aim to analyze these correlations in the project data to investigate whether contributing to public goods and paying taxes appear to both be driven by some intrinsic civic spirit, or whether citizens view their civic obligation fulfilled given either form of participation. Also, a set of more open ended questions will ask individuals why they did or did not pay. Their responses will provide qualitative evidence about why some individuals are motivated to pay taxes while others are not.

Another factor that might influence citizens' decisions about tax payment is awareness of being legible to the state. There is likely substantial variation in the extent to which citizens understand they are in the tax ministry database because of the program. Do citizens know their codes? Do they anticipate annual visits from tax collectors, or do they think the 2016 campaign was an one-off event? A number of survey questions will seek to shed light on how citizens understood the various components of the program—the census survey and code assignment, the subsequent visits by collectors, the threat of sanctions in the absence of payment—and to see how their understanding affects the probability of tax payment. Although not identified, such analysis will provide suggestive evidence about the correlates of tax compliance in a low-capacity, and low-compliance, setting

A more mundane but potentially important determinant of tax compliance is simply

presence at one's house during the hours that collectors are likely to visit. Gender norms in congo are such that typically the father or grandfather is the household head who is expected to deal with responsibilities like paying taxes. Although the availability or 'findability' of an individual is difficult to measure precisely, one compelling quasi-experimental measure is how difficult it was for enumerators to find this individual for their surveys. Some individuals are readily available at their houses for interviews, while others require multiple revisits. This generates a useful estimate of the availability of a given individual. Less availability will surely be associated with lower probability of tax payment. Although such a result would hardly be shocking, it could explain a substantial portion of the variation in tax compliance.