# Does Progressivity Raise Tax Capacity?

## Experimental Evidence from the D.R. Congo

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**Abstract**

Progressive taxation is central to high-income countries' tax systems, whereas developing countries typically use less progressive instruments. This paper studies the introduction of progressive taxation in the context of property taxes in a large Congolese city. In partnership with the provincial government, we implemented a citywide field experiment assigning neighborhoods to one of three property tax systems: (*i*) a progressive schedule, (*ii*) a proportional schedule, or (*iii*) the status quo flat fee. The progressive system raised revenue by 55% relative to both alternatives. Revenue increased throughout the property value distribution: at the top, higher statutory rates mechanically outweighed modest compliance losses, while at the bottom, lower rates induced large compliance gains that more than offset the mechanical revenue loss. Cross-randomized information treatments show that taxpayers' responses were driven by their own rates rather than by others' rates or the perceived fairness of the overall tax system. Finally, we examine how statutory progressivity maps into *effective* tax rates (ETRs). Across all systems, ETRs decline with property value — implying that the rich pay less as a share of wealth — and the slope is steepest under the progressive schedule. However, an enforcement intervention targeting higher-value properties flattens this relationship, suggesting that investments in enforcement capacity can help narrow the gap between statutory and effective tax progressivity.

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# 1 Introduction

Progressive income taxes emerged in the early 20th century alongside major revenue gains in Europe and the United States and remain central to advanced-economy tax systems (Besley and Persson, 2009; Scheve and Stasavage, 2010). Across countries today, there is also a strong positive relationship between tax progressivity and the amount of revenue raised by the income tax as a share of GDP (Figure A1). Yet whether this relationship is causal remains unclear: does progressivity increase tax capacity, and through what mechanisms?

This question is particularly important in developing countries, where governments face acute revenue gaps and significant barriers to implementing progressive taxation. These barriers include the economic structure of low-income countries – largely informal economies with low financial development – that hinders measurement of the tax base and enforcement of income taxes (Gordon and Li, 2009; Jensen, 2022).[1] There are also political economy barriers, stemming from limited political demand for progressive taxation in elite-dominated coalitions (Besley and Persson, 2014). Finally, there is state capacity itself that limits tax administration resources that are needed to implement progressive systems that are more costly to administer than simplified, presumptive tax instruments (Zolt and Bird, 2005; Regan, 2020).[2] Enabling progressive taxation by relaxing these constraints could potentially boost tax capacity while allowing governments to pursue redistributive objectives.

This paper studies the introduction of progressive property taxation in the D.R. Congo (DRC), one of the world's poorest countries, where total tax revenue remains below 10% of GDP. In partnership with the tax authority of the Provincial Government of Kasaï Central, we implemented a citywide field experiment in Kananga (population 1.6 million). During the 2024 property tax campaign, the 460 neighborhoods of the city were randomly assigned to a Progressive property tax rate schedule (41% of neighborhoods), a Proportional rate schedule (41%), or remained in the *Status Quo* flat-fee schedule (18%). Our study leverages a recent technological leap in the ability of local governments to systematically measure the property tax base, allowing the government

[1] One offsetting factor is that consumption taxes are sometimes *de facto* progressive in developing countries because of the prevalence of informal consumption among lower income population (Bachas et al., 2024b).

[2] The use of coarse tags to proxy for the tax base in presumptive systems can create inequities among similar taxpayers that hinder the desirability of progressive rates in property taxation (Best et al., 2025).

to set property taxes as a percentage of assessed value instead of flat fees and enabling experimentation with alternative rate schedules: Proportional vs. Progressive.[3]

Although proportional property taxation remains the most common system around the world, a growing number of developing countries are introducing progressive property taxation, which is a more feasible form of redistribution through direct taxation than income taxation, which remains elusive due to information and enforcement constraints.[4] To ensure that we could credibly compare the revenue impacts of Progressive and Proportional systems, our design held constant their revenue potential under full compliance. In other words, the average tax liability was constant across these treatments, but tax rates in Progressive were calibrated to pivot around this common mean, raising liabilities for higher-valued properties and lowering them for lower-valued ones.[5] All other components of tax administration — building valuation method, payment modalities, collector visits and incentives, enforcement efforts — were also held constant across treatments.

Why might a progressive tax schedule raise more revenue than a proportional one with the same average liability? Three countervailing forces are at play. The first is the *mechanical effect* of tax rate changes. At the top of the property value distribution, higher statutory rates increase tax liabilities and would mechanically raise revenue absent any behavioral response (i.e., under full compliance). At the bottom of the distribution, lower rates would mechanically reduce revenue. Second, there are *behavioral responses* to one's own rate. Facing higher rates, owners of high-value properties may reduce their compliance, thereby offsetting part of the mechanical gain at the top. Conversely, lower rates at the bottom may encourage more owners to pay, increasing compliance and revenue. Finally, there may be *second-order behavioral responses* — changes in compliance driven by awareness of others' rates and preferences over the tax

[3]The mass valuation of all buildings in Kananga uses a rich set of building characteristics measured by drone and household surveys combined with an expert-assessed training sample. As we discuss in Section 3.1, this approach to mass valuation was pioneered in Freetown (Prichard et al., 2020) and has been adopted by many developing countries in recent years (Knebelmann, 2022).

[4]One potential concern with achieving progressivity through property taxes is how capitalization into property prices might affect it. In frictionless markets, lower prices can fully offset higher taxes, so progressivity could fade. However, in Kananga the property market is thin, taxes are not salient and face limited enforcement, and there are additional financial and housing supply and demand constraints that can prevent full capitalization.

[5]Tax liabilities were systematically lower in neighborhoods assigned to Status Quo, a legacy of prior years' tax policy. Although not our main comparison of interest, when we examine revenue differences between Status Quo and Progressive or Proportional we adjust for this difference in liabilities, as discussed in Section A4.1.

rate system. If taxpayers perceive progressivity as fair, for instance, it could strengthen tax morale and raise compliance across the property-value distribution. Which of these three forces — the mechanical effect, own-rate behavioral responses, or second-order behavioral responses — dominates overall, and how their relative importance varies across the property-value distribution, is an empirical question our field experiment is designed to answer.[6]

According to administrative tax data, the Progressive tax schedule increased average revenue by 55% relative to Proportional and by 54% relative to Status Quo.[7] There is no detectable difference in revenue between Proportional and Status Quo. These effects are large, precisely estimated, and robust across a range of specifications — including alternative functional forms, sample restrictions, and accounting for potential corruption opportunities from field-based tax collection. We further show that these gains reflect taxpayers' behavior rather than differences in collector effort by (*i*) holding collectors' expected wages constant across treatments and within neighborhoods, and (*ii*) examining revenue effects among taxpayers with randomly assigned tax visit appointments, which preclude selective targeting by collectors. Both approaches reinforce that our main effects come from taxpayer, not tax collector responses, to the progressive tax system treatment.

Importantly, the Progressive schedule increased revenue throughout the property value distribution. These increases, however, reflect different mechanisms among high- and lower-value buildings. Among the bottom 90% of properties, the behavioral response to lower rates — higher compliance — more than offsets the mechanical revenue loss. In other words, enough additional payers entered the tax net thanks to lower tax rates to more than compensate for the drop in potential revenue. That lower tax rates in this part of the distribution raised revenue is consistent with past work in this setting that motivated the government to experiment with progressive tax rates in this campaign (Bergeron et al., 2024). At the top 5% of the distribution, by contrast, the mechanical effect of higher statutory rates dominates the potential decline in compli-

[6]Similarly to recent papers on property taxation in developing countries, we focus on tax compliance as the key margin of behavioral response and we abstract from real responses (Brockmeyer et al., 2023; Best et al., 2025). There is a rich set of variables used in the property value assessment and the valuation estimation process is complex, which reduces concerns over distortions in property characteristics as in the English windows tax (Oates and Schwab, 1997). Also, tax increases are not likely to impact investment in properties because the cadastral value – on which the tax is based – would not be affected by maintenance or upgrades.

[7]When we compare revenue in Progressive or Proportional to Status Quo, we adjust our estimates following a pre-specified approach to reflect the difference in average tax liability.

ance. In sum, progressivity boosts revenue both by shifting the tax burden toward higher-value property owners and by eliciting greater compliance among lower-value owners.

The revenue-maximizing tax schedule thus appears to increase in property value, much like the progressive system. To formalize this point, we estimate the revenue-maximizing tax schedule directly using random variation in tax rates within bands of property value generated by assignment to Proportional or Progressive. This variation allows us to estimate the elasticity of tax compliance with respect to the tax rate, which we apply in a standard formula for the revenue-maximizing tax rate in each property value band. The revenue-maximizing tax schedule lies between the Proportional and Progressive rate schedule and increases with property value, although the slope is flatter than under the implemented Progressive system.

To assess whether second-order behavioral responses — that is, changes in compliance driven by preferences over the tax rate system — help explain the effect of Progressive on revenue, we conduct three complementary tests. First, we embedded a cross-cutting information experiment on the back of tax bills. Randomized at the property level, treated owners received information about the distribution of tax rates in their neighborhood, while control owners received placebo information. If favorable views of progressive taxation contributed to the revenue gains, we should expect this information treatment to increase compliance in Progressive more than in Proportional. However, providing information about the tax system did not alter compliance in either system — on average or across the property-value distribution. Second, taxpayers who reported at baseline that they preferred a progressive tax system were no more likely to comply when assigned to Progressive neighborhoods. Third, assignment to the Progressive system had no measurable effect on endline tax morale or perceived fairness of the tax system. Overall, the tax rate systems were simply not salient to taxpayers: at endline, roughly two-thirds could not correctly identify which system applied to their neighborhood.[8] Taken together, these findings indicate that higher revenue in Progressive did not arise from improved tax morale linked to awareness of the system, but rather from behavioral responses to taxpayers' *own* rates.

Finally, we investigate how introducing a statutorily progressive property tax system affects the distribution of *effective* tax rates (ETRs) — taxes paid as a share of

[8]Beyond ruling out second-order behavioral responses, this low salience also mitigates concerns that awareness of the randomization itself might have affected potential outcomes or compromised external validity.

property value. Across all tax systems, ETRs decline with property value: owners of higher-value properties pay larger amounts in absolute terms, but these payments represent a smaller share of their property's value. Moreover, the ETR is higher but declines even more steeply with property value in the progressive tax system. Although high-value properties had similar ETRs in Progressive and Proportional, higher compliance among lower-value properties in Progressive raised the ETR at the bottom. Thus, although high-value properties contributed more revenue in absolute terms under Progressive, the overall distribution of ETRs was paradoxically more regressive than under a proportional statutory system.

However, targeted enforcement at the top of the value distribution can help flatten the ETR curve. In higher-value bands, randomly selected properties were informed that they would receive a visit from an enforcement team if they remained delinquent. Although no serious enforcement actions — such as seizing assets or garnishing bank accounts — were ultimately taken, the enforcement team visited most selected properties within a few weeks of the main collection phase. This mild enforcement intervention increased compliance among high-value properties and thus flattened the ETR curve, reducing its regressivity. More intensive and credible enforcement actions targeting high-value properties would likely further rotate the distribution of the ETR, with potential to bridge the gap between effective and statutory rates.

In light of the revenue gains from the 2024 tax campaign, the government decided to scale up the progressive tax system citywide in 2025. Because most property owners were unaware of the different tax systems in 2024, a natural question is whether the observed revenue gains will persist as, over time, people learn about the progressivity of the system. Several pieces of evidence suggest that the effect is more likely to grow than to fade. First, before the 2024 campaign had been announced, 67% of a random sample of taxpayers said they would prefer a progressive tax system over the alternatives. Second, we embedded a survey experiment at endline in which we made salient the 2024 tax system for treated respondents. Consistent with their baseline preferences, learning that the tax system was progressive raised perceptions of its fairness. It also increased taxpayers' self-reported willingness to pay taxes in the future. Both effects hold across the property-value distribution, including among high-value property owners who might have resented facing higher rates than others. Given that progressivity appears to align with local preferences and conceptions of fairness, it is likely that the revenue it produces would increase over time as familiarity with the tax

system grows.[9]

This paper provides the first credible evidence on the causal effect of introducing a progressive tax system on total revenue. The closest paper is Ajzenman et al. (2024), who study a series of reforms in Argentina that gradually made the property tax schedule more progressive. Their analysis exploits a regression discontinuity design to estimate the *local* compliance responses of properties near rate thresholds and a tax-letter experiment that makes the increase in progressivity salient. By contrast, we study the *aggregate* revenue effects of introducing a progressive property tax schedule relative to a proportional tax schedule — the most common policy alternative. The provincial government's decision to roll out these tax systems using a randomized field experiment allows us to estimate treatment effects on revenue both on average and across the property-value distribution. While our results point to the promise of progressive property taxation, most developing countries have proportional schedules. Given the generality of our mechanism results,[10] we suspect other low-income governments could similarly increase revenue from progressive property tax reforms — while also improving the perceived fairness of the tax system.[11]

Second, our work is part of growing interest in equity and distributional effects in the literature on public finance in developing countries (Bachas et al., 2024a). For instance, Bachas et al. (2024b) shows that, contrary to expectations that they could be regressive, consumption taxes are in fact progressive in many developing countries, due to the fact that (untaxed) informal consumption is much more common among low-income households compared to higher-income households. Best et al. (2025) examines horizontal inequities created by presumptive property taxation in Brazil, documenting sharp drops in property tax compliance across arbitrary borders that create sharp discontinuities in tax liabilities among otherwise similar houses. We contribute to this emerging literature in our focus on vertical equity and our evidence about the gap between statutory and effective tax rates across the distribution — as well as, crucially, how targeted enforcement actions can shift up ETRs, even in a low-capacity environment like the DRC.[12]

[9] As discussed before, the flier experiment produced a null effect because the information treatment was not salient, while the survey experiment illustrates potential effects under stronger salience.

[10] Revenue gains from progressivity in our setting arise largely from taxpayer responses to their own rates, emphasizing the role played by liquidity constraints, which are a well-documented barrier to property tax compliance in other developing contexts (Brockmeyer et al., 2023).

[11] According to recent survey experiments, citizens appear to view tax progressivity favorably in most developing countries (Hoy, 2025) — as we found in Kananga.

[12] While past work has compared the effectiveness of tax administration reforms and tax rate changes

Third, we provide some of the first evidence concerning how taxpayers in low-income countries perceive the fairness of different types of tax rate systems. Our evidence aligns with Hoy (2025), who finds that citizens in many developing countries self-report stronger tax morale in survey experiments when they learn that their tax system is progressive. It also aligns with Ajzenman et al. (2024), which finds that an informational flier making salient the increase in progressivity of the property tax leads people to view the system as more fair across the distribution of property values.[13] We contribute by studying fairness with four sources of experimental variation: the field experiment of different tax systems (Progressive only increases the perceived fairness of one's own tax rate), the 2024 tax bill experiment (no effects), the 2025 endline survey experiment (salience of progressivity increases the perceived fairness of the system across the distribution), and the 2025 tax bill experiment (results forthcoming). Overall, the evidence suggests that people express preferences for progressivity but often respond more to their own rates when making compliance decisions.

## 2 Setting

The study takes place in the city of Kananga, in the Kasaï Central Province of the Democratic Republic of Congo (DRC). Kananga is home to roughly 1.6 million residents — making it the Congo's fourth largest city — and serves as the seat of the Provincial Government of Kasaï Central. The DRC is among the world's poorest countries: in Kananga, the median reported income is $53 per month (compared to $40 nationally).

Like many local governments in low-income countries, the Provincial Government of Kasaï Central relies primarily on transfers from the national government for the bulk of its revenue. These transfers, however, are frequently delayed — most years, several *never* arrive — and seldom meet the province's needs or development goals. The government therefore faces strong pressure to mobilize more reliable own-source

(Basri et al., 2021) or tax enforcement and tax rate changes (Brockmeyer et al., 2023), there is less work on how changing tax policy *interacts* with enforcement. An exception is Bergeron et al. (2024), which studies how the revenue-maximizing tax rate interacts with enforcement. Here, by contrast, we study how enforcement interacts with different tax rate systems and shapes the distribution of effective tax rates.

[13] To be more precise, their treatment provides information about progressivity alongside the statement (in treatment and control) that the property tax is "now fairer and more equitable," while our mailings provide the tax system information without mention of fairness or equity.

of revenue. As elsewhere in similar contexts, the most promising option is the property tax (Moore et al., 2018). Property is a visible and immovable asset; taxing it is thus relatively efficient and potentially easier for low-capacity tax authorities than taxes with more manipulable and hard-to-verify tax bases. Moreover, Africa's rapid urbanization is driving up property values, creating a potential revenue base to fund urgently needed urban infrastructure (Fjeldstad et al., 2017). Yet property taxation remains the most underutilized tax instrument in low-income countries relative to its role in richer ones (Brockmeyer et al., 2023), implying substantial scope for revenue growth.

In Kasaï Central, the property tax currently accounts for 29% of total provincial tax revenue — the largest single source.[14] Since 2016, the tax authority has conducted a series of city-wide door-to-door collection campaigns. Despite these efforts, compliance has remained below 10 percent, even though most properties receive both a bill and a collector visit (Weigel, 2020; Balan et al., 2022; Bergeron et al., 2024).

# 3 Design

The status quo tax system prior to 2024 exemplified the simplified, presumptive tax systems that low-capacity governments often adopt when they lack reliable proxies for the underlying tax base (Franzsen and McCluskey, 2017; Prichard, 2025). Kananga's housing market is thin and largely informal, and valuing properties is costly work that only a few trained experts in the city can perform. As a result, the tax authority incurred this cost for only a few hundred properties in the city center.[15] For the remaining 98 percent of the city, the government relied on a simple two-tiered fee schedule. Properties built with non-durable materials such as adobe bricks, were classified as low value and faced an annual liability of 3,000 Congolese Francs (CF) — roughly $2 — representing about 90 percent of all properties. Those made with durable materials such as cement were classified as high value and faced an annual liability of 13,200 CF — roughly $9 — covering about 8 percent of properties (Bergeron et al., 2024).

These fixed fees, applied over coarse bins of property value, implied a tax *rate* that decreased over most of the property value distribution, before rising again at the very top (Figure A2). As a result, for the vast majority of taxpayers, the status quo property-tax system was regressive. Indeed, the implied tax rate for the lowest-value property

[14] Other significant revenue sources include business licenses, mining taxes, and transportation taxes.

[15] Even among those, few were formally assessed in recent years. Rather the government applied a uniform flat fee of $200 to any large property designated a 'villa' or 'apartment.'

was higher than the highest-value property. Such de facto regressivity is a common feature of presumptive tax instruments. Such systems not only generate horizontal inequities at the boundaries of classification categories (Best et al., 2025), but also vertical inequities within those categories (Zolt and Bird, 2005; Regan, 2020). To address these inequities and strengthen revenue collection, the provincial government sought to reform its property tax system. The first step was to relax the core constraint that had necessitated the presumptive approach in the first place: the absence of systematic information on building values in Kananga.

## 3.1 Mass Assessment of Building Values

Inspired by a recent reform in Freetown, Sierra Leone (Grieco et al., 2019), we partnered with the government to mass-assess the value of all buildings in Kananga and roll out a new property tax management software.

First, we collected high-resolution drone imagery of the entire city, which we used to (*i*) identify and label every building using unique Google Plus Codes, and (*ii*) estimate each building's surface area. To estimate areas, we first used an AI algorithm to detect and trace rooftops; then human teams reviewed the algorithm outputs, looking in particular for buildings that were accidentally grouped together or split. Second, a team of government enumerators recorded 45 external characteristics for each building — including the quality of the walls, roof, door, window, and fence; the presence of security features, AC, or a TV antenna, access to electricity and water; and the quality of the surrounding road, etc. — using a tablet-based survey linkable to the building through Plus Codes.[16] Third, we constructed a ground-truth training dataset by commissioning the government's two senior property assessors to perform detailed market value assessment of 1,500 buildings randomly sampled across the city. We then used LASSO to calibrate a linear model predicting log property value, minimizing out-of-sample root mean squared error (RMSE).[17]

Although the ground-truth data rely on the best available proxy for market values (expert assessments), the purpose of this mass-valuation approach is not to obtain precise market prices. Instead, it is to create a consistent and comparable measure

[16] See Prichard et al. (2025) for more detailed information about this process.

[17] The best-performing prediction model included surface area, location, and 15 property characteristics, achieving an OOS RMSE of 0.65 log pts and an OOS R-squared of 0.77 (Figure A3). The government opted for the simpler linear model — rather than more complex machine-learning algorithms — because of its transparency and interpretability.

of building value within Kananga that can serve as a tax base. In this sense, the method is designed to rank buildings relative to one another (an ordinal objective) rather than estimate their absolute market worth (a cardinal one). For this reason, in other contexts, this approach is referred to as a "points-based" system (Fish et al., 2017). This approach is now used in at least six large African cities, from Senegal to Malawi. More broadly, in most countries, property taxes are levied on assessed rather than market values — typically based on mass-appraisal methods, simplified formulae, or standardized valuation tables, and often set at a fraction of estimated market value. A direct comparison of statutory tax rates in Kananga with those in other settings can therefore be misleading, since the underlying assessed value is defined differently. We do, however, conduct a series of validation checks showing that the assessed building values are strongly correlated with independent survey measures of wealth, income, and expenditure (Figure A4).

These assessed values form the tax base for the new property tax management software (*Moptax*). The software offers several advantages. First, it enables year-to-year tracking of payments and arrears using Google Plus Codes — an improvement in a city with incomplete street addressing, a common challenge in developing-country settings. Second, it automatically calculates each property's assessed value by applying the estimate coefficients to the recorded building characteristics. If a taxpayer wishes to understand their bill, the tax ministry staff can easily explain how the value was determined; if a characteristic is incorrect, it can be corrected instantly, and the software automatically recalculates both the assessed value and the tax liability.

## 3.2 Tax Rate System Experiment

Once the government had a uniform database of assessed building values, it faced the question of how to set tax rates. Proportional property tax systems — with a single flat property tax rate — are the most common in Africa and around the world (Figure A5). However, a growing number of countries and municipalities are experimenting with progressive property taxation.[18] Interest in a progressive schedule in Kananga was partly motivated by prior work conducted in collaboration with the tax author-

[18]Countries with nationally progressive property tax systems include Chile, Greece, Ireland, Morocco, Panama, Singapore, and Turkey. Progressive property taxes have also been implemented at the municipal level in Argentina, Brazil, China, Colombia, and Mexico. Moreover, most of the world's property tax systems exhibit at least some progressivity, such as exemptions or lower rates for properties at the bottom of the distribution.

ity, which examined the revenue-maximizing tax rate by exploiting randomly assigned property tax liability abatements (Bergeron et al., 2024). That experiment found that the elasticity of compliance with respect to tax liability declines with property value, implying that the revenue-maximizing tax rate increases with property value. These past findings provided a rationale for a more progressive tax rate schedule on efficiency grounds alone — independent of fairness or redistributive considerations. In addition, household survey data showed that the great majority of Kananga residents preferred a progressive property tax rate schedule (Figure A7). Although respondents were more divided on which system they viewed as fairest, both the progressive and proportional schedules were perceived as substantially fairer than the status quo flat-fee system.

The government therefore decided to compare progressive and proportional tax rate systems in the context of its 2024 property tax campaign. In a first group of 189 randomly selected neighborhoods, buildings were subject to a proportional tax rate of 0.4 percent of assessed value. In a second group of 189 neighborhoods, buildings were instead subject to a progressive system of tax rates varying by value band (Table A1). Buildings in Band 1 (percentiles 0-60 of assessed value), faced a tax rate of 0.06 percent;[19] in Band 2 (60-80 percentile), the tax rate is 0.16 percent; in Band 3 (80-90 percentile), 0.26 percent; in Band 4 (90-95 percentile), 0.36 percent; and in Band 5 (95-100 percentile), 0.56 percent.[20] Finally, a smaller set of 82 neighborhoods remained under the status quo fixed-fee system (explained on p. 9). Although the government had no intention of returning the status quo, it deemed it useful to retain in a small sample of neighborhoods in 2024 as a benchmark from which it could evaluate progress. As such, we allocated 41% of total neighborhoods (and roughly 43,000 assessable buildings) to Progressive and to Proportional, and the remaining 18% of neighborhoods (and roughly 20,000 buildings) to the Status Quo. While our main comparison is Progressive and Proportional, we will similarly benchmark our main results by comparing to the Status Quo. Figure 1 summarizes the three tax systems of the field experiment.[21]

[19]There is one small exception: the government imposed a minimum tax of 2,000 CF or $0.70 to cover administrative recovery costs. This causes the tax rate to decrease slightly with building value at the very bottom of the distribution (Figure 1).

[20]Notches are not uncommon in developing countries (e.g., Kleven and Waseem, 2013; Bachas and Soto, 2019), and they may be more common worldwide for property taxes given that owners often cannot as easily adjust the tax base (especially if it is assessed only periodically with opaque criteria). Countries with notched progressive property tax systems include Ireland, the UK, and Colombia (in Bogota).

[21]Commercial buildings, which constitute 1.8% of total buildings, were subject to slightly higher

Crucially, tax rates in the Progressive and Proportional treatments were calibrated so that the average tax liability is identical across the two sets of neighborhoods (Figure A6). In Progressive, the schedule is tilted around this common mean: lower-value properties face lower rates and higher-value properties face higher rates, but the overall average liability is unchanged. This design ensures that total revenue potential under full compliance is the same in both treatments. Any observed difference in revenue must therefore come from differences in compliance behavior. This revenue equivalence does not hold when comparing to the Status Quo because average tax liabilities there were systematically lower in these neighborhoods. Thus, when we compare revenue in Progressive or Proportional to Status Quo, we adjust our estimates following a pre-specified approach to reflect the difference in average tax liability.[22]

In addition to holding constant the revenue potential between Progressive and Proportional, the experimental design holds constant all other aspects of tax administration, as we discuss in the next sub-section.

### 3.3 Flier Experiment and Endline Survey Experiment

To shed light on mechanisms — specifically whether taxpayers respond primarily to their own rate or also to others' rates in the distribution — we implemented a cross-randomized information experiment embedded in the fliers printed on the back side of property tax bills. Randomized at the property level,[23] property owners received one of three versions of the flier: (*i*) a control version providing additional details about the property tax itself, (*ii*) the same information plus their building's position in the citywide distribution of building values, and (*iii*) both prior pieces of information along with details about the distribution of tax rates and average liabilities in their neighborhood's tax schedule.[24] The treatment of interest is (*iii*), which varied according to the neighborhood's tax schedule treatment: in Progressive neighborhoods, taxpayers learned that tax rates were increasing in building value, and so on. Figure A10 shows

tax rates: 0.66% in Proportional, and 0.3%, 0.4%, 0.5%, 0.6%, 0.8% for Bands 1-5, respectively.

[22] As we discuss in detail in Section A4.1, we first estimate the elasticity of compliance with respect to tax liability by leveraging random variation in rates across treatments within value bands. We then predict counterfactual compliance in the status quo group assuming average liability was equivalent with the other treatment groups. Finally, we compute revenue as compliance × tax liability.

[23] This treatment was randomized at the property, not building, level to ensure that owners of plots with multiple buildings received only one treatment.

[24] A fourth treatment made salient the building assessment method and provided the specific recorded characteristics for the building. This transparency intervention is analyzed in a companion paper.

a complete flier, and Figure A11 shows the key visuals for the flier treatment (*ii*) and (*iii*) in Proportional and Progressive neighborhoods.

The design of the flier experiment follows directly from the underlying behavioral mechanisms behind compliance responses to the tax schedules we study. Taxpayers in the control group received only information about their own tax liability. Comparisons across tax schedules within the control group thus reflect the pure effect of their own liabilities.[25] By contrast, if awareness of the tax system — and the fairness considerations it may trigger — affects compliance, we should observe disproportionately higher payment rates among properties assigned to treatment (*iii*) when comparing Progressive and Proportional neighborhoods.

To further investigate these mechanisms, we embedded a follow-up information experiment in the 2025 endline survey. Its design closely mirrors the flier experiment. Control respondents received no information while the main treatment provided information about the neighborhood's tax rate distribution during the 2024 campaign, using the same visuals as on the fliers. A secondary treatment group received the tax system information and additional information about the average 2024 compliance rate within each value band. The logic of this treatment was that the distribution of compliance across the distribution could also become salient over time — as taxpayers learn more about what others are paying — and this could shape preferences and perceptions of the tax system. Finally, cross-randomized across these treatments, half of respondents learned their location in the value distribution (analogous to treatment (*ii*) in the flier experiment). The hypotheses motivating this experiment are identical to those in the flier experiment. The advantage of this survey experiment is it ensures that the tax systems would be understood and highly salient to taxpayers: enumerators gave detailed explanations with many examples and understanding checks.

## 3.4 Property Tax Administration

**Tax Campaign Mechanics.** Across all treatments, the tax campaign operated identically, in several steps. First, tax collectors went door-to-door delivering bills. There was one bill for each assessable building with a unique Plus Code and tax ID. Properties with multiple buildings inside the plot received multiple bills. The bill showed the property owner's name, a picture of the building, a picture of a valid receipt, the

[25] This interpretation assumes that taxpayers did not learn about variation in tax systems through word of mouth, an assumption we test in Section 5.5.

total liability, and details about how to pay, payment deadlines, and where to find more information (Figure A9). Importantly, the bill did not make salient the property tax system of the neighborhood. It also did not show the assessed value of the building. Both of these aspects were revealed to randomly assigned subsets of taxpayers to unpack different mechanisms, as we describe in Section 3.3. During the bill delivery visit, collectors also elicited preferences over revisit dates for a random subsample of properties.

Second, tax collectors returned to each property during the payment facilitation stage of the campaign, a few weeks following bill delivery. They directly solicited payment of the property tax during this visit. Collectors received a daily schedule of visits to make, which contained a mix of visits scheduled according to taxpayer preferences and randomly assigned visits. We developed a matching algorithm to give taxpayers their highest choices subject to scheduling constraints and the need to spread out random visits over time (see Section A4.2 for details). We introduced this layer of experimental variation to help rule out differential collector targeting of certain property types by tax system treatment — as we discuss in Section 3.5. In addition to these scheduled visits, tax collectors also had time to make additional discretionary visits in the neighborhood. They recorded all of these scheduled and discretionary visits with a GPS point and time stamp that we could verify.

**Payment Modalities.** Taxpayers could pay in two ways. First, they could pay the field-based collector, either during the bill delivery visit (rare) or during a payment facilitation visit. If they paid in this way, the tax collector would issue them a receipt identical to that shown on the bill. The collector would then log the payment at the tax authority. Receipt books — which had unique increasing identifiers and carbon copy pages — were regularly checked to ensure no payments went missing. Second, taxpayers could pay directly at the tax authority, where they could visit the payment desk and get their receipt. Although this would be more costly, some taxpayers with larger liabilities appeared to prefer this modality due to lack of trust in the collectors. Regardless of the payment modality, all payments were individually reconciled in the digital tax database.

In the past, taxpayers have only been able to pay their full tax liability: partial payments were not permitted. In the 2025 campaign, a subsample of taxpayers was randomly selected to be invited to pay in installments of at least one-third of the liability. This property-level variation is orthogonal to the tax system experiment and

the subject of a companion paper (Danner et al., 2025).

The property tax is owed by the property owner. In Kananga, roughly 75% of properties are owner-occupied; the rest are rented out. For properties with only renters, the property owner is responsible for making arrangements with the renter to transmit the bill to them for payment.

**Exemptions.** There are two levels of exemptions. First, some buildings were ex ante deemed non-assessable based on building characteristics collected during the assessment field survey.[26] Second, certain property owners are also legally exempt based on their own characteristics: owners who are older than 55 years or who are widows (and who, in both cases, must be living without another non-exempt adult in the property). Owner-level exemptions were recorded during the property assessment survey. However, to be legally binding, technically owners must come to the tax authority to claim their exemption.[27] Of the roughly 12% of exempt owners recorded by field-based assessors, only 2% claimed official exemption at the tax authority. Because field-based exemptions were pre-treatment while desk-based exemptions were not, we use the field-based definition when restricting our analysis sample to the non-exempt.[28] We also show robustness to including exempt owners in the sample.

**Enforcement.** A separate team of enforcement agents made additional house visits to delinquent properties toward the end of the campaign. There were too few agents to visit all delinquents, so we randomly selected a subset to receive these visits. They were informed on the back of the bill that, if they remained delinquent after the payment window expired, they would receive a visit from the enforcement team. The enforcement team visited the majority of those selected for this intervention and they collected additional payments. However, they ultimately lacked any strong enforcement action, such as the seizure of assets or locking of buildings.[29]

**Tax Collector Incentives.** Tax collectors were contractors trained to deliver bills

[26] Non-assessable buildings include religious buildings, public hospitals and schools, cemeteries, buildings under construction, temporary structures (e.g., market stalls), outbuildings (e.g., external kitchens), and any building that lacks a permanent foundation, walls, and roof.

[27] A summary of the claiming of official exemptions by treatment and band is presented in Appendix Figure A8.

[28] Assessability, field exemptions, and desk exemptions are balanced across tax rate system treatments. The exception is that we observe slightly fewer owners in Status Quo claiming exemptions at the tax authority, likely because their tax rates are systematically lower.

[29] Weak enforcement of the property tax is common in developing countries (Figure A12). Even in higher-capacity, middle-income countries like Brazil and Mexico, it is common to find extensive-margin tax compliance below 50% with little serious enforcement among the delinquent.

and facilitate tax payments. They received a monthly wage with three components: (*i*) during bill delivery, a fixed amount for delivering the day's assignment of bills; (*ii*) during facilitation, a fixed amount for honoring the day's assignment of appointments;[30] and (*iii*) a performance wage increasing in the amount of tax collected. Parts (*i*) and (*ii*) were calibrated to a reasonable daily target; failure to reach that target resulted in a linear penalty. As we discuss in Section 3.5, the performance wage was designed to equalize the expected wage across treatments and within neighborhoods. Although they were not full-time staff, similar contractors have received promotions to permanent positions in the past. They may thus experience career incentives, too.

## 3.5 Neutralizing Collector Effort

A key threat to our design arises from the possibility that collectors might work harder or differentially target certain types of taxpayers by tax system treatment. For example, if collectors exerted more effort to collect taxes from the owners of high-value buildings in Progressive, it would be difficult to attribute a treatment effect on revenue to *taxpayer* responses.

We have two solutions to neutralize collector effort. First, we held collectors' expected wages constant (*i*) across treatments and (*ii*) within neighborhoods. The logic of (*i*) is to ensure that collector effort levels remained constant across treatments. The logic of (*ii*) is to ensure that, within the neighborhood they are assigned to on a given day, collectors did not have incentives to systematically target certain types of taxpayers more than others. If collectors received a wage, $w_i$, equal to a constant share of revenue collected from building $i$, a policy used in many developing countries (e.g., Khan et al., 2015), they would receive more for collecting from high-value buildings in the Progressive arm. Whether they would actually target these buildings, however, would be determined by their beliefs about the probability of compliance, $p$, of high- and low-value building owners. Ultimately, collectors maximize their expected wage $p_i w_i$, which factors in the expected compliance of each property owner. To neutralize incentives to target buildings of different value with greater collection effort, we therefore equated the expected wage of all buildings in each neighborhood and solved for the wage for building $j$:

[30] We could verify appointments were honored using the GPS location and timestamp of collector visits.

$$w_j = w_i \frac{p_i}{p_j} \tag{1}$$

To estimate $p$, we used the exogenous variation in tax liabilities in Bergeron et al. (2024) to estimate compliance elasticities. We then predicted the compliance probability for every building in Kananga according to its 2024 liability (depending on the tax system of the neighborhood).[31] We then set wages to equate the wage ratio and predicted compliance ratio for any pair of houses $i$ and $j$ within the neighborhood. After setting the ratio of wages within a neighborhood, we then adjusted the average neighborhood level of all wages to ensure that we also achieved $(i)$, namely that the average expected wage was constant across treatment groups. Finally, to simplify presentation, the resulting performance wage for collecting taxes from each building was visible on collectors' assignment sheets next to the owner's name and liability.

The second solution to collector targeting is to re-estimate our main results to payments made during random facilitation visits. Because these visits were randomly assigned, we know that payments made during them were not the product of differential targeting by tax collectors (assuming that collectors honored their appointments).[32]

# 4 Data and Balance

## 4.1 Data

We combine two main sources of data: administrative data and survey data. The administrative data covers all property tax payments made in 2024 as well as assessed values, value bands, and exemptions. We also have access to administrative data created by collector visits during bill delivery and facilitation, in which they logged visit times, locations, and other relevant property characteristics, such as whether the property owner was present.

We have three sources of survey data, all collected by the independent survey nonprofit ODEKA. Before the 2024 campaign, we collected a baseline survey ($N$= 3,947)

[31] Of course, our estimates of $\hat{p}$ will not align perfectly with collectors' subjective expectations. But, given that collectors likely had diffuse priors due to their unfamiliarity with the great majority of neighborhoods they worked in, this wage scheme should offset much of the incentive to differentially target by building value — a hypothesis we will test in the data since we observe visits.

[32] Of course, it remains possible that collectors could exert more effort on the intensive margin, even conditional on untargeted visits — e.g., by staying longer at a property. We can test for intensive margin responses using data on the duration of collector visits.

that we use to assess balance and characterize taxpayers' preferences over different property tax rate systems. Second, in the months immediately after the tax campaign, we collected a midline survey ($N$ = 28,583). This survey gauged property owners' experiences with the tax campaign, including perceptions of fairness. Finally, we collected an endline survey roughly six months after the conclusion of the tax campaign ($N$ = 5,888), in which we elicited a broader set of taxpayers' attitudes and beliefs about the tax system. Most importantly, we included a survey experiment providing detailed information about the respondent's 2024 tax system to further investigate how the tax rate systems shape perceived fairness when they are highly salient.

### 4.2 Randomization and Balance

We stratify the randomization on geographic location and average assessed building value. Specifically, for each of eight geographic regions in Kananga, we split them into above- and below-median assessed value, and then randomized within these 16 strata. We then followed Banerjee et al. (2017) and ran 100 re-randomizations, selecting the randomization that produced the best balance according to a set of baseline neighborhood and property characteristics. The final randomization achieves the expected high degree of balance (Table A2). We examine a range of property characteristics (assessed value, income, public goods access, etc), property owner characteristics (education, employment, tax morale, tax system preferences), tax campaign features (including cross-randomized treatments), and neighborhood-level variables capturing treatment status in past tax field experiments. Of these 41 variables, one is imbalanced at the 5% level and three are imbalanced at the 10% level, as one would expect under random assignment.[33]

## 5 Results

### 5.1 Estimation

To identify the causal effects of our tax system treatments, we estimate the following equation using OLS:

[33]Given that field-based exemptions and the delivery of bills exhibit some imbalance, we show robustness to controlling for these variables or studying alternative samples not restricting using these variables in Tables A4 and A3.

$$Y_{ins} = \beta_0 + \beta_1 \mathbb{1}_{ns}^{Progressive} + \alpha_s + \boldsymbol{X}_{ins}\boldsymbol{\Gamma} + \epsilon_{ins} \tag{2}$$

where $i$ indexes individuals, $n$ neighborhoods, and $s$ randomization strata. The omitted category here is Proportional neighborhoods. The $\alpha_s$ are stratum fixed effects. $\boldsymbol{X}_{ins}$ includes individual-level pre-treatment covariates, which in most specifications is empty. We cluster standard errors at the neighborhood level (460 total). In our main specification, we exclude buildings that collectors never located during bill delivery, which is also balanced by treatment, as well as commercial buildings (1.84% of assessable buildings).[34]

While our main specification focuses on the impact of Progressive relative to Proportional, comparing these treatments to the Status Quo system is also policy relevant in settings with similarly presumptive, fee-based property tax systems. At times, we thus augment Equation 2 by adding a dummy for Proportional neighborhoods with Status Quo the omitted group.

## 5.2 Main Results

We begin by studying how a progressive tax rate system shaped the revenue collected during the 2024 property tax campaign. Progressive increased the average revenue raised per property by 283 CF compared to Proportional — a 55% increase (Figure 2). This increase occurs throughout the distribution of property value (Figure 3), though the positive coefficients in the top two deciles are not statistically significant (Table 1). If we instead compare with Status Quo, Progressive also increased revenue by 279 CF (or 54%); there is no average difference between Status Quo and Proportional.

Progressive also increased compliance — by 8.9 percentage points on average compared to Proportional (Figure 2). This increase occurs throughout the bottom 90% of the distribution (Figure 4), though it is most pronounced in Band 1. In the top decile, compliance is low and not statistically distinguishable between Progressive and Proportional (Table 2). Comparing to the Status Quo, compliance in Progressive is also higher until the eighth decile of building value. It then drops below compliance in Status Quo in the top deciles. Compliance in Proportional is lower than Status Quo in all of the distribution except the bottom decile.

We consider a number of robustness checks (Tables A3 and A4), including ($i$) drop-

[34] We show robustness to these sample restrictions in Appendix Tables A3 and A4.

ping exempted properties from the analysis sample, (*ii*) including properties that did not receive a bill into the analysis sample, (*iii*) including commercial buildings, (*iv*) controlling for imbalanced covariates, (*v*) estimating results at the compound level (rather than the building level), (*vi*) removing owners of multiple plots (who might receive more than one treatment), (*vii*) removing payments collected by the enforcement team, (*viii*) studying log revenue as the outcome, and (*ix*) flexibly controlling for other cross-randomized treatments, as suggested by Muralidharan et al. (2025). Across each of these approaches, the compliance and revenue impacts of Progressive remain large and significant.

## 5.3 Mechanical v. Behavioral Effects of Tax Rate Changes

In comparing a progressive system rotated around an average flat rate, the mechanical and behavioral effects of the corresponding tax rate changes on revenue differ across the value distribution. Under a progressive system, there are higher tax rates on high-value properties (mechanically increasing revenue) and lower tax rates on low-value properties (mechanically decreasing revenue). However, the behavioral effects on compliance go in the opposite direction. At the bottom of the distribution, lower rates may increase compliance (higher revenue); at the top, higher rates may decrease compliance (lower revenue).[35]

These revenue increases in Progressive do indeed reflect different mechanisms at the top and bottom (Figure 5). In the bottom 90%, the behavioral effect on compliance (which raises revenue) outweighed the mechanical effect of lower tax liabilities (which lowers it). In other words, enough additional property owners entered the tax net because of the lower tax rates in Progressive to offset the mechanical reduction in revenue.[36] In the top 5% of the value distribution, however, the mechanical effect of higher tax rates (raising revenue) appears to have outweighed the behavioral effect (lowering compliance and thus revenue), although again the treatment effects here are not statistically significant.

[35]Finally, there are also possibly *second-order behavioral responses*, i.e., compliance effects resulting from awareness of others' rates and the tax system as a whole, as we consider in Section 6.

[36]This finding — that lowering tax rates in the bottom of the distribution increases revenue — aligns with past work in this setting (Bergeron et al., 2024).

## 5.4 The Revenue-Maximizing Tax Schedule

Our revenue results suggest that the revenue-maximizing tax schedule in this setting would appear to increase in property value, as does a progressive system of tax rates. To directly test this conjecture, we follow the approach in Bergeron et al. (2024) and estimate the revenue-maximizing tax schedule directly using random variation in tax rates within bands of property value generated by the experimental assignment to the Proportional and Progressive tax schedule. Specifically, adapting the formula in Bergeron et al. (2024) to a context with tax rates expressed in percentage of property value, the revenue-maximizing tax rate can be written as

$$\frac{\mathbb{P}(\tau^{\mathrm{RM}})}{-\frac{d\,\mathbb{P}(\tau)}{d\tau}\Big|_{\tau=\tau^{\mathrm{RM}}}} \tag{3}$$

where $\mathbb{P}(\tau^{\mathrm{RM}})$ is the share of owners who pay at tax rate $\tau^{\mathrm{RM}}$ and $-\frac{d\,\mathbb{P}(\tau)}{d\tau}$ is the semi-elasticity of compliance with respect to the tax rate. We can estimate the RMTR by computing $\frac{-\beta_0}{2\cdot\beta_1}$, where $\beta_0$ and $\beta_1$ are the intercept and slope from a linear regression of compliance on tax rate. We estimate this regression within band, leveraging the variation in tax rates among similar buildings generated by assignment to Progressive or Proportional.

We find that tax rates increase with property value under the revenue-maximizing schedule (Figure 6), although the slope is somewhat flatter than under the implemented progressive system. In levels, the estimated schedule lies between the Proportional and Progressive rate structures, and rises from roughly 0.2% at the bottom of the property value distribution to just over 0.5% at the top. Because our design holds average tax liability constant across the Progressive and Proportional schedule, the estimated schedule should be interpreted as the revenue-maximizing schedule around this fixed average liability. In principle, behavioral responses could have produced a much steeper or flatter profile; the fact that the schedule rises moderately with value therefore provides direct evidence that the optimal degree of progressivity is positive but limited — flatter than the implemented progressive schedule yet steeper than a uniform proportional one.

## 5.5 Alternative Explanations

**Endogenous Collector Effort**. As noted in Section 3.5, an important challenge when studying a tax system with in-person tax collection is whether observed effects reflect taxpayer responses or endogenous tax collector responses. Anticipating this issue, we set collectors' performance wages such that collectors would not have incentives to differentially target properties by value within neighborhoods or across treatments. To assess if this scheme succeeded in neutralizing collector effort, we use administrative data on the GPS location and timestamp of every facilitation visit. There is no difference in the probability of receiving a facilitation visit by treatment, nor are there differences by value band (Table A5). We also check the number of visits and the duration of visits — two intensive margins — and again find no differences. Finally, we control for each of these visit variables. Although they are potentially outcomes of treatment (and thus "bad controls"), controlling for visits would likely change our main results if differential collector effort by treatment was a key confounder. However, the results are very similar to those in our main specification (Table A6).

The second approach we pre-registered was to examine tax outcomes from randomly assigned facilitation appointments, which cannot be differentially targeting properties by value or by treatment (so long as collectors honored their appointments). We first verify that, indeed, collectors honored the great majority of their randomly scheduled facilitation visits: 86% on average, compared to 85% among non-randomly scheduled facilitation visits. This is not surprising given that they were financially motivated to honor these visit times (and, anecdotally, collectors counted on this component of their wage since they could easily control it, whereas they viewed the performance wage linked to payments as riskier). The share of random visits honored also does not appear to vary by treatment (Table A7, Column 1). Most importantly, we observe no systematic differences in our treatment effects on compliance and revenue among properties assigned to (and receiving) randomly scheduled facilitation visits (Table A7, Columns 2-7). Altogether, there is little evidence of endogenous collector effort responses to the tax system treatments.

**Fraudulent Payments.** One endogenous collector response we did not anticipate is that, in some cases, collectors paid their own money in lieu of the taxpayer in order to receive the performance wage. They did this because for 19% of buildings the performance wage was greater than the tax liability. Such "excess wages" occurred

because in the last step in the process of setting performance wages — in which we adjust the neighborhood average to equate expected wages across treatments — we unintentionally lifted collector incentives above liabilities for very low-value buildings. In essence, we set wages higher than liabilities for some low-value buildings to equate expected wages across treatments. Because this problem only occurred for low-value properties with very low liabilities, it is unlikely to explain our main revenue results, especially the increase in revenue observed among medium- and high-value properties in Progressive.

Nonetheless, together with the tax authority, we investigated such fraudulent payments intensively during the campaign, and we address the problem in several ways in our analysis. First, when we learned of the problem, we conducted an audit of all recorded payments, in which independent ODEKA enumerators visited property owners to verify that they had paid and check their receipts. From this, we learned that 2.4% and 8.8% of revenue in waves one and two (out of three) of the tax campaign were from likely fraudulent payments (Figure A14). The behavior was more common in wave two because collectors were only paid their wages at the end of a wave. In wave one, it was uncertain whether they would receive the performance wage for fraudulent payments, and only a few collectors tried it (with a few buildings). Once those pioneers received the wage for these wave one cases, the behavior became more widespread in wave two.[37] After the investigation, the tax authority fired the eight collectors who committed the most fraud, and none of the fraudulent payments were included when calculating wages. We also changed the incentive scheme to eliminate excess wages in wave three.[38]

To account for fraudulent payments in our analysis, we use the audit results to trim high-probability fraud cases symmetrically across treatments. The most important issue is that excess wages occurred more often in Progressive because it had the lowest tax liabilities. If we simply dropped all confirmed fraudulent payments, we would be trimming the sample differently by treatment. We therefore first calculate counterfactual excess wages in Proportional and Status Quo *as if they had been in Progressive*. Since in Band 1, the tax rate is always lower in Progressive, any building that was

[37] A companion paper explores the diffusion of fraud throughout collectors' social networks (Kapon et al., 2025).

[38] To be precise, we kept intact the underlying structure of performance wages but lifted the wage level in all neighborhoods with any excess wage cases by a constant. We then also slightly shifted up the level in unaffected neighborhoods to preserve equality of expected wage by neighborhood and across treatments.

an excess wage in reality would also be tagged as an excess wage according to this counterfactual measure. Second, we predict which of these counterfactual excess wage cases would have been fraudulent payment using household and collector characteristics. Specifically, we regress confirmed fraud cases on collector dummies and a range of household characteristics in Progressive. We then use the coefficients to predict likely counterfactual fraud cases in the other two treatment groups. We then drop all of these cases from our analysis symmetrically across treatments. This is the approach we take in our main specification.

We also show robustness to different approaches in Table A8. First, we show results with no fraud adjustment. Second, we include tax campaign wave fixed effects and tax collector fixed effects, given that opportunities for fraud varied by wave and by collector assignment.[39] Third, we drop Band 1 of wave two entirely, as it was the wave most affected by fraud and all excess wage opportunities were in Band 1 (Figure A14). Finally, we simply recode fraud as no compliance — our most conservative check, given that fraud is more prevalent in Progressive than other treatment arms. The revenue and compliance gains from Progressive remain large and significant across these different approaches.

**Spillovers.** Another important concern is that the neighborhood-level randomization could have led to spillovers — SUTVA violations — that complicate our evaluation of these three tax rate systems. If taxpayers in Proportional were aware and jealous that people in other neighborhoods were in Progressive, their tax compliance might have been lower than it would have been if the whole city had been in Proportional. Similarly, if taxpayers in Progressive felt lucky to be under their preferred tax system while others were not, their tax compliance could have been artificially high.

We investigate the importance of spillovers in three ways. First, we examine whether taxpayers had knowledge of their own tax system and others' tax systems — a necessary condition to have spillovers in this context. At endline, respondents reported how they perceived the 2024 tax system. Their responses reveal very low knowledge of the tax system in their own neighborhood: only a little over a third of respondents correctly identified the tax system — not much better than randomly guessing (Figure A16). Such limited awareness even of one's own tax system lowers the probability of possible SUTVA violations. Moreover, at midline, taxpayers reported whether they had had

[39] Some collectors were randomly assigned to a series of neighborhoods with zero opportunities for fraud.

any recent discussions about the property tax with people living in other neighborhoods (and, if so, what they had discussed). Only 17% of people reported having had such discussions, and they were not more likely to do so in Progressive neighborhoods. The most common topics were how to calculate tax liabilities and value properties — but this also did not differ between Progressive and Proportional.[40] Our main results are robust to flexibly controlling for whether respondents reported such conversations (Table A10).

Second, we hone in on taxpayers for whom the differences in tax systems could have been more salient: owners of multiple plots. Our main results are also not driven by owners of multiple plots (who might have been exposed to multiple treatments) (Tables A3 and A4, Column 7)

Third, we leverage the cluster randomization to estimate spillovers directly. Following Miguel and Kremer (2004), we exploit random variation in the number (or total border length) of Progressive neighborhoods adjacent to non-Progressive neighborhoods, controlling for the total number of (or border length with) adjacent neighborhoods. Consistent with the previous results, exogenously having more non-Progressive neighborhoods nearby does not appear to shape compliance or revenue (Table A11). All told, we find little evidence of spillovers in our context.

# 6 Behavioral Effects of Others' Rates and the Tax Rate System

Thus far, our analysis of mechanisms concerned the mechanical and behavioral effects of a property owner's *own* tax rates. But second-order behavioral effects — i.e., the effects of *others*' rates and the tax rate system on compliance — could also influence our results if taxpayers perceive progressivity to be more fair than other tax systems and have higher tax morale in Progressive as a result. In this section, we investigate whether the compliance and revenue gains from Progressive arise because it matches taxpayers' preferences over tax rate systems and thus boosts their tax morale.

To explore this possibility, we first exploit the flier experiment discussed in Section 3.3, which varied whether property owners receive ($i$) a message about the property

[40] In both Progressive and Proportional, taxpayers were more likely to discuss tax liabilities compared to the Status Quo — a testament, no doubt, of the significant changes in liabilities introduced by the rollout of these new systems.

tax (control), (*ii*) their building's location in the distribution of building values (alternative control), or (*iii*) the distribution of tax rates in their neighborhood's tax system (treatment). If awareness of the distribution were driving the compliance responses in Progressive, then we should see a disproportionately large effect when owners receive information treatment (*iii*) on the back of their tax bill. However, compliance levels in Progressive and Proportional are very similar among owners who got the control and treatment flier information (Figure A15). This is true on average and throughout the distribution. This helps to rule out the possibility of offsetting responses: low-value owners increasing compliance upon learning that others face higher rates, and high-value owners reducing compliance upon learning that others face lower ones.

Second, we estimate treatment effects of our tax rate system treatments on endline attitudes. Consistent with the flier experiment, the perceived fairness of the tax system at endline does not vary across tax rate treatments — on average and across the distribution (Figure A19). Tax morale also appears similar across tax rate treatments (Figure A18). Third, we estimate heterogeneous treatment effects by baseline preferences over tax systems. Although the sample is smaller, taxpayers who preferred progressivity or viewed it as the most fair system at baseline do not exhibit a more pronounced compliance response to Progressive (Table A12). In sum, we find little evidence to suggest that our main results on compliance and revenue arise because Progressive aligned with taxpayer preferences over tax rate systems and thus boosted tax morale.

These results are puzzling in light of baseline evidence that taxpayers preferred progressive property taxation and viewed it as substantially more fair than the status quo system (Figure A7). Why do taxpayers in Progressive not similarly view the tax system as fairer? The most likely explanation is that the different tax systems used in the 2024 campaign simply were not salient to property owners, even among treated flier recipients. As noted above, taxpayers performed only slightly better than random guessing when indicating the distribution of property tax rates in their neighborhood during the 2024 campaign (Figure A16). What does appear to have been salient to taxpayers, however, was their own liability. Indeed, perceived and actual 2024 liabilities are highly correlated (Figure A17). Similarly, when we ask about the fairness of their own property-specific liability, endline respondents' perceptions move in tandem with the tax rate schedule of their assigned neighborhood (Figure A20): in Progressive, low-value property owners view their tax liability as fairer than high-value property owners;

the comparable relationship is essentially flat in Proportional. In short, taxpayers appear more aware of their own tax rates than the tax rates of others (and the shape of the distribution of rates).

This lack of tax system salience is, in a sense, a boon for our field experiment because it makes SUTVA concerns unlikely: i.e., that the responses we measure are some function of taxpayers' awareness of other systems. However, it also creates uncertainty for how taxpayers will respond in the future after the progressive tax system is scaled and made salient over time.

To shed light on how taxpayers would likely respond if the system were more salient, we turn to the endline survey experiment. We added this information experiment precisely to help deal with salience: enumerators were prompted to explain the visual aids and provide examples until taxpayers understood the differences between tax systems. The information experiment results echo taxpayers' baseline preferences. Taxpayers in Progressive updated positively about the fairness of the tax system when they learned about the distribution of tax rates (Figure 7). By contrast, taxpayers' perceptions of fairness in Proportional did not change when they learned about their tax system. Informed (treated) taxpayers in Status Quo in fact updated negatively about the fairness of the tax system. Interestingly, informed taxpayers in Progressive updated positively about the fairness of the tax system throughout the distribution. Even owners of high-value buildings viewed the tax system as more fair when the increasing system of tax rates was made salient to them. Furthermore, when asked about their plans to pay the property tax in the future, informed (treated) taxpayers in Progressive reported higher likelihood of payment — on average and throughout the distribution (Figure A21).[41] These results are reassuring for the scale up of the progressive tax system: it appears unlikely that tax morale will fall as progressivity becomes more salient to taxpayers. If anything, our results suggest that tax morale could increase over time and lift up compliance across the distribution.

# 7 The Distribution of *Effective* Tax Rates

Although the Progressive and Proportional tax systems are statutorily less regressive than the Status Quo, to understand the true distribution of the tax burden, we need a

[41] The usual concerns about self-reported future compliance apply, of course. We take this as an expression of tax morale.

measure that factors in compliance. We therefore turn to the effective tax rate (ETR): the amount of tax paid divided by the property value. Estimating ETRs across the distribution of property values allows us to understand whether indeed owners of high-value properties are paying a larger share of their property wealth than owners of low-value properties.

In fact, the ETR decreases across the distribution of property value in all tax systems (Figure 8, Panel A).[42] Even in the Progressive system, owners of higher-value properties end up paying a smaller share of their wealth than owners of lower-value properties, despite their higher statutory tax rates. This occurs because compliance declines with property value, offsetting the higher statutory tax rates at the top. This negative ETR slope is more pronounced in Progressive due to the stronger compliance response in lower value bands (Figure 4). Thus, the most progressive system statutorily is the most regressive in terms of ETRs.

What, if anything, can the government do to counter such ETR regressivity? We investigate the potential of enforcement targeted at the owners of high-value properties. The enforcement intervention discussed in Section 3.4 included a message on the back of the tax bill noting that the property had been selected to receive a visit from the enforcement team if it was still delinquent after the property tax payment deadline. This separate team of agents working for the tax authority indeed visited the majority of properties selected for this enforcement intervention. They collected payment from many delinquent owners, though ultimately lacked any strong enforcement technology, such as seizure of vehicles or locking commercial buildings. As such, the treatment provides a modest enforcement shock to roughly half of property owners.

This targeted enforcement intervention does indeed flatten the distribution of ETRs by shifting up compliance at the top (Figure 8, Panel B). The exception is in Bands 1 and 5, which stay persistently low in compliance. This admittedly weak enforcement nudge nonetheless illustrates the potential for meaningful enforcement to flatten, or even flip, the slope of the ETR curve. If the tax authority bolsters the enforcement actions among owners of more valuable properties — a major focus of the 2025 tax campaign — it could close the gap between the statutory and effective tax rate distribution.

[42] In many countries, ETRs decline at the very top of the distribution because large taxpayers are better able to engage in profit shifting and international tax planning (Bachas et al., 2025).

# 8 Conclusion

We evaluate a citywide field experiment in Kananga that randomized neighborhoods to progressive, proportional, or status-quo property-tax systems. Progressive schedules raised revenue substantially relative to both alternatives, with gains across the value distribution. At the bottom, lower rates boosted compliance enough to offset lower liabilities; at the top, mechanical liability increases dominated modest compliance losses. Taxpayers primarily responded to their own rates rather than to information about others' rates, and the revenue-maximizing rate rises with value—consistent with progressivity. Although effective tax rates decreased in property value across all tax systems, targeted enforcement flattened the slope.

Although proportional property taxes are the modal system across Africa and many developing countries, our evidence indicates that progressive schedules can be revenue-maximizing while aiming to address redistributive objectives. Because the behavioral margins we detect are driven mainly by own statutory rates — a mechanism likely to travel across contexts more reliably than fairness perceptions — these results should generalize: well-designed progressive rate structures, paired with light, targeted enforcement at the top, can raise revenue and shift the distribution of the tax burden toward the rich.

This research also raises many questions. One priority is to compare statutory reform versus targeted enforcement — and their interactions — in making the true tax burden progressive: when do rate design changes substitute for (or complement) top-end enforcement? Second, it will be important over time to quantify how a progressive, notched system capitalizes into prices and shapes real responses (improvements, mobility, sorting), and test smoother phase-ins or kinks to curb distortions. Finally, we need more research on the politics of reform: progressivity may be efficient and equitable, but do politicians adopt it — especially when it requires credible enforcement among elites? Mapping out when leaders have incentives "tax the top" we view as a first-order research objective.

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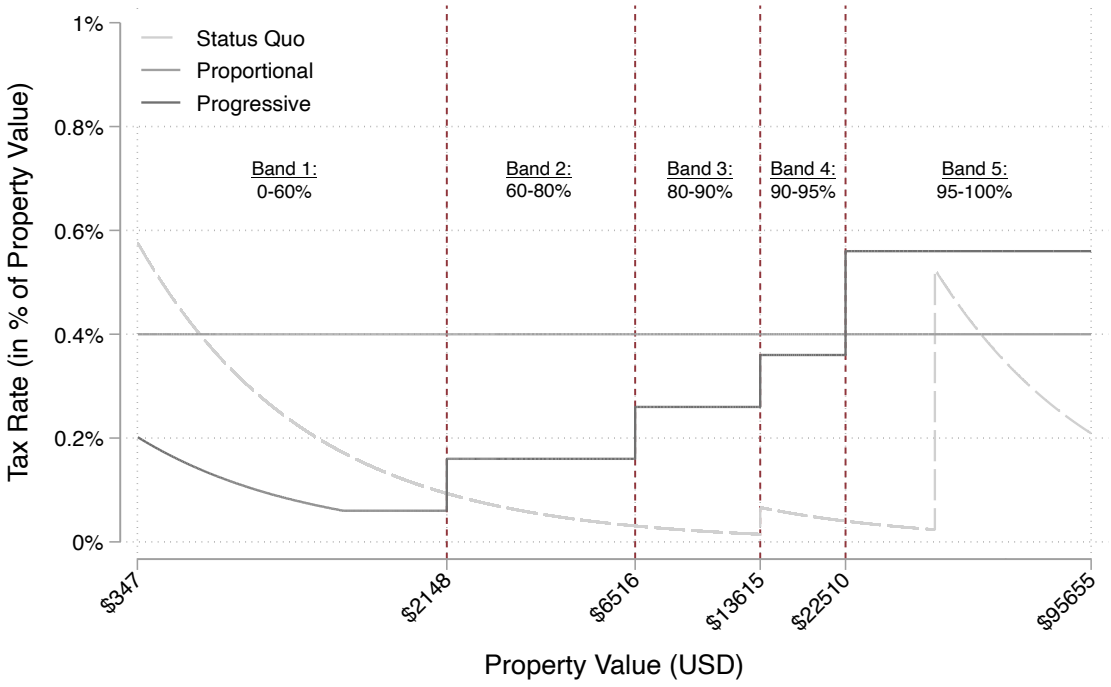
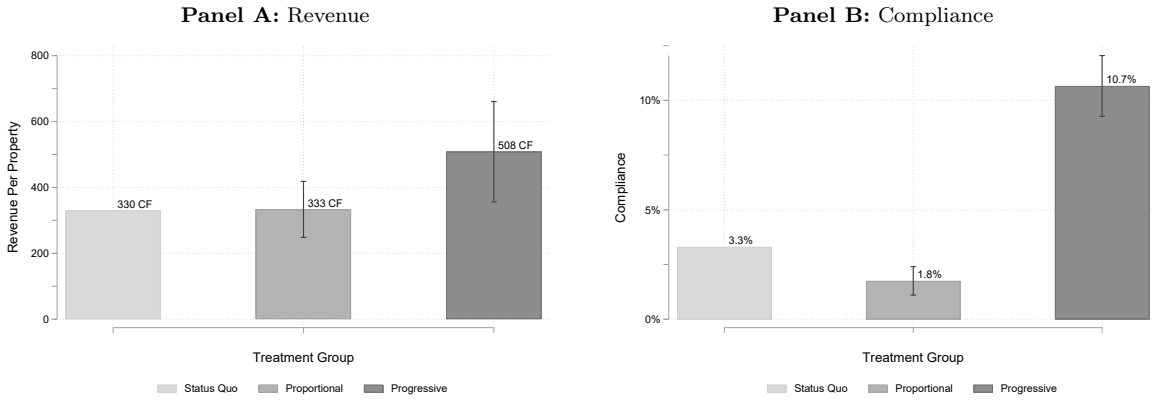
# 9 Exhibits

## Figure 1: Three Tax Systems: Tax Rates



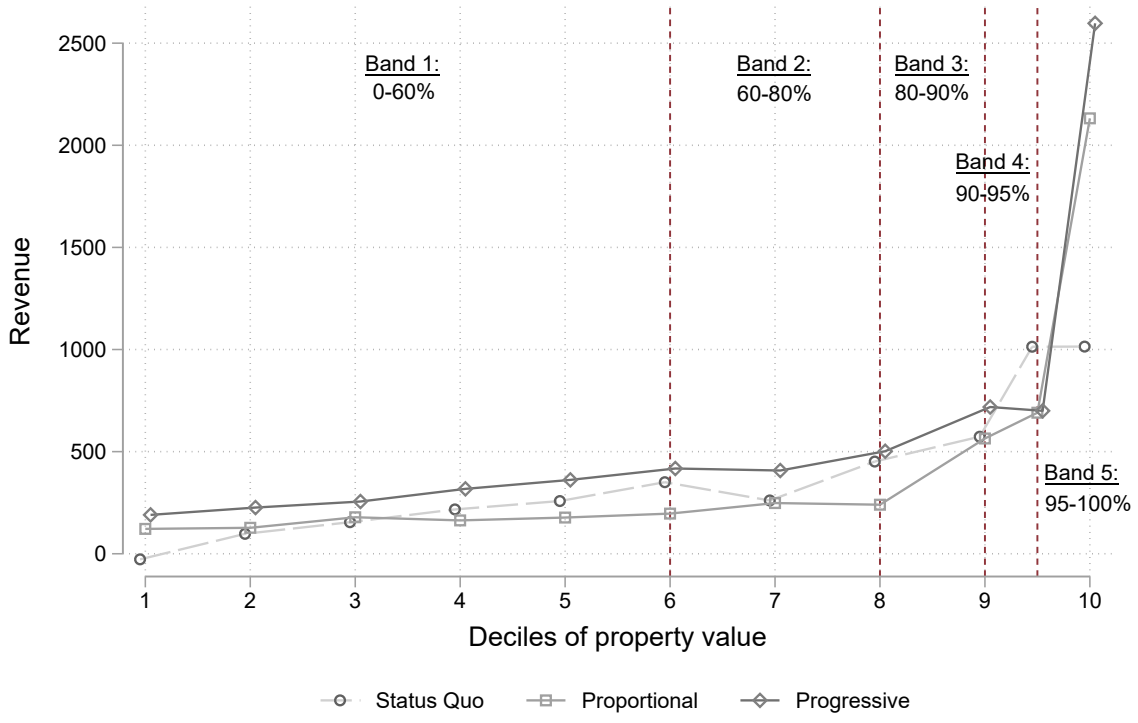

*Notes*: This figure shows tax rates across the three tax systems in the 2024 property tax campaign. The y-axis is the tax rate (in % of property value), and the x-axis is log property value (labeled with USD amounts for clarity). Vertical dashed lines indicate the five value bands. The solid gray line indicates the (flat) Proportional tax rate; the solid black line indicates the Progressive tax rate schedule; and the dashed gray line indicates the implied tax rate in the Status Quo fee schedule (expressed in % of property value). The Progressive schedule decreases in property value at the very bottom because the government imposed a minimum tax amount of 2,000 CF or $0.70 to cover the cost of recovery. We discuss this figure in Section 3.

## Figure 2: Treatment Effects on Tax Revenue and Compliance




*Notes*: This figure shows the average revenue raised per property (Panel A) and compliance rate (Panel B) by treatment group. The sample includes all assessable residential buildings that received a tax bill in the 2024 property tax campaign. Other details about the estimation can be found in Section 5.1. Figure A13 shows the analogous figures without adjusting for lower average tax liabilities in Status Quo as described in Section A4.1. We discuss this figure in Section 5.2.

## Figure 3: Tax Revenue by Treatment and Building Value



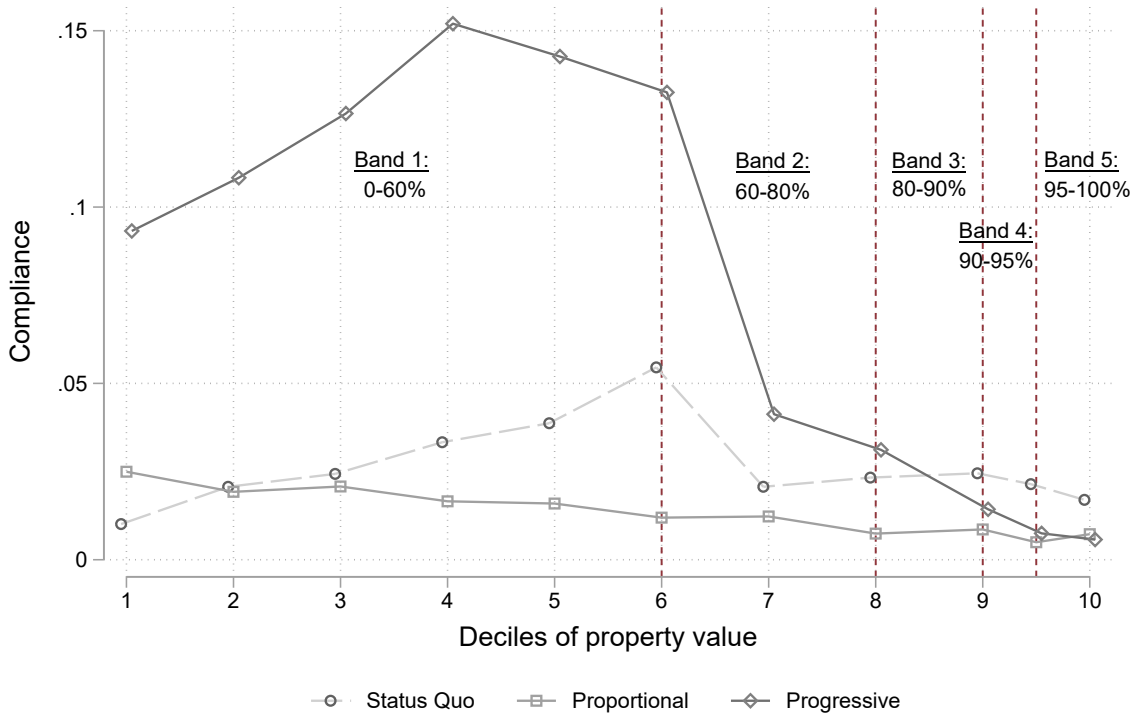

*Notes*: This figure summarizes the average revenue raised per property by treatment and decile of the building value distribution. The vertical lines correspond to the value bands used in the progressive tax system. The sample includes all assessable residential buildings that received a tax bill in the 2024 property tax campaign. Table 1 shows the corresponding treatment effects. Other details about the estimation can be found in Section 5.1. We discuss this figure in Section 5.2.

## Table 1: Treatment Effects on Tax Revenue by Decile of Building Value

| | | Decile of Property Value | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Band 1: 0–60%* | | | | | | *Band 2: 60–80%* | | *Band 3: 80–90%* | *Band 4: 90–95%* | *Band 5: 95–100%* |
| | All Deciles Pooled | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 9.5 | 10 |
| **Panel A: Proportional vs Progressive** | | | | | | | | | | | | |
| Progressive | 175.307** | 67.670** | 97.362*** | 77.247** | 154.757*** | 186.613*** | 222.082*** | 161.370*** | 259.983*** | 154.170 | 14.970 | 340.554 |
| | (78.055) | (27.268) | (25.582) | (33.740) | (31.667) | (38.698) | (50.151) | (56.878) | (81.476) | (159.108) | (333.434) | (1311.673) |
| Observations | 77700 | 7543 | 7738 | 7837 | 7883 | 7898 | 7853 | 7826 | 7783 | 7831 | 3787 | 3721 |
| Control Mean | 312.400 | 113.414 | 118.239 | 177.484 | 162.764 | 175.768 | 193.946 | 260.829 | 243.802 | 558.662 | 620.415 | 1630.929 |
| **Panel B: Status Quo vs Proportional and Progressive** | | | | | | | | | | | | |
| Proportional | 2.765 | 149.227*** | 29.498 | 24.133 | -53.856* | -80.870** | -153.850*** | -12.761 | -211.303*** | -8.547 | -323.202 | 1117.637 |
| | (43.428) | (25.607) | (26.803) | (33.767) | (29.635) | (34.641) | (42.729) | (47.158) | (67.761) | (128.399) | (276.720) | (709.579) |
| Progressive | 177.781** | 217.885*** | 128.562*** | 101.229*** | 100.686*** | 103.680*** | 67.042 | 146.576*** | 50.527 | 145.485 | -313.782 | 1582.735 |
| | (77.815) | (21.727) | (27.933) | (26.207) | (28.829) | (34.403) | (44.470) | (46.440) | (69.812) | (132.427) | (263.979) | (1485.978) |
| Observations | 96297 | 9460 | 9613 | 9717 | 9738 | 9776 | 9740 | 9689 | 9616 | 9642 | 4653 | 4653 |
| Control Mean | 330.493 | -27.334 | 97.726 | 154.678 | 217.180 | 258.185 | 350.507 | 261.087 | 451.654 | 573.050 | 1013.756 | 1014.395 |

*Notes*: This table shows treatment effects on revenue across deciles of building value. Panel A summarizes results from estimating Equation 2, comparing Progressive and Proportional, while Panel B includes the comparison to the Status Quo. The sample includes all assessable residential buildings that received a tax bill in the 2024 property tax campaign. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this figure in Section 5.2.

## Figure 4: Tax Compliance by Treatment and Building Value



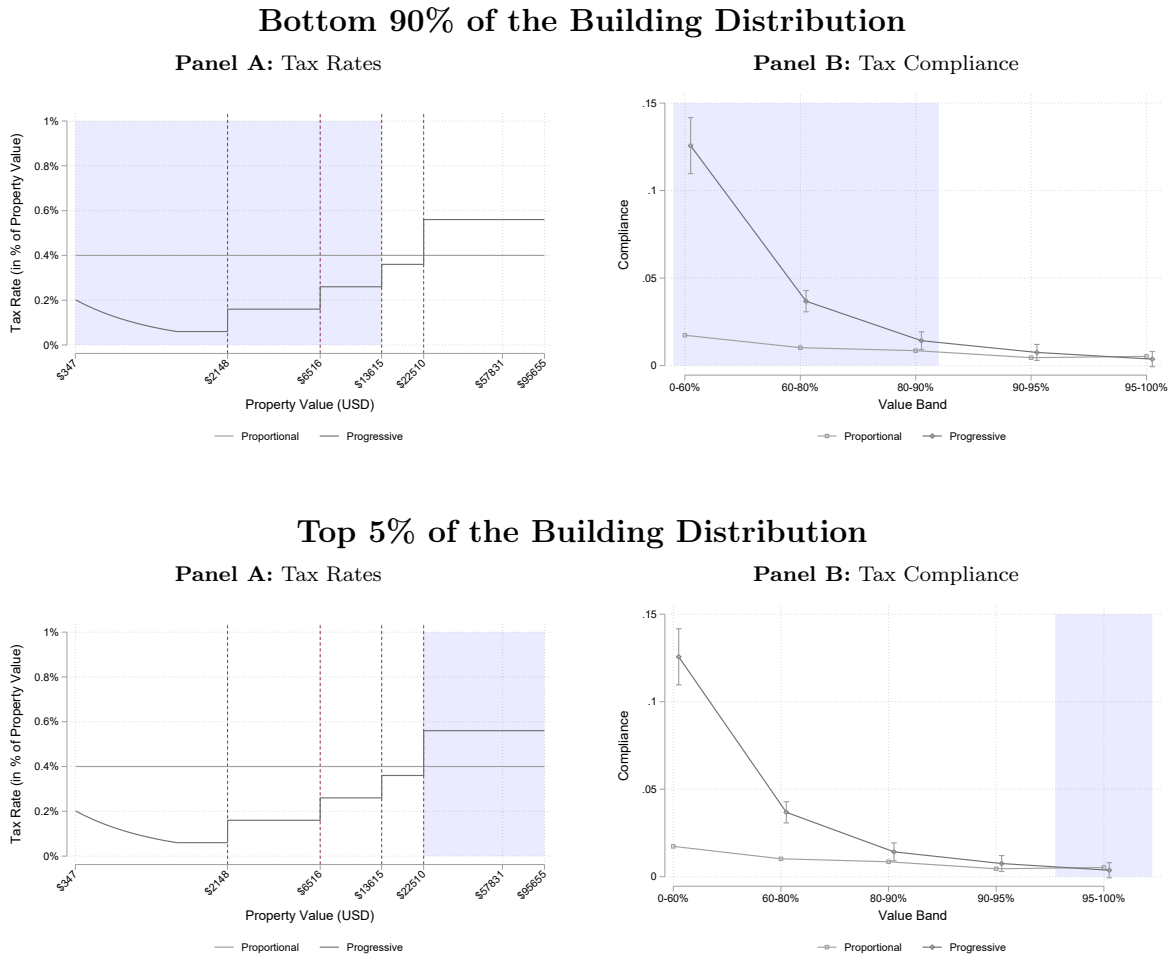

*Notes*: This figure shows compliance rates by treatment and decile of the building value distribution. The vertical lines correspond to the value bands used in the progressive tax system. The sample includes all assessable residential buildings that received a tax bill in the 2024 property tax campaign. Table 1 shows the corresponding treatment effects. Other details about the estimation can be found in Section 5.1. We discuss this figure in Section 5.2.

## Table 2: Treatment Effects on Tax Compliance by Decile of Building Value

| | | Decile of Property Value | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Band 1: 0–60%* | | | | | | *Band 2: 60–80%* | | *Band 3: 80–90%* | *Band 4: 90–95%* | *Band 5: 95–100%* |
| | All Deciles Pooled | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 9.5 | 10 |
| **Panel A: Proportional vs Progressive** | | | | | | | | | | | | |
| Progressive | 0.072*** | 0.068*** | 0.089*** | 0.106*** | 0.136*** | 0.127*** | 0.121*** | 0.029*** | 0.024*** | 0.006** | 0.003 | -0.002 |
| | (0.006) | (0.009) | (0.009) | (0.010) | (0.011) | (0.011) | (0.012) | (0.004) | (0.004) | (0.003) | (0.002) | (0.002) |
| Observations | 77700 | 7543 | 7738 | 7837 | 7883 | 7898 | 7853 | 7826 | 7783 | 7831 | 3787 | 3721 |
| Control Mean | 0.014 | 0.023 | 0.017 | 0.021 | 0.017 | 0.015 | 0.012 | 0.013 | 0.008 | 0.009 | 0.004 | 0.006 |
| **Panel B: Status Quo vs Proportional and Progressive** | | | | | | | | | | | | |
| Proportional | -0.014*** | 0.015*** | -0.001 | -0.004 | -0.017*** | -0.023*** | -0.043*** | -0.008** | -0.016*** | -0.016*** | -0.016*** | -0.010* |
| | (0.003) | (0.005) | (0.005) | (0.005) | (0.004) | (0.004) | (0.005) | (0.003) | (0.003) | (0.004) | (0.006) | (0.005) |
| Progressive | 0.058*** | 0.083*** | 0.088*** | 0.102*** | 0.119*** | 0.104*** | 0.078*** | 0.021*** | 0.008* | -0.010** | -0.014** | -0.011** |
| | (0.006) | (0.008) | (0.009) | (0.010) | (0.011) | (0.011) | (0.012) | (0.005) | (0.004) | (0.004) | (0.006) | (0.005) |
| Observations | 96142 | 9460 | 9613 | 9717 | 9738 | 9776 | 9740 | 9689 | 9616 | 9642 | 4624 | 4527 |
| Control Mean | 0.027 | 0.010 | 0.021 | 0.024 | 0.033 | 0.039 | 0.055 | 0.021 | 0.023 | 0.025 | 0.021 | 0.017 |

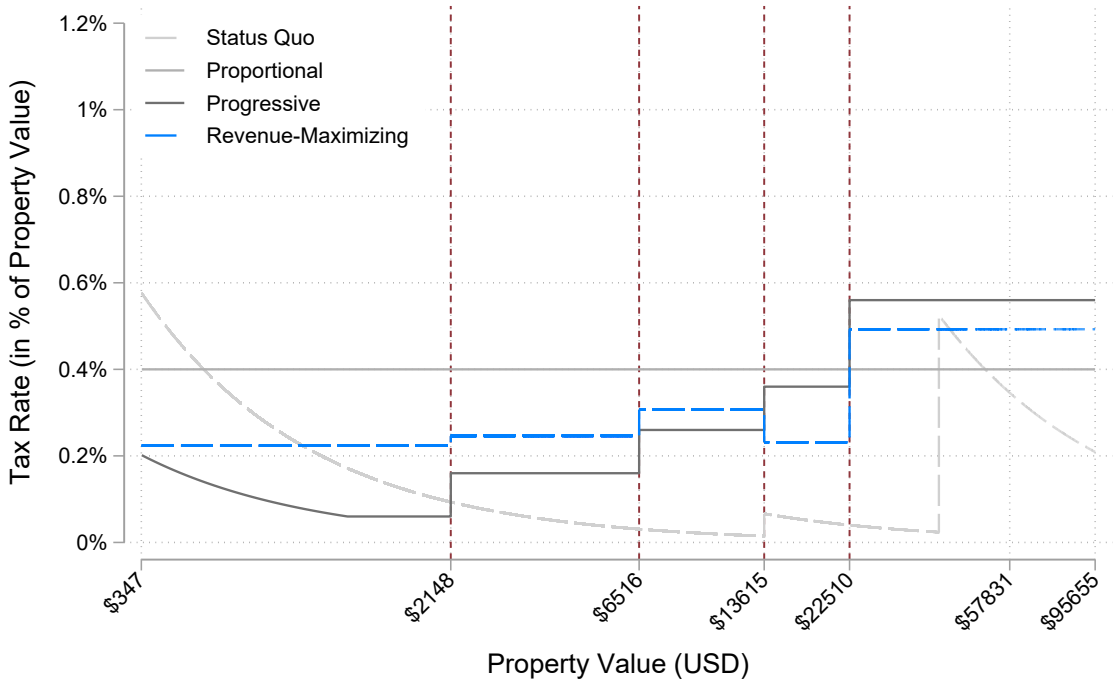
*Notes*: This table shows treatment effects on tax compliance across deciles of building value. Panel A summarizes results from estimating Equation 2, comparing Progressive and Proportional, while Panel B includes the comparison to the Status Quo. The sample includes all assessable residential buildings that received a tax bill in the 2024 property tax campaign. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this figure in Section 5.2.

## Figure 5: Mechanical v. Behavioral Effects Throughout the Distribution



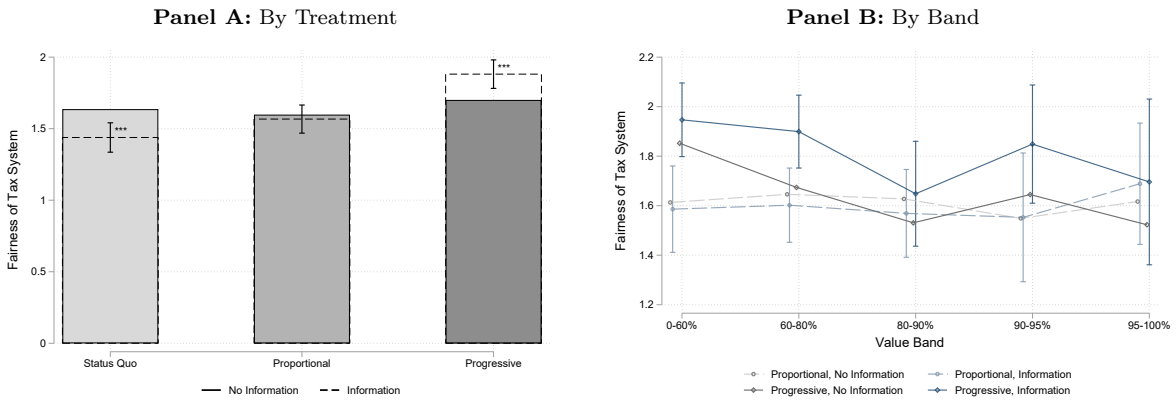

*Notes*: This figure illustrates how competing mechanical and behavioral effects from tax rate changes drive revenue responses at different parts of the building value distribution. The top two graphs focus on the bottom 90% of the value distribution, in which the behavioral effect (higher compliance) dominates the mechanical effect of lower tax rates. The bottom two graphs focus on the top 5% of the value distribution, in which the mechanical effect of higher tax rates dominates the behavioral effect. In Band 4 (percentile 90-95%), the tax liability is essentially identical. We discuss this figure in Section 5.2.

## Figure 6: The Revenue Maximizing Tax Schedule



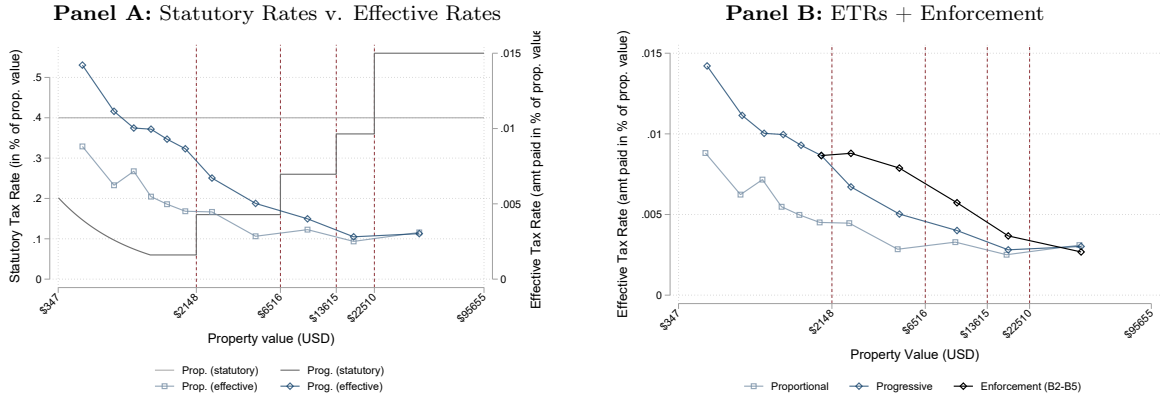

*Notes*: This figure overlays the revenue-maximizing tax rate (RMTR) schedule with the three tax systems that make up the 2024 Kananga field experiment. Tax schedules are labeled as in Figure 1, with the addition of the estimated RMTR in blue. We discuss the estimation that generated this figure in Section 5.4.

## Figure 7: Endline Information Experiment: Fairness of the Tax System




*Notes*: This figure summarizes the results of the endline information experiment on perceptions of the fairness of the tax system in Kananga. Panel A shows the average perceived fairness by treatment comparing taxpayers who received information about the tax system (dashed line) or not (filled bar). Panel B compares the treatment effect of information for Progressive and Proportional across value bands. We discuss this figure in Section 3.3.

## Figure 8: Effective Tax Rates by Treatment and Value Band

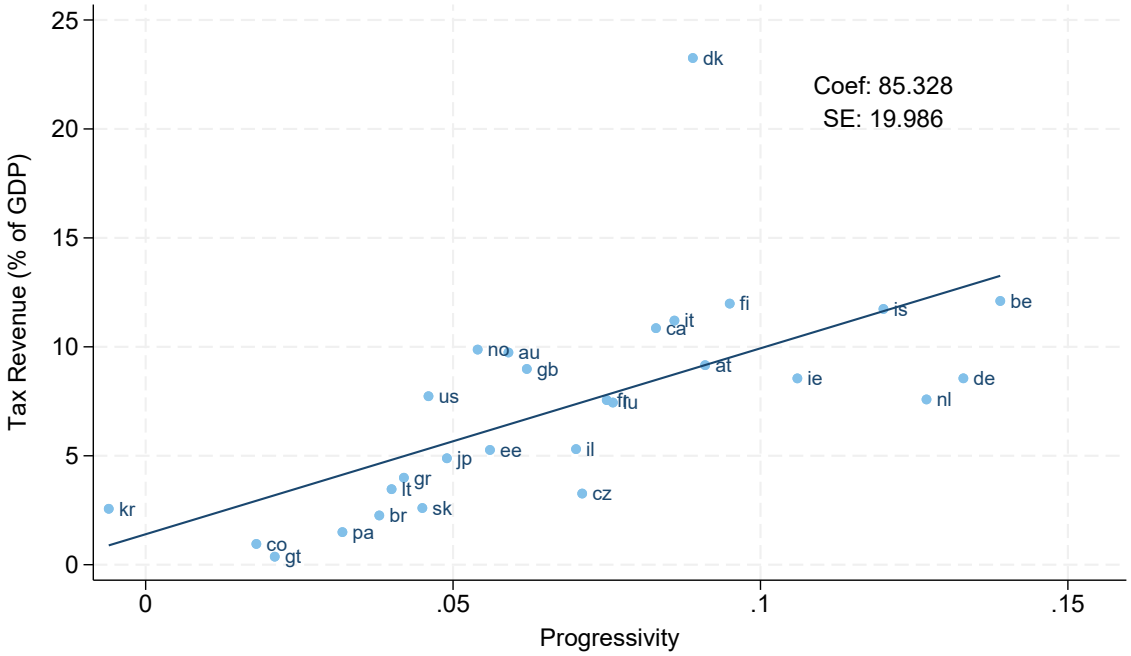



*Notes*: This figure plots the effective tax rate (ETR) — the tax amount paid divided by property value — over the property value distribution. Panel A compares statutory tax rate schedules under Progressive and Proportional with the distribution of the ETR. Panel B then shows how the ETR curve in Progressive shifts up among properties exposed to the enforcement intervention targeting randomly sampled owners in Bands 2-5. In Panel A, the gray lines show the statutory Proportional and Progressive tax system, corresponding to the left y-axis. In both panels, the light blue lines show the ETR for Progressive and Proportional, corresponding to the right y-axis. In Panel B, the black line shows the ETR in Progressive for property owners who received the enforcement intervention. We discuss the estimation that generated this figure in Section 7.

# Appendix

## A1 Additional Exhibits — Setting

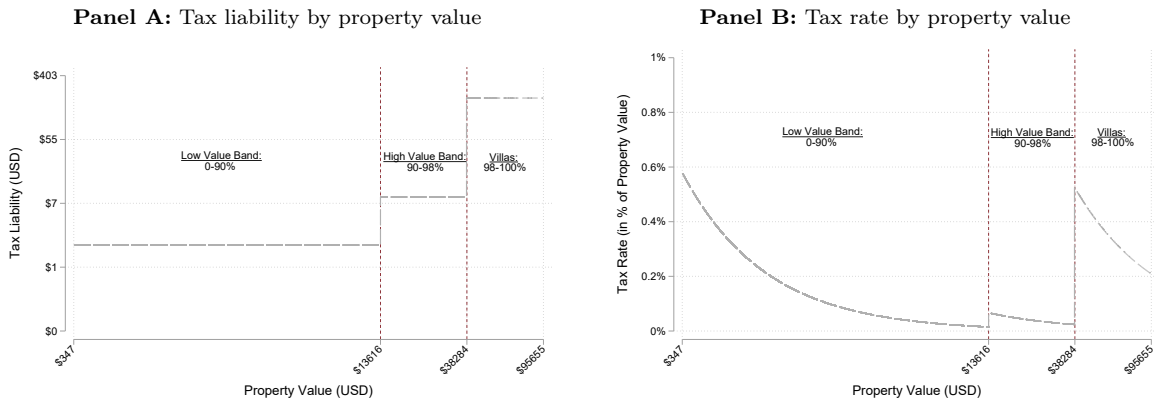
**Figure A1: Progressivity and Tax Capacity: Cross-Country Relationship**




*Notes*: This figure shows the cross-country relationship between income tax revenue as a share of GDP — a proxy for tax capacity — and the progressivity of the income tax. The data on income tax revenue (in % of GDP) come from the World Bank, while the data on the progressivity of the income tax come from Qiu and Russo (2024). The coefficient and standard error from a linear regression are shown in the top right of the graph. We discuss this figure in Section 1.

## A2 Additional Exhibits — Design

## Figure A2: Regressivity of the Status Quo Property Tax System



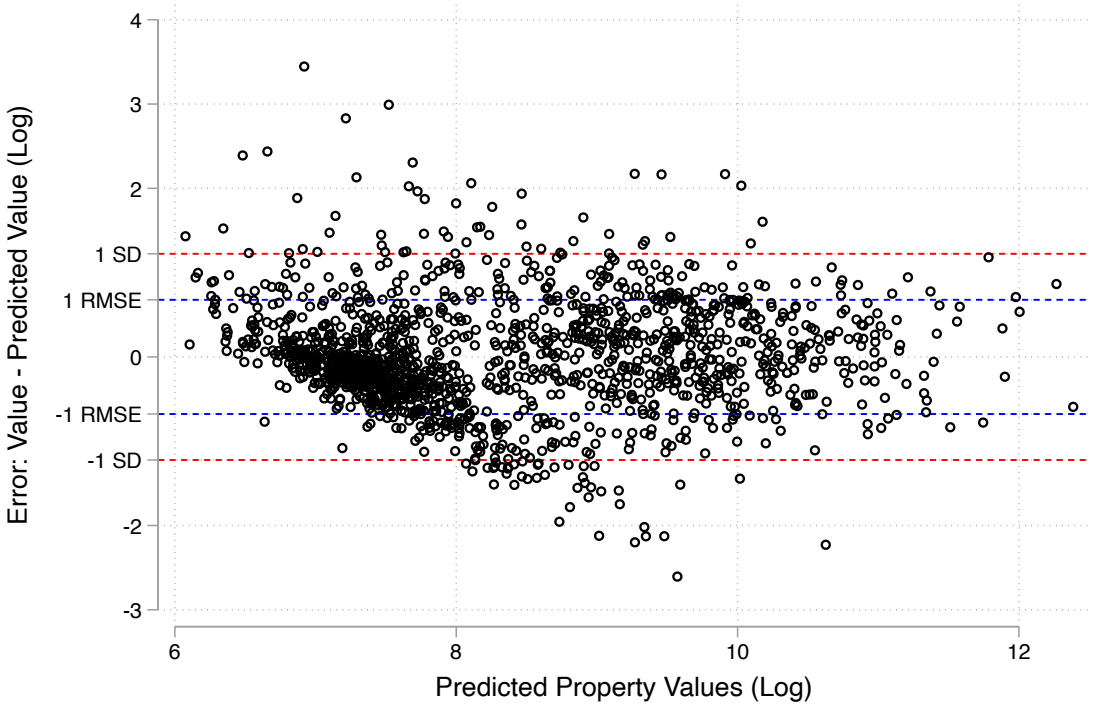

*Notes*: This figure visualizes the regressivity of the status quo property tax system. The left panel plots tax liability (in USD) against property value (in USD), indicating the thresholds at which different fees apply. The right panel plots the implied tax rate (in % of property value) against property value, noting the same thresholds. We discuss this figure in Section 3.

## Table A1: Tax Rates in Proportional, Progressive, and Status Quo

| Band | Percentiles | Rate (in % of property value) | | |
|---|---|---|---|---|
| | | Status Quo | Proportional | Progressive |
| 1 | 0-60% | 0.22% | 0.4% | 0.06% |
| 2 | 60-80% | 0.06% | 0.4% | 0.16% |
| 3 | 80-90% | 0.02% | 0.4% | 0.26% |
| 4 | 90-95% | 0.05% | 0.4% | 0.36% |
| 5 | 95-100% | 0.1% | 0.4% | 0.56% |

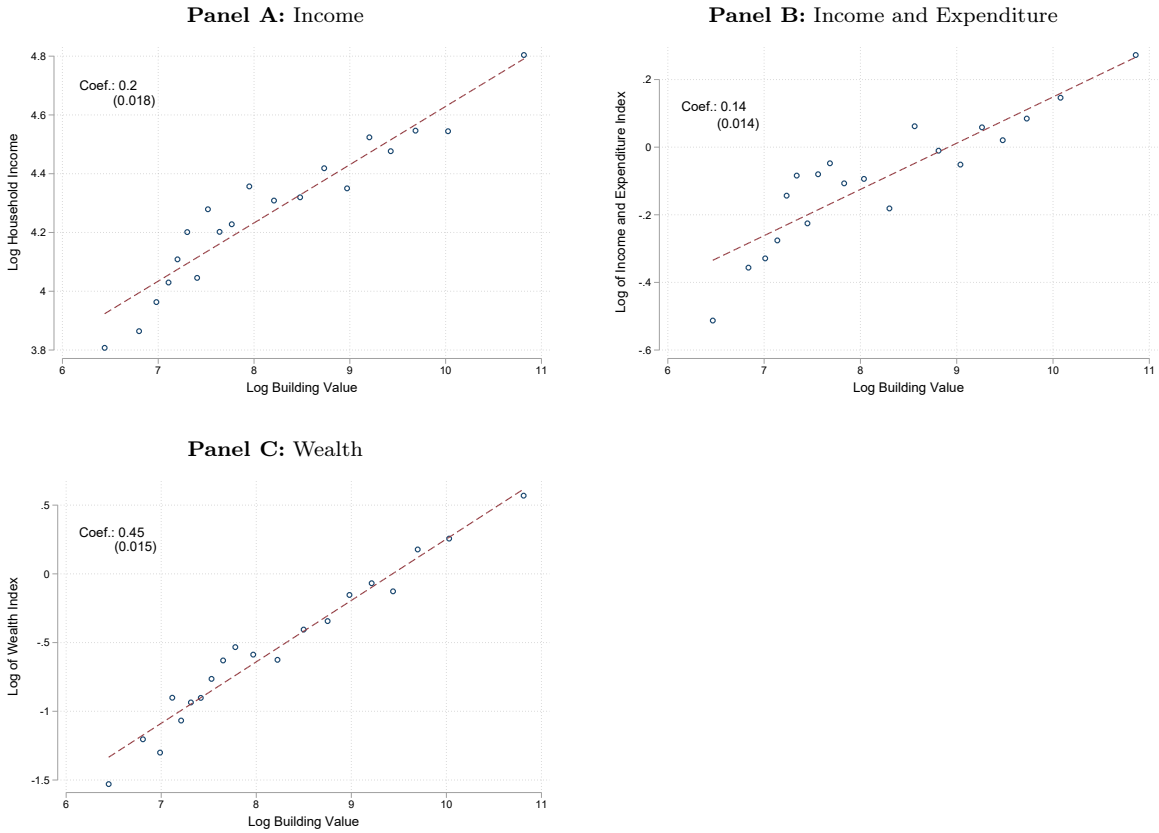
*Notes*: This table shows the tax rates for different bands of assessed value in Progressive, Proportional, and Status Quo. We discuss this table in Section 3.2.

## Figure A3: Calibration Results: Errors



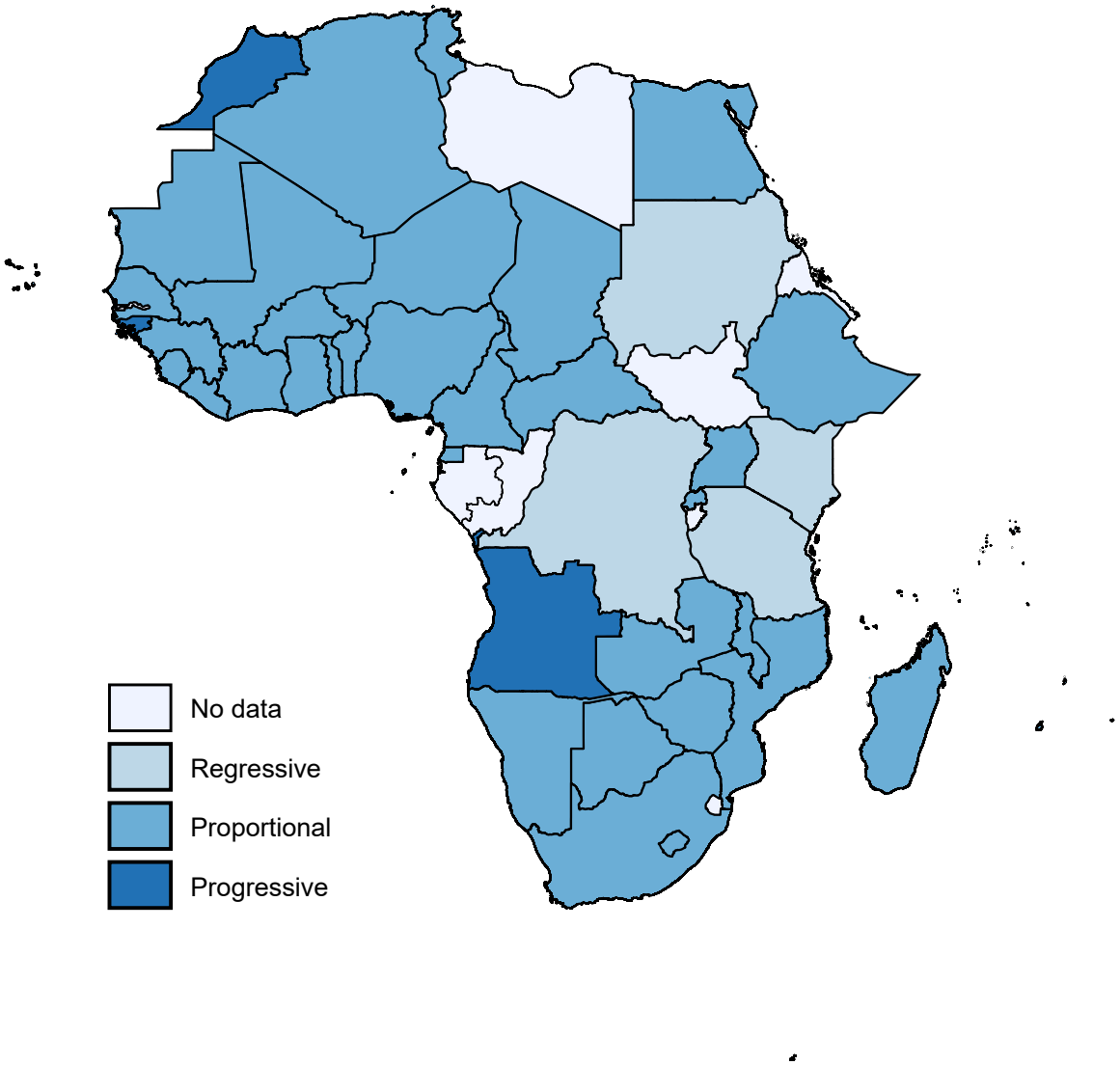

*Notes*: This figure visualizes the errors from the model we calibrated to predict log building values. The y-axis shows errors (the log true value - predicted value), and the x-axis shows predicted property values (in log). Horizontal dashed lines indicated 1 RMSE and 1 SD (positive and negative). We discuss this figure in Section 3.1.

## Figure A4: Correlations: Predicted Property Values and Household Income, Expenditure, and Wealth



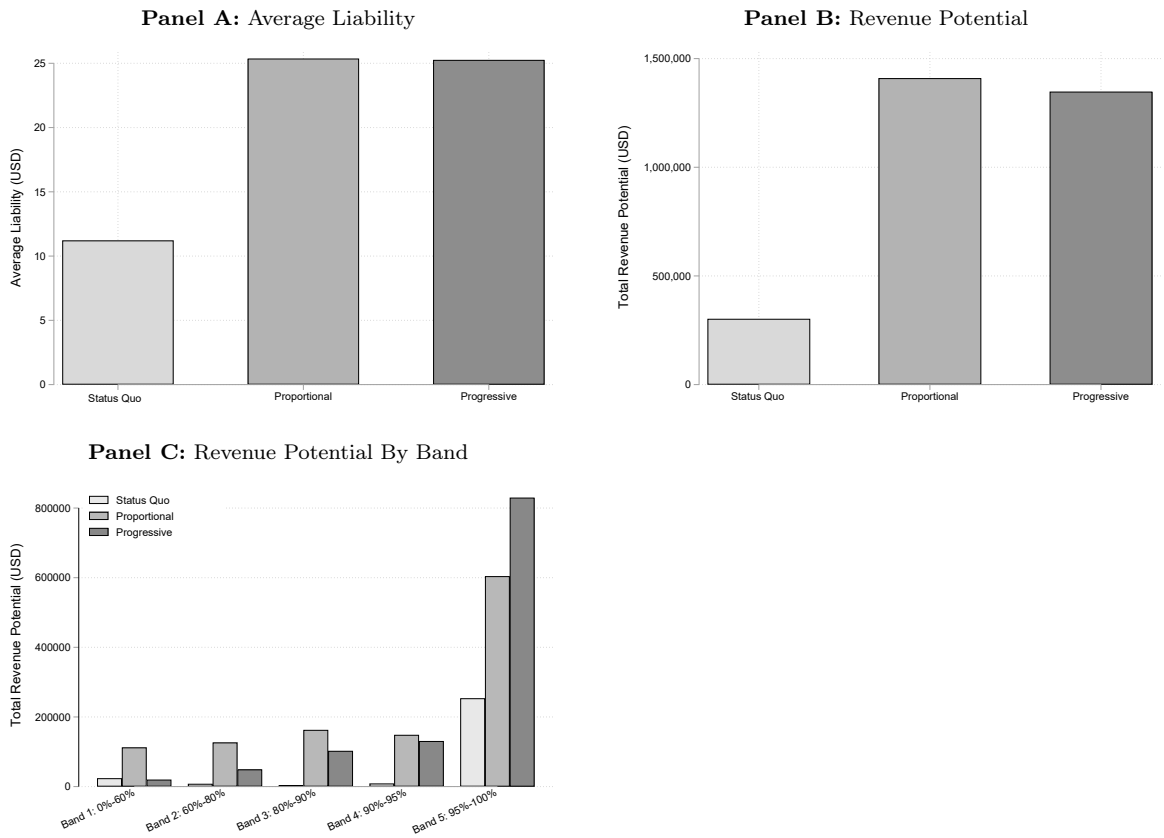

*Notes*: This figure illustrates that predicted building values are highly correlated with other indicators of economic wellbeing. The x-axis is predicted log building value, and the y-axis is log income, log income and expenditure, and log wealth. These wellbeing measures come from household surveys conducted with a representative sample in Kananga by independent enumerators. The wealth measure is generated by an asset-based survey module. We discuss this figure in Section 3.1.

## Figure A5: Property Tax Systems in Africa



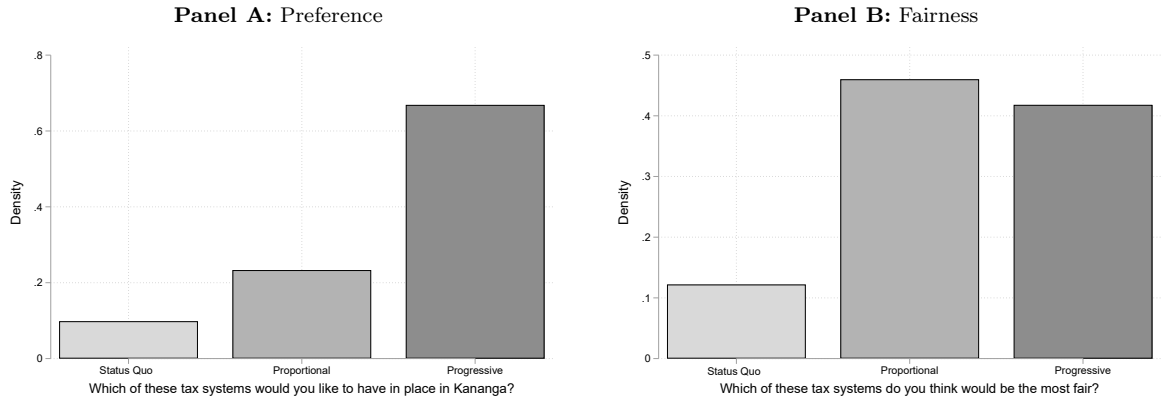

*Notes*: This map shows the distribution of progressive, proportional, and regressive property tax systems in Africa. When countries do not have centrally administered property tax systems, we use the tax system in place in the capital city. We discuss this figure in Section 3.2.

## Figure A6: Equivalence of Average Liability and Revenue Potential in Progressive and Proportional



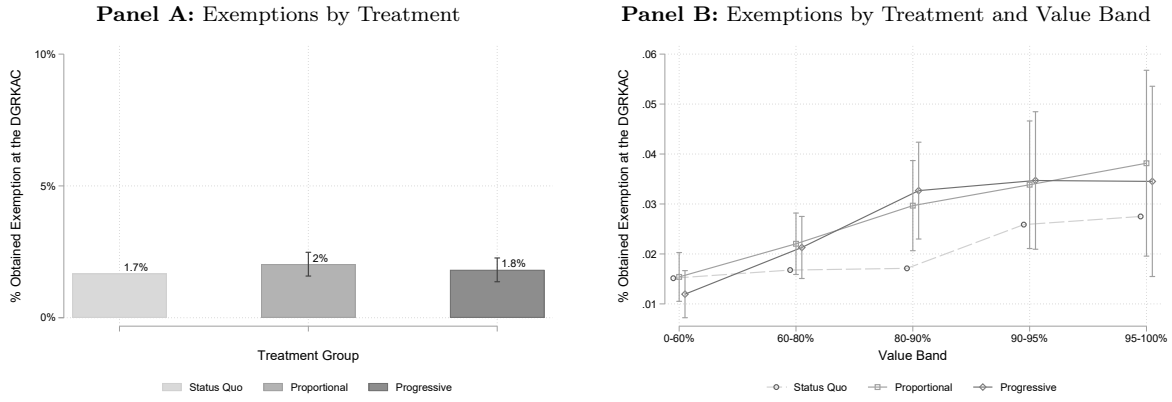

*Notes*: This figure summarizes the liabilities and revenue potential across the three tax systems. Panel A compares average liability across treatments. Panel B compares revenue potential (under full compliance) across treatments. Panel C compares the distribution of revenue potential (under full compliance). We discuss this figure in Section 3.2.

## Figure A7: Baseline Preferences over Progressive, Proportional, and Status Quo Tax Rate Systems




*Notes*: This figure summarizes the preferences of a representative sample of taxpayers measured during our baseline survey (prior to the 2024 tax campaign). Respondents were shown graphs visualizing the three tax rates systems along with detailed explanations by enumerators. We discuss this figure in Section 3.2.

## Figure A8: Official Exemptions by Treatment and Value Band




*Notes*: These figures summarize the claiming of desk-based exemptions, by treatment (Panel A) and across treatments and value bands (Panel B).

## Figure A9: Example Property Tax Bill from 2024 Campaign

*République Démocratique du Congo*
*Province du Kasaï Central*
**DIRECTION GENERALE DES RECETTES DU KASAI CENTRAL**
**DGRKAC**
**DIRECTION GENERALE**

**Identifiant de la note de perception : 110624**

Au propriétaire M. [redacted]
La présente note de perception vous est signifiée pour le paiement de l'impôt foncier de la ville de Kananga pour l'année 2024.
**Veuillez lire attentivement cette note de perception.**

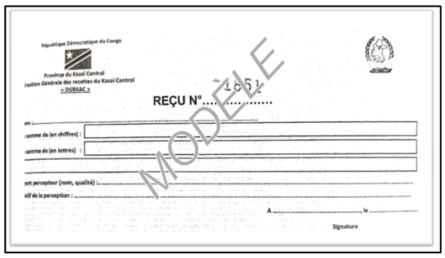
### NOTE DE PERCEPTION DE L'IMPÔT FONCIER 2025

| | |
|---|---|
| **Identifiant du bâtiment :** | KC000037112 |
| **Code Plus :** | [redacted] |
| **Quartier :** | MALANDJI |
| **Nom du propriétaire :** | M. [redacted] |
| **Montant à payer :** | 223.22 US$ |

**Comment payer ?**
Pour vous éviter de vous déplacer à la DGRKAC, nos agents circuleront dans votre quartier pendant les quatre prochaines semaines pour collecter votre paiement sur place. Ils vous donneront un reçu (voir le modèle sur cette note de perception). Vous pouvez également payer à la DGRKAC, mais les frais de transport seront à votre charge.

**Quand payer ?**
Les agents de la DGRKAC collecteront l'impôt foncier dans votre quartier pendant les quatre prochaines semaines. Veuillez-vous référer à la date indiquée au verso de cette note de perception.

**Quelle preuve de paiement dois-je recevoir lorsque je paie mon impôt foncier ?**




**Des questions ?**
Si vous avez des questions ou souhaitez recevoir davantage d'informations concernant l'impôt foncier, vous pouvez vous rendre au bureau des renseignements de l'impôt foncier à la DGRKAC.

Autorité de la DGRKAC

*Bâtiment administratif sur l'Avenue Kinkole – Commune/Ville de Kananga, Province du Kasaï Central*
*République Démocratique du Congo*

*Notes*: This figure shows an example property tax bill. The bill is addressed to the property owner, and shows the unique plus code and tax ID of the building. It also shows the total liability, along with a photo of the building and an image of a valid receipt. The information sections at the bottom explain the modalities of payment, deadlines, and where the taxpayer can find additional information. We discuss this figure in Section 3.2.

## Figure A10: Example Property Tax Flier from 2024 Campaign

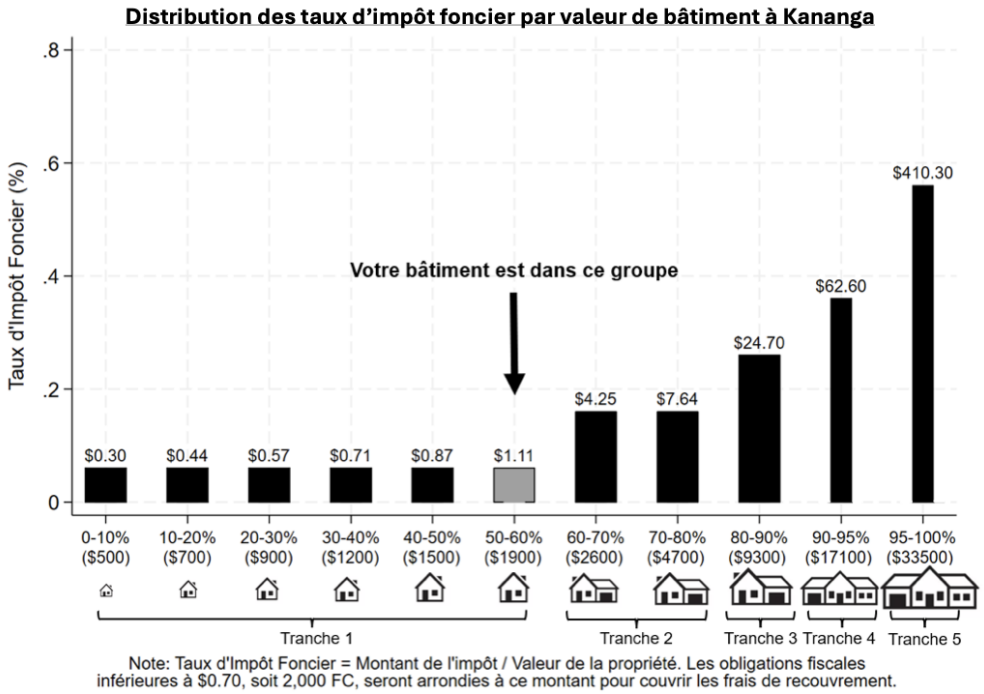
### TRACT D'INFORMATION POUR L'IMPÔT FONCIER 2024

**Informations générales sur l'impôt foncier :**
Ce tract a pour objet de vous rappeler vos obligations en matière d'impôt foncier. La Direction Générale des Recettes du Kasaï-Central (DGRKAC) est chargée de collecter des recettes pour le gouvernement provincial du Kasaï-Central. Les recettes fiscales sont essentielles au fonctionnement du gouvernement et au développement de la province. Payez votre impôt foncier dès aujourd'hui.

**Date de paiement :**
Vous aurez l'occasion de payer auprès d'un percepteur qui va circuler dans votre quartier **avant le 2 novembre 2024**.

**Informations sur les valeurs de bâtiment :**
D'après la dernière évaluation de la DGRKAC, votre bien se situe dans la tranche 1 de la valeur des biens immobiliers à Kananga. Environ 40% des bâtiments ont une valeur supérieure au vôtre et environ 50% des bâtiments ont une valeur inférieure vôtre.

Les bâtiments situés dans votre groupe de valeur sont soumis à un impôt foncier moyen pour 2024 de $ 1.11



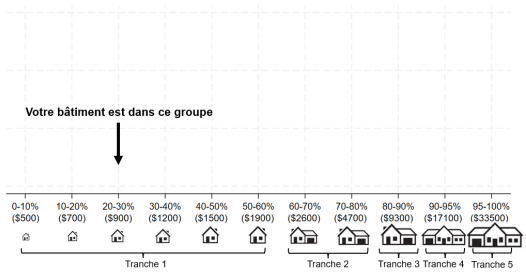

Comme vu sur le graphique ci-contre, les bâtiments de Kananga sont soumis aux taux d'imposition suivants :

- Tranche 1 : 1-60% : taux = 0.06 %, impôt moyen = $ 0.80
- Tranche 2 : 61-80% : taux = 0.16 %, impôt moyen = $ 5.91
- Tranche 3 : 80-90% : taux = 0.26 %, impôt moyen = $ 24.71
- Tranche 4 : 91-95% : taux = 0.36 %, impôt moyen = $ 62.60
- Tranche 5 : 96-100% : taux = 0.56 %, impôt moyen = $ 408.40

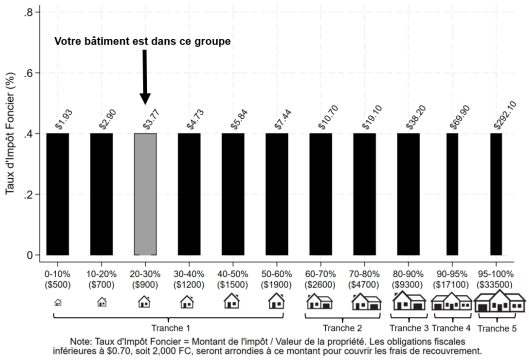
*Notes*: This figure shows an example property tax flier, located on the back side of the bill. All fliers began with a short informational message about the property tax. Treatment fliers then iteratively added information about the building's location in the distribution of building values in Kananga, and information about the distribution of property tax rates. This flier concerns a building in the fifth decile of property value (Band 1) in Progressive. We discuss this figure in Section 3.3.

# Figure A11: Flier Image Alternatives

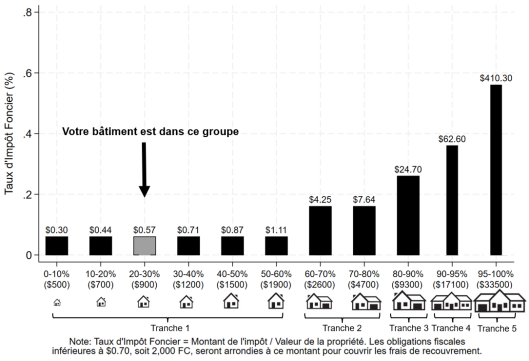
**Panel A:** Building Location Only




**Panel B:** Location + Distribution (Proportional)

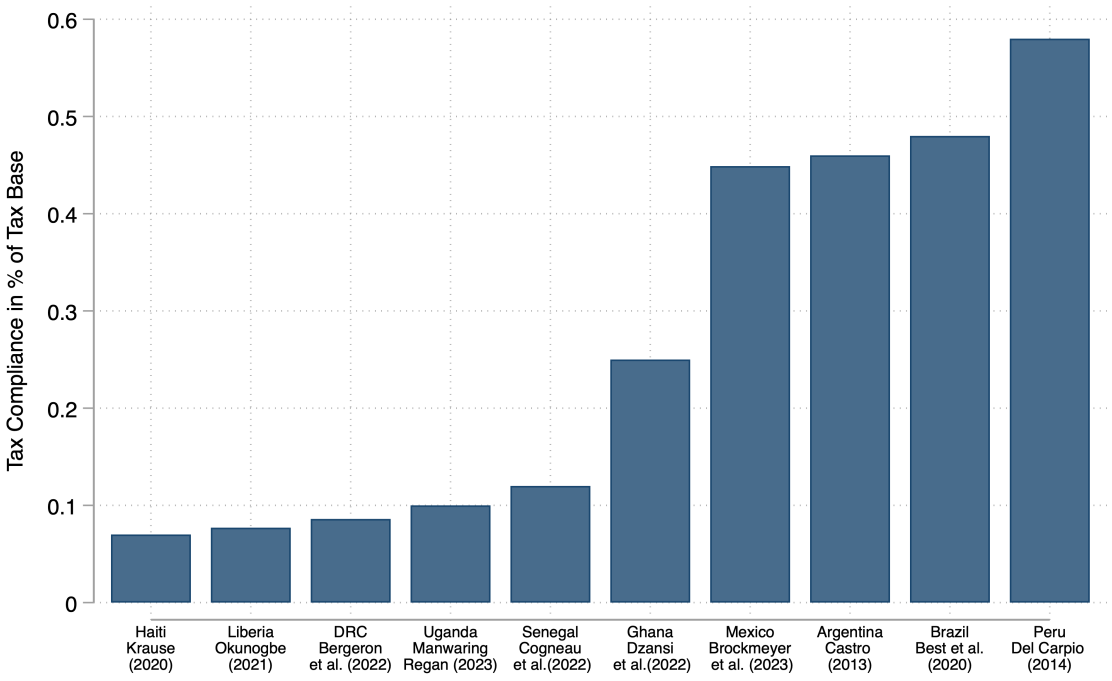



**Panel C:** Location + Distribution (Progressive)




*Notes*: This figure shows additional visuals on fliers to complement the full flier in Figure A9. Each flier corresponds to a building in the third decile of building value. The flier in Panel A shows only the building's location in the distribution of value, while the fliers in Panels B and C show the location as well as the distribution of tax rates and liabilities in Proportional and Progressive, respectively. We discuss this figure in Section 3.3.

## Figure A12: Property Tax Compliance Across Ten Developing Countries




*Notes*: This figure summarizes property tax compliance rates measured using administrative data in ten recent studies. In each case, the compliance estimate reflects a large city in the country rather than the country-level average. We discuss this figure in Section 3.4.

# Table A2: Balance Table

| | Data Source (1) | Observations (2) | Control Mean (3) | Proportional (4) | Progressive (5) | p-value: Prop vs Prog (6) |
|---|---|---|---|---|---|---|
| Panel A: Property Characteristics | | | | | | |
| Assessable | Admin (Assess.) | 135915 | 0.770 | 0.022 | 0.031 | 0.354 |
| Assessed Value | Admin (Assess.) | 105885 | 8041.640 | 25.570 | 148.576 | 0.898 |
| Adult Present | Admin (Assess.) | 66527 | 0.517 | -0.002 | 0.006 | 0.581 |
| Household Income | Admin (Assess.) | 31139 | 170062.9 | 4731.789 | 3881.639 | 0.917 |
| Has Electricity | Admin (Assess.) | 105566 | 0.221 | 0.012 | 0.010 | 0.822 |
| Household Size | Admin (Assess.) | 32774 | 7.286 | -0.054 | -0.094 | 0.634 |
| Wall Quality | Admin (Assess.) | 105566 | -0.042 | 0.096* | 0.079 | 0.649 |
| Roof Quality | Admin (Assess.) | 105186 | 0.218 | 0.001 | 0.004 | 0.825 |
| Commercial Building | Admin (Assess.) | 107837 | 0.028 | -0.004 | -0.004 | 0.873 |
| Status Quo Tax Liability | Admin (Assess.) | 105885 | 6.091 | -0.395 | -0.076 | 0.579 |
| Panel B: Property Owner Characteristics | | | | | | |
| Age | Baseline | 10452 | 42.332 | -0.581 | -0.494 | 0.868 |
| Gender | Baseline | 10452 | 0.590 | -0.002 | 0.010 | 0.483 |
| Education: Any Secondary | Baseline | 10452 | 0.844 | 0.012 | 0.012 | 0.991 |
| Education: Any University | Baseline | 10452 | 0.166 | 0.014 | 0.010 | 0.694 |
| Employed | Baseline | 10452 | 0.661 | 0.009 | -0.004 | 0.260 |
| Employed by Government | Baseline | 10452 | 0.076 | -0.003 | -0.007 | 0.599 |
| Believes Government Handles Tax Collection Well | Baseline | 6211 | 0.017 | -0.005 | -0.053 | 0.165 |
| Believes Government is Responsive to their Needs | Baseline | 10287 | 0.012 | -0.035 | -0.029 | 0.849 |
| Perceived Fairness of Tax System | Baseline | 9773 | -0.027 | 0.028 | 0.024 | 0.875 |
| Predicted Tax Liability | Baseline | 9778 | 43.025 | 118.880 | -32.928 | 0.355 |
| Perceived Fairness of Tax Amount | Baseline | 9802 | 0.035 | -0.041 | -0.048 | 0.812 |
| Perceived Probability of Punishment for Non-Compliance | Baseline | 10452 | -0.025 | 0.033 | 0.035 | 0.950 |
| Perceived Amount of Public Goods from Tax Revenue | Baseline | 10452 | -0.028 | 0.009 | 0.056 | 0.362 |
| Believes Progressive System is Fairest | Baseline | 3458 | 0.423 | 0.001 | -0.004 | 0.871 |
| Believes Progressive System Generates Highest Revenue | Baseline | 3458 | 0.654 | 0.038 | 0.029 | 0.696 |
| Prefers Progressive System | Baseline | 3458 | 0.659 | 0.022 | 0.023 | 0.945 |
| Panel C: Tax Campaign Features | | | | | | |
| Exempt (Field) | Admin (2024 Tax) | 103815 | 0.122 | -0.012 | -0.017** | 0.464 |
| Bill Delivered | Admin (2024 Tax) | 103815 | 0.939 | -0.010 | -0.013* | 0.695 |
| Installment Treatment | Randomization | 66322 | 0.499 | -0.000 | -0.001 | 0.628 |
| Appointment Treatment | Randomization | 66322 | 0.500 | 0.000 | 0.000 | 0.920 |
| Enforcement Treatment | Randomization | 66322 | 0.469 | 0.004 | 0.000 | 0.449 |
| Panel D: Neighborhood Characteristics | | | | | | |
| Compliance in 2018 Tax Campaign | Admin (2018 Tax) | 460 | 0.091 | 0.000 | 0.004 | 0.660 |
| Revenue Per Owner in 2018 Tax Campaign | Admin (2018 Tax) | 460 | 259.609 | -24.775 | -16.848 | 0.720 |
| Tax Treatment in 2018: Central | Randomization | 460 | 0.256 | -0.013 | -0.029 | 0.719 |
| Tax Treatment in 2018: Local | Randomization | 460 | 0.256 | -0.023 | -0.013 | 0.811 |
| Tax Treatment in 2018: Central + Local Information | Randomization | 460 | 0.159 | 0.027 | 0.011 | 0.685 |
| Tax Treatment in 2018: Pure Control | Randomization | 460 | 0.110 | -0.015 | 0.012 | 0.410 |
| Tax Treatment in 2018: None | Randomization | 460 | 0.220 | 0.024 | 0.019 | 0.904 |
| Tax Treatment in 2016 | Randomization | 350 | 0.625 | 0.016 | -0.083 | 0.088* |

*Notes*: This table assesses the balance of the neighborhood-level randomization of tax rate system treatments. Each row summarizes a separate regression of the variable shown on treatment dummies according to Equation 2. Panel A includes property characteristics from the administrative data used for mass assessment. Panel B includes property owner characteristics drawn from the baseline survey. Panel C includes features of the 2024 tax campaign, which come from either the admin data or our randomization files. Panel D includes neighborhood characteristics from 2018 administrative tax data or 2018 and 2016 randomization files. The number of observations varies by characteristic based on respondent availability and non-response during the assessment survey and the baseline survey. We discuss this figure in Section 4.2.

# A3 Additional Exhibits — Results

## Table A3: Robustness — Treatment Effects on Compliance

| | (1) Main Specification | (2) Dropping Exempt Properties | (3) Including Failed Bill Deliveries | (4) Including Commercial Buildings | (5) Controlling for Imbalanced Covariates | (6) Compound Level | (7) Removing Owners of Multiple Buildings | (8) Removing Enforcement Payments | (9) Controlling for Other Treatments |
|---|---|---|---|---|---|---|---|---|---|
| **Panel A: Proportional vs Progressive** | | | | | | | | | |
| Progressive | 0.072*** | 0.074*** | 0.067*** | 0.071*** | 0.069*** | 0.089*** | 0.072*** | 0.066*** | 0.056*** |
| | (0.006) | (0.006) | (0.005) | (0.006) | (0.005) | (0.007) | (0.006) | (0.006) | (0.006) |
| Observations | 77700 | 68725 | 83792 | 79594 | 74817 | 50855 | 77672 | 77347 | 77524 |
| Control Mean | 0.014 | 0.015 | 0.013 | 0.014 | 0.013 | 0.018 | 0.014 | 0.013 | 0.014 |
| **Panel B: Status Quo vs Proportional and Progressive** | | | | | | | | | |
| Proportional | -0.014*** | -0.012*** | -0.014*** | -0.014*** | -0.012*** | -0.016*** | -0.014*** | -0.014*** | -0.010*** |
| | (0.003) | (0.003) | (0.002) | (0.003) | (0.003) | (0.003) | (0.003) | (0.002) | (0.004) |
| Progressive | 0.058*** | 0.062*** | 0.052*** | 0.056*** | 0.056*** | 0.074*** | 0.058*** | 0.053*** | 0.046*** |
| | (0.006) | (0.006) | (0.005) | (0.006) | (0.006) | (0.007) | (0.006) | (0.006) | (0.007) |
| Observations | 96142 | 84791 | 103429 | 97741 | 92078 | 62759 | 96107 | 95737 | 95914 |
| Control Mean | 0.027 | 0.026 | 0.026 | 0.027 | 0.025 | 0.033 | 0.027 | 0.027 | 0.027 |

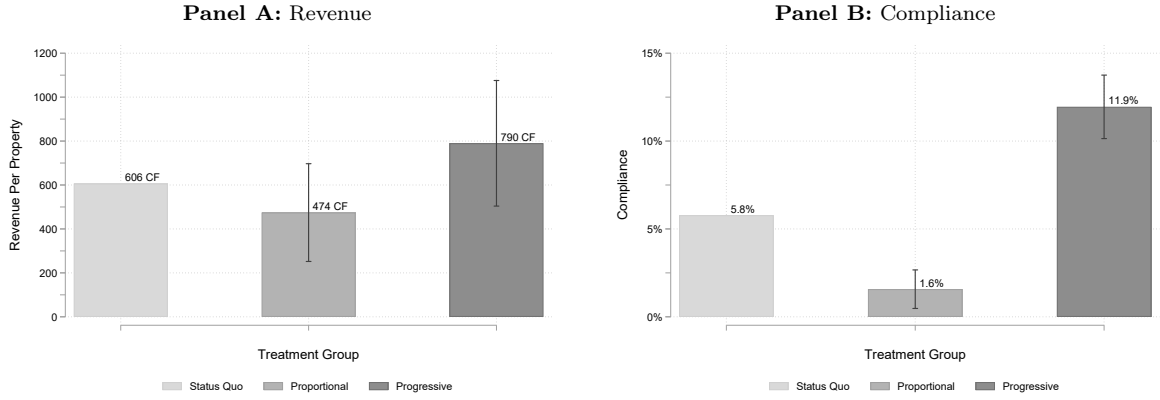
*Notes*: This table shows the robustness of our results on compliance to a number of checks. Column 1 shows our main specification. Column 2 drops exempted properties. Column 3 includes properties that did not receive a bill. Column 4 includes commercial buildings. Column 5 controls for imbalanced covariates as found in Appendix Table A2. Column 6 estimates results at the compound level rather than the building level. Column 7 drops owners of multiple buildings, who might receive more than one treatment. Column 8 drops payments collected by the enforcement team. Column 9 flexibly controls for other cross-randomized treatments. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this table in Section 5.2.

## Table A4: Robustness — Treatment Effects on Revenue

| | (1) Main Specification | (2) Dropping Exempt Properties | (3) Including Failed Bill Deliveries | (4) Including Commercial Buildings | (5) Controlling for Imbalanced Covariates | (6) Compound Level | (7) Removing Owners of Multiple Buildings | (8) Removing Enforcement Payments | (9) ln(1+Revenue) as the Outcome | (10) Controlling for Other Treatments |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A: Proportional vs Progressive** | | | | | | | | | | |
| Progressive | 175.307** | 184.339** | 155.778** | 142.200* | 162.854** | 283.698** | 175.158** | 163.271** | 0.546*** | 325.729*** |
| | (78.055) | (89.283) | (70.279) | (78.600) | (78.952) | (123.993) | (78.040) | (78.474) | (0.045) | (125.368) |
| Observations | 77700 | 68725 | 83792 | 79119 | 74817 | 50855 | 77672 | 77347 | 77700 | 77524 |
| Control Mean | 312.400 | 328.695 | 290.224 | 340.521 | 302.501 | 473.871 | 312.535 | 307.636 | 0.130 | 312.400 |
| **Panel B: Status Quo vs Proportional and Progressive** | | | | | | | | | | |
| Proportional | 2.765 | 40.390 | -16.907 | 30.735 | 19.434 | -3.802 | 3.025 | 1.616 | -3.482*** | -72.381 |
| | (43.428) | (48.645) | (41.681) | (46.508) | (45.933) | (68.477) | (43.428) | (43.592) | (0.337) | (63.000) |
| Progressive | 177.781** | 225.095** | 138.761* | 173.169** | 182.753** | 279.330** | 177.898** | 164.786** | -2.940*** | 253.372** |
| | (77.815) | (89.056) | (70.981) | (76.222) | (80.152) | (123.014) | (77.835) | (78.396) | (0.339) | (118.227) |
| Observations | 96297 | 84910 | 103589 | 97939 | 92202 | 62820 | 96262 | 95892 | 95153 | 96067 |
| Control Mean | 330.493 | 312.826 | 328.245 | 331.272 | 311.486 | 513.602 | 330.405 | 326.768 | 3.610 | 330.493 |

*Notes*: This table shows the robustness of our results on revenue to a number of checks. Column 1 shows our main specification. Column 2 drops exempted properties. Column 3 includes properties that did not receive a bill. Column 4 includes commercial buildings. Column 5 controls for imbalanced covariates as found in Appendix Table A2. Column 6 estimates results at the compound level rather than the building level. Column 7 drops owners of multiple buildings, who might receive more than one treatment. Column 8 drops payments collected by the enforcement team. Column 9 studies log revenue as the outcome. Column 10 flexibly controls for other cross-randomized treatments. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this table in Section 5.2.

## Figure A13: Treatment Effects on Tax Revenue and Compliance: No Status Quo Adjustment




*Notes*: This figure shows the average revenue raised per property by treatment group without adjusting for lower average tax liabilities in Status Quo, as described in Section A4.1. The analogous figure with the adjustment is Figure 2. The sample includes all assessable residential buildings that received a tax bill in the 2024 property tax campaign. Other details about the estimation can be found in Section 5.1. We discuss this figure in Section 5.2.

**Table A5: Assessing Endogenous Collector Effort: Treatment Effects on Visits**

| | All Bands Pooled | Value Band 0-60% | 60-80% | 80-90% | 90-95% | 95-100% |
|---|---|---|---|---|---|---|
| **Panel A: Any Visit** | | | | | | |
| Progressive | -0.014 | -0.016 | -0.006 | 0.005 | -0.022 | 0.009 |
| | (0.011) | (0.013) | (0.015) | (0.018) | (0.018) | (0.027) |
| Observations | 77700 | 46752 | 15609 | 7831 | 3873 | 3635 |
| Control Mean | 0.638 | 0.571 | 0.690 | 0.745 | 0.823 | 0.844 |
| **Panel B: Number of Visits** | | | | | | |
| Progressive | 0.000 | 0.012 | -0.013 | 0.006 | -0.042 | 0.029 |
| | (0.024) | (0.027) | (0.033) | (0.040) | (0.044) | (0.059) |
| Observations | 77700 | 46752 | 15609 | 7831 | 3873 | 3635 |
| Control Mean | 0.880 | 0.780 | 0.982 | 1.046 | 1.120 | 1.106 |
| **Panel C: Average Duration of Visit (Minutes)** | | | | | | |
| Progressive | 1.283 | 1.663 | 0.637 | 1.250 | 0.638 | 1.229 |
| | (0.994) | (1.142) | (1.078) | (1.704) | (1.417) | (1.874) |
| Observations | 48679 | 26064 | 10615 | 5811 | 3130 | 3059 |
| Control Mean | 5.656 | 5.567 | 5.546 | 5.842 | 6.184 | 5.900 |

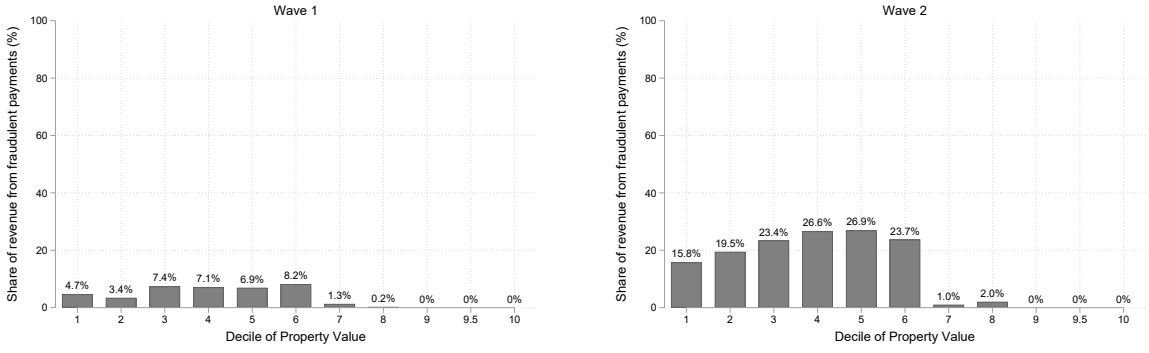
*Notes*: This table shows treatment effects of Progressive on visits across value bands (compared to Proportional). In Panel A, the outcome is a binary variable for receiving at least one visits. In Panel B, the outcome is the number of visits received. In Panel C, the outcome is the average duration of each visit. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this table in Section 5.5.

## Table A6: Robustness — Treatment Effects on Compliance and Revenue: Controlling for Number and Duration of Visits

| | Compliance | | | Revenue | | |
|---|---|---|---|---|---|---|
| | (1) Controlling for Any Visit | (2) Controlling for Nb. of Visits | (3) Controlling for Visit Duration | (4) Controlling for Any Visit | (5) Controlling for Nb. of Visits | (6) Controlling for Visit Duration |
| **Panel A: Proportional vs Progressive** | | | | | | |
| Progressive | 0.072*** | 0.072*** | 0.083*** | 180.307** | 175.163** | 240.805* |
| | (0.006) | (0.006) | (0.007) | (78.705) | (77.744) | (123.618) |
| Observations | 77700 | 77700 | 48679 | 77700 | 77700 | 48679 |
| Control Mean | 0.014 | 0.014 | 0.014 | 312.400 | 312.400 | 312.400 |
| **Panel B: Status Quo vs Proportional and Progressive** | | | | | | |
| Proportional | -0.014*** | -0.015*** | -0.014*** | -7.270 | -6.509 | 45.972 |
| | (0.003) | (0.003) | (0.004) | (43.125) | (43.266) | (66.043) |
| Progressive | 0.058*** | 0.057*** | 0.070*** | 172.629** | 168.589** | 287.392** |
| | (0.006) | (0.006) | (0.007) | (77.204) | (76.563) | (123.636) |
| Observations | 96142 | 96142 | 59711 | 96297 | 96297 | 59849 |
| Control Mean | 0.027 | 0.027 | 0.027 | 330.493 | 330.493 | 330.493 |

*Notes*: This table shows the robustness of our results on compliance and revenue to controlling for the duration and number of visits. Columns 1 and 4 control for receiving any visit. Columns 2 and 5 control for the number of visits received. Columns 3 and 6 control for the average duration of visits. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this table in Section 5.5.

## Figure A14: Share of Revenue from Fraudulent Payments, by Wave and Decile of Property Value



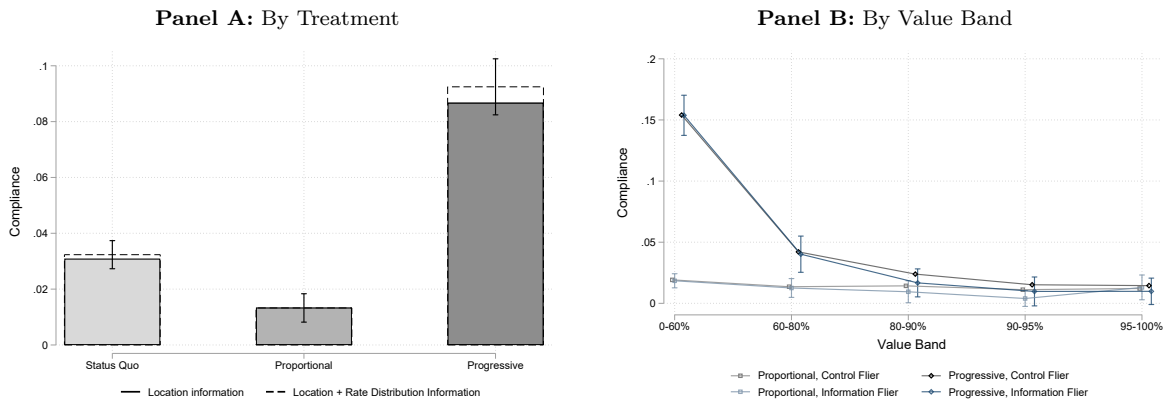

*Notes*: This figure shows the share of revenue from fraudulent payments discovered during the audit of all recorded payments described in Section 5.5, by wave of tax collection and decile of property value.

## Table A7: Robustness — Treatment Effects on Compliance and Revenue: Randomly Assigned Facilitation Appointments

| | | Compliance | | | ln(1+Revenue) | | |
|---|---|---|---|---|---|---|---|
| | (1) Random Appt Met | (2) Conditioning on Assignment to Random Appt | (3) Conditioning on Random Appt Met | (4) Heterogeneity by Random Appt | (5) Conditioning on Assignment to Random Appt | (6) Conditioning on Random Appt Met | (7) Heterogeneity by Random Appt |
| **Panel A: Proportional vs Progressive** | | | | | | | |
| Progressive | -0.006 | 0.074*** | 0.074*** | 0.071*** | 0.564*** | 0.564*** | 0.537*** |
| | (0.017) | (0.006) | (0.007) | (0.006) | (0.049) | (0.052) | (0.047) |
| Progressive x Random Appt | | | | 0.004 | | | 0.029 |
| | | | | (0.004) | | | (0.033) |
| Random Appt | | | | -0.000 | | | 0.003 |
| | | | | (0.001) | | | (0.014) |
| Observations | 24162 | 25332 | 20779 | 77700 | 25332 | 20779 | 77700 |
| Control Mean | 0.863 | 0.014 | 0.014 | 0.014 | 0.137 | 0.129 | 312.400 |
| **Panel B: Status Quo vs Proportional and Progressive** | | | | | | | |
| Proportional | 0.014 | -0.018*** | -0.019*** | -0.012*** | -0.360*** | -0.380*** | -0.256*** |
| | (0.024) | (0.003) | (0.003) | (0.003) | (0.049) | (0.051) | (0.040) |
| Proportional x Random Appt | | | | -0.006** | | | -0.104*** |
| | | | | (0.002) | | | (0.031) |
| Progressive | 0.008 | 0.057*** | 0.055*** | 0.059*** | 0.204*** | 0.182*** | 0.278*** |
| | (0.025) | (0.007) | (0.007) | (0.006) | (0.065) | (0.068) | (0.059) |
| Progressive x Random Appt | | | | -0.002 | | | -0.074* |
| | | | | (0.004) | | | (0.042) |
| Random Appt | | | | 0.006*** | | | 0.107*** |
| | | | | (0.002) | | | (0.028) |
| Observations | 29812 | 31243 | 25500 | 96142 | 31317 | 25562 | 96297 |
| Control Mean | 0.847 | 0.031 | 0.032 | 0.027 | 0.491 | 0.506 | 0.418 |

*Notes*: This table presents results on the share of random appointments honored by treatment status, and shows the robustness of our results on compliance and revenue to assignment to random appointments. Column 1 shows the effect of treatment on random appointments being honored. Columns 2 and 5 present treatment effects conditional on being assigned to random appointments. Columns 3 and 6 present treatment effects conditional on being assigned to random appointments and the appointment being honored. Columns 4 and 7 test for heterogeneity in treatment effects by assignment to random appointments. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this table in Section 5.5.

## Figure A15: Treatment Effects of Tax System Information on Compliance




*Notes*: This figure summarizes the effect of providing information about the tax rate system on compliance. Panel A shows results by treatment, while Panel B further disaggregates by value band. The control group receives only a short message about the property tax, while the treatment group receives information about their location in the distribution of building values and the schedule of tax rates in their neighborhood. We discuss this figure in Section 6.

## Table A8: Robustness — Alternative Fraud Adjustments

| | Compliance | | | | | Revenue | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **Panel A: Proportional vs Progressive** | | | | | | | | | | |
| Progressive | 0.089*** | 0.113*** | 0.117*** | 0.072*** | 0.086*** | 266.463** | 339.728*** | 462.882** | 253.733 | 254.311* |
| | (0.007) | (0.009) | (0.008) | (0.007) | (0.007) | (129.707) | (130.593) | (185.212) | (166.877) | (129.454) |
| Observations | 51235 | 51235 | 51235 | 39993 | 51235 | 51235 | 51235 | 51235 | 39993 | 51235 |
| Control Mean | 0.018 | 0.019 | 0.019 | 0.018 | 0.018 | 509.867 | 513.208 | 513.208 | 544.186 | 511.917 |
| **Panel B: Status Quo vs Proportional and Progressive** | | | | | | | | | | |
| Proportional | -0.014*** | -0.011*** | -0.014** | -0.008** | -0.011*** | 68.148 | -2.179 | -71.267 | -4.227 | -2.977 |
| | (0.003) | (0.003) | (0.006) | (0.004) | (0.003) | (72.761) | (70.730) | (103.502) | (90.002) | (70.598) |
| Progressive | 0.075*** | 0.102*** | 0.100*** | 0.064*** | 0.075*** | 332.565*** | 335.364*** | 358.903* | 247.994 | 248.901** |
| | (0.007) | (0.009) | (0.008) | (0.007) | (0.007) | (117.568) | (117.131) | (184.315) | (152.189) | (116.085) |
| Observations | 62795 | 62795 | 62795 | 48731 | 62795 | 62795 | 62795 | 62795 | 48731 | 62795 |
| Control Mean | 0.032 | 0.030 | 0.030 | 0.028 | 0.030 | 436.495 | 510.308 | 510.308 | 550.222 | 510.094 |
| Fraud Adjustment | Yes | No | No | No | No | Yes | No | No | No | No |
| Excluding Wave 2 Band 1 | No | No | No | Yes | No | No | No | No | Yes | No |
| Recoding fraud as no compliance | No | No | No | No | Yes | No | No | No | No | Yes |
| Wave FEs | No | No | Yes | No | No | No | No | Yes | No | No |
| Collector FEs | No | No | Yes | No | No | No | No | Yes | No | No |

*Notes*: This table shows the robustness of our results on compliance and revenue to collector fraud. Columns 1 and 6 show our main specification, in which we drop properties likely exposed to fraud uniformly by treatment (as discussed in Section 3.5). Columns 2 and 7 show results with no fraud adjustment. Columns 3 and 8 introduce tax campaign wave fixed effects and tax collector fixed effects, given that opportunities for fraud varied by wave and collector. Columns 4 and 9 drop Band 1 properties in wave 2 entirely, as this was the wave most affected by fraud and essentially all opportunities for fraud occurred in Band 1. Columns 5 and 10 recode fraud as no compliance. Panel A summarizes results from estimating Equation 2, comparing Progressive and Proportional, while Panel B includes the comparison to the Status Quo. The sample includes all assessable residential buildings that received a tax bill in the 2024 property tax campaign. Regressions in Panel B include a rate adjustment for the Status Quo group. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this figure in Section 5.5.

## Table A9: Spillovers — Awareness of Others' Rates

| | | Topic of Discussion | | | | | |
|---|---|---|---|---|---|---|---|
| | Discussed Taxes with People from Other Neighborhoods | Tax Liability Calculation | Property Valuation Approach | Tax Campaign Sensitization | Tax Collectors | Tax Campaign Timing | Tax Campaign Payment Modes |
| **Panel A: Proportional vs Progressive** | | | | | | | |
| Progressive | 0.000 | -0.004 | -0.000 | 0.003 | -0.004 | -0.001 | 0.001 |
| | (0.008) | (0.006) | (0.005) | (0.003) | (0.003) | (0.003) | (0.004) |
| Observations | 22450 | 22450 | 22450 | 22450 | 22450 | 22450 | 22450 |
| Control Mean | 0.176 | 0.051 | 0.072 | 0.037 | 0.020 | 0.013 | 0.028 |
| **Panel B: Status Quo vs Proportional and Progressive** | | | | | | | |
| Proportional | 0.004 | 0.016*** | 0.008 | -0.016*** | 0.000 | 0.003 | 0.001 |
| | (0.009) | (0.006) | (0.006) | (0.006) | (0.004) | (0.004) | (0.005) |
| Progressive | 0.005 | 0.013** | 0.007 | -0.013** | -0.003 | 0.002 | 0.003 |
| | (0.009) | (0.006) | (0.006) | (0.005) | (0.004) | (0.004) | (0.005) |
| Observations | 27335 | 27335 | 27335 | 27335 | 27335 | 27335 | 27335 |
| Control Mean | 0.173 | 0.035 | 0.065 | 0.053 | 0.020 | 0.010 | 0.027 |

*Notes*: This table shows treatment effects on self-reported discussions about taxes with people from other neighborhoods, recorded in the midline survey. The outcome in Column 1 is a dummy for ever discussing taxes with people from other neighborhoods. The next six columns then disaggregate the reported topic(s) of the conversation. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this figure in Section 5.5.

## Table A10: Spillovers — Main Results Controlling for Awareness of Others' Rates

| | Compliance | | | ln(1 + Revenue) | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Progressive | 0.064*** | 0.064*** | 0.059*** | 0.495*** | 0.495*** | 0.461*** |
| | (0.005) | (0.005) | (0.005) | (0.043) | (0.043) | (0.041) |
| Discussed Taxes with People from Other Neighborhoods | | 0.025*** | 0.012*** | | 0.216*** | 0.119*** |
| | | (0.005) | (0.003) | | (0.040) | (0.034) |
| Progressive x Discussed Taxes with People from Other Neighborhoods | | | 0.025*** | | | 0.193** |
| | | | (0.009) | | | (0.079) |
| Observations | 21436 | 21436 | 21436 | 21436 | 21436 | 21436 |
| Control Mean | 0.013 | 0.013 | 0.013 | 0.127 | 0.127 | 0.127 |

*Notes*: This table shows heterogeneous treatment effects on compliance and revenue by reported tax discussions with people in other neighborhoods. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this figure in Section 5.5.

## Table A11: Spillovers — Compliance Effects Controlling for Non-Progressive Adjacent Neighborhoods

| | All Bands Pooled | Value Band 0-60% | 60-80% | 80-90% | 90-95% | 95-100% |
|---|---|---|---|---|---|---|
| **Panel A: Controlling for Share of Adjacent Status Quo Neighborhoods** | | | | | | |
| Progressive | 0.072*** | 0.108*** | 0.026*** | 0.006** | 0.003 | -0.002 |
| | (0.006) | (0.008) | (0.003) | (0.003) | (0.002) | (0.002) |
| Share of Adjacent Status Quo Neighborhoods | 0.012 | 0.012 | 0.020* | -0.004 | 0.007 | 0.007 |
| | (0.021) | (0.028) | (0.012) | (0.010) | (0.009) | (0.010) |
| Observations | 77700 | 46752 | 15609 | 7831 | 3873 | 3635 |
| Control Mean | 0.014 | 0.017 | 0.010 | 0.009 | 0.005 | 0.005 |
| **Panel B: Controlling for Share of Adjacent Proportional Neighborhoods** | | | | | | |
| Progressive | 0.072*** | 0.108*** | 0.027*** | 0.006** | 0.003 | -0.002 |
| | (0.006) | (0.008) | (0.003) | (0.003) | (0.002) | (0.002) |
| Share of Adjacent Proportional Neighborhoods | -0.008 | -0.008 | -0.013 | -0.007 | -0.001 | -0.008 |
| | (0.014) | (0.020) | (0.008) | (0.006) | (0.006) | (0.005) |
| Observations | 77700 | 46752 | 15609 | 7831 | 3873 | 3635 |
| Control Mean | 0.014 | 0.017 | 0.010 | 0.009 | 0.005 | 0.005 |

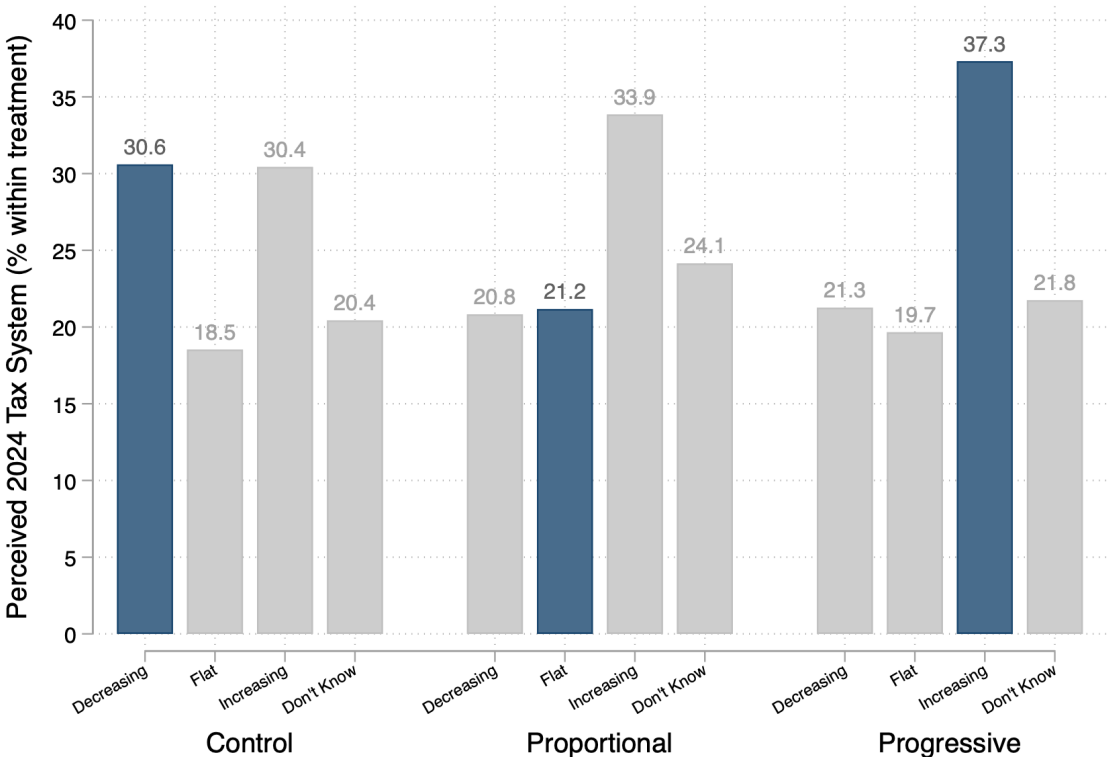
*Notes*: This table examines spillovers on compliance by exploiting the cluster random assignment of tax systems, following Miguel and Kremer (2004). Specifically, we examine whether exogenously being assigned to a larger share of adjacent neighborhoods in Status Quo or Proportional impacts compliance. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this figure in Section 5.5.

## Table A12: Heterogeneous Treatment Effects on Compliance by Baseline Preferences Over Tax Rate Systems

| | Proportional vs Progressive | | Status Quo vs Proportional and Progressive | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Progressive | 0.066*** | 0.082*** | 0.072*** | 0.078*** |
| | (0.018) | (0.013) | (0.017) | (0.013) |
| Progressive x Prefers Progressive | 0.025 | | 0.008 | |
| | (0.020) | | (0.021) | |
| Prefers Progressive | -0.009 | | -0.008 | |
| | (0.009) | | (0.010) | |
| Progressive x Progressive Most Fair | | 0.005 | | 0.001 |
| | | (0.020) | | (0.022) |
| Progressive Most Fair | | -0.008 | | -0.010 |
| | | (0.006) | | (0.011) |
| Proportional | | | -0.012* | -0.004 |
| | | | (0.007) | (0.009) |
| Proportional x Prefers Proportional | | | 0.026* | |
| | | | (0.015) | |
| Prefers Proportional | | | -0.024 | |
| | | | (0.017) | |
| Proportional x Proportional Most Fair | | | | -0.003 |
| | | | | (0.014) |
| Proportional Most Fair | | | | -0.007 |
| | | | | (0.016) |
| Observations | 2719 | 2698 | 3310 | 3284 |
| Control Mean | 0.014 | 0.014 | 0.027 | 0.027 |

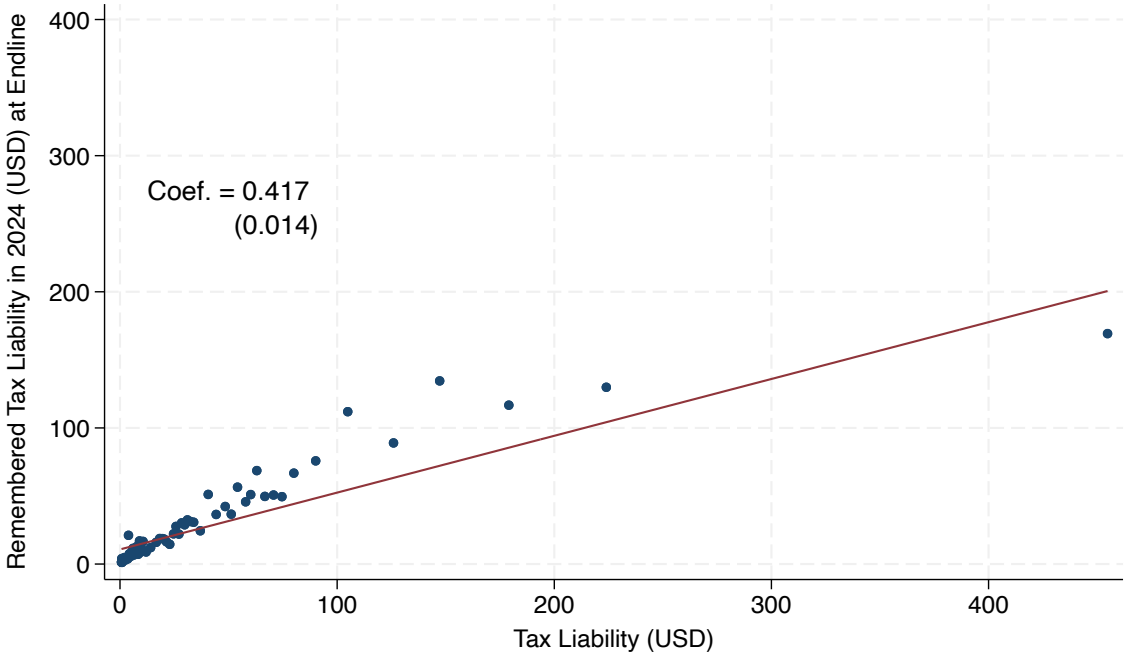
*Notes*: This table examines heterogeneous treatment effects on compliance by baseline preferences over tax rate systems. *Prefers Progressive* is a dummy for baseline respondents who indicated that they would choose Progressive of the three possible systems. *Progressive Most Fair* is a dummy for respondents who said Progressive was the fairest of the three tax systems. Both variables are constructed analogously for Proportional. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels. We discuss this figure in Section 6.

## Figure A16: Actual v. Perceived Tax Schedule in 2024



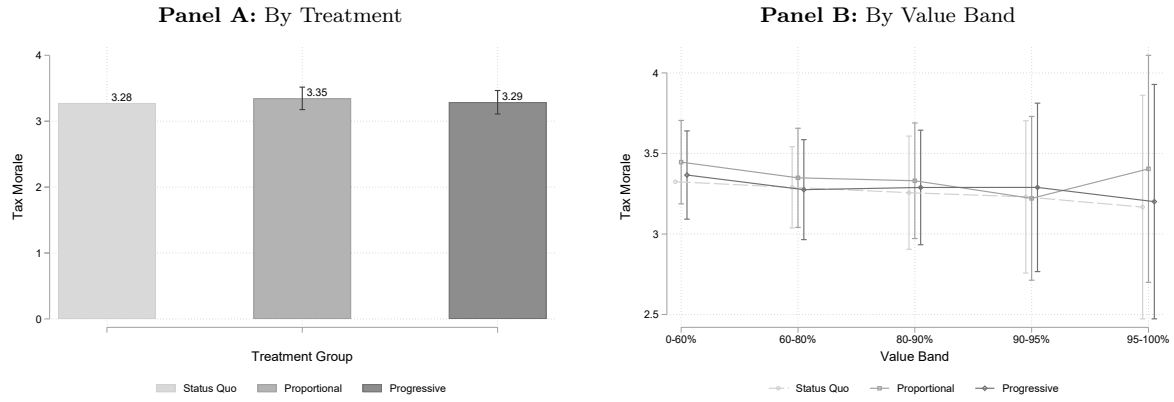

*Notes*: This figure compares taxpayers' perceptions of their 2024 tax system with the actual randomly assigned system. It uses data from the midline survey. We discuss this figure in Section 6.

## Figure A17: Actual v. Perceived Tax Liabilities in 2024



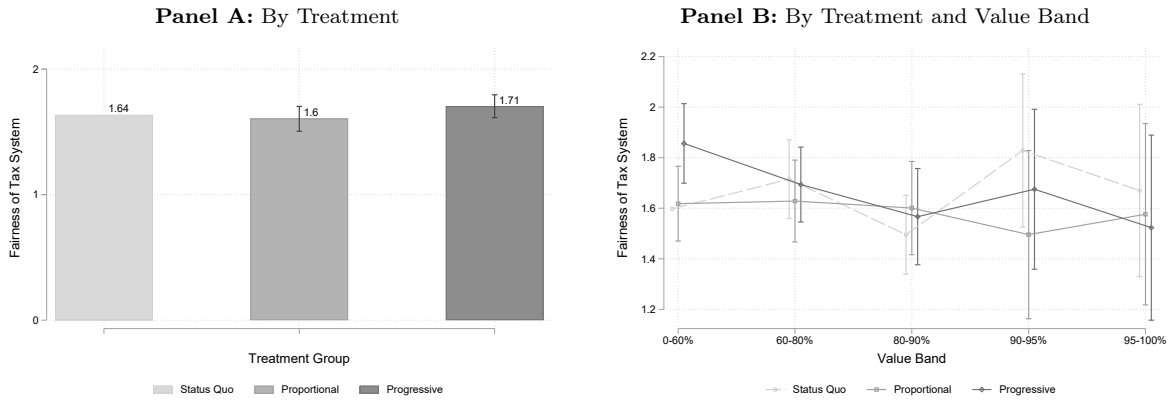

*Notes*: This figure compares taxpayers' perceptions of their 2024 tax liability with their actual 2024 tax liability. It uses data from the endline survey. We discuss this figure in Section 6.

## Figure A18: Tax Morale by Tax System Treatment and Value Band



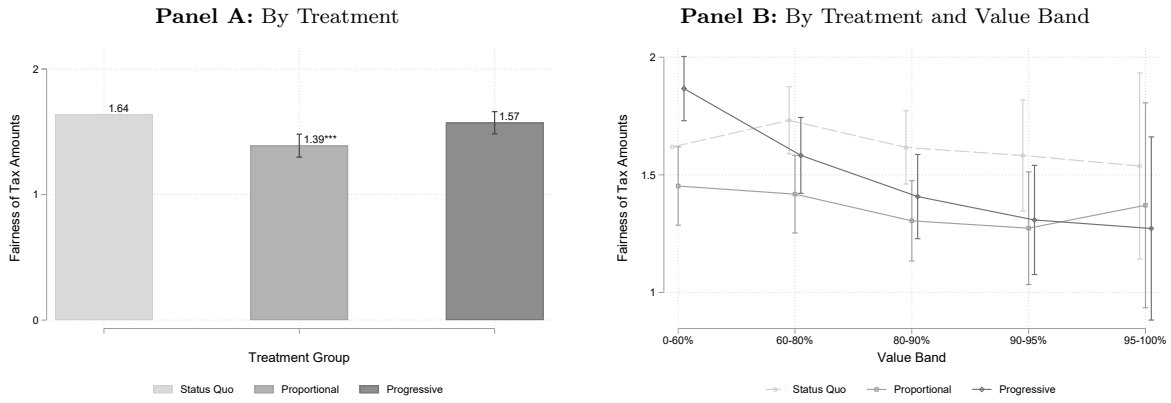

*Notes*: This figure summarizes the effect of tax rate treatments on endline tax morale. Panel A shows results by treatment, while Panel B further disaggregates by value band. We discuss this figure in Section 6.

## Figure A19: Perceived Fairness of Tax System by Tax System Treatment and Value Band




*Notes*: This figure summarizes the effect of tax rate treatments on the perceived fairness of the tax system, measured at endline. Panel A shows results by tax system treatment, while Panel B further disaggregates by value band. The sample only includes respondents in the control group for the information experiment: the result thus reflect only the 2024 tax system variation (rather than the endline information treatments). We discuss this figure in Section 6.

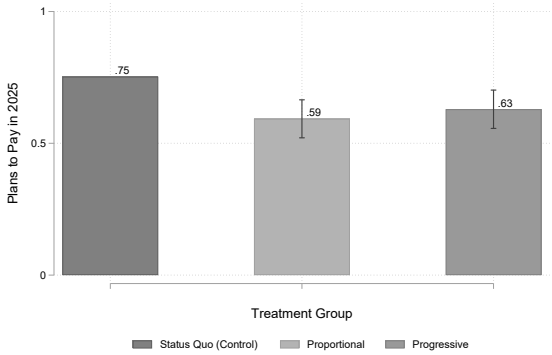
## Figure A20: Perceived Fairness of Tax Liability by Tax System Treatment and Value Band



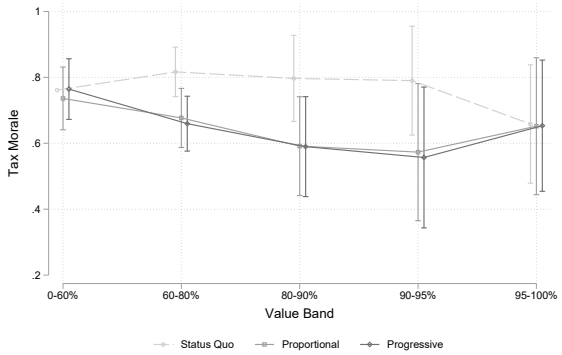

*Notes*: This figure summarizes the effect of tax rate treatments on the perceived fairness of the tax liability, measured at endline. Panel A shows results by treatment, while Panel B further disaggregates by value band. The sample only includes respondents in the control group for the information experiment: the result reflect only the 2024 tax system variation (rather than the endline information treatments). We discuss this figure in Section 6.

## Figure A21: Intent to Pay the Property Tax in 2025 by Tax System Treatment and Value Band

**Panel A:** By Treatment



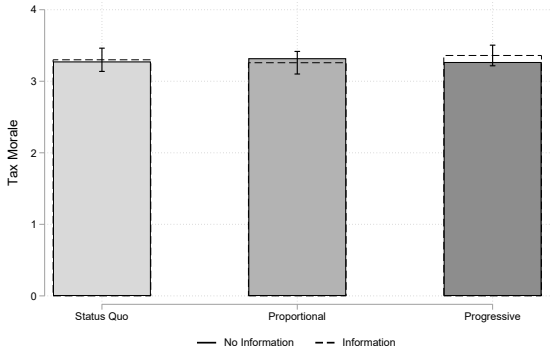

**Panel B:** By Treatment and Value Band



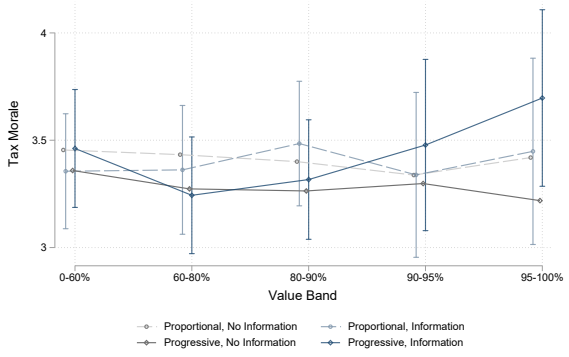

*Notes*: This figure summarizes the effect of tax rate treatments on self-reported intention to pay the property tax in 2025, measured at endline. Panel A shows results by treatment, while Panel B further disaggregates by value band. The sample only includes respondents in the control group for the information experiment: the results reflect only the 2024 tax system variation (rather than the endline information treatments). We discuss this figure in Section 6.

## Figure A22: Endline Information Experiment — Tax Morale

**Panel A:** By Treatment



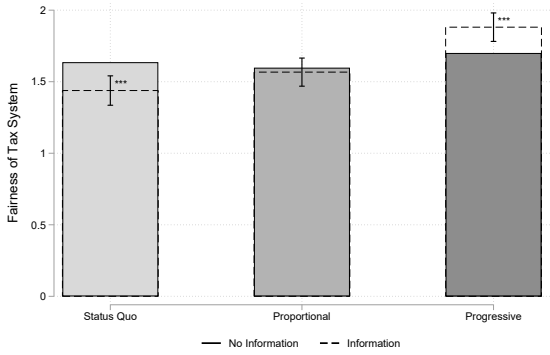

**Panel B:** By Treatment and Value Band



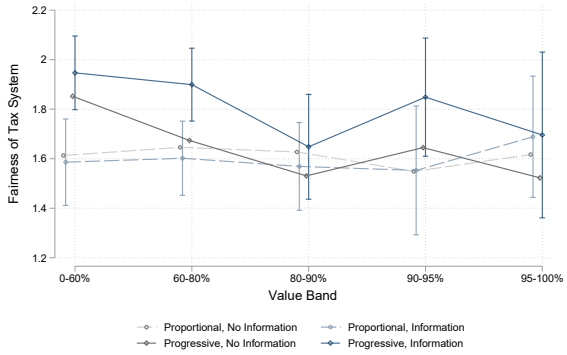

*Notes*: This figure summarizes the results of the endline information experiment on endline tax morale. Panel A shows the average tax morale by treatment comparing taxpayers who received information about the tax system (dashed line) or not (filled bar). Panel B compares the treatment effect of information for Progressive and Proportional across value bands. We discuss this figure in Section 6.

## Figure A23: Endline Information Experiment — Perceived Fairness of Tax System

**Panel A:** By Treatment



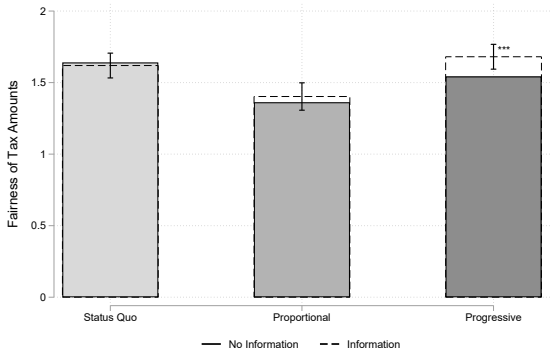

**Panel B:** By Treatment and Value Band



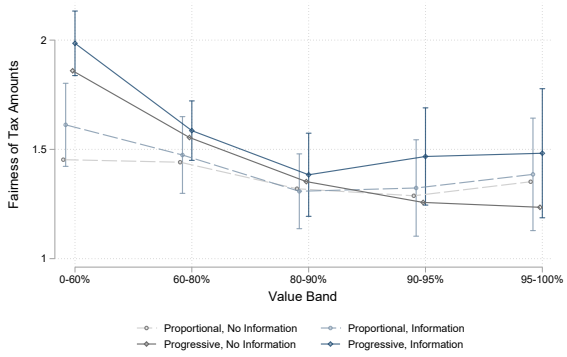

*Notes*: This figure summarizes the results of the endline information experiment on the perceived fairness of the tax system. Panel A shows the average perceived fairness of the tax system by treatment comparing taxpayers who received information about the tax system (dashed line) or not (filled bar). Panel B compares the treatment effect of information for Progressive and Proportional across value bands. We discuss this figure in Section 6.

## Figure A24: Endline Information Experiment — Perceived Fairness of Tax Liability

**Panel A:** By Treatment

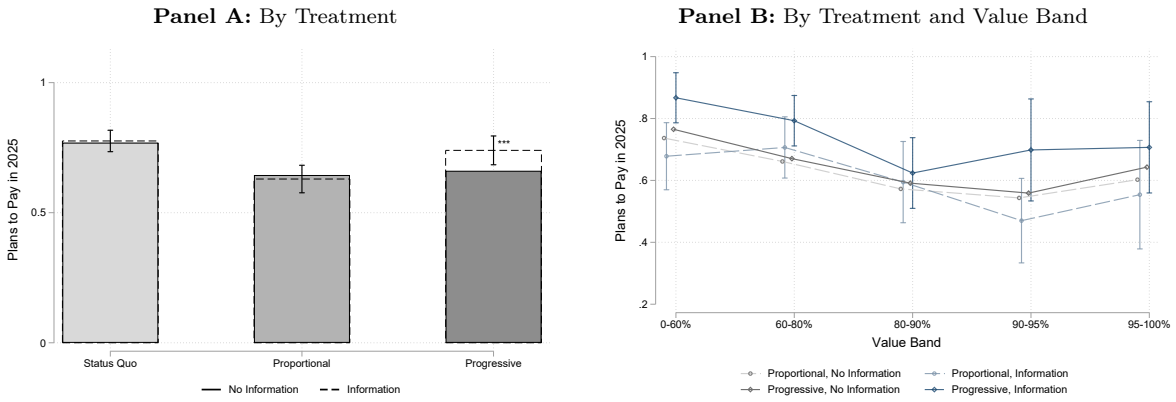



**Panel B:** By Treatment and Value Band




*Notes*: This figure summarizes the results of the endline information experiment on the perceived fairness of the tax liability. Panel A shows the average perceived fairness of the tax liability by treatment comparing taxpayers who received information about the tax system (dashed line) or not (filled bar). Panel B compares the treatment effect of information for Progressive and Proportional across value bands. We discuss this figure in Section 6.

## Figure A25: Endline Information Experiment — Intent to Pay the Property Tax in 2025




*Notes*: This figure summarizes the results of the endline information experiment on self-reported intention to pay the property tax in 2025. Panel A shows the average intention to pay by treatment comparing taxpayers who received information about the tax system (dashed line) or not (filled bar). Panel B compares the treatment effect of information for Progressive and Proportional across value bands. We discuss this figure in Section 6.

# A4 Additional Design Details

## A4.1 Status Quo Adjustments

To determine the appropriate family of generalized linear model to use in the status quo revenue adjustment, we use the variance in the proportional and progressive treatment groups to perform a modified Park test, following Manning and Mullahy (2001). We find an estimated power parameter of $\hat{p} = 1.9$, supporting the use of a Gamma GLM (with a log link) for the revenue adjustment.

**Table A13: Robustness — Alternative Status Quo Compliance Adjustments**

| | | Decile of Property Value | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Band 1: 0–60%* | | | | | | *Band 2: 60–80%* | | *Band 3: 80–90%* | *Band 4: 90–95%* | *Band 5: 95–100%* |
| | All Deciles Pooled | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 9.5 | 10 |
| **Panel A: Status Quo Compliance Adjustment - Probit** | | | | | | | | | | | | |
| Proportional | -0.013*** | -0.000 | -0.009* | -0.010** | -0.016*** | -0.013*** | -0.023*** | -0.014*** | -0.012*** | -0.016*** | -0.012* | -0.017*** |
| | (0.003) | (0.006) | (0.005) | (0.005) | (0.004) | (0.004) | (0.005) | (0.003) | (0.004) | (0.004) | (0.007) | (0.005) |
| Progressive | 0.058*** | 0.068*** | 0.080*** | 0.095*** | 0.120*** | 0.114*** | 0.097*** | 0.015*** | 0.012*** | -0.010** | -0.006 | -0.019*** |
| | (0.006) | (0.009) | (0.009) | (0.010) | (0.011) | (0.011) | (0.012) | (0.005) | (0.005) | (0.004) | (0.008) | (0.005) |
| Observations | 96254 | 9460 | 9613 | 9717 | 9738 | 9776 | 9740 | 9689 | 9616 | 9642 | 2370 | 6893 |
| Control Mean | 0.027 | 0.026 | 0.028 | 0.031 | 0.032 | 0.029 | 0.035 | 0.026 | 0.019 | 0.024 | 0.015 | 0.023 |
| **Panel B: Status Quo Compliance Adjustment - OLS** | | | | | | | | | | | | |
| Proportional | -0.022*** | -0.007 | -0.019*** | -0.023*** | -0.033*** | -0.029*** | -0.038*** | -0.015*** | -0.013*** | -0.016*** | -0.012* | -0.014*** |
| | (0.003) | (0.006) | (0.005) | (0.005) | (0.005) | (0.004) | (0.005) | (0.003) | (0.004) | (0.004) | (0.007) | (0.005) |
| Progressive | 0.050*** | 0.062*** | 0.071*** | 0.083*** | 0.102*** | 0.098*** | 0.082*** | 0.014*** | 0.011** | -0.010** | -0.006 | -0.016*** |
| | (0.006) | (0.009) | (0.010) | (0.010) | (0.011) | (0.011) | (0.012) | (0.005) | (0.005) | (0.004) | (0.008) | (0.005) |
| Observations | 96254 | 9460 | 9613 | 9717 | 9738 | 9776 | 9740 | 9689 | 9616 | 9642 | 2370 | 6893 |
| Control Mean | 0.036 | 0.032 | 0.038 | 0.044 | 0.050 | 0.045 | 0.050 | 0.028 | 0.021 | 0.024 | 0.015 | 0.020 |

*Notes*: This table shows the robustness of our main results on compliance to alternative functional forms used in the Status Quo compliance adjustment. Panel A shows our main specification (Probit), and Panel B uses OLS. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels.

## A4.2 Matching Algorithm for Facilitation Appointments

Our research also incorporated a timing treatment component designed to test whether eliciting households' preferred visit dates improves tax collection.[43] Households were randomly assigned to one of two groups. In the first group, enumerators collected information during bill delivery on the six dates that each household most preferred for a follow-up visit by the tax collector. In the second group, visit dates were assigned without reference to individual preferences. The rationale for collecting stated preferences was to identify, for each neighborhood, the visiting day that maximized aggregate preferences based on the distribution of individual rankings.

To operationalize this, we developed a matching algorithm that implemented a greedy assignment heuristic. The algorithm sequentially assigns visit days to neigh-

[43] We are very grateful for Juan Ferrer for help with the matching algorithm.

## Table A14: Robustness — Alternative Status Quo Revenue Adjustments

| | All Deciles Pooled | Decile of Property Value 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 9.5 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A: Status Quo Rate Adjustment - Gamma GLM with Log Link** | | | | | | | | | | | | |
| Proportional | 50.872 | 31.652 | 1.965 | 18.237 | -8.241 | 0.135 | -42.327 | -5.680 | -17.016 | 113.194 | -200.222 | -212.604 |
| | (45.829) | (25.014) | (26.089) | (33.192) | (26.987) | (31.596) | (41.874) | (45.925) | (61.265) | (125.382) | (267.258) | (440.642) |
| Progressive | 212.955*** | 98.689*** | 100.515*** | 93.065*** | 147.952*** | 186.119*** | 176.625*** | 154.589*** | 245.722*** | 271.131** | 134.068 | 58.459 |
| | (75.016) | (20.825) | (27.090) | (25.275) | (25.924) | (31.333) | (43.294) | (45.363) | (62.694) | (129.949) | (318.721) | (872.059) |
| Observations | 96254 | 9460 | 9613 | 9717 | 9738 | 9776 | 9740 | 9689 | 9616 | 9642 | 2370 | 6893 |
| Control Mean | 281.161 | 93.412 | 125.595 | 162.765 | 169.473 | 176.774 | 241.283 | 255.338 | 256.759 | 448.946 | 484.844 | 1559.102 |
| **Panel B: Status Quo Rate Adjustment - Poisson GLM with Log Link** | | | | | | | | | | | | |
| Proportional | 65.581 | 31.639 | 1.935 | 18.099 | -8.449 | 0.103 | -43.702 | -5.611 | -17.980 | 117.152 | -306.914 | 161.732 |
| | (45.366) | (25.011) | (26.089) | (33.191) | (26.985) | (31.595) | (41.868) | (45.918) | (61.285) | (125.196) | (264.569) | (438.442) |
| Progressive | 227.643*** | 98.675*** | 100.487*** | 92.924*** | 147.745*** | 186.084*** | 175.239*** | 154.648*** | 244.746*** | 275.064** | 28.150 | 433.953 |
| | (74.605) | (20.823) | (27.090) | (25.275) | (25.923) | (31.332) | (43.287) | (45.356) | (62.717) | (129.764) | (315.809) | (870.268) |
| Observations | 96254 | 9460 | 9613 | 9717 | 9738 | 9776 | 9740 | 9689 | 9616 | 9642 | 2370 | 6893 |
| Control Mean | 266.473 | 93.433 | 125.625 | 162.908 | 169.689 | 176.820 | 242.642 | 255.263 | 257.724 | 444.980 | 589.805 | 1184.410 |

*Notes*: This table shows the robustness of our main results on revenue to alternative functional forms used in the Status Quo revenue adjustment. Panel A shows our main specification (a Gamma GLM with a log link), and Panel B uses a Poisson GLM with a log link. All regressions include stratum fixed effects. Standard errors are clustered at the neighborhood level. ***, **, and * indicate significance at the 1, 5, and 10% levels.

borhoods by prioritizing all their households' highest-ranked preferences and filling available capacity as early as possible. Each iteration ensures that no day is allocated to more than one neighborhood and that each neighborhood receives only as many visit days as its calculated capacity allows. We use the greedy approach as it provides a transparent, computationally efficient, and field-feasible method that quickly secures the largest possible share of first-choice assignments.

### Integrating the random treatment arm

Households in the random treatment arm are processed alongside choice arm households so that capacity is managed jointly at the neighborhood by day level. For these households, we generate day rankings from a uniform distribution over the same tax campaign horizon. Conceptually, this places the random arm on an equal footing regarding visits capacity while preserving the experimental status that their schedules are not preference based. The combined dataset, which stacks choice arm preferences and random arm pseudo preferences, is the input to the matching stage.

### Scoring function and aggregation

To quantify individual preferences, we defined a value function that transforms each ranked choice into a corresponding numerical weight. The function is specified as $v = 11 - \text{preference}$ where the most preferred option (preference $= 1$) receives a value of 10, and subsequent ranks decrease linearly by one unit for each lower preference. When a day is not part of an individual's elicited set of preferences, its value is set to

zero. We intentionally maintained a gap between the least preferred option ($v = 5$) and non-preferred options ($v = 0$). This distinction reflects the qualitative difference between a day that is explicitly ranked, even if least preferred, and a day that was never chosen. By keeping a positive value for all stated preferences, the algorithm acknowledges that even the least preferred options provide some utility compared to days that were not chosen at all. This gap ensures that unlisted days are not treated as slightly preferred, allowing the algorithm to prioritize assigning households to one of their explicitly expressed choices whenever possible. Then, for each neighborhood and candidate day, we compute the mean value across all individuals which measures the expected preference quality if the neighborhood is scheduled on that day.

**Two way ranking and assignment**

The algorithm performs two complementary rankings. First, for each day, we identify the neighborhood with the highest mean value. Ties are broken by the count of individuals who list that day. Second, for each neighborhood, we identify the day with the highest mean value. Ties are broken by the same count based rule. Using these two rankings, we select for each neighborhood the top day among the days for which that neighborhood also appears as the top ranked neighborhood. A day can tentatively appear matched to more than one neighborhood. To enforce that each day is assigned to at most one neighborhood, we retain only the neighborhood that has the highest mean value on that day. We repeat this process until every day is linked to at most one neighborhood.

For each neighborhood day pair, we assign households to that visit day subject to the expected daily capacity of collectors. We include only households in that neighborhood that listed the selected day among their six preferences. Within that filtered set, we order households by the rank of the selected day, that is, first those who ranked it as first choice, then second choice, and so on. We admit households in that order until the thirty slots are filled. If fewer than thirty households in the neighborhood listed that day, all such households are admitted.

After fixing the first batch of neighborhood day assignments, we remove those days from the choice sets of the remaining households and mark the assigned households as scheduled. This shrinks the feasible set for the next iteration and prevents the algorithm from assigning the same day twice. For each household that remains unscheduled, we compress their ranks so that the best remaining option becomes the new first choice, the next best becomes the new second choice, and so on. This re ranking ensures that individuals who lost a preferred day in the previous round still have their best remaining option prioritized. We then recompute the neighborhood by day summaries using the updated preference sets, re run the two way ranking, and repeat the uniqueness enforcement and household level assignment. We continue iterating until each neighborhood has received the number of days implied by its size or the pool of candidate days is exhausted.

**Final pass for unmatched individuals**

After all neighborhood days have been assigned and filled to capacity where possible, a residual share of individuals may remain unmatched to any of their elicited preferences. For these individuals we implement a distance based heuristic within their neighborhood. We compute, for each person, the absolute distance in days between each of their elicited preferences and each of the already scheduled visit days for their neighborhood. We then order the neighborhood days for that person by a ladder of distances that prioritizes the next calendar day, then the previous calendar day, then two days after, then two days before, and so on. If two neighborhood days are at the same calendar distance, we break ties using proximity to the highest ranked preference. We then assign the person to the highest ranked neighborhood day in this ordered list that still has free capacity. If the first candidate day is full, we consider the next day in the list, and we continue until either a slot is found or all days are full. This final pass preserves as much of the spirit of the elicited preferences as possible, since it seeks the nearest available date around the highest ranked options.