

# PROGRESSIVITY, FAIRNESS, AND TAX CAPACITY: EVIDENCE FROM THE D.R. CONGO\*

Augustin Bergeron<sup>†</sup>  
Arthur Laroche<sup>‡</sup>  
Joana Naritomi<sup>§</sup>  
Marina Mavungu Ngoma<sup>¶</sup>  
Gabriel Tourek<sup>||</sup>  
Jonathan L. Weigel<sup>\*\*</sup>

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## Abstract

The innovation of progressive taxation in the early 20th century accompanied some of the largest increases in tax revenue in Europe and the US and is a core feature of most tax systems in today’s developed countries. In developing countries, however, states often use simplified tax instruments that are comparatively less progressive. This project will explore the randomized introduction of progressive property taxation in the D.R. Congo, a low-income country with weak fiscal capacity. In collaboration with the provincial government of Kasai-Central, the study will compare neighborhoods in the city of Kananga assigned to (1) a progressive property tax rate schedule, (2) a proportional schedule, or (3) the status quo flat fee schedule. We will study the effects on total revenue, household compliance, perceptions of fairness and tax morale, and general attitudes toward the government. Cross-randomized household-level information treatments will help distinguish between ability-to-pay and tax-morale mechanisms.

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<sup>†</sup>Harvard University

<sup>‡</sup>University College London

<sup>§</sup>London School of Economics

<sup>¶</sup>The World Bank, Development Research Group

<sup>||</sup>University of Pittsburgh

<sup>\*\*</sup>University of California Berkeley.

# 1 Introduction

Progressive taxation has the potential to increase revenue by (i) collecting more from those with greater ability to pay, and (ii) increasing tax compliance by improving the perceived fairness of the tax system. Yet, in many developing countries, tax authorities use simplified instruments — e.g., fixed fees instead of tax rates for property taxation. While less resource-intensive to administer, simplified instruments are often regressive (Zolt and Bird, 2005) and are widely viewed as unfair (Robinson, 2023). The regressive nature of tax systems in developing countries may thus constrain tax revenue while also potentially exacerbating economic inequality (if the burden of taxation exceeds the benefits from redistribution among the poor) (Inchauste and Lustig, 2017).

This project explores the rollout of progressive taxation in the D.R. Congo (DRC), one of the world’s poorest countries that collects less than 10% of its GDP in tax. Building on a close partnership with the tax authority of the Provincial Government of Kasai Central, we will evaluate the randomized introduction of more progressive property taxation in the provincial capital city of Kananga. The current property tax system involves fixed fees based on building materials: constructions of durable materials face one liability and those of non-durable materials (e.g., “adobe” bricks) face a lower liability. This system ends up being de-facto regressive. The government uses this simplified presumptive tax system because, in the absence of a formalized housing or rental market, it lacks information on building values that it could use to levy an actual property tax rate.

The first step of this project is thus to assist the government with the “computer assisted mass assessment” (CAMA) of all buildings in Kananga, following a procedure that has been widely used in sub-Saharan African cities (Knebelmann, 2022). We first collect high-resolution drone imagery of the city and use AI-based roof detection, supplemented by human verification, to estimate the surface area of all buildings in the city. We then combine this information with a survey recording building characteristics (e.g., wall and roof type) and compound characteristics (e.g., land area, fence type, outbuildings). We then estimate a linear model in a training data set of 1,500 randomly sampled properties assessed by valuation experts from the government cadastral office. Finally, we predict values using the estimated coefficients.<sup>1</sup>

Armed with estimated building values, the second step is to choose the system of property tax rates given the government’s objective of increasing revenue while minimizing welfare losses and raising the perceived fairness of taxation. This is where our randomized evaluation comes in. We will compare neighborhoods assigned to a proportional system of property tax rates, a progressive system of tax rates, or the status quo fixed fee tax schedule. The proportional and progressive treatments correspond to competing notions of tax equity: the former equalizes the property tax burden as a share of wealth, while the latter treatment places

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<sup>1</sup>Although machine learning could improve out-of-sample predictions, the government prefers linear regression because of its simplicity, especially when considering explaining the building value estimates to taxpayers.

a higher burden on wealthier properties.

Although the adoption of progressive taxation is thought to be one of the most critical developments in the fiscal history of the modern nation-state (Saez and Zucman, 2019), there is little rigorous empirical evidence on how progressivity impacts tax compliance and revenue. Historically, states have tended to adopt progressive taxation at points in time when their capacity to collect taxes was also changing for other reasons — e.g., increased civic motivation during wartime (Besley and Persson, 2009; Scheve and Stasavage, 2016). The present moment in the fiscal development of the Congolese state is a unique opportunity to study the causal effect of tax progressivity holding tax collection capacity constant. Moreover, while researchers have recently explored the role of horizontal equity considerations in tax compliance (Best et al., 2020), vertical equity remains a largely unexplored component of tax morale, likely due to the difficulty of identifying exogenous variation in the progressivity of taxation.

## 1.1 Theory: How Progressivity Shapes Tax Compliance and Revenue

There are two potential mechanisms through which greater progressivity may impact compliance and revenues. First, according to an *ability-to-pay* mechanism, a tighter correspondence between tax liability and wealth (property value) could increase the likelihood that property owners pay if ability to pay and wealth are positively correlated. Our past work (Bergeron et al. (2024) suggests precisely this: owners of more valuable properties were less elastic to property tax rate reductions, implying the government can sustain higher tax rates in upper quantiles of the property value distribution without losing revenue. In other words, the revenue-maximizing tax rate increases in property value, providing a strong rationale for a progressive rate schedule on purely revenue maximization grounds. Indeed, these findings motivated the government’s decision to roll out progressive property taxation.

Second, according to a *tax-morale* mechanism, a progressive rate schedule could increase compliance and revenue by improving the perceived vertical equity and fairness of the tax system and thus strengthening non-pecuniary motivations to pay. Citizens pay more tax than canonical models of pecuniary motivations — in which citizens trade off the cost of compliance with the expected cost of delinquency (Allingham and Sandmo, 1972) — predict (Andreoni et al., 1998). One important explanation is that non-pecuniary motivations, or tax morale, also crucially shape citizens’ compliance behavior (Luttmer and Singhal, 2014). The perceived fairness and vertical equity of the tax system are thought to be essential components of tax morale in rich and poor countries alike. If progressive taxation similarly causes citizens to view the tax system as fairer than the status quo, it might make them more likely to be willing to pay.

Importantly, our treatments reflect two alternative notions of tax equity. A proportional schedule equalizes the property tax burden as a share of wealth. If the property tax is viewed

as a user fee — i.e., a payment made in exchange for accessing local amenities in a given neighborhood — then proportional rates are well justified (Musgrave and Musgrave, 1980; Oates and Schwab, 1997). By contrast, a progressive schedule places a higher (respectively lower) burden on wealthier (respectively less wealthy) properties. If the property tax is viewed as a wealth tax with a redistribution objective, then progressive rates are well justified (Musgrave and Musgrave, 1980; Youngman, 2016). The rationale for this latter view of the property tax may be stronger in low-income countries because progressive taxation on other bases is limited, e.g., progressive income taxation is constrained by low levels of formal employment (Jensen, 2022). Indeed, in settings of low state capacity, the ease in which a tax can be collected is a paramount concern (Best et al., 2015), and the property tax scores highly in this dimension given that it is a visible, immovable asset. Which, if any, of these conceptions of equity might raise tax morale in DRC is an empirical question our design seeks to address.

## 2 Experimental design

We will partner with the Provincial Government of Kasai Central to conduct a randomized controlled trial at scale in Kananga. The city’s 460 neighborhoods, encompassing approximately 107,837 assessable buildings, will be randomly assigned to either the existing flat fee schedule, a proportional tax rate, or a schedule of progressive property tax rates. Approximately 18% of neighborhoods will be assigned to the Status Quo tax rate system, 41% will be assigned to Progressive and Proportional (Table 1). The main comparison of interest in the study is Progressive versus Proportional, hence the larger allocation of neighborhoods to these treatment groups.

**Table 1: Number of Neighborhoods by Treatment Group**

Treatment Group	Neighborhoods
Proportional	189
Progressive	189
Status Quo	82

In neighborhoods assigned to the flat fee schedule — the status quo in Kananga — properties will face the same annual liability within two coarse value bands determined by the materials of the principal construction, as noted above. In neighborhoods assigned to the proportional or progressive tax schedules, properties will face a tax liability increasing in CAMA-estimated property value (Table 2). Other than the rate schedule, all other aspects of tax collection will be the same across treatments, including the structure of the campaign (bill delivery followed by collection), the information provided to property owners, the payment modalities, and the incentives of the tax inspectors.<sup>2</sup> Crucially, the average tax liability will also be held constant between the proportional and progressive treatments, meaning that any tax revenue difference

<sup>2</sup>Collectors are paid a wage with three components: (1) a fixed daily salary during bill delivery if they deliver all

between these arms will be attributable to a change in the distribution of the tax burden rather than a change in the average liability.<sup>3</sup>

**Table 2: Property Tax Rates by Treatment Group**

<b>Band</b>	<b>Proportional</b>	<b>Progressive</b>	<b>Status Quo</b>
Band 1 (p0-p60)	0.4%	0.06%	0.22%
Band 2 (p60-p80)	0.4%	0.16%	0.06%
Band 3 (p80-p90)	0.4%	0.26%	0.02%
Band 4 (p90-p95)	0.4%	0.36%	0.05%
Band 5 (p95-p100)	0.4%	0.56%	0.1%

To adjudicate between the ability-to-pay and tax-morale mechanisms, we will embed a series of information treatments in the tax bills delivered to property owners that make salient the change in the distribution of the tax burden. The intuition is that an increase in revenue among properties that receive no information about the greater progressivity of the tax system likely reflects the ability to pay mechanism. If, however, we observe a more pronounced increase in revenue from properties that receive information about progressivity, this will allow us to estimate the additional importance of tax morale.

Thus, randomized at the owner level, the following treatments include messages making salient: (1) a building’s position in the building value distribution; (2) the building’s position in the values distribution and the full distribution of tax rates; (3) a detailed description of how building values were estimated; or (4) a placebo message noting the importance of paying the property tax. While the first message controls for the revelation of information about the wealth distribution — itself a potential driver of compliance (Stantcheva, 2021) — the second message assesses how information about the distribution of rates in the assigned tax system shapes compliance and attitudes about tax fairness. We anticipate that this message will have heterogeneous effects given a property owner’s position in the value and tax rate distribution, so we will flexibly estimate its impact throughout the distribution. The third treatment allows us to understand whether taxpayers are more (or less) likely to comply when they better understand how the government assessed building values.

In addition, we embed several cross-randomizations at the property level to further help understand mechanisms and rule out alternative interpretations. First, randomly selected property

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assigned tax bills in the required two-week window, (2) a fixed daily salary during tax collection if they honor all assigned appointments, and (3) a bonus for tax collection that is set to equalize the expected wage for every property in a neighborhood. We compute (3) using estimated compliance of each building as a function of the tax liability using the observed relationship in Bergeron et al. (2024). The logic of (3) is to eliminate collectors’ incentives to target certain types of properties more than others.

<sup>3</sup>The average tax liability is lower in the status quo system: roughly \$5 compared to \$25 in the treatment groups. It was necessary to break equivalence in the status quo in order to implement the other tax systems, otherwise there would have been negative tax liabilities at the bottom end of the property value distribution. When comparing the treatments to the status quo, we will adjust for this difference in average tax liability, as we describe more below.

owners will have an additional enforcement message on the back of their tax bill. On control bills, property owners will only be informed of the payment deadline. On treatment bills, they will also be informed (i) of penalties that apply after the deadline, and (ii) that the household has been selected to receive a visit from a dedicated enforcement team. In addition, treatment households will receive an enforcement SMS message with information about penalties for non-compliant taxpayers. This cross-randomization will allow us to study the interaction of the tax rate treatments with enforcement.

Second, tax collectors will receive a list of appointments for each day, some of which are randomly assigned.<sup>4</sup> We will analyze compliance during these visits to assess the impact of tax rate system, independent of any targeting by collectors. Indeed, a potential concern is that collectors' enforcement strategies may change depending on the tax system. For instance, they might prioritize larger taxpayers in the progressive system where liabilities are higher. Assuming collectors honor their appointments, this (randomized) appointment intervention mitigates such concerns by holding collector targeting constant. Additionally, the collection wage structure further reduces incentives for targeted enforcement.<sup>5</sup>

### 3 Data

The study leverages a combination of administrative tax data and household surveys. The administrative tax data includes information about property values, liabilities, assessability and exemption status, and property tax payments for all buildings in Kananga. We also observe tax campaign program data, including whether taxpayers received visits from collectors. In addition we administer three household surveys.

1. **Baseline Survey** The baseline survey targets approximately 15,000 randomly selected property owners throughout the city of Kananga. This survey collects information on individual beliefs about state capacity and responsiveness, perceptions of a fair tax system, state capacity, government responsibility, and awareness of the current tax system.
2. **Midline survey** The midline survey collects short-term outcomes soon after tax collection with a broader sample of 30,000 properties, including the baseline sample. These surveys will capture data on household experiences with tax collectors, tax payments, salience of different treatments, and consumption patterns. Additionally, the surveys will explore awareness and perceptions of the different tax systems.
3. **Endline survey** The endline survey will revisit a sample similar to that of the baseline to assess changes in the same set of outcomes measured previously. We also plan to include

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<sup>4</sup>This corresponds to a treatment arm in a companion paper, in which property appointments are assigned either randomly or based on the property owner's preferences. In this project, we exploit the control group of this intervention — random appointments — to study tax compliance in the absence of collector targeting.

<sup>5</sup>As discussed earlier, the collection wage system is designed to help neutralize collectors' incentives to target certain groups of taxpayers.

survey experiments to allow a more detailed understanding of how taxpayers in Kananga perceive tax equity.

## 4 Analysis

### 4.1 Outcomes and estimation

Impacts on compliance and revenues will be measured using administrative tax data, while other outcomes will be assessed through surveys. Our main empirical specification will include treatment dummies, stratum fixed effects, and wave fixed effects.<sup>6</sup> We will focus on non-exempt properties, assuming we find that exemptions are balanced across treatments.

### 4.2 Hypotheses

- **Tax compliance and revenue.**

1. Progressive v. Proportional. We expect the progressive tax system will result in higher compliance and revenue than the proportional system. Ex ante, it is ambiguous whether a progressive property tax schedule will increase revenue in a setting of low extensive margin compliance because those whose tax rate increases could be less likely to pay, even if those whose tax rate decreases become more likely to pay. The net impact on revenue thus depends on the elasticities observed across the distribution of property value and tax liability. However, past work in this context (Bergeron et al., 2024) finds that higher value properties are less elastic to changes in the property tax rate and thus have a higher revenue-maximizing tax rate.<sup>7</sup> We therefore hypothesize a positive net impact of the progressive tax system on revenue.
2. Progressive v. Status Quo. We also expect tax compliance and revenue to increase on average in the progressive tax schedules compared to the status quo flat fee system. Because the average tax liability varies between the treatment groups and the status quo, our primary comparison will adjust estimates of compliance and revenue in status quo as we describe below.<sup>8</sup>
3. Proportional v. Status Quo. In the adjusted comparison — i.e., after accounting for lower average tax liabilities in the status quo group — we again expect proportional

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<sup>6</sup>The tax campaign is organized into three waves occurring over time. In past projects (Balan et al., 2022), we observed trends in tax compliance over time, and as such we believe it will likely be wise to include fixed effects to net out these trends.

<sup>7</sup>Indeed, this finding motivated the government to experiment with progressive property taxation in the first place.

<sup>8</sup>In the unadjusted comparison of progressive and the status quo system, which we will show for policy relevance, the tax liabilities are lower in progressive in Band 1 and strictly higher in Bands 2-5. We therefore expect compliance to be higher in Band 1 and lower in the other bands. Since Band 1 is larger than the other bands, we still expect average compliance and revenue to be higher in progressive.

to achieve greater compliance and revenue compared to the status quo system. Although it is not progressive, a proportional system is still less regressive than the status quo and the relatively lower liabilities will help more property owners enter the tax net.<sup>9</sup>

- **Perceptions of fairness and attitudes about the government.** Based on our baseline data, we anticipate that both the progressive and proportional treatments will enhance the perceived fairness of the tax system. Indeed, in the baseline survey, respondents viewed both systems as fairer than the status quo, with minimal difference between them. We thus expect the same outcome in terms of endline updating about the tax system. Regarding overall satisfaction and attitudes toward the government, however, we expect the progressive system to be viewed more favorably than the proportional system. This again reflects that at baseline the majority of citizens reported preferring a progressive system.<sup>10</sup>

**Comparisons with the status quo system.** As noted, the status quo tax system has a lower average tax liability — roughly \$5 — compared to about \$25 in the treatment arms. This difference was necessary to implement the other tax systems, especially progressive, because maintaining equivalence would have capped tax liabilities at the upper end of the distribution well below the government’s target rates. While we will present unadjusted comparisons across treatment arms — a policy relevant comparison — our main specification will adjust compliance and revenue metrics in the status quo system to enable an “apples-to-apples” comparison.

Specifically, we plan to estimate the elasticity of compliance and revenue with respect to the tax rate by leveraging the random variation in rates across treatments. By grouping properties into building value quantiles, we can observe the compliance and revenue responses associated with rate differences across the main treatments. However, perceived fairness in progressive systems could lead to tax morale effects, complicating these comparisons. To address this, we focus on households that randomly received a placebo informational flier, for whom the progressivity of the tax system should not be salient. We can verify this assumption — that tax progressivity is not salient — using survey questions.

Once we estimate the elasticity of compliance and revenue by rate within each quantile of building value, we can estimate what compliance and revenue would have been in the status

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<sup>9</sup>In the unadjusted comparison, we have no strong prior about the proportional arm compared to the status quo system. Although this tax system increases tax liability on some properties who are less elastic to rate changes, it also increases average tax liabilities on properties who are highly elastic and thus likely exceeds the revenue maximizing tax rate (Bergeron et al., 2024). We therefore think it is ambiguous what impact it will have on net revenue relative to the status quo system.

<sup>10</sup>To analyze citizens’ views of the tax system at endline, we will ask them about the fairness of their tax liability, of the overall tax rates, and what rate schedule they believe would be most fair. This range of questions will allow us to distinguish their views on their own tax burdens — which is systematically higher in the treatment groups relative to the status quo system — from their beliefs about a fair distribution of the property tax burden.

quo system if the average tax liability was the same as in the progressive and proportional treatment arms. Our primary specification when comparing tax systems will use these adjusted results, but we will also report unadjusted results for policy interest.

### 4.3 Testing mechanisms

In Section 1.1, we identify two principal mechanisms through which progressivity might increase tax compliance relative to a proportional tax schedule. First, the *ability to pay* mechanism suggests that a progressive tax schedule enhances compliance and revenue by aligning tax liabilities more closely with the property owner’s ability to pay, assuming that ability to pay correlates positively with property value. Second, the *tax morale* mechanism posits that a more progressive schedule is perceived as fairer, thereby strengthening non-pecuniary motivations to comply.

To separate these mechanisms, we leverage the cross-cutting information treatments mentioned above. For property owners who receive a placebo flier, any observed increase in compliance would likely reflect the ability to pay mechanism.<sup>11</sup> In contrast, if we observe a larger increase in compliance among those who received the information treatment emphasizing the neighborhood distribution of tax rates, this would likely indicate an additional effect from fairness concerns, engaging the tax morale mechanism.

### 4.4 Heterogeneity

We plan to analyze several sources of heterogeneity in the effect of the tax system treatments.

1. Position in the distribution of property value. A key objective of the new tax systems is to make the property tax burden more progressive. Although this goal is achieved in terms of statutory tax liability, we will examine if it also holds in terms of actual tax compliance. To do this, we will estimate compliance and revenue under each system across different property value bands. One issue is that people might misperceive their position within the property value distribution, potentially leading them to perceive their tax liability as either too high or too low, even if they generally prefer a proportional or progressive tax rate. While we would like to study heterogeneity based on perceived position within the property value distribution, this perception is endogenous to the treatment. Thus, as a supplementary analysis, we will also subset to the set of owners who received the flier providing taxpayers with their true position in the distribution (without revealing the distribution of tax rates). For properties that received this message, we expect beliefs about position in the property value distribution should be closer to the truth.

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<sup>11</sup>This assumes, of course, that these property owners are not indirectly informed about the progressive tax system through others. Based on prior work, we expect such information spillovers to be rare, as financial topics, including taxation, are generally private in Kananga. However, we will include survey questions to directly assess the presence of such information spillovers, using questions similar to those examined in (Bergeron et al., 2024).

2. Cross-cutting enforcement intervention. Building on [Bergeron et al. \(2024\)](#), we anticipate that the enforcement intervention will reduce households' elasticity to tax rate reductions, which will be likely most pronounced for lower-value properties in the progressive treatment arm. Therefore, when comparing the progressive and proportional arm, we expect a smaller compliance gap at the lower end of the value distribution among properties who received the enforcement message: i.e., proportional will be closer to the higher compliance we observe in progressive in this part of the distribution. Similarly, at the top of the property value distribution, we expect a smaller gap between the two treatments, with compliance in the progressive arm approaching that in the proportional arm.

We also plan to study heterogeneous effects of the tax flier messages.

1. Own position in building value distribution. We expect that learning one's position in the building value distribution will have heterogeneous effects depending on whether the property owner's priors were too high or too low. Owners who find they are relatively lower (respectively higher) in the distribution than they initially thought may be less (respectively more) likely to pay their property tax on average. We expect this pattern to hold across tax systems though the effects should be more muted at the bottom and top of the progressive treatment arm. For instance, we expect owners who revised downward and are at the lower end of the distribution to be less discouraged, as they may face a lower-than-expected liability. Similarly, owners who revise upward and are near the bottom of the distribution may experience a smaller compliance boost, as they may owe more than anticipated.
2. Own position + tax rate distribution. Learning one's position within the distribution of house values, along with information about the overall tax rate and liability distribution may also affect compliance depending on (a) the tax system, and (b) one's position in the value distribution. On average, we expect the information flier to increase compliance among treatment groups relative to the placebo treatment, provided it makes the tax system appear fairer. We also anticipate heterogeneity in responses to this flier in the progressivity arm depending on one's position in the value distribution. That is, we expect a larger compliance increase among those in the bottom part of the distribution (relative to the placebo) and a more muted or potentially negative response among those in the upper part of the distribution. In the proportional treatment arm, where the same tax rate applies throughout the value distribution, we expect less variation in responses by property value. In the status quo arm, we predict that this flier will reduce average compliance if it makes the tax system appear less equitable, with the effects more pronounced among lower-value properties, where effective tax rates are highest.<sup>12</sup>

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<sup>12</sup>The expected impact of the transparency flier is ambiguous and a topic we plan to explore in a separate paper on

## 5 Addendum: Enforcement Dynamics

One extension we hope to investigate is the long-term effect of credible versus non-credible enforcement messages. In many tax letter RCTs, tax authorities make enforcement threats that they often cannot fulfill. While these threats tend to produce positive short-term compliance, these unfulfilled threats may erode trust in the tax authority, potentially reducing compliance in the long-term. We seek to provide evidence on this dynamic by leveraging a staffing shortage that occurred during the rollout of the 2024 property tax campaign. Approximately half of properties received an enforcement message attached to their tax bill, indicating they would be subject to an audit visit if they did not pay. Although the tax authority intended to follow through on these additional visits to all properties who received the enforcement message, limited staffing meant that only a subset of properties could be visited by enforcement teams. We assisted by randomly assigning about half of the enforcement message recipients to receive enforcement visits and the other half to receive no enforcement visit. This randomization will enable us to study whether compliance in 2025 is lower among those who received an unfulfilled threat compared to those whose threat was honored by a subsequent enforcement team visit.

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transparency and procedural justice. On the one hand, providing detailed information about property assessments and how tax liabilities are calculated could increase the perceived procedural fairness of the tax system, enhancing tax morale and increasing tax compliance. On the other hand, this information could inadvertently offer property owners grounds to dispute their tax liability — e.g., by questioning the accuracy of hard-to-validate property details — potentially dampening tax morale and compliance. Consequently, we have no strong prior about the impact of the transparency flier on short-term compliance. Over the longer term, however, we suspect that the "costs" of transparency may decrease, assuming that taxpayers' interactions with the tax authority are positive and professional. That is, if taxpayer appeals are examined and implemented in a manner citizens deem appropriate, then even those who do dispute their assessment or liability might over time have greater willingness to pay. We therefore also plan to examine how tax compliance behavior evolves in 2025 and expect that the positive effects of transparency on compliance will start to outweigh its negative effects.

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