Tax morale, public goods, and politics: Experimental evidence from Mozambique

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Abstract

Tax revenue is vital for development, but governments must balance raising revenues with maintaining political support. Partnering with a city government in Mozambique, we experimentally vary the provision of information highlighting the role of municipal tax revenues in 1) local public good provision and 2) local political autonomy. We measure how this information affects property owners' tax morale and their political support for the government. Public goods information raises tax morale, especially in areas of low baseline public good provision, but has no effect on voting. The political message increases electoral support for the locally ruling party, but has no significant effect on tax morale. These results suggest that communication about the uses of public revenue offers a politically feasible way to increase tax morale.

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1 Introduction

Raising tax revenue is vital for development, but efforts by governments in low-income countries to improve tax collection are constrained by low state capacity and political opposition (Besley and Persson 2013, 2014). The resources necessary for effective enforcement and credible deterrence are, paradoxically, often out of reach for cash-strapped governments (Pomeranz and Vila-Belda 2019; Besley and Persson 2009). Even where it is fiscally feasible, ramping up enforcement can provoke political resistance which vulnerable governments prefer to avoid (Bird et al. 2008; Fuest et al. 2024; Foremny and Riedel 2014). Low-cost, politically feasible revenue interventions are therefore of particular value.

Tax morale — which we define as citizens' intrinsic willingness to pay taxes voluntarily — represents an important margin for increasing revenues in such contexts.[1] As typically understood, tax morale depends on the reciprocity inherent in the social contract: the government uses citizens' contributions to provide public goods (Luttmer and Singhal 2014; Locke 1689).[2] In theory, informing citizens about the quality of public goods could raise tax morale among those who update their beliefs positively (Besley 2020). Reciprocity also depends on political legitimacy (Levi 1988). Informing citizens about

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[1]We follow a simplification of Luttmer and Singhal (2014) when defining tax morale as non-pecuniary motivations for tax compliance, i.e., not encompassing (strict) enforcement motivations for tax compliance. Luttmer and Singhal (2014) enumerate intrinsic motivation, reciprocity (directly related to the social contract), peer effects and social influences, and culture to be specific non-pecuniary mechanisms for tax morale. They also point to information imperfections and deviations from expected utility as other potential mechanisms for their definition of tax morale.

[2]This basic concept of social contract is variously denoted in the literature with the closely-related terms "reciprocity," "fiscal exchange," and "benefit-based taxation."

the necessity of tax revenues for achieving political objectives could raise tax morale among those who share the objectives (Cullen et al. 2021). This may be particularly relevant when political frictions exist between local and central governments (Brollo and Nannicini 2012). However, efforts to increase revenue could also create political backlash (Prichard 2018; Fuest et al. 2024).

In this paper, we experimentally study how information about public good provision and/or local political autonomy affects tax morale (measured by survey intentions and public goods game behavior) and political support among property owners in the city of Quelimane, Mozambique. Quelimane is emblematic of the challenges faced by local tax-collecting jurisdictions around the world. Its population is about 500,000, with rapid population growth putting pressure on the public goods under its jurisdiction (roads, sanitation, and drainage). Authority to collect property taxes is decentralized, but the municipality has only a weak capacity for enforcement. This scenario is typical in the continent: over 60% of Africa's urban population lives in agglomerations of less than a million inhabitants (United Nations 2018). These governments usually lack the kind of administrative tax data used in studies of larger and better-resourced jurisdictions (Bergeron et al. 2024; Almunia et al. 2024). Africa's urban population is projected to double by 2050, increasing pressure on governments like Quelimane's to improve infrastructure and services (Saghir and Santoro 2018). The politics of fiscal decentralization in Quelimane also resonate in many local jurisdictions worldwide where dependence on transfers from central governments limits fiscal and political autonomy. Quelimane's political position — an opposition-governed city not aligned with the ruling party or its rural power base — is representative of a broader pattern across Africa (Resnick 2012; Harding 2020).

We conducted a survey experiment, in which all participants were provided with information about property tax rates and the municipal budget prior to the cross-randomized presentation of two information treatments. The "public goods" treatment presented the idea of the social contract as the reciprocal relationship by which citizens pay taxes in exchange for public services from the state. It also included a list of recent infrastructure built by the municipal government — including roads repaired, drainage ditches dug, and sanitation improvements — with accompanying photos of the works. The "political autonomy" treatment highlighted the municipality's budget dependence on the central government and the constraints this placed on its political and fiscal autonomy. In order to replicate how respondents might perceive such a message when delivered at scale by agents of the municipal government, the message was designed to highlight partisanship: it drew on language used in political speeches by the incumbent opposition-party mayor, and included photos of him in speeches and rallies. In addition to measuring the direct effect of each treatment, we also examine their interaction; real-world governments emit many communications, but few studies examine how different messages might enhance or interfere with each other.

Respondents constituted a representative sample of over 900 property owners in the city. Because the municipality's existing tax rolls (and administrative data) include only a small number of high-value properties, gathering representative data was necessary for informing efforts to broaden the tax base. Prior to the treatment portion of the survey experiment, the survey collected baseline data on respondents' characteristics, attitudes, and past tax payments and political behavior. Administrative data from before the survey experiment corroborate these survey measures: the few respondents whose names also appear in administrative tax collection records are far more likely to report in the survey that their properties were evaluated and that they paid taxes. After the presentation of the experimental treatments, the survey measured tax morale outcomes, using both survey questions and a behavioral response outcome: costly contributions to a real-stakes public goods game. We also include a series of questions aimed directly at eliciting experimenter demand effects, finding no effect of any treatment on these measures.

We show that information about public good provision raised tax morale, as measured by both survey responses and real payments in a public goods game. In the control condition, 62% of respondents said it was "likely" or "very likely" they would pay the property tax if assessors came to evaluate their property. The public goods message raised this by 10.4 percentage points (16%). In the public goods game, 32% of control group participants chose to contribute a positive amount to the public good by making a mobile money transfer. The public goods treatment raised this by 10.7 percentage points, a 33% increase. This effect was entirely concentrated among respondents with low baseline experience of public good provision, suggesting the effect is driven by respondents who update based on the information.

The political autonomy treatment had no average effect on tax morale on its own, and it attenuated the positive effect of the public goods treatment when they were combined. In fact, measures of tax morale for respondents who heard both messages were not statistically different from the control group. The exception was for strong partisans of the opposition party which governs the city (RENAMO). Among these respondents, the political autonomy message on its own had large but imprecise effects on public goods game contributions, and did not attenuate the large and significant effect of the public goods message when they were combined. Taken together, these results suggest that taxpayers respond positively to information about public good provision, but become disillusioned when the message of government effectiveness is mixed with an overtly political message with which they do not agree.

Turning to political outcomes, we find little evidence that either treatment produced a political backlash; if anything, the effects on attitudes toward the party of the incumbent municipal government were positive. The public goods message increased respondents' reported satisfaction with both the municipal and national governments, but had no significant effect on people's vote choice in a mock ballot exercise. Meanwhile, the political autonomy message raised the vote share for opposition parties at the national level.

This suggests that people understood the Political Autonomy message, but generally responded through political attitudes rather than tax attitudes.

Our paper contributes to existing work on how information about public service provision influences various aspects of citizens' relation with the state. The evidence on prompting taxpayers in low-income countries to think in general terms about the social contract is mixed. Tax compliance increased in response to text messages and phone calls with some degree of personal contact which invoked the social contract and/or offered information about recent public good provision in Ethiopia, Tanzania, and Sierra Leone (Shimeles et al. 2017; Collin et al. 2025; Montenbruck 2023). But simple text messages did not yield significant impacts in Rwanda and Uganda (Mascagni and Nell 2022; Cohen 2024). Letters referring the social contract sent to taxpayers in Argentina, Uruguay, and Eswatini were also ineffective in increasing tax compliance (Castro and Scartascini 2015; Bergolo et al. 2023; Santoro 2024). A variety of different non-personal communications did not increase tax revenues in Papua New Guinea either (Hoy et al. 2024). It is possible that low-cost interventions invoking the social contract are more effective when involving personal contact and/or specific information about public good provision. Indeed, a related body of work examines how public goods themselves affect tax morale. Various kinds of public goods have been shown to increase tax compliance in a wide range of developing countries (Carrillo et al. 2021; Blimpo et al. 2018; Kresch et al. 2023; Gonzalez-Navarro and Quintana-Domeque 2015; Krause 2020; Fernández et al. 2025).[3] We do not perceive clear patterns of different results relating to different regions in this literature.[4] Our paper observes that providing specific information about recently provided public goods, through personal contact, can raise tax morale, offering an important low-cost tool for poor jurisdictions with residual taxation to increase tax revenues.

We also contribute to the literature showing how public good information affects

[3] Brockmeyer et al. (2024)'s null result is an exception.

[4] As a matter of fact, the literature on general "social contract" information messages in developed countries is similarly mixed: positive effects in the UK and Norway (Hallsworth et al. 2017; Bott et al. 2019), null effects in Belgium and the United States (De Neve et al. 2021; Blumenthal et al. 2001).

citizens' perceptions of government and political attitudes/behaviors. Acemoglu et al. (2020) show using a lab experiment that information about improvements to courts in Pakistan raised people's willingness to use them.[5] Other work documents electoral effects of information about public service quality in Italy, Chile, and Brazil (Kendall et al. 2015; Cox et al. 2024; Dias et al. 2026). Similarly, various studies show that the provision of public goods and services can win votes.[6] We show that public goods information alone can be sufficient to affect views about government and political positions. Our paper is also unique in addressing the natural tension between asking citizens for more taxes and their electoral support (Prichard 2018), as we evaluate both tax morale and political attitudes in the same setting in response to information about public goods provision and the social contract.

We build on the work relating tax morale to decentralization and fiscal federalism. Local political autonomy matters for growth: Enikolopov and Zhuravskaya (2007) find that the outcomes of fiscal decentralization deteriorate when central governments dominate local governments, and Arzaghi and Henderson (2005) show a positive cross-country correlation between growth and fiscal decentralization. Recent empirical work also shows that public services improve when funded by local taxes (Gadenne 2017; Bianchi et al. 2023). Torgler et al. (2010) find a positive correlation between local political autonomy and tax morale specifically, and Güth et al. (2005) find a positive effect of decentralization on tax morale in the lab. Related research underscores that people are happier to pay taxes when they agree with what the revenue is used for (Cullen et al. 2021; Alm et al. 1993; Giaccobasso et al. 2024). All of this evidence, however, comes from high- and middle-income countries, where tax revenues as a share of GDP are al-

[5]However, citizen attitudes can be difficult to move: Khan et al. (2021) find no effect of information relating to past state effectiveness in Pakistan on citizens' support for policy, perceptions of state capacity, or trust in the state.

[6]Positive electoral effects have been found for building roads, raising the minimum wage, reforming school governance, and integrating internal migrants (Boudot-Reddy and Butler 2024; Huet-Vaughn 2023; Leff-Yaffe et al. 2023; Biasi and Sandholtz 2024; Armand et al. 2026). Other studies find null or negative electoral effects, however, including in some of the same domains (Goyal 2024; Garfias et al. 2021; Bueno et al. 2023; Sandholtz 2023). See Hartmann and Sandholtz (2023) for a review.

ready relatively high. The belief that appeals to fiscal independence can raise tax morale has been documented among policymakers in the developing world (Luttmer and Singhal 2014). Our paper provides empirical evidence of this phenomenon, at least among partisans of the local government.

Finally, we add to the body of research on raising revenues in contexts of low state capacity, summarized in a recent review by Okunogbe and Tourek (2024). Effective strategies have included incorporating new technology (Okunogbe and Santoro 2023), enlisting local chiefs and increasing public oversight in the DRC (Balán et al. 2022; Henn et al. 2024), and leveraging trading networks in Uganda (Almunia et al. 2023). Nearly all existing work on tax compliance in low-income countries involves the revenue authorities of nations or large cities of over a million people (Almunia et al. 2024; Montenbruck 2023; Balán et al. 2022). However, most Africans (and most of the world) live in smaller cities of under a million people (United Nations 2018). Because these jurisdictions lack sophisticated property tax data systems, almost no existing economics literature studies them — and the lessons from higher-capacity jurisdictions may not carry over (Allcott 2015). We show that information on public goods and political autonomy can raise tax morale and political support, offering a low-cost way for capacity-constrained governments to expand revenue collection and broaden the tax base.

2 Context

The city of Quelimane in Mozambique is typical of many urban contexts in Africa in various ways. Its population makes it comparable to the sub-million-resident cities home to the majority of urban dwellers in Africa and the world (United Nations 2018). Like many cities in developing countries, Quelimane is growing rapidly: it has more than tripled in population since 2000, placing stress on public services (United Nations, Department of Economic and Social Affairs, Population Division 2018). The municipal government's jurisdiction extends over local road construction, sanitation, and drainage systems — a crucial defense against frequent flooding caused by tropical cyclones (Leeffers 2023).

Politically, Mozambique is classified as an "electoral autocracy," along with countries representing 43% of the world's population: citizens vote in multi-party elections, but they lack many safeguards to ensure they are free and fair.[7] In practice, this means that the ruling party FRELIMO dominates elections at the national level, but that local elections have been successfully contested by opposition parties in a handful of jurisdictions. At the time of our study, the mayor of Quelimane was from RENAMO (the largest opposition party), having first won the municipal election in 2011.[8] In the local elections in 2023, less than one year after our study was implemented, following a turbulent electoral process, the Constitutional Court finally announced that the participation rate in Quelimane was 64%, and that RENAMO got 50% of the vote and FRELIMO 46%. The previous local election was in 2018 with comparable results, as the participation rate was 65% and RENAMO had 59% of the vote (against 36% for FRELIMO). Generally, turnout rates in national (presidential) elections in Mozambique started very high in the first elections in the 1990s (70-88%) but decreased to an all time low of 36% in 2004. From then, this rate has increased and stabilized (in the 49-56% range) but decreased in the 2024 elections to 44%.

The vast majority of the city's budget – around 70% – comes from transfers from the central government, creating a dependency with important political ramifications given that the city is governed by an opposition party. Tax revenues make up less than 5% of the city's budget, with property taxes constituting the majority of these. The IPRA (Imposto Predial Autárquico or Municipal Property Tax) is the property tax established

[7]This classification comes from the V-Dem (Varieties of Democracy) Institute's "Regimes of the World (RoW)" classification, which includes 4 categories: closed autocracy, electoral autocracy, electoral democracy, liberal democracy (Coppedge et al. 2024). Similarly, Mozambique is rated as "partly free" by Freedom House, and an "Open Anocracy" in the categorization of Polity IV (Freedom House 2023; Marshall et al. 2023).

[8]The current mayor was first elected in 2011 as a candidate of the MDM, another (smaller) opposition party, but joined RENAMO ahead of the 2018 municipal election cycle.

under the law in Mozambique that is meant to fund municipal public services such as urban infrastructures, territorial planning and public space maintenance (Law 1/2008, of January 16). The IPRA is applied to buildings used for both residential and commercial purposes. It corresponds to 0.4% (residential) or 0.7% (commercial) of the property value. There are a few exemptions for buildings serving the public interest. The property value is calculated following a formula introduced by Law 61/2010, of December 27: $V_p = (A_e \cdot P \cdot F_a + 0.05 \cdot A_l \cdot P) \cdot F_l$, where P is the average price of construction by squared meter, A_e is the built area, F_a is the age factor of the building, A_l is the area of complementary land used (beyond the building itself), and F_l is the location factor. The evaluation of property values is made by the corresponding municipality, and nothing happens if that evaluation does not take place.

In Quelimane, these efforts have been very limited due to capacity constraints of the municipality. As we show in Section 3, the Department of Finance received property tax payments from only 538 individuals per year on average over the period 2019-2021. The municipal government's capacity for enforcement is minimal. In 2020, the most recent full year for which data are available, the Finance Department of the municipality received property tax payments from 515 contributors, for a total of 6.8 million meticais (USD 105,079). Figure A1 in the Appendix shows the sources of Quelimane's revenues for 2015-2020.

Still, the law implies a few penalties for non-payment. First, there is a penalty in the form of increased debt through added interest (as a function of time passed over the due date for payment, which is the end of the corresponding year). The municipality can also initiate a legal enforcement process to collect the amounts owed, which in the limit can involve the seizure of the property. However, in practice, this is a rarity in Mozambique. A more likely incentive to pay this tax is the need to have it paid when selling the property or when the corresponding land title is transferred between entities (this is most frequently the DUAT, a long-term concession which grants the holder the right to use the land; in Mozambique, all land is public).

3 Data and Design

3.1 Sampling

To build evidence on municipal tax morale in Quelimane, we surveyed a representative sample of property owners. The city is divided into 5 Administrative Posts (*Postos Administrativos*), which are further subdivided into 51 neighborhoods (*bairros*), which in turn are further subdivided into 558 blocks (*quarteirões*). We first selected a random sample of blocks from which to sample properties. We then randomly sampled properties from within the randomly selected blocks. To do this, our randomization code placed four pins at randomly selected points within each block's boundaries to indicate which properties were to be surveyed. At each of the properties indicated by these pins, enumerators knocked on the door and asked the property's owner to participate in the survey. When a point was not on an identifiable property, or where no owner was available to interview, enumerators started at the pin and followed a pre-codified random walk procedure until arriving at a property where an eligible respondent was available to interview. We do not find strong evidence of differential selection into the sample by treatment group. The final analysis sample, representative of the properties in the city, consists of 922 properties in 214 blocks. The sampled respondents were surveyed over the course of about two weeks in November/December of 2022. The survey took about one hour. Further details on sampling can be found in Appendix Section A.2.

3.2 Survey

Our survey provides representative data on property owners, a rare asset in medium-sized jurisdictions like Quelimane. In addition to basic demographic characteristics, the survey measured respondents' beliefs and attitudes about the tax system, as well as questions about respondents' experience with and knowledge about public services relating to the social contract. Table 1 presents summary statistics.

These descriptive statistics illuminate some characteristics of the population. Over half (59%) of property owners are women. About 18% are Muslim, compared to 19% for Mozambique as a whole (U.S. Department of State 2023). About half of respondents were born in Quelimane. Eighty-four percent are literate, and 44% finished secondary school.[9] Employment situations vary widely, with significant minorities in professional occupations, in agriculture, and not working at all. Respondents' reported weekly income averages 31 USD (compared to a weekly GDP per capita of 12 USD in Mozambique as a whole, according to The World Bank (2024)).

The majority of dwellings were built by their current owner (69%), and nearly all are owner-occupied. The average dwelling houses five inhabitants. Only about half have any form of title documentation. Dwelling quality also varies widely: most have metal roofs, but a significant minority (37%) have earthen floors.

Some striking facts about tax collection in the municipality also emerge:

- Tax information is minimal. Only 26% of respondents are familiar with the acronym used by the municipality to denote property tax (*IPRA*). The average resident believes the annual tax rate to be 37 times higher than the actual one (15% of the value of the property, compared to the true rate of 0.4% for residential properties).

- Tax compliance is low. Only 17% of property owners report having paid property tax in the past year. This appears to be partly driven by low enforcement, with state capacity a likely bottleneck: only 8% report that their property has ever been evaluated. The average resident believes that about 24% of property owners in the city paid property tax in the last year.

[9] This is comparable to nationwide rates of lower secondary completion for girls (41%) and boys (44%) (UNESCO Institute for Statistics (UIS) 2024).

Table 1: Summary Statistics

	Mean	SD	N
Demographics:			
Female	0.59	0.49	922
Muslim	0.18	0.39	921
Born in Quelimane	0.46	0.50	922
Literate	0.84	0.37	922
Finished secondary school	0.44	0.50	922
Employment: professional	0.15	0.36	919
Employment: agriculture	0.15	0.36	919
Unemployed	0.19	0.40	919
Weekly income (USD)	30.71	81.82	793
Property:			
Owner lives at property	0.98	0.15	921
Has any property document	0.55	0.50	922
Built by current owner	0.69	0.46	922
Inhabitants of house	5.40	2.26	911
Earthen floor	0.37	0.48	922
Metal roof	0.90	0.30	922
Taxes:			
Muni. has authority to tax property	0.90	0.30	922
Gov. uses tax revenue well	0.57	0.49	922
Prefers higher taxes and better services	0.68	0.47	922
Has heard of muni. property tax	0.26	0.44	922
Property ever assessed	0.08	0.27	922
Paid property tax in last year	0.17	0.37	922
Belief: share of neighbors paying prop. tax last yr	0.32	0.35	694
Belief: share of city property owners paying prop. tax last yr	0.24	0.26	692
Belief: Property tax rate	15.33	24.12	876
Services:			
Belief: Muni. budget (USD/capita/yr)	174.90	1319.28	614
Belief: share of muni. budget from federal transfers	0.33	0.29	626
Gov 'never' collects garbage	0.62	0.49	922
Gov 'never' repairs street	0.55	0.50	922
Gov 'never' repairs drainage ditches	0.55	0.50	922
Politics:			
'Never' discusses politics	0.58	0.49	922
Belief: share of city property owners who voted FRELIMO in 2018	0.32	0.28	763
Voted in 2018 municipal election	0.82	0.39	922
Voted FRELIMO in 2018	0.50	0.50	680
Voted in 2019 national election	0.76	0.43	922
Voted FRELIMO in 2019	0.63	0.48	650

- Tax morale appears relatively high. One measure of this is that the number of people who report paying property tax is more than double that which reports having been assessed. Another is that beliefs about others' compliance are nearly double the actual reported compliance; willingness to pay taxes has been shown to correlate negatively with the number of people free-riding (Güth et al. 2005). Attitudes toward taxation are broadly favorable. Knowledge that the municipality has the authority to collect property taxes is nearly universal, 57% think the government uses tax revenues well, and 68% prefer a higher-tax, higher-service equilibrium. This may be related to widespread acknowledgment of poor public service provision: for each of the three main services in the municipality's ambit (garbage collection, street repair, drainage repair), large majorities report that the last time the government provided that service on their street was "never."

The survey also sheds light on political attitudes and information. A majority (58%) say they never discuss politics; this may be indicative of the sensitive nature of discussing politics in Mozambique, and in fact the average respondent evinces quite a high degree of political information (see Appendix Section A.4 for more detail). Stated support for the national-level ruling party (FRELIMO) among property owners is strong — perhaps surprisingly, given that the opposition RENAMO party controls the city government. Half of respondents report having voted FRELIMO in the most recent municipal election; nearly two-thirds of respondents report the same when considering the most recent national election. However, the average respondent believes that only about 32% of other property owners voted for FRELIMO in the most recent municipal election.

3.3 Validation of survey measures using administrative data

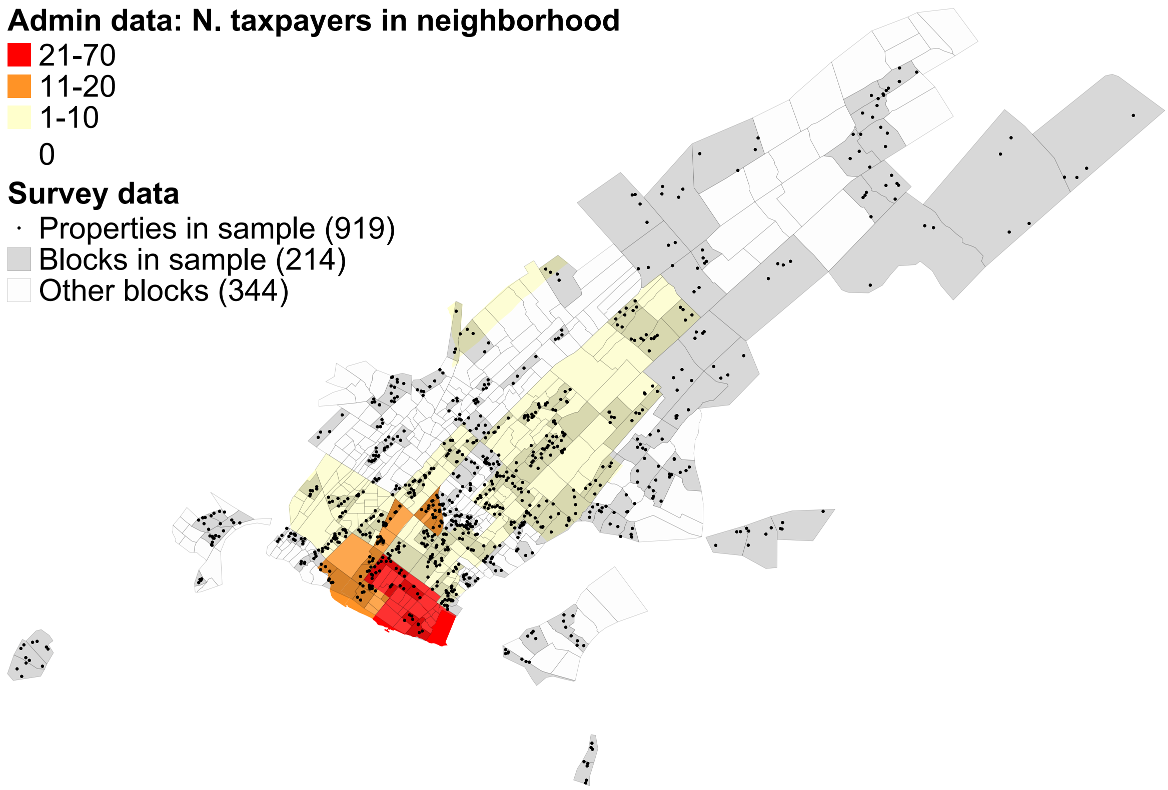
Access to any kind of systematic administrative data on tax compliance from a relatively small municipal jurisdiction in a low-income country is rare, and we were fortunate to have the cooperation of the Quelimane Municipal Council in furnishing administrative data on tax enforcement and compliance. These data were only available from the period prior to the survey, and we are therefore unable to measure any treatment effects on administrative measures of tax compliance. Nevertheless, these administrative data can be used to show that our survey measures of tax compliance are useful proxies.

Our administrative data come from two sources: the Quelimane Revenues Commission (RC), which is responsible for evaluating properties; and the Quelimane Department of Finances (DoF), which receives tax payments. RC data are available for the years 2020 and 2021, in which the Commission evaluated the properties of 489 individuals per year on average. DoF data are available for the years 2019-2021, in which the Department received property tax payments from 538 individuals per year on average.

We use the DoF data from 2020 to show broad geographic patterns in tax compliance. The location information in these data is often incomplete; we are unable to pinpoint more granular locations than the city's 51 neighborhoods, and only 44% of records can even be mapped to neighborhoods due to missing data. Nevertheless, these measures are illuminating and support information obtained from conversations with municipal officials on the distribution of tax enforcement and compliance.

Figure 1 maps the sampled blocks and properties from our survey, as well as the intensity of tax collection by neighborhood according to these administrative data. Property taxpayers came from only 22 of the city's 51 neighborhoods. Among these taxed properties, 82% of revenue (and 66% of contributors) came from just five neighborhoods in the downtown area. By contrast, just 13% of our representative sample reside in these high-tax neighborhoods. Our survey respondents in these neighborhoods are twice as likely to report having paid IPRA in the last year, and three times as likely to report having had their property assessed by municipality technicians — consistent with our survey measures being good proxies for administrative outcomes.

Figure 1: Surveyed properties and baseline tax compliance



Black dots show the locations of surveyed properties superimposed on the city of Quelimane, Mozambique. (Three respondents who consented to participate but not to have their location recorded are excluded from the map.) Gray blocks are those randomly selected to have properties sampled; unsampled blocks are white. The 51 neighborhoods in the city are shaded according to the number of identifiable individual contributors they contain in 2020 administrative data from the Department of Finances.

We can also validate our survey data by matching it with administrative data at the individual level. No universal taxpayer identification number exists in Quelimane, so this match must be performed using individuals' names. We matched the set of unique names from all RC and DoF datasets to the names of our survey respondents using `reclink` in Stata, reviewed the match by hand, and created a dummy for whether a survey respondent's name can reasonably be considered a match to a name in the administrative data. We find 18 respondents (2% of the survey sample) who are likely matches. This low level of overlap is to be expected: our survey aimed to represent all property owners in the city, while municipal enforcement efforts are focused on a few neighborhoods, as evidenced by Figure 1. This exercise strongly supports the accuracy of our survey measures as proxies of administrative outcomes: respondents whose names appear in administrative data are significantly likelier to reside in neighborhoods of high tax enforcement, and are overwhelmingly more likely to report having had their property evaluated and having paid property tax. Neither is this accuracy merely a function of geography: these large and significant correlations persist even when including block fixed effects. See Appendix Section A.3 for more details.

These descriptive results increase confidence in the credibility of our survey data and highlight the important role of survey data in contexts such as ours. While administrative data are valuable, many jurisdictions like Quelimane have limited capacity to collect them, or can only do so in a circumscribed and selected way. Learning about public finances in such places — and providing insights on how their governments might expand their capacity and scope — requires other data sources. Representative surveys can offer insights in such circumstances which administrative data cannot.

3.4 Experimental design

Survey respondents were randomized at the sampling stage into one of four treatment arms corresponding to messages that would be presented within the context of the survey. This randomization procedure was implemented stratifying at the block level: within each block, each of four sampled properties was allocated a different treatment condition. Survey enumerators conducted interviews across all treatment conditions. A quarter of the surveyed respondents/properties received information about Quelimane's recent achievements in public good provision; a quarter received information about how municipal tax collection increases the municipality's fiscal and political autonomy; a quarter received both messages; and a quarter received neither.[10] The treatments provided new information to respondents: large majorities in each group reported that they learned something new (62% for the Public Goods message, and 64% for the Political Autonomy message). The full text of the messages, in their original Portuguese as well as English translations, can be found in Appendix B. The experiment pregregistration (ID# AEARCTR-0010628) can be found at https://www.socialscienceregistry.org/trials/10628.

3.4.1 Control condition

All experimental participants received a message providing information about property taxes; for control participants, this is the only message they received. The message described the property tax rate for residential and commercial properties. It clarified that paying the property tax is necessary to sell the property, and mentioned that property taxes contribute to the municipality's budget, which is about 500 meticais (USD 7.80) per citizen per year. (The average resident at baseline believed the municipal budget to be over 20 times higher, at about USD 175 per capita per year.)

3.4.2 Public goods condition

The public goods treatment condition contained a message relating taxes to the social contract: the agreement that citizens pay taxes in exchange for public services from the government. The message mentioned a number of major public works undertaken by the government in the last 10 years (since the current mayor was elected), including paved and resurfaced roads; construction and maintenance of drainage ditches; expansions of garbage collection services; construction of libraries, a school, and a market; and the regularization of property rights.

[10] Respondents who received both messages always heard the public goods message before the political autonomy message.

This treatment also included the showing of photos, through the enumerator's data collection tablet, depicting some of the public goods provided by the municipality: workers installing a traffic light, firefighters standing in front of a new fire engine, a backhoe cleaning out old drainage ditches, and a stretch of new drainage ditches dug alongside a paved road. (See Figure B1.)

We hypothesize that this information can raise tax morale, especially among respondents for whom the information updates their existing beliefs about public good provision. It can also raise political support for incumbents.

3.4.3 Political autonomy condition

The political autonomy treatment condition provided a political message which highlighted the municipality's need for tax revenue to strengthen its autonomy from the central government. Because Quelimane is one of the few municipalities in Mozambique controlled by the opposition party, the central government can create problems for local public service delivery by withholding transfer funds for political reasons. The message stated that 70% of the municipal budget comes from the central government (the average respondent at baseline believed this figure to be 33%), and that this fiscal dependency can create political dependency, a potential problem for enacting the public policies that best serve the local population. Similar language has been used by the incumbent mayor in political speeches in the city.

We deliberately designed this treatment condition to highlight partisan politics. Although our survey was conducted by our non-partisan research team, we sought to design this treatment in a way that would be informative for governments that might consider adopting something like it. As a practical matter, however, municipal agents operating under the aegis of an incumbent government would not be able to separate abstract arguments about federalism from the inherently partisan question of the government's policy priorities. We therefore sought to highlight respondents' perception of the partisanship inherent in this aspect of fiscal federalism by showing four images depicting the incumbent mayor engaging in political speeches or his trademark bicycle rallies. (See Figure B2.)

We hypothesize that this information can raise tax morale for respondents who share the political objectives of the opposition party which governs the municipality (RENAMO). It can also raise political support for the opposition.

3.5 Outcome data

We collected outcome variables at the end of the survey, after the randomized information was provided. In this section we describe our measures of tax morale and political support.[11]

3.5.1 Tax morale measures

Our primary survey measure of tax morale was derived from the respondents' answer to the question "If assessors came to evaluate your property, how likely is it that you would pay your property tax?" The corresponding variable we construct is a binary depiction of likelihood of paying, which takes a value of one if respondents answered they were "Likely" or "Very likely" to pay. The control-group mean of this variable is above 60%, but we interpret it with caution. One reason is that respondents' beliefs about past compliance (including their own) are implausibly high. 17% report having paid property taxes in the previous year, a number inconsistent with administrative data; this over-reporting could be due to respondents' conflation of the property tax with other taxes they have paid. Another reason for caution is that this survey question asks respondents

[11] Our experimental registration pre-specified another outcome variable: a dummy for whether respondents sent a text message to a provided number to request more information or a visit from a tax assessor (see https://www.socialscienceregistry.org/trials/10628, registry ID # AEARCTR-0010628). Full details of the script of this behavioral message are given in Appendix A.5. Less than one percent of the sample ended up sending a text message, with no detectable difference across treatment arms. We report these results in Table A4.

to make projections about a situation which vanishingly few have ever faced: assessors evaluating their property. Only 698 properties were assessed in 2021, the last year for which administrative data are available. That said, payments were received from 658 properties – 94% of those assessed. So even if survey respondents over-represent their real enthusiasm for paying taxes (as seems likely), it appears that assessment capacity may be a more binding constraint on municipal revenues than compliance conditional on assessment.

We also invited respondents to play a public goods game with real stakes. This standard game is designed to mimic the structure of tax payment and service provision, gauging respondents' willingness to contribute to a productive endeavor with payoffs to other participants beyond oneself. In our context, players were offered an endowment of 100 meticais (about USD 1.60) — slightly higher than the median respondent's daily household income. We transferred this amount to players via mobile money before explaining the rules of the game. This ensured that choosing to contribute in the game would have a direct and tangible cost for the player. It also made clear to respondents that the initial endowment they received was not contingent on their choice in the game, reducing the likelihood of experimenter demand effects. Players were then placed in a group with nine other random and unknown survey respondents. Each player chose how much of their 100 meticais to contribute to a central pot labeled the "public good." The central pot was then doubled by the research team and redistributed equally among the 10 players, regardless of how much each contributed. Our main behavioral game-based measure of tax morale is a binary variable which takes a value of one if respondents contributed a positive amount in the public goods game.[12]

[12] Empirical work in developing and developed countries has found that various measures of tax morale predict actual tax compliance (Torgler 2007; Cummings et al. 2009; Halla 2012).

3.5.2 Political attitudes and voting measures

Our survey asked respondents not only about which parties and candidates they had voted for in previous elections, but also which parties and candidates they planned to support in upcoming elections. This is important because the direction of either treatment's effects on support for the incumbent government is theoretically ambiguous. On the one hand, highlighting the government's capacity and intention to complete public works could bolster support. On the other hand, asking citizens to pay more could produce backlash or highlight the government's weaknesses. Because questions about electoral choices can be sensitive and not all respondents wish to answer, we supplemented these survey questions with a behavioral measure, previously implemented in Grácio and Vicente (2021). Enumerators carried a mock "ballot box:" a clear plastic box with a slot in the top, filled with folded mock ballot papers.[13] Near the end of the survey, each respondent was handed a paper mock ballot, and asked to privately tick the box next to the candidate she preferred at the municipal, provincial, and national levels. Respondents were then asked to fold the paper, without the enumerator seeing it, and place it in the slot in the ballot box along with the other mock ballots. This procedure was intended to increase respondents' willingness to answer truthfully. The mock ballot handed to the respondents carried a mark that allowed enumerators to later open the box and identify the respondent's mock ballot. This behavioral measure was highly correlated with survey responses on voting preferences, but appears to have captured some extra information indicative of reluctance among respondents to vocalize opposition to the ruling party.[14]

[13]This method is similar to that of Crépon et al. (2025), which has been found to produce unbiased and lower-variance measures of sensitive questions relative to other indirect methods such as list experiments. Political science literature has also found ballot-box methods to produce more truthful responses on sensitive subjects than direct interview questions (Diskin and Felsenthal 1981).

[14]The ballot garnered slightly more responses than the survey question (93% vs. 90%). Among respondents who provided both measures for the national elections, 9% of responses differed across the two measures, and support for the ruling party was slightly lower in the ballot than the survey question (47% to 49%). Among those who declined to give an answer to the survey question, support for the ruling party using the ballot measurement was much lower: 34%.

3.6 Empirical specification

Equation 1 presents the empirical specification we used to measure the causal effect of the information treatments on outcome variables:

$$Y_{ibe} = \alpha_b + \gamma_e + \beta_1 PublicGoods_i + \beta_2 PoliticalAutonomy_i + \beta_3 PublicGoods_i \times PoliticalAutonomy_i + \varepsilon_{ibe} \quad (1)$$

α_b represent fixed effects for the city blocks within which randomization took place, γ_e are survey enumerator fixed effects, $PublicGoods_i$ is an indicator for whether respondent i heard the Public Goods message, and $PoliticalAutonomy_i$ is an indicator for whether respondent i heard the Political Autonomy message. We cluster standard errors at the level of the block.

Balance checks in Table A5 show that pre-treatment characteristics do not generally differ between treatment and control groups. The number of significant differences we observe between the groups is consistent with what would be expected by random chance: of 105 tests, 5 (4.8%) are significant at the 10% level, and 2 (1.9%) are significant at the 5% level.

4 Results

4.1 Effects on tax morale

Our first result is that information on public good provision raised respondents' tax morale. Table 2 shows estimates of the causal effect of the information treatments on survey responses and public goods game contributions. The public goods message increased the likelihood respondents reported being "likely" or "very likely" to pay the property tax if assessors came to their property. From a control group mean of 61.8%,

Table 2: Effects of treatment on tax payment intentions and public goods game contributions

	Survey	Public goods game contributions		
	Likely to pay property tax	Any contribution	Amount, unconditional	Amount, conditional
Public goods	0.104***	0.107***	2.956	-1.573
	(0.037)	(0.037)	(1.897)	(4.324)
Political autonomy	0.039	0.028	0.765	3.679
	(0.041)	(0.038)	(2.259)	(4.745)
Public goods × Political autonomy	-0.104**	-0.083	-3.411	-6.241
	(0.050)	(0.053)	(2.884)	(6.350)
N	922	922	922	288
Mean (control group)	0.618	0.324	13.400	39.839
p-val: PG=PA	0.121	0.032	0.294	0.245
p-val: PG + PA + PG × PA = 0	0.328	0.200	0.883	0.354

Coefficients from the regression specified in Equation 1, with standard errors shown in parentheses. 'Likely to pay property tax' indicates that the respondent answered 'Very likely' or 'Likely' to the survey question 'If assessors came to evaluate your property, how likely is it that you would pay your property tax?' In the 'Public goods game contributions' columns, 'Any contribution' indicates that the respondent contributed a positive amount in the public goods game. 'Amount, unconditional' denotes the amount of meticais the respondent contributed in the public goods game, with non-contributors taking a value of zero. 'Amount, conditional' denotes the amount of meticais the respondent contributed in the public goods game, limiting the sample to contributors. All regressions include block and enumerator fixed effects. Standard errors clustered at the block level are reported in parentheses. * p<0.10, ** p<0.05, *** p<0.01

this message increased the proportion by 10.4 percentage points (pp), or 16.8%.[15] Confirming these positive effects on survey measures, treated respondents were also 10.7 pp more likely to contribute a positive amount in the public goods game — an increase of 33.0% off a base of 32.4%. The effect of this message on the total amount respondents contributed — unconditional on whether they contributed at all — was large and positive (3.0 meticais from a base of 13.4 in the control group) but not statistically significant. Conditional on contributing, there was no significant difference in the average amount contributed across treatment arms.

We also show that the political autonomy message alone had no significant effect

[15] Figure A4 in the appendix shows that the public goods treatment produced a rightward shift in the distribution of responses to this question.

on either measure of tax morale. Moreover, it appears to have counteracted the effect of the public goods message: the interaction effect of the two treatments is consistently negative and large, and significant in the case of self-reported likelihood to pay. For all outcomes, the group which received both the public goods and political autonomy messages is statistically indistinguishable from the control group on these tax morale outcome measures. Identifying the mechanism behind this negative interaction effect is beyond the scope of the current paper, but existing literature presents various potential explanations. One possibility is that including multiple messages in the same communication crowds out motivation by diluting the value of either one (Frey and Jegen 2001; Bénabou and Tirole 2006). A related potential explanation is that the political autonomy message, which appears to have been less effective, was more salient because it always came after the public goods message for respondents who heard both. Another possibility is that highlighting the political dimension of public good provision may have prompted a reaction against the prospect of politically-driven inefficiencies in the use of public funds, a well-documented phenomenon (Alesina and La Ferrara 2002; Miguel and Gugerty 2005; Seidel 2023). Mentioning politics may reduce respondents' trust that tax revenues will be used well. This interpretation is further supported by Figure 2B, which shows that the negative interaction effect is absent among respondents who are strong partisans of the locally-ruling party.

4.1.1 Heterogeneity by baseline public good provision and partisan affiliation

Because people's reaction to information likely depends on how it interacts with their existing beliefs, we next test whether the information treatments affects respondents heterogeneously along these dimensions.

Citizens with less direct experience of municipal public good provision may be more likely to update based on public good information. Our survey asked respondents about the frequency of provision of the three main public services within the municipality's purview: garbage collection, drainage, and road construction/maintenance.[16] We build dummies for whether respondents answered "never" for each of these variables, then create an index based on the first factor of the correlation matrix of these dummies (pairwise correlations between these variables are quite high, ranging between .42 and .65). We then split the sample into "high" and "low" baseline public good provision at the median of this index. We regress the dummy for contributing in the public goods game on the full set of treatment condition dummies (public goods, political autonomy, or both) — separately for respondents with high and low baseline public goods.

Figure 2A shows that the positive effect of the public good message on tax morale is concentrated among respondents who report low public good provision from their personal experience at baseline. This is consistent with taxpayers updating their priors in response to new information about public good provision.

The political autonomy treatment may be expected to be particularly persuasive for citizens whose own political beliefs predispose them to share the goals of the opposition party which governs the municipality (RENAMO).[17] We identify as "RENAMO partisans" the respondents who report having voted for RENAMO party candidates in both the 2018 municipal elections and the 2019 national elections. We regress the dummy for contributing in the public goods game on the full set of treatment condition indicators — separately for RENAMO partisans and all other respondents.

Figure 2B shows that, among RENAMO partisans, the effect of the public goods message is even larger than for the general population. The effect of the political autonomy message is large and positive, but not statistically significant. Furthermore, the political autonomy message appears not to have diminished the effect of the public goods message as in the overall sample. This is consistent with the political autonomy message

[16] The wording of the question was "When was the last time someone from the government [collected trash on your street; worked on building or cleaning/repairing the drainage ditches on your street; worked on building or repairing the access roads to your home]?" Options were "One week ago or less," "One month ago," "One year ago," "Several years ago," "Never," "Don't know."

[17] Evidence from the United States suggests that individual citizens' tax morale increases when a president from their own party is in power (Cullen et al. 2021).

being effective for those whose political goals incline them toward greater empowerment of the municipal government.[18]

These results suggest that both information treatments' effects were concentrated among those whose prior beliefs predisposed them to be affected by the information.

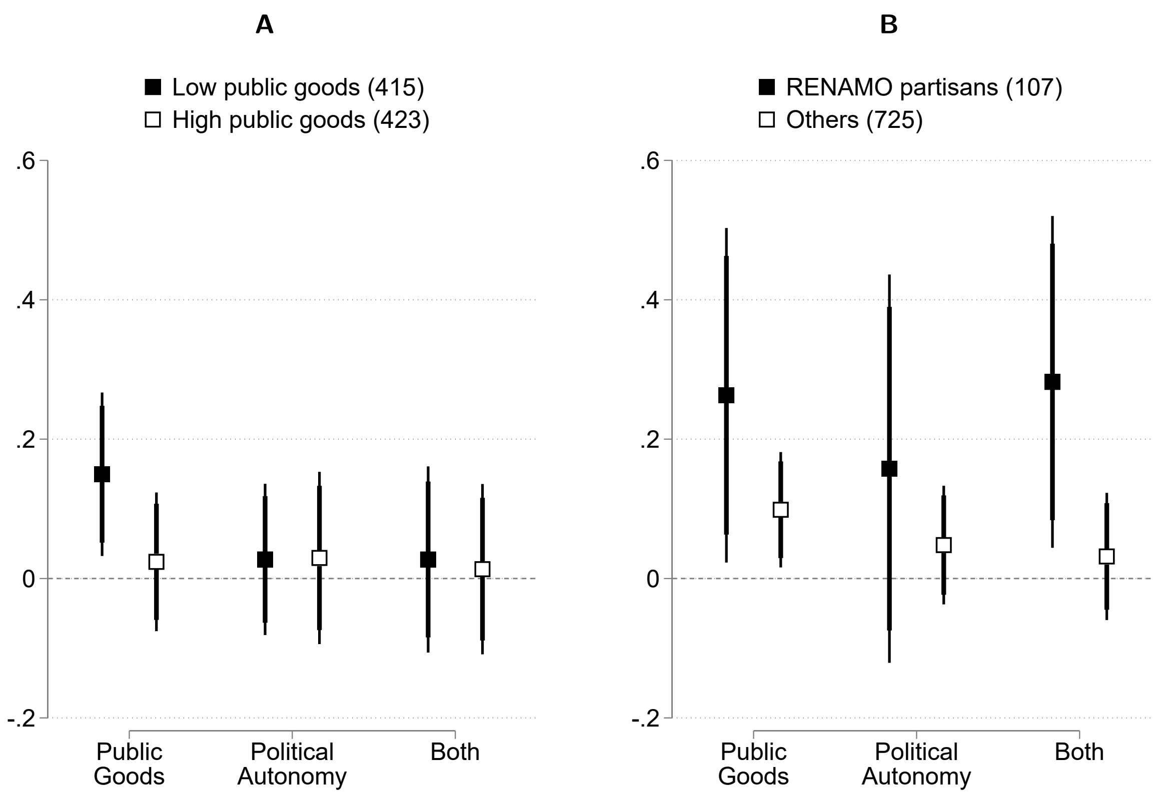
4.2 Effects on politics

Table 3 shows the treatment effects on political outcomes. Broadly, we find no evidence that either treatment produced a backlash against the party of the incumbent municipal government, and we find some evidence of positive effects. The public goods message raised respondents' level of satisfaction with both the municipal government of Quelimane and the national government of Mozambique, by 6.7 pp ($p < .1$) and 9.2 pp ($p < .05$) respectively. The fact that the information increased satisfaction with both levels of government is surprising, given that the municipal government is controlled by the main opposition party (RENAMO) while the national government is controlled by FRELIMO. This may reflect the ruling party's adeptness at claiming credit for public goods (Aker et al. 2017; Cruz and Schneider 2017). It may also indicate confusion about attribution of public goods to the correct level of government, which perhaps helps explain the non-effect of the political autonomy message on tax morale. As with the tax morale outcomes, the political autonomy message had no impact on government satisfaction its own, and again negated the positive effect of the public goods message.

However, respondents' own stated voting intentions — as measured through the mock ballots — were less responsive to the public goods message than to the political autonomy message. Political autonomy moved them towards RENAMO or MDM (the national-level opposition parties), not FRELIMO. In the control group, as expected given the incumbent mayor's popularity, support for the opposition is higher at the municipal level (54%) than in the provincial or national level (47% and 44%, respectively). The

[18] These estimates can also be found in Table A9.

Figure 2: Heterogeneous treatment effects on contribution to public goods game



Panel A shows coefficients and corresponding confidence intervals of 95% and 90% from regressing an indicator for whether respondents contributed to the public goods game on treatment group dummies, separately for respondents scoring below vs. above the median on an index of baseline public good provision. Panel B shows coefficients and corresponding confidence intervals from the same regression, separately by whether respondents report having voted for RENAMO in the 2018 municipal and 2019 national elections, or not. In both panels, dummies are included for "public goods," "political autonomy," and "both" rather than plotting the interaction term; this is to facilitate comparing outcomes for each group relative to the control group. All regressions include block and enumerator fixed effects, with standard errors clustered at the level of the block. The correlation between the above-median baseline public goods dummy and the RENAMO voter dummy is 0.015.

effect of the political autonomy message on support for the opposition was positive at all levels of government, though significant only at the national level. Support for the ruling party fell commensurately (see Table A7). Point estimates are also positive but noisy for the public goods message, and not significantly different from the political autonomy coefficients. Table A6 shows similar results on voting intentions as measured by survey responses.

Table 3: Effects of treatment on political outcomes

	Satisfaction with government		Vote for opposition (RENAMO or MDM)		
	Municipal	National	Municipal	Provincial	National
Public goods	0.067*	0.092**	0.031	0.057	0.056
	(0.039)	(0.042)	(0.045)	(0.046)	(0.046)
Political autonomy	-0.008	0.001	0.054	0.073	0.096**
	(0.037)	(0.042)	(0.044)	(0.047)	(0.044)
Public goods × Political autonomy	-0.065	-0.117**	-0.056	-0.077	-0.083
	(0.053)	(0.057)	(0.062)	(0.062)	(0.062)
N	922	922	863	856	858
Mean (control group)	0.707	0.462	0.543	0.466	0.440
p-val: PG=PA	0.027	0.038	0.605	0.726	0.385
p-val: PG + PA + PG × PA = 0	0.876	0.590	0.511	0.268	0.132

Coefficients from the regression specified in Equation 1, with standard errors shown in parentheses. 'Satisfaction with government' indicates that the respondent answered 'Very satisfied' or 'Satisfied' to the question 'In general, are you satisfied with political governance in [the municipality of Quelimane / Mozambique]?' 'Vote for opposition' indicates that the respondent submitted a ballot on which they checked the box next to 'RENAMO' or 'MDM' for the stated level of government (defined for respondents who submitted any ballot). All regressions include block and enumerator fixed effects. Standard errors clustered at the block level are reported in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

4.3 Robustness and experimenter demand effects

We show in Appendix Section A.11 that all these results are robust to a variety of specification choices. Removing enumerator fixed effects and using robust rather than clustered standard errors do not meaningfully change the estimates.

To test whether our results are driven by experimenter demand effects, we included questions in the survey which asked respondents directly if they agreed with the hypotheses we were testing. After presenting the treatment information, we asked respondents whether the information provided was likely to motivate themselves or their neighbors to pay property taxes. If respondents' answers were driven by their perceptions of experimenter demand, we would expect treatment to have large effects on these questions. In fact, no treatment had any effect on any of these measures (see Table A8).

5 Conclusion

Increasing municipal revenues in the developing world is of vital importance for improving the quality of public goods and services, and ultimately for boosting economic growth. But governments face both resource and political constraints to strengthening enforcement, pointing to the necessity of finding ways to raise voluntary tax compliance (tax morale). This need is especially pressing for smaller jurisdictions which lack sophisticated data collection infrastructure.

In this paper, we show that communication highlighting the local government's existing efforts at providing public goods can engender greater property tax morale among property owners, especially those for whom the information updated beliefs given their own poor experience of public good provision. The public goods communication raises satisfaction with government, and may increase partisan support, though these estimates are noisy. Meanwhile, highlighting local political autonomy increases support for the opposition party but only raises tax morale for strong co-partisans, reversing the gains of the public goods message for everyone else.

These results carry important policy implications for governments seeking to raise revenue without losing political support. Effective communication about the government's public goods successes offers a relatively low-cost way to provide a positive shock to people's perceptions of the social contract. Our results about the heterogeneity of effects by citizens' prior experience of public goods suggest that targeting information to those most likely to update their beliefs could make these interventions even more cost-effective. Ideally, this positive shock could lead to a virtuous cycle, as governments use increased revenues to improve the quality of public goods and services, which in turn further boosts citizens' tax morale. In addition to improving revenues, improving public services can bring broader benefits by crowding in private investments (McIntosh et al. 2018; Andrabi et al. 2024; Sandholtz 2024; Ferreira and Sandholtz 2026). The returns to strengthening the fiscal contract may go well beyond the fiscal benefits.

Together, these results hint that incumbent politicians may benefit from separating messages about the social contract and politics: while public goods marketing can be used for boosting tax adherence in times of policy-making, underscoring political autonomy should probably be left to the political campaign periods. Political communication is art.

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Figure Legends and Alt Text

Figure 1. Surveyed properties and baseline tax compliance. Black dots show the locations of surveyed properties superimposed on the city of Quelimane, Mozambique. (Three respondents who consented to participate but not to have their location recorded are excluded from the map.) Gray blocks are those randomly selected to have properties sampled; unsampled blocks are white. The 51 neighborhoods in the city are shaded according to the number of identifiable individual contributors they contain in 2020 administrative data from the Department of Finances.

Alt text: Map of Quelimane, Mozambique. Small dots mark the sampled properties, densest in the central and southern neighborhoods. Neighborhood fill shows administrative taxpayer counts, highest in five downtown neighborhoods and zero across most of the north and periphery.

Figure 2. Heterogeneous treatment effects on contribution to public goods game. Panel A shows coefficients and corresponding confidence intervals of 95% and 90% from regressing an indicator for whether respondents contributed to the public goods game on treatment group dummies, separately for respondents scoring below vs. above the median on an index of baseline public good provision. Panel B shows coefficients and corresponding confidence intervals from the same regression, separately by whether respondents report having voted for RENAMO in the 2018 municipal and 2019 national elections, or not. In both panels, dummies are included for "public goods," "political autonomy," and "both" rather than plotting the interaction term; this is to facilitate comparing outcomes for each group relative to the control group. All regressions include block and enumerator fixed effects, with standard errors clustered at the level of the block.

Alt text: Two coefficient plots with 95 and 90 percent confidence intervals across three treatment arms. Panel A splits by baseline public good provision: only the low-provision estimate under public goods sits clearly above zero. Panel B splits by partisanship: RENAMO estimates run above others, with wide intervals.