State Expansion and Social Responses in the Democratic Republic of the Congo

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Abstract: This paper shows that the expansion of a weak state can increase citizens' demand for state governance and displace existing governance actors. We study a reform in the Democratic Republic of the Congo that exogenously extends state authority, via a population threshold, to small towns previously governed by traditional chiefs. Using a regression discontinuity design, we find that state expansion increased citizens' demand for the state even when such an expansion is fraught. Towns above the population threshold have more state appointed personnel, public goods provision, and state security personnel, but little improvements in capacity or infrastructure. State expansion also leads to increased conflict between the state and traditional chiefs, especially around property rights. Citizens increasingly turn to the state when resolving disputes, make more tax payments and bribe payments. This increased demand for the state comes at the expense of demand for traditional authority. In public goods games citizens affected by state expansion are more likely to contribute to the common pool when hearing messages from state officials while citizens in unaffected villages react to messages by traditional leaders. Our results suggest that a weak state can extend its capacity and capture society via political competition.

Keywords: State Expansion, Governance, Weak State, Chiefs.
JEL Codes: H11, H70, O17, P48.

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1. Introduction

Contemporary state-building efforts continue to fail in many fragile societies around the world. Political historians have argued that the failure of state expansion and economic development can be attributed to the absence of incentives for institution building that occurred historically in Europe and East Asia (Herbst, 2000, Tilly, 1990, Wang, 2022). In justifying the elites' interests to finance external wars or protect their social networks, those historical states created institutions and established a monopoly on violence by neutralizing local authorities. Yet, there is limited evidence if a weak state can and should do the same, and expand into places where local authorities have established a strong presence in the state's absence. How can a weak state successfully extend its authority? How do local authorities and citizens react to such an expansion of the state where it was previously absent and non-state governance alternatives had developed?

How both local authorities and citizens respond to state expansion is crucial for the viability of long-run development. A coercive form of state expansion will likely have significant drawbacks (Acemoglu, Fergusson, Robinson, Romero, and Vargas, 2020, Lowes and Montero, 2021). Social costs will be compounded when the state's expansion into society is met with active resistance rather than the costs of geography and social fragmentation alone (Weber, 1976, Scott, 2009). States with low capacity, operating in areas with little history of state governance, especially have to rely on citizens—in the form of compliance, contribution, and information—in order to significantly reduce the costs associated with the implementation of their expansion, and compete with the non-state alternatives which have provided basic governance. Such cost considerations imply that successful local state institutions and functioning public goods provision are more likely to develop if the supply of state governance is met with a corresponding demand for it.

However, analyzing state expansion and its effect on existing institutions' reaction and citizens' demand for state governance is challenging for several reasons. First, if a state expands because it anticipates local demand for its governance, then the positive association between state expansion and the demand for the state will capture a reverse causal effect. To ail the endogeneity issue further, when, where, and how a state expands is determined by a range of political and logistical factors that may jointly determine demand, such as bargaining between the state and local elites or the presence of resources to extract. It is also challenging in terms of measurements. For many established states, periods of state expansion happened in the past. For these historical episodes we often lack data on the targeting of these expansions, the previous local governance arrangements, or citizens' preference for either type of governance. Finally, states that require state expansion often have limited capacity to do so. They typically lack the willingness or ability to implement effective policies and have poor record keeping, therefore exacerbating the challenges with data availability.

In this paper we made progress on the fundamental issues afflicting contemporary state-building efforts by studying the causal effects of an exogenous state expansion in the Democratic Republic of the Congo (henceforth "DRC") through a 2008–2012 decentralization reform. The reform expanded state authority to rural localities which were previously governed by traditional

chiefs. One of the criteria for state expansion was a population threshold of 20,000. Localities above the threshold would be assigned a state administrator with the authority to levy taxes, set up judicial institutions, provide public goods, and formalize land titles. In localities below the threshold such duties remained in the hands of traditional authorities. We take advantage of the reform's population threshold to implement a regression discontinuity design. We compare governance and development outcomes as well as citizens' demand for governance 10 years after the reform in localities just above the population threshold in 2008 (henceforth "towns") to localities just below it (agglomerations of villages, henceforth "agglomerations").

The DRC and its 2008–2012 reform are a particularly suitable context for investigating the effects of state expansion. First, the DRC is a weak state with an urgent need to gain authority in areas of *de facto* limited statehood. The reform only expanded the state to a select number of localities, as opposed to sweeping increases in state presence. Such a gradual and piece-meal expansion of the state is likely to be more representative of many historical state building processes, and offers a more realistic policy option as well as external validity for other weak states that try to expand. Second, the DRC features local actors, in the form of traditional authorities, with a long history of local governance, allowing us to observe whether citizens take up state services in the presence of a credible alternative.

To guide our empirical analysis, we develop a social interaction model of traditional ruler before and after the expansion of another political authority. We find natural correspondence with the economic theory of club goods, that has been used to explain public goods provision by religious organizations (Iannaccone, 1992, Berman and Laitin, 2008). A key result from this literature is the leader of a social organization has the incentive to tax group members' individual consumption in order to incentivize them to increase production of the group's public good. We extend this model by allowing different technological functions of the group leaders, the traditional ruler and the state. Informed by the sociology of African chiefs and states (Boone, 2014), traditional ruler has comparative advantage in land allocation, while the state has comparative advantage in public goods production. Both traditional ruler and the state impose taxation on citizens' own consumption in order to increase their own tax revenues and public goods under their group provision. Our framework predicts land allocation and public good provision under state to both increase or decrease, the condition of which is determined by the rate of taxation and the strategic substitutability or complementarity of land and public goods (Henn, 2023).

We address challenges of data availability surrounding the reform with a combination of original survey evidence, experimental results, satellite models, and electoral data. To determine eligibility for the reform we need pre-reform population data. However, historical population data for the DRC is not available nor is the data which was used during the reform. Instead, we estimate each locality's 2008 population with the help of electoral and satellite data. We first obtain the number of registered voters in 2018 in each locality from leaked electoral results (Congo Research Group, 2019). To obtain each locality's 2018 population, we then scale this number by a territory's specific ratio of registered voters to population estimates obtained from satellite models (Tatem, 2017). Finally, we backwards impute 2005 to 2018 yearly population by measuring the

population growth within a 10km radius around the locality using the same satellite model. The resulting estimate for 2008 population provides a near perfect match with treatment assignment.

To implement our empirical strategy and systematically gather evidence of the local governance landscape, we designed surveys for both government and household respondents. In the summer of 2022, 10 years after the reform, our team of researchers conducted surveys of 1,072 households and 532 local leaders in 134 localities (67 towns and 67 agglomerations) across the provinces of North Kivu, South Kivu, Kasaï, and Kasaï Central. To test the extent of state expansion induced by the reform we measure leader characteristics, physical infrastructure, and multiple dimensions of state capacity including the existence of financial and administrative records. We also document interactions between state officials and traditional chiefs along a range of policy dimensions. We survey citizens about their demand for governance, notably, whom they turn to for dispute resolution, whom they pay taxes to, and whom they prefer to be in charge of governance. We also assessed attitudes towards governance through a lab-in-the-field experiment, consisting of standard public goods games augmented with real audio messages from authority figures. We accompany our survey evidence with satellite-derived data of nightlights and building settlements to measure aggregate development.

The findings from our regression discontinuity design show that despite an imperfect expansion of the state the reform succeeded in increasing demand for governance by the state. We first demonstrate that localities with a population above 20,000 in 2008 were indeed significantly more likely to be designated as towns in the reform. Results suggest further that the reform was implemented, albeit imperfectly. Localities above the threshold are more likely to have state administrators, more state personnel, and more public goods provision by the state. However, 10 years after the reform, less than 35% of towns have a state administrator, and none of them are elected as stipulated by the law. The increase in state personnel is driven largely by security personnel. Other than an increase in police stations we don't observe an increase in government buildings nor an increase in other measures of state capabilities.

Both qualitative and survey evidence shows that the reform lead to increased conflict and reduced cooperation between state officials and traditional chiefs. Numerous stakeholders told us in interviews that traditional chiefs actively resisted state expansion. In our survey both leaders and citizens report an increase in conflict and a decrease in cooperation between the two governance actors. The extent of conflict and cooperation varied by policy areas. Cooperation actually increased in public goods provision, an area where the state has a comparative advantage due to its scale and technology. Conflict between the state and traditional chiefs was concentrated in land allocation an area historically organized by traditional chiefs.

We then show that citizens in localities above the population threshold report higher demand for governance by the state. They are more likely to turn to the state when resolving disputes and are more likely to pay taxes. This comes at the expense of traditional authorities whom citizens turn to less when resolving disputes, and, pay less taxes to. Citizens are also less likely to contribute to public works programs organized by traditional chiefs.

Imperfect state expansion, increased conflict between governance actors, and a shift of citizens'

demand for governance from chiefs to the state has led to mixed results on public goods provision and development. Localities above the population threshold see an increase in public goods provision of 22 pp. driven by the state. We also see population growth over the previous 5 years. However, the reform also seems to have resulted in worse land allocation with citizens 45 pp. less likely to own land in localities above the threshold. We find no effects on nightlights and household assets.

We provide further evidence in support of our framework of the state and traditional leader's comparative governance. Citizens are satisfied with public goods provision in localities above the threshold. Their satisfaction with the state does not change, presumably due to the flaws in the implementation of the state expansion. However citizens in localities above the threshold are more dissatisfied with land allocation and they evaluate their traditional chief lower on a range of dimensions indicating that they are blamed for the worsening land ownership. We rule out a range of alternative mechanisms such as differences in leader characteristics, improved accountability, or changes to ethnic representation.

Finally, we show that these demand effects of the state expansion reform have real consequences for local authority and legitimacy. Citizens in towns and agglomerations respond differently to messages from authority figures in our behavioral game. When playing a public goods game households in towns were significantly more likely to contribute to the public pool when they heard an encouragement message from their governors compared to households in agglomerations. Audio messages from traditional rulers on the other hand resulted in an increased contribution in agglomerations, localities that remained under their control, and had no effect in towns.

In summary, we show that state expansion affects the demand for state governance, with vital implications for state-society relations. While there has been extensive literature on the role of state capacity for development and the *causes* of state expansion (Levi, 1988, Acemoglu, Johnson, and Robinson, 2005, Besley and Persson, 2009), we organize our findings on the *consequences* of state expansion to contribute to three themes of this state capacity paradigm in economics, namely research on improving governance in weak states, research on state formation, and the substitutability of the state with social alternatives.

First, we contribute to a growing literature exploring attempts to improve the functioning of the state in various dimensions.[1] Our paper offers evidence on a crucial first step in improving governance in developing countries without which other policy interventions are mute. Before state capacity, extending state authority to areas previously not governed by the state increases the demand for its governance through displacing competitors and increasing legitimacy. This provides a missing link between the literature on how to increase state capacity on the intensive margin, which assumes the existence of the state to perform its capacities to begin with, and the literature on the causes and consequences of historical state expansion, the extensive margin.

[1]These range from increasing local revenue collection (Khan, Khwaja, and Olken, 2016, Weigel, 2020), organizing development (Casey, Glennerster, and Miguel, 2012), improving justice provision (Acemoglu, Cheema, Khwaja, and Robinson, 2020), extending informational capacity (Muralidharan, Niehaus, and Sukhtankar, 2016, Bowles, 2023), and changing incentives of local bureaucrats (Henn, Larreguy, and Marshall, 2020).

In doing so we speak to the debate between the "demand-side" versus "supply-side" theories of state formation (North, 1981). Growing empirical studies find support for both, in the view that individuals are willing to cede resources and contractually form state institutions to organize public goods provision (Dell, Lane, and Querubin, 2018, Allen, Bertazzini, and Heldring, 2023), but also in the view that elites form state institutions to extract resources and public goods provision results from bargaining between elites (Olson, 1993, Sánchez De La Sierra, 2020, Mayshar, Moav, and Pascali, 2022). Our findings suggest that an exogenous increase in the supply of the state can lead to increased local demand. That is, even when state expansion is purely supply driven in that it reflects the interests of the elites, local demand may follow if the state can demonstrate a comparative advantage in certain governance areas.

Finally, our study contributes to the limited but growing evidence on the substitutability between the state and other social institutions in providing economic and social order.[2] Following the framework established by Henn (2023), our findings that the reform induces citizens to switch from traditional chiefs to state agents imply that by formalizing the chiefs' integrated position in the countryside and sidelining them in towns the reform created two types of state-chief relationships: strategic complementarity in the countryside and substitutability in towns. The reform's effects on the authority of chiefs has important consequences for agriculture and land use as chiefs constrain the allocation of property rights on land (Goldstein and Udry, 2008, Acemoglu, Reed, and Robinson, 2014).

2. Context: State Expansion in the DRC

A. *Historical State and Non-State Governance*

Characteristics of the country and the limited capacities of the central state make the DRC a suitable, yet vulnerable, setting for state expansion. The DRC's enormous territory, sparse population, dense rainforests, and limited road access make it challenging for the central state in Kinshasa, located on the western frontier, to exert control. Since the Belgian colonial administration, the state focused on building infrastructure for resource extractions and never established an effective presence outside major towns and resource-rich areas. Inheriting a stretched state apparatus and having received little training, the post-independence state deteriorated. Under Mobutu Sese Seko the state was further hollowed out; state officials and citizens were largely left to their own devices, immortalized by the popular phrase "*débrouillez-vous*" (fend for yourselves).

In areas of limited statehood where the central state had little control, traditional authorities have historically held and continue to hold significant power. This has been, at least in part, by design of the colonial and post-independence administrations. Prior to colonial rule, the DRC was home to a multitude of societies with diverse governance arrangements. Belgian colonial officials,

[2]These dimensions include, among others, family values (Lowes, Nunn, Robinson, and Weigel, 2017), religious values (Bazzi, Koehler-Derrick, and Marx, 2020), education (Bazzi, Hilmy, and Marx, 2023), dispute resolution (Acemoglu et al., 2020), security from violence (Bandiera, Dinarte Diaz, Jimenez, Rozo, and Sviatschi, 2022), exchange relations (Lameke, Nkuku, de la Sierra, Tanutama, and Titeca, 2023), and taxation (Balan, Bergeron, Tourek, and Weigel, 2022).

in the search for intermediaries to govern their vast possession, coopted, coerced, and transformed existing governance structures. As a result, throughout the colonial era the Congolese countryside was governed by "traditional" chiefs organized in (sometimes pre-existing, other times artificial) hierarchies and acting as intermediaries between their communities and the colonial power. During the post-colonial rule of Mobutu Sese Seko their *de jure* influence generally declined, but weakness of the central state allowed many traditional chiefs to retain *de facto* influence. After the fall of the Mobutu regime and during the chaos of the First and Second Congo War the state deteriorated further and traditional chiefs remained the only active governance actor in vast parts of the country.

B. *The decentralization reform of 2008–2012*

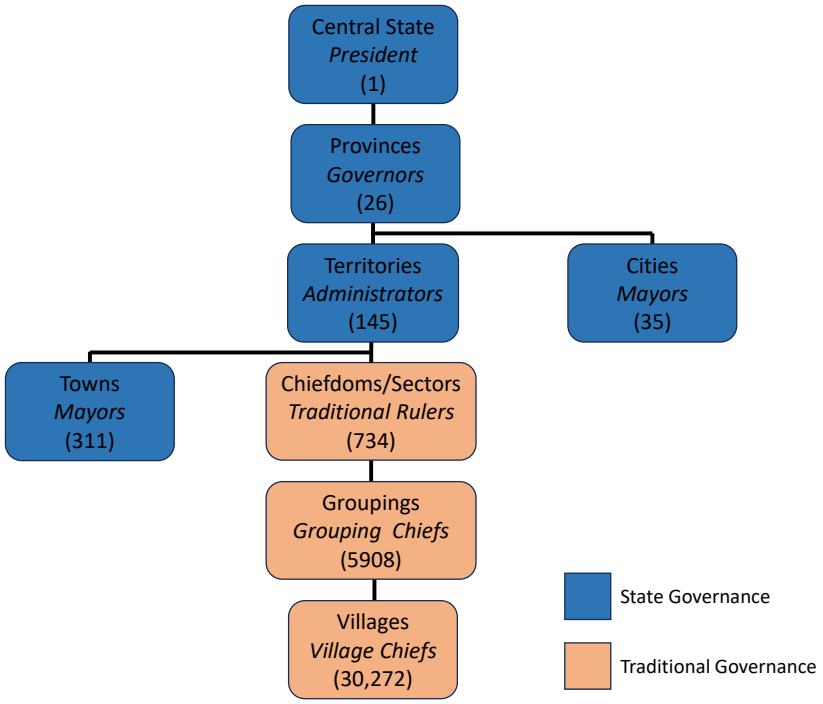
In the last 20 years, following the end of the Second Congo War, the country has embarked on an ambitious reform program aimed at consolidating and expanding state control. In addition to the proliferation of provinces from 11 to 26 and of cities and towns, the new constitution in 2006 granted decentralized rights to these entities. Decentralization administratively means exclusive jurisdiction in some aspects of public policy (education, health, and rural development), politically grants the election of provincial/city/town legislature which in turn elects the governor/mayor/burgomaster[3], and fiscally allows decentralized entities to levy their own taxes on property and industry. The raised revenue is supposed to be transferred to the central state which retains 60% of the revenue and returns 40% to the decentralized entities (Président de la RDC, 2006). The reform also changed traditional governance in two ways that are relevant for state expansion studied in this paper.

First, the reform formally embeds traditional governance into the state's administrative divisions, visualized in Figure 1. Starting with the central state at the top, state governance is decentralized into provinces, which are run by elected governors and provincial legislature who can raise their own tax revenue and coordinate public goods. The urban parts of the province are decentralized into cities (*villes*), and the rural parts of the province are further subdivided into territories (*territoires*) headed by state-appointed territorial administrators who legally cannot raise their own taxes and only govern on behalf of provincial governor. Traditional governance is constitutionally inserted as decentralized entities of these state-governed territories. Similar to their sub-territorial state counterparts of towns (*communes*), chiefdoms (*chefferies*) can levy taxes to raise their own revenue, allocate land, provide justice in non-criminal cases, and organize the provision of public goods pertaining to education, health, and rural development.[4] However, different from towns who are headed by elected mayors (henceforth "mayors") and

[3]The DRC uses the term *maire* as the head of city and *bourgmestre* as the head of town. Since we only focus on towns in this paper, we henceforth choose a familiar term "mayor" to mean *bourgmestre*.

[4]Some chiefdoms are instead called sectors (*secteurs)*. The sector is a generally heterogeneous entity of independent traditional communities, organized on the basis of custom. Its chief is appointed and vested in the public authorities. The chiefdom, on the other hand, is a generally homogeneous entity of traditional communities organized according to custom and headed by a chief designated by hereditary custom, but recognized and vested in the public authorities. In the context of the 2008–2012 reform, sub-territories of either chiefdom or sector that fulfills the criteria for town designation will undergo change in administrative status into towns.

Figure 1: Administrative Structure in the DRC



Notes: This chart shows the administrative subdivisions of the DRC. Blue fields denote localities controlled by the central state through appointment or elections. Orange denotes localities part of the traditional governance structure. Each field contains the name of the administrative division in the first line, the title of the the person(s) in charge of the division in italics in the second line, and the number of individual units of that administrative division in the DRC in parentheses in the third line. The number of villages comes from a list of geo-coded villages by UN OCHA.

town legislature, chiefdoms are governed by traditional rulers.[5] Furthermore, because chiefdoms are not part of state governance, their personnel are not state employees and reflect the governance needs of the traditional rulers, such as basic allocation of property rights and land use, as well as in-kind contribution of public goods (usually termed *salongo* in the DRC).[6]

Second, the reform selected certain urban parts of the rural territories for state expansion. Small towns already outside of the chiefdom jurisdiction only underwent nominal change (*cités* into *communes*). However, this also consolidated state control on agglomerations of villages within the chiefdom jurisdiction with population above 20,000 inhabitants, where township status was conferred (Président de la RDC, 2008). As a result, some localities—agglomerations—still fall under traditional governance while others—new towns—fall under state governance. In this paper, we focus on such localities that were agglomerations before 2008–12 and became towns and compare them to localities that were also agglomerations before 2008–12 but whose population fell short of the 20,000 threshold and therefore remained agglomerations and under traditional

[5]These traditional leaders are hereditary kings with terms that vary by local languages, such as *mwami* (in singular, *bwami* in plural) in the Kivu regions and *mulopwe* (in singular, *balopwe* in plural) in the Kasaï regions. Sectors vary in how they select the "sector chief."

[6]Traditional chiefs often use labor supplied by citizens to provide public goods, such as building and maintaining public facilities (roads, health centers, schools). Economists have labeled such levy in terms of labor to fund public provisions "informal taxation" (Olken and Singhal, 2011). These practices are known by many names in various countries, such as *salongo* in the DRC, *harambee* in Kenya, or *gotong royong* in Indonesia.

Table I: Governance in agglomerations and towns after the reform in practice

Agglomerations *(below 20,000 population)*	**Towns** *(above 20,000 population)*
Continued governance by chiefs (now formalize)	Governed by state-appointed mayor
No local elections	No local elections
Continued tax collection by chiefs (now legal)	Tax collection by state agents
Funds are not being received from higher levels	Funds are not being received from higher levels

governance. The population cutoff allows use to implement a regression discontinuity to causally identify the effects of expansion of the state in barely vs almost towns.

Ultimately, the implementation of the 2008–2012 reform has been extremely lacking according to existing accounts (Englebert and Mungongo, 2016) and our own qualitative evidence.[7] For one, local elections, which are mandated by the Constitution and required to select town, territory, and chiefdom leaders have never been held. Instead provincial government appointed mayors to cities, towns, and territories. Further, officials in decentralized entities across the country report that they do not receive the 40% of their own tax revenue as envisioned by the decentralization reform and thus many do not send all their tax revenue to the central state. Finally, even the installation of state agents in towns was neither immediately nor completely implemented. Most towns spent years without an administrator, or without sufficient personnel and resources to implement all the governance tasks assigned to them. These "would-be" towns often inherit the old administrative structure of agglomerations when they are still within the area of authority of the traditional chief. The data and analysis we present in Section 6 confirm this. Table I summarizes the governance differences after the reform between agglomerations and towns in practice. The main change introduced by the reform was the installation of state-appointed mayors who are in charge of all local governance as well as tax collection.

3. Theoretical Framework

How can we understand the social responses from the introduction of state authority in areas where local authorities have previously provided governance? We provide a simple theoretical framework in the Appendix Section Appendix B which builds on the economic theory of clubs, which has been applied to public good provisions in religious organizations (Iannaccone, 1992, Berman and Laitin, 2008), and the textbook firm entry model in industrial organization (Tirole, 1988). Below we describe the intuition behind the model.

We start by considering two governance actors, a state official and a traditional chief. Each actor can provide governance in two separate dimensions, in the case of rural DRC these are public goods provision—the construction, maintenance and management of roads, schools, and hospitals—and land management—land allocation as well as land dispute resolution. Each actor has a comparative advantage in one of the dimensions, based on their unique characteristics. The state official has an advantage in providing public goods, due to their link with higher levels of

[7]See Appendix Section Appendix A for quotes from our qualitative interviews.

authority in the state. The traditional chief has a comparative advantage in land management, due to better local information and social authority. Furthermore, in the public goods provision governance dimension, governance by one actor complements governance by the other actor. In the land management dimension however, governance by one actor has negative impacts on the governance by the other actor. There is a third actor, the citizens. Citizens are engaged in local production for which they use land and their own labor and they also get utility from the public goods that are being provided. The citizens can chose how much to contribute to the governance efforts of each actor.

Prior to the reform—and in villages after the reform—there was only one actor present in localities, namely the traditional chief. The chief focused their efforts on the governance dimension where they had comparative advantage, land, and only undertook minimal effort on the second dimension. The reform represents the entrance of the second actor in towns.

Because for the state official both government dimensions are complementary, they enter both dimensions. In the dimension where the state official has a comparative advantage, public goods provision, and which was previously under-provided, the entry of the state officials leads to an increase in governance and little friction with the chief who was not interested in public goods provision and sees the benefit of state leadership in that dimension. However, in the second dimension, land management, the effects of state entry are quite different. Not only is the state official worse than the chief in managing land, state governance also undermines land management by the chief. As a result, land management worsens. Citizens, seeing the changes of the two types of governance, update about the state official and the traditional chief and adjust their contribution accordingly. They will increase their contribution to governance by the state official and decrease their contribution to governance by the chief.

We can thus formulate four testable implications coming out of our theoretical framework:

Testable implication 1 *The reform will lead to an increase in public goods provision in localities above the population threshold and less conflict between chiefs and the state on that dimension.*

Testable implication 2 *The reform will lead to a decrease in land management in localities above the population threshold and more conflict between chiefs and the state on that dimension.*

Testable implication 3 *The reform will lead to an increase in citizens' demand for governance by the state.*

Testable implication 4 *The reform will lead to a decrease in citizens' demand for governance by the chief.*

In reality there might be more governance dimensions or more than two actors. Further we don't model the relationship between the state official and higher levels of governance or the traditional chief's link to their hierarchy. In an extension to the current model, we model shocks to citizens' productivity to generate more accurate depiction of the average response in taxes and public goods provisions by the ruler and the state.

4. Data

A. *Site selection*

Our choice of sample localities reflected the need to balance cost and statistical power, while also maximizing the number of eligible towns (former agglomerations above 20,000 inhabitants, excluding previous *cités* and capital cities of territories/chiefdoms). For each selected province, we selected all towns which were eligible for the decentralization reform.[8] In descending order of number of eligible towns per province, our selection logic yields North Kivu, Kasaï Central, Kasaï, and South Kivu provinces until we exhausted our budget. Table A1 presents the number of eligible towns in all the 26 provinces of the DRC.

Data was therefore collected from 67 towns—48% of all eligible towns in the DRC—and 67 corresponding agglomerations, totaling 134 localities, in 4 provinces of the DRC.[9] The agglomerations were randomly selected among the universe of large agglomerations in a territory to ensure we had an equal amount of towns and agglomerations in each territory. Figure 2 presents a map with the location of each locality in our sample, and the distribution of localities in each province is further presented in Table A2.

B. *Estimating Population Using Satellite and Election Data*

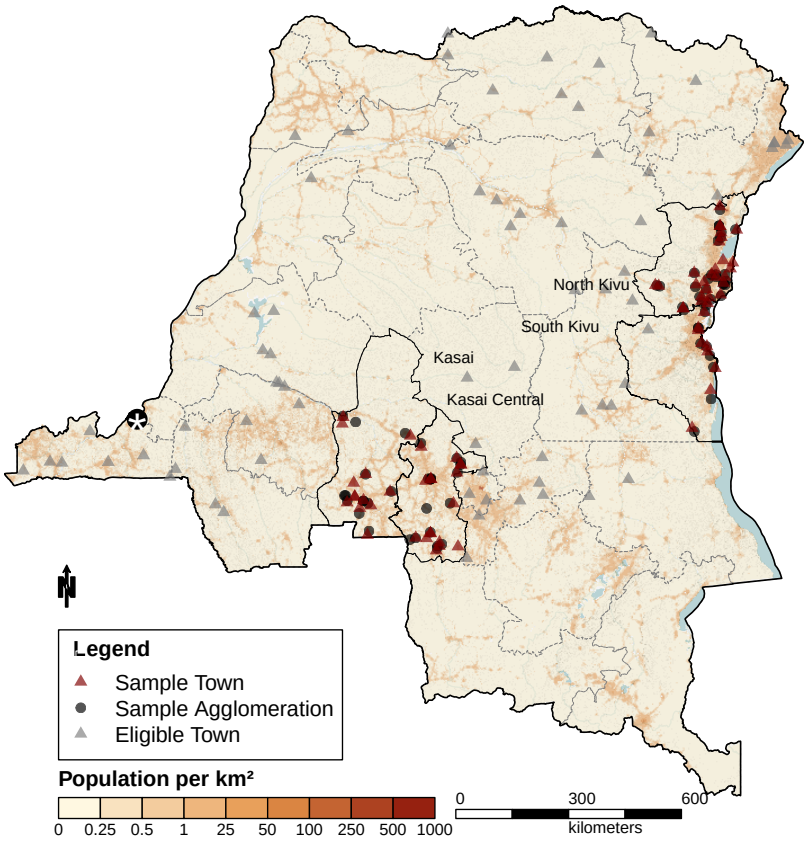
The 2008–2012 reform specified that only localities with a population above 20,000 should be designated as towns. Unfortunately, we do not have access to the population data used during the reform to make designation decisions, nor was it made available to many central government agencies when we qualitatively interviewed the relevant state officials. To circumvent these data challenges, we use a combination of election data and satellite models to estimate each sample locality's population in 2008. Figure A2 in the Appendix visualizes the process outlined below.

We begin by considering data from the 2018 Presidential election. After the election—whose results have been disputed—the reportedly real election returns at the polling station level were leaked and published by Congo Research Group (2019). We match the polling stations to our

[8]The province cluster as opposed to random locality sampling is done to minimize logistical cost of travel and the number of provincial authorizations and audio recordings used in the lab-in-the-field behavioral games. Recognizing that estimated treatment effects of state expansion apply to selected provinces, we later weight our regressions with cluster sampling probability when generalizing the effect of state expansion to the population of localities in the DRC. However, there may remain concerns about our sample with respect to power and the generalizability of selected provinces. Our power calculation with standard levels of significance (95%) and power (80%) reveals that our sample allows us to detect an effect size of above 0.1 when the population standard deviation is above 0.17. This fits well with our ex-ante knowledge of the operationability of town designation. Secondly, to increase power, we allow treatment and control observations to be as similar as possible. That is, for a given selected town, we let researchers select agglomerations at random from the list of large agglomerations in the territories, and let local knowledge guide which selected agglomerations are closest in geographic and demographic proximity to selected towns. Our strategy is informed by the pair-wise matching recommendation in pursuit of balance which can increase power (Bruhn and McKenzie, 2009). The analysis from pairwise matching improves power.

[9]We excluded 1 eligible town in Shabunda Territory of South Kivu Province due to lack of geographic access.

Figure 2: Map of sample localities and eligible towns



Notes: This map shows the location of the 67 towns (maroon triangles) and 67 agglomerations (grey bullets) which made up our sample localities across the 4 provinces of North Kivu, South Kivu, Kasaï, and Kasaï Central in the DRC. Other eligible towns (new towns from agglomerations containing above 20,000 inhabitants, excluding previous *cités* and capital cities of territories/chiefdoms) throughout other provinces are mapped as grey triangles. The map overlays population density to show its geographic correlation with the location of eligible towns.

localities and use the reported number of registered voters.[10] For each locality we then compare the overall number of registered voters in its territory (*territoire*) to population estimates for the territory's geographical area in 2018 obtained using Tatem (2017)'s satellite population model. Table A3 lists the number of registered voters, satellite population estimate and their ratio. We use this territory specific ratio to obtain 2018 population for each locality. We then use the satellite data to calculate the yearly population growth in a 10km radius around each locality's centroid.We use this yearly locality-specific population growth measure to impute each locality's population backwards from 2018 until 2005 and forwards to 2021. The following equation summarizes the

[10]While it is impossible to verify the leaked election data, the leaked results correlate strongly with survey data collected prior to the election and monitoring data released by the Catholic Church (Congo Research Group, 2019). Furthermore we focus on the number of registered voters which was less contentious and political than the votes obtained by different candidates.

procedure to obtain the population estimate for a given year:

$$\text{Population}_{ld}^{t} = \underbrace{\text{Registered Voters}_{ld}^{2018} \times \frac{\text{Satellite Estimate}_{d}^{2018}}{\text{Registered Voters}_{d}^{2018}}}_{\text{Registered voters in } l \text{ in 2018 scaled by satellite estimates of } d} \times \underbrace{\prod_{k=1}^{2018-t} \frac{\text{Satellite Centroid}_{ld}^{2018-k}}{\text{Satellite Centroid}_{ld}^{2018-k+1}}}_{\text{Population growth within 10km centroid of } l} \tag{1}$$

where $\text{Population}_{ld}^{t}$ is the population of locality l in territory d in year t; $\text{Registered Voters}_{ld}^{2018}$ is the number of voters registered in locality l for the 2018 presidential election according to leaked election results; $\text{Satellite Estimate}_{d}^{2018}$ is the satellite-based estimated population data from WorldPop (Tatem, 2017) for all localities circumscribed in territory d in 2018; $\text{Registered Voters}_{d}^{2018}$ is the number of voters registered in territory d; $\text{Satellite Centroid}_{ld}^{t}$ is the satellite-based estimated population data for a 10km radius around the centroid of locality l in year t.

C. *Survey data collection*

Data collection took place between May and August 2022. Figure A3 in the Appendix shows a detailed timeline of data collection activities. Congolese researchers from the research organization Marakuja Kivu Research[11] visited each locality in teams of two.

In each locality, 8 household heads were selected at random to participate in our survey. To increase representativeness, each team of two researchers was specifically instructed to divide themselves further into two distinct parts of the locality, one to an area with densest population, and another to that with least dense population. Within these population density strata, each researcher conducted a simple random sampling of 4 households in the locality, following every fifth house after a public point of interest. Researchers would then return as a team and interview 4 community leaders to complete the survey. These 4 leaders comprise the locality head (mayor in the case of town, or agglomeration chief in the case of agglomeration), their administration secretary, their treasurer, and the head of a sub-administration. The 4 leaders in each locality also provided information for a locality survey, one per locality. At the end of data collection, we collected 1,072 household surveys, 536 leader surveys, and 134 locality surveys.

Additionally, in each locality, researchers asked local leaders whether they have organizational charts of the local bureaucracies and financial documents of their budgeting process. We then asked if we could take pictures of these documents or if they could draw their organizational chart if a printed version did not exist. Appendix Figure A4 show both examples.

After finishing data collection we asked all team members to write a short report (2–3 pages) on their experience and perception of decentralization in the field and to contrast their experience of state governance vs. traditional governance. This allowed researchers to express additional insights that did not fit into the standard survey format. The authors of the two best reports received a bonus payment.

[11] https://marakujakivuresearch.com/

D. *Outcome Variables*

Our data collection was designed to collect data on four important dimensions for our analysis: the extent of state expansion, cooperation and conflict between state officials and traditional leaders, citizens' demand for government, and development outcomes. Section Appendix D in the Appendix lists how each variable in the main analysis is constructed.

First, to measure to what extent the reform succeeded in expanding the state we ask officials and citizens about several dimensions of state capacity in 2022, ten years after the reform. We ask a series of questions about *local leaders and governance personnel* to determine whether a locality has a state administrator, the number of state personnel by category, whether officials are appointed by the state or traditional authorities, and other leader characteristics. We also measure *physical governance infrastructure* by creating a list of all government buildings in the locality. We then ask about *government activities* such as tax collection, the existing of administrative and financial documents, and land ownership by the state and traditional authority.

Second, we ask both leaders and citizens about cooperation and conflict between state officials and traditional chiefs. Specifically, leaders are asked to list all areas of governance in which state officials cooperate with traditional chiefs and all areas where they are in conflict. We also ask citizens about the general level of conflict and cooperation between the two actors.

Third, we measure citizens' stated demand for governance by the state and traditional chiefs. We elicit citizens' preference of *dispute resolution* by asking them who they turn to in case of different types of disputes. We also measure their *fiscal and labor contributions* in the form of tax payments, bribe payments, and participation in public work programs. We also ask a range of question about citizens' stated *governance preferences* for who should be in charge of various governance dimensions.

Fourth, we measure a locality's development using a combination of survey evidence and publicly available data. We ask each respondent to list their *household assets* including land and livestock. We obtain measures of *economic activity* such as the number of weddings, bars, and economic production from leader surveys. We obtain average yearly luminosity from satellite *nightlight data* and average yearly *building footprints* from satellite reanalysis, which we use as an alternative measure of economic activity. Finally we measure *public goods provision* using both our leader survey and publicly available data on schools, roads, and healthcare facilities.

Tables A4 and A5 in the Appendix show summary statistics for economic and political characteristics for household and locality, respectively, in our sample.

E. *Lab-in-the-field public goods behavioral game*

We recognize that citizens' stated preference for governance can contain measurement errors arising from non-systematic subjective evaluations, lack of understanding of true preference, and survey biases such as experimenter demand effects and social desirability. We therefore design a lab-in-the-field behavioral game to as much as possible remove these errors and biases in order to capture the true demand for the state.

The behavioral game is authority-augmented public goods game. In the basic series of the public goods game, our implementation is as follows. Each household head (the subject) was trained to secretly choose how much of real money was to be contributed to the public pot in the form of an envelope stamped "Public", and keep the remainder of the money in another envelope written "Own". The subject plays one series of this game 5 times, with different starting endowments of 400, 600, 800, 1000, and 1200 francs (equivalent to 20, 30, 40, 50, 60 USD cents at the time of the study), in 100 franc denominations, randomly ordered. At the end of one series, the subject was asked to choose at random among the five "Own" envelopes whose values for them would be realized such that they could keep the money. The subject is trained that once he picks the "Own" envelope, the remainder of the endowment the subject puts in the corresponding "Public" envelope would actually be realized, together with the remaining 7 households in the locality and multiplied by the research team 1.25×. Researchers were explicitly asked and verified to give this money to locality heads. The subject plays one trial round of 2 games to test his understanding and clarify any confusion. The subject then plays two series of the games, each 5 times with the said randomly ordered starting endowments, thus the range of possible own collections is [0.40, 1.20] USD at the end of the two series.

The two series of the behavioral game represents the authority framing effect, one with audio-augmented authority voices, and the other a placebo game. Each household was randomly assigned one of the authorities: {State Governor, Traditional Chief, Locality Leader, No Authority}. In the audio-augmented series of the game, each subject first listens to the audio message, that the research team had obtained from the relevant authority figures, who encourage households to contribute to the public pot for the benefit of the community. Appendix Figure A6 shows the template of the transcribed audio message to be read by authority figures in relevant local languages, and then recorded and played before households participate in the audio-augmented series of the behavioral game. In contrast, in the placebo game, the subject was not played the audio message at all. Instead, the subject was informed by the researcher that the relevant, randomized, possibly different, authority figures had encouraged households to contribute to the funds and will manage them. The randomization was done by household-game series, so it is possible that the subject first heard an audio message from an authority, and then had a different authority in the placebo game. The order of the audio-augmented and the placebo series was also randomized to minimize spillover bias.

We use the level of contribution under different authority configurations in the audio-augmented series as a measure of revealed preference for the relevant authorities. In doing so, we remove extraneous information that does not capture the demand for the state or for traditional governance. For instance, comparisons within game series (across five different games of starting endowments) remove the subject's warm-glow effect of public goods contribution (Andreoni, 1990). Furthermore, comparisons between audio-augmented and the placebo game (within-household comparison of authorities) allows us to isolate the signals that come only from

authorities.[12] Our goal is to measure the demand for the state and for the traditional chief, whether that comes from citizens' preference for authority or perception of legitimacy. Using how subjects respond in public goods games to audio messages by authority figures to measure the legitimacy of these figures builds on recent experimental work in political science (Blair, 2018, Grieco, 2023). Section Appendix E discusses the theoretical and empirical basis for this in detail.

5. Empirical Strategy

We now turn to the analysis of the state expansion. We present the empirical strategy that uses the reform's population threshold and implements a regression discontinuity design to determine the reform's causal effect. We show the relationship between population and commune designation, then discuss our specification, and the sample we use.

A. *Relationship Between Population and State Expansion*

Figure A7 shows the distribution of a locality's imputed population for 2008—the year the state expansion was legislated—separately for towns and agglomerations. We can see that there are no agglomerations above the threshold of 20,000, however there are a handful of localities below the threshold according to 2008 population numbers that were subsequently designated as towns. This could have three reasons. First, our population estimates might be inaccurate. This could be due to inaccuracies in the election data or satellite estimates. Second, population changes from 2008 until the formal designation of towns could account for the differences. Especially the Eastern provinces of the DRC have seen considerable population movements towards agglomerations due to insecurity. Third, bureaucrats and politicians might not have followed the threshold rule strictly when designating towns.

B. *Specification*

We will use a locality's imputed population in 2008 and implement a regression discontinuity design with the following specification:

$$Y_l = \gamma_1 \text{Population}_l^{2008} + \gamma_2 \text{Threshold}_l + \gamma_3 \text{Threshold}_l \times \text{Population}_l^{2008} + X_l' \Gamma + \Psi_l + \epsilon_l \quad (2)$$

where Y_l is the outcome for locality l; $\text{Population}_l^{2008}$ is the locality's imputed population in 2008 as we outlined in Section 4B; Threshold_l is a binary indicator whether the locality had a population above 20,000 in 2008; X_l is a vector of historical and geographic covariates; and Ψ_l are territory (*territoire*) fixed effects. Standard errors are clustered at the locality level. The coefficient of interest is γ_2 and identifies the causal jump of the outcome at the population threshold. For analysis at the household or official level we modify the specification by replacing Y_l with Y_{jl}, the outcome for household or leader j in locality l.

[12] To mitigate the unverifiability of the message, we explicitly ask leaders to mention their names and address the citizens in the local language used in the localities.

To analyze the results of our public goods game we use the following specification:

$$Y_{gjl} = \beta_1 \text{Governor}_j + \beta_2 \text{Chief}_j + \beta_3 \text{Leader}_j + X_l' \Gamma + \Psi_l + \epsilon_{gjl} \quad (3)$$

where Y_{gjl} is the percentage contribution in the public goods game round g of household j in locality l; Governor_j, Chief_j, and Leader_j are indicators whether the household j was randomly assigned an audio message by their Governor, Traditional Chief, or the Locality Head; and Ψ_l are territory fixed effects. Standard errors are clustered at the locality level. We run the analysis separately for towns and agglomerations. We also run a specification where we interact the treatment indicators in Equation 3 with town status and a third specification where we interact the regression discontinuity design of Equation 2 with the behavioral treatment indicators. Both additional specification can be found in Appendix Section B..

C. *Sample selection for analyses*

To estimate the effect of state expansion we restrict our sample of localities in five ways. First, we exclude 4 localities which we found out after surveys were completed to be the capital cities of their administrative division. This is because territory headquarters were automatically made into towns while headquarters of chiefdoms and sectors could not become towns. In these cases the population threshold was irrelevant and has thus no impact on town status of a locality. Second, we exclude 10 localities that were *cities* prior to 2008, the predecessor of the town status. These localities were already different from other localities prior to the reform. These two sets of cases rendered towns ineligible for causal identification of state expansion. Third, we exclude 14 agglomerations which are co-located with towns. We are concerned that there are institutional or economic spillovers from the commune to the adjacent agglomeration. Fourth, we use a bandwidth of 16,000 around the 20,000 cutoff and therefore exclude localities with an imputed 2008 population of less than 4,000 or more than 36,000. After sample exclusion, our analysis uses data from 94 localities (48 towns and 46 agglomerations), and the corresponding 376 government official observations from the leader survey and 752 household observations from the citizen survey.

6. Results

A. *Town Assignment*

We first establish whether the regression discontinuity design does indeed identify localities designated as towns. Panel A of Table II shows the results of Specification 2 with town assignment as the dependent variable while varying the bandwidth from 6,000 to 20,000. Throughout the results remain remarkably consistent. Being above the threshold increases designation as a town by around 100 percentage points. Figure A11 in the Appendix shows the coefficient when varying the bandwidth from 6,000 to 30,000. Panel B shows how the first stage varies when using different years of the imputed population measure. Using a year before 2008 shows qualitatively similar

results. The first stage becomes somewhat weaker when using 2009 or 2010 imputed population as the running variable and discontinuity. Since later years could be affected by manipulation due to knowledge of the cutoff, we consider 2008 as the best year to use.

Figures A8 and A9 in the Appendix shows the RD plots and results of localities being assigned town status in the 2008–2012 reform, using linear and quadratic fit of our chosen specification. Being above the threshold strongly predicts a locality being designated as a town.

Table II: Effect of Population Discontinuity on State Expansion

	Dependent Variable: State Expansion (Town Assignment)					
	(1)	(2)	(3)	(4)	(5)	(6)
	A. Effect by bandwidth selection, using constant 2008 year					
Population Discontinuity	1.098***	1.022***	0.956***	0.959***	0.927***	0.928***
	(0.149)	(0.092)	(0.084)	(0.059)	(0.053)	(0.052)
McCrary p-val	[0.286]	[0.000]	[0.000]	[0.292]	[0.196]	[0.141]
1st Stage F-stat	⟨42.29⟩	⟨76.43⟩	⟨76.95⟩	⟨108.4⟩	⟨108.6⟩	⟨117.3⟩
Observations	47	66	78	94	101	106
R^2	0.909	0.920	0.908	0.917	0.915	0.917
Bandwidth	10,000	12,000	14,000	16,000	18,000	20,000
	B. Effect by population year, using constant 16,000 bandwidth					
Population Discontinuity	0.997***	0.869***	0.976***	0.959***	0.701***	0.569***
	(0.089)	(0.120)	(0.073)	(0.059)	(0.139)	(0.148)
McCrary p-value	[0.000]	[0.000]	[0.483]	[0.292]	[0.350]	[0.106]
1st Stage F-stat	⟨118.8⟩	⟨70.18⟩	⟨124.6⟩	⟨108.4⟩	⟨34.88⟩	⟨22.81⟩
Observations	99	99	98	94	88	88
R^2	0.918	0.880	0.917	0.917	0.864	0.855
Year	2005	2006	2007	2008	2009	2010

Notes: This table presents the first-stage regression coefficients of state expansion (town assignment = 1) on population discontinuity, population margin as running variable, their interaction, and pre-treatment covariates, using our locality samples as the unit of observation. The two panels present the estimated coefficients by bandwidth selection and pre-treatment population year. In Panel A, each column indicates the bandwidth around the population discontinuity, using 2008 population year. In Panel B, each column indicates the year of population, using 16,000 as bandwidth around the discontinuity. Standard errors are clustered at the locality level and reported in parentheses. The McCrary density test p-value is reported in square braces. The F-statistic from the 2SLS regression whose first-stage instruments state expansion with population discontinuity is reported in angular braces. The observations exclude (1) 4 localities which were capital cities of territories, sectors, chiefdoms, (2) 10 previous cities, and (3) 14 agglomerations which are co-located with towns as mentioned in Section 5C.

B. *Balance*

We now test whether the population threshold is correlated with other locality characteristics. Table A6 shows regression results results of Specification 2 with various geographical and historical variables as the dependent variable. Of the 16 variables tested only two—elevation and distance

to the national border—are significant at the 10% level or lower. Figure A10 shows the results as a coefficient plot. Table A10 in the Appendix show the 2SLS results which have no significant variable. Throughout, the results indicate that the population threshold is not associated with other geographical or historical locality characteristics. We still include all geographical and historical variables as covariates in the main specification.

C. *Effects of State Expansion Reform on State Presence*

We begin the analysis of the state expansion reform by looking into its implementation. Localities that became towns are supposed to be governed by a locally elected mayor (*Bourgmestre*), the establishment of government offices, and the transfer of revenue collection authority from traditional to state agents. Table III shows the effect of a locality being above the population threshold on the presence of government personnel, the establishment of government offices, and government activities. The results reveal a positive effect of the reform on state expansion in the form of state presence, albeit a flawed one.

Panel A shows that localities above the 20,000 population threshold in 2008, and thus designated as towns, are more likely to have a mayor, yet only by 37 pp. (Column 1) meaning not every town has received a mayor yet. The reform did not lead to a significant increase in administrative personnel (Column 2), though the number of security personnel increased considerably by 34 (Column 3). The electoral prescription of the reform was not followed with only 10 percent of leaders in our sample being elected and localities above the threshold are not more likely to have had such elections (Column 4). Appointment authority over local officials shifted substantially to the state with leaders in towns more likely to be appointed by the state (Column 5) and less likely to be appointed by the traditional hierarchy (Column 6). Overall we can see a noticeable shift in the governance personnel towards state officials in towns following the reform though it did not reach all towns and the electoral requirement was not followed.

We next test whether the reform is associated with increases in physical government infrastructure. Panel B shows almost no effect on the establishment of government buildings. Localities above the threshold are not more likely to have a Secretariat (Column 1), Tax Office (Column 2), Public Works building (Column 3), State Court (Column 4), or Military Post (Column 5). They are however significantly more likely to have a Police Station (Column 6).

Panel C investigates the effect of the reform on other indicators for the capacity of the state and finds mixed results. The reform does not seem to have increased tax collection (Column 1 and 2). Towns don't tax a larger number of industries (Column 3). Localities above the threshold are not more likely to have organizational charts at hand when we visited them (Column 4). They are somewhat more likely to have financial records (Column 5) and towns are more likely to receive inter-governmental transfers suggesting increase cooperation across government levels (Column 6).

Throughout our results indicate that the reform was implemented, albeit imperfectly. Towns are more likely to be governed by a state administrator and less likely by someone appointed by

Table III: The effects of state expansion on state presence

A. The effects on presence of state government personnel

	State mayor exists	Number of administrative personnel	Number of security personnel	Election of mayor	Key Personnel appointment by the State	Key Personnel appointment by the Chief
	(1)	(2)	(3)	(4)	(5)	(6)
Population Discontinuity	37.73*	8.184	33.98*	−3.131	26.95*	−30.30*
	(21.90)	(6.129)	(17.27)	(8.828)	(15.19)	(17.84)
Mean Dep. Var	20.90	7.660	13.89	10.45	17.29	58.27
Observations	94	94	94	94	376	376
R^2	0.105	0.028	0.217	0.002	0.036	0.026

B. The effects on presence of state government buildings

	Secretariat (Administrative)	Tax office (Fiscal)	Public works (Fiscal)	State court (Legal)	Military post (Security)	Police station (Security)
	(1)	(2)	(3)	(4)	(5)	(6)
Population Discontinuity	−18.88	16.01	13.23	9.860	5.080	49.47**
	(25.33)	(18.84)	(9.258)	(14.66)	(24.24)	(21.85)
Mean Dep. Var	49.25	14.93	2.990	8.960	24.63	47.01
Observations	94	94	94	94	94	94
R^2	0.013	0.014	0.024	0.009	0.026	0.101

C. The effects on presence of state activities

	Tax Collection effort on industries	Log total tax collection ($)	Number of taxable industries	Organization chart exists	Finance document exists	Inter governmental transfer
	(1)	(2)	(3)	(4)	(5)	(6)
Population Discontinuity	−0.7853	0.1360	−1.035	−17.73	31.50	44.76**
	(13.61)	(0.4939)	(31.53)	(25.95)	(21.68)	(22.23)
Mean Dep. Var	89.55	1.980	75.90	50.75	55.22	29.85
Observations	94	94	94	94	94	94
R^2	0.016	0.038	0.057	0.037	0.034	0.067

Notes: This table presents the estimates of γ_2 coefficients from Equation 2 which regresses outcomes indicated on table header on the population discontinuity, the 2008 imputed population as running variable, their interaction, and pre-treatment geographic covariates as control, ±16,000 around population discontinuity as bandwidth. The sample in all panels are localities which satisfied our sample inclusion detailed in Subsection C. Panel A presents the effects of state expansion on locality head political characteristics and state personnel. Panel B presents the effects on government buildings. Panel presents the effects on variables associated with state activities. Standard errors are clustered at the locality level.

traditional hierarchy. Towns also have more state personnel and somewhat higher capacity. On the other hand towns are not more likely to have elected leaders, don't have more government buildings, and the effect on state personnel seems to be driven by security personnel.

D. *Effects of State Expansion on Supply of Governance*

We now turn to investigating the effect of state expansion on the relationship between the state and traditional chiefs. Our theoretical framework outlined how the entry of the state in areas

previously governed by traditional chiefs can lead to an increase in conflict depending on the dimension of governance. Figure 5 shows the RD plots for cooperation and conflict between the state and chiefs. In Panel A cooperation between the state and chiefs according to leaders declines sharply at the threshold while Panel B shows a slight increase in conflict. Our testable implications 1 and 2 predicted heterogeneity in conflict by governance area. Panels C and D split up conflict by areas of governance and show a decrease in conflict in public goods provision, in line with testable implications 1, but an increase in conflict surrounding land, in line with testable implications 2. Lastly, Panel E uses household responses to collaborate the increase in conflict between the state and chiefs. Panel A in Table A8 in the Appendix shows the results in table form. Conflict over property rights increases by 10 pp. while conflict over public goods provision decreases by 23 pp. Citizens' perception of conflict increases by 10 pp. with a very high variable mean of 57% of citizens reporting conflict between state officials and traditional chiefs.

E. *Effects of State Expansion on Demand for Governance*

We now investigate how the decentralization reform affected citizens' demand for governance. In particular we are interested whether citizens turn to the state or traditional chiefs for public goods provision, who they make payments to, which authority they prefer and whose messages they respond to. Testable implication 3 predicted an increase in demand for the state while testable implication 3 predicted a decrease in demand for chiefs.

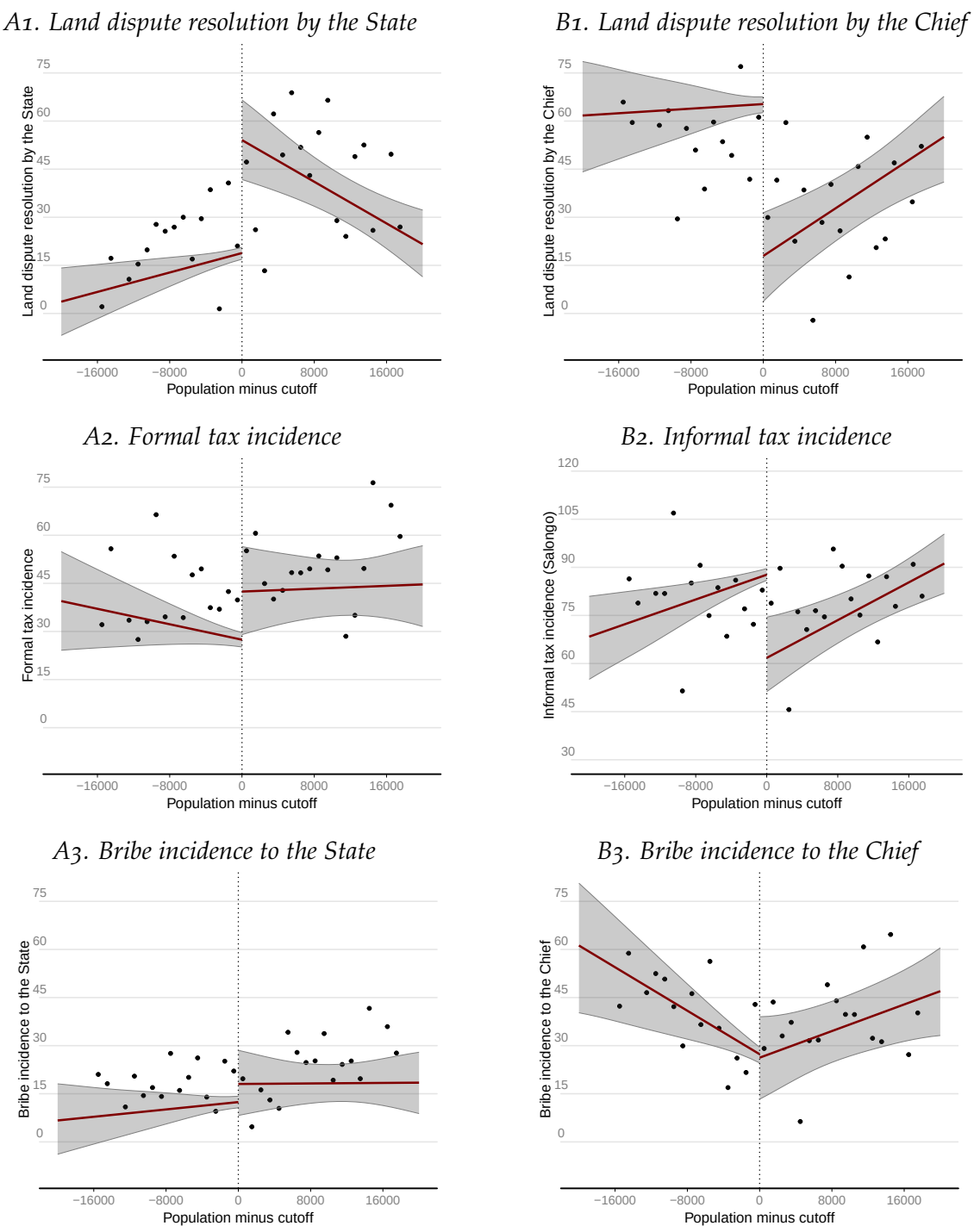
Figure 3 shows the result of this investigation by plotting the RD graphs on citizens' demand for governance by the state and chiefs. Panel A1 shows that citizens in localities above the threshold are more likely to turn to the state when resolving a dispute and Panel B1 shows a corresponding decline in dispute resolution by chiefs. Similarly, formal tax incidence increases above the threshold (Panel A2) while informal tax incidence, in the form of community work in Salongo, decreases (Panel B2). Bribes to the state increase (Panel A3) while bribes to the chief are unaffected (Panel B3). Panel B in Table A8 in the Appendix shows the results in table form.

Results from Figure 3 taken together suggest citizens substituted away from traditional chiefs and towards state authorities in line with the predictions of testable implication 3 and 4.

F. *Effects of State Expansion on Development*

Next we test whether state expansion led to improved development outcomes. Table IV shows mixed results. Panel A shows that the provision of public goods increases considerably, by 30 pp. (Column 1), while provision by chiefs decreases slightly by 7 pp. (Column 2). Looking at a panel of population over 5 years we can see an increase in population in localities above the threshold (Column 3). The effect is large with 12,000 additional occupants, indicating that localities above the threshold grew 50%. This growth in population could potentially have put strain on local resources. Panel B shows one possible consequence, namely that households are 45 pp. less likely to own land (Column 1). Further, even though public goods provision increase, there is no effect on nightlights (Column 2), and no effect on household assets (Column 3).

Figure 3: The effects of state expansion on demand for the State and the Chief



Notes: This figure presents the regression discontinuity plots, where each panel plots the bin estimates of residualized dummy dependent variables (0, 100) and independent variables, the predicted values, and bootstrapped confidence intervals based on cluster errors, from Equation 2. The samples are households in sample localities around the 16,000 bandwidth. The dependent variables are: A1. Land dispute resolution by the State is a dummy variable of land disputes being resolved by state personnel (mayor, police, tribunal) if households had a land dispute in the past year (actual) or being potentially assigned to state personnel if households did not have a land dispute in the past year (hypothetical). B1. Land dispute by the Chief similarly measures the dummy variable of actual or hypothetical land disputes resolved by the chief personnel (chief, chief agents, heads of subvillages). A2. Formal tax incidence measures the dummy variable if households paid taxes for taxable industries as listed in the Example Form on Appendix Figure A5. B2. Informal tax incidence measures the dummy variable if households participated in public works program organized by the Chief (Salongo) at least once in the past month. A3. Bribe incidence to the State measures if households paid the State personnel in gifts, bribe, or in-kind for any public activity in the past month, or if households paid bribes instead of taxes when paying for taxable industry to the State. B3. Bribe incidence to the Chief similarly measures if households paid to the Chief personnel for any activity or when paying for taxable industry to the Chief. Each dependent variable is translated by the amount such that its predicted value just below the cutoff corresponds to its control mean values.

Table IV: The effects of state expansion on short-run development

A. Public Goods Provision and Population

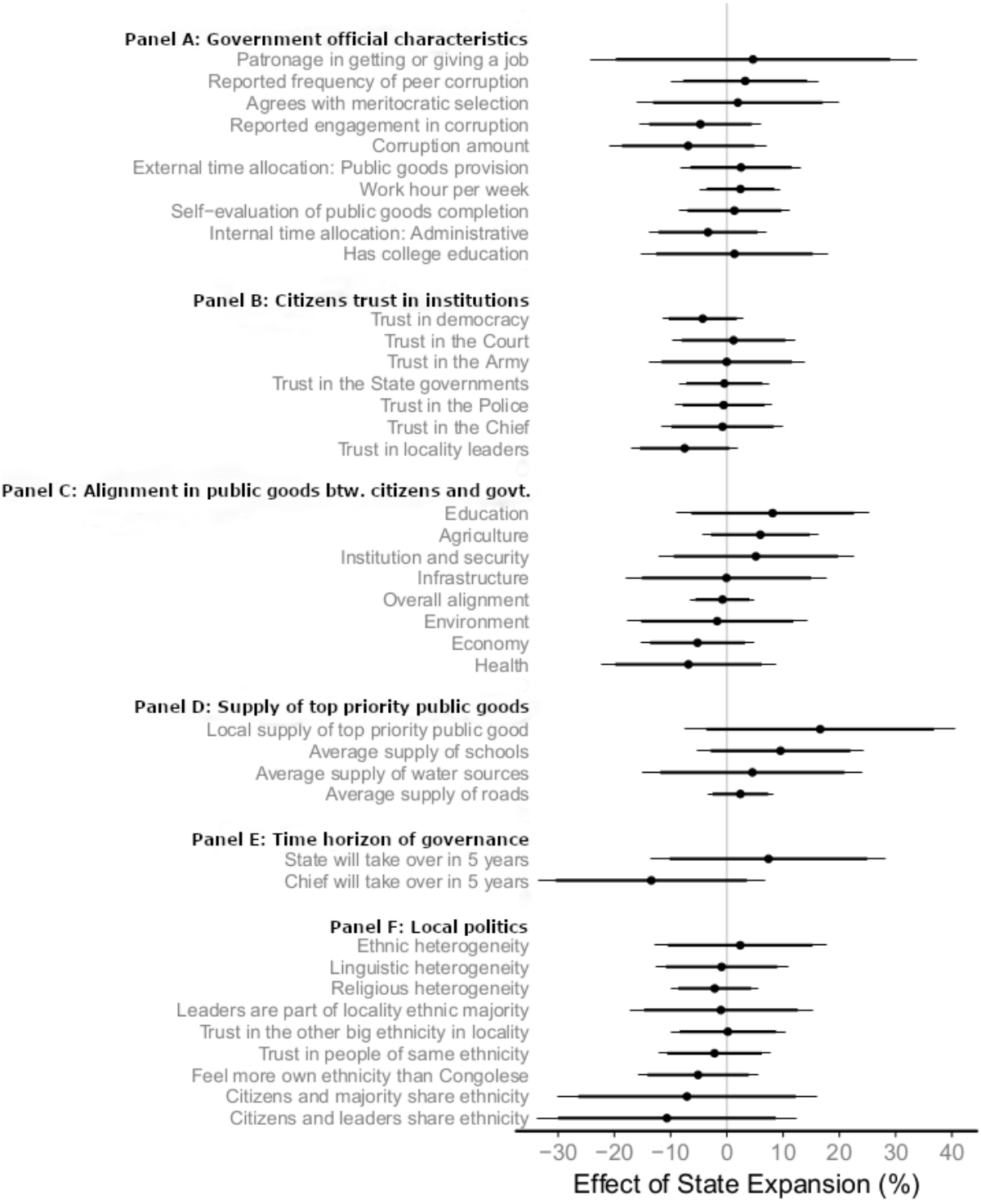
	Public goods (State) (1)	Public goods (Chief) (2)	Population (3)
Population Discontinuity	29.62**	−7.079*	12,528*
	(11.30)	(3.716)	(7,278)
Mean Dep. Var	33.21	2.360	23,763
Observations	94	94	466
R^2	0.114	0.035	0.212

B. Development Outcomes

	Household land ownership (1)	Nighttime lights intensity (2)	Household asset and livestock (3)
Population Discontinuity	−45.06***	−59.70	−4.274
	(14.51)	(43.38)	(2.600)
Mean Dep. Var	43.13	370.8	27.99
Observations	734	470	752
R^2	0.042	0.008	0.016

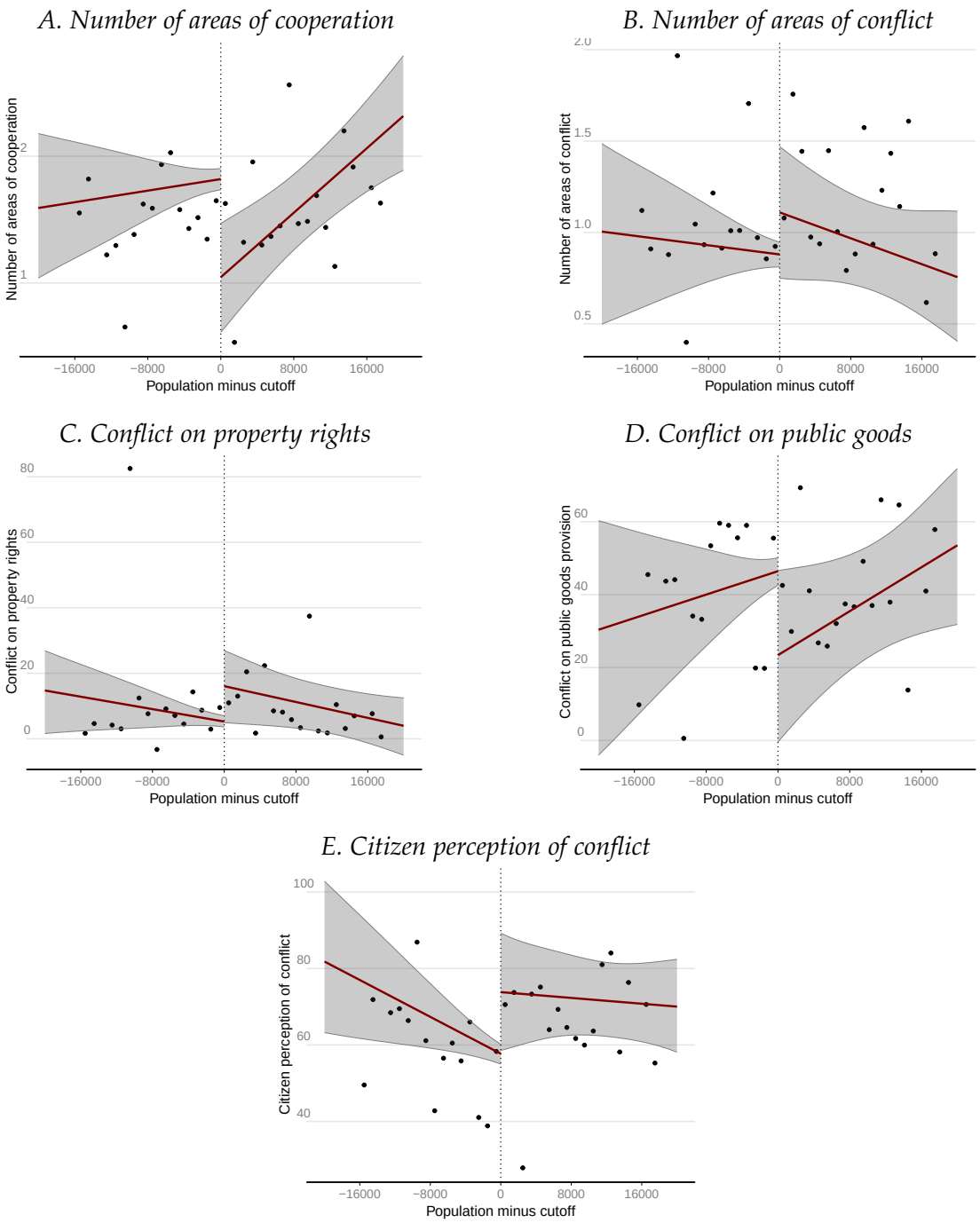
Notes: This table presents the estimates of γ_2 coefficients from Equation 2 which regresses outcomes indicated on table header on the population discontinuity, the 2008 population as running variable, their interaction, and pre-treatment geographic covariates as control.

Figure 4: The effects of state expansion on characteristics of governance and citizens' satisfaction



Notes: This figure presents the estimates of γ_2 coefficients from Equation 2 which regresses outcomes indicated on the vertical axis on the population discontinuity, the 2008 population as running variable, their interaction, and pre-treatment geographic covariates as control.

Figure 5: The effects of state expansion on the relationship between the State and the Chief



Notes: This figure presents the regression discontinuity plots, where each panel plots the bin estimates of residualized dependent variables and independent variables, the predicted values, and bootstrapped confidence intervals based on cluster errors, from Equation 2. The samples for Panels A through D are government officials in the sample, and those for Panel E are households in sample localities, around the 16,000 bandwidth. The dependent variables are: A. Number of areas of cooperation between the State and the Chief, among a list of areas of authorities, where government officials were free to select multiple options which indicated where they collaborate. B. Number of areas of conflict between the State and the Chief, where similarly to A government officials were free to select multiple options of areas of conflict. C. Dummy (0, 100) if the State and the Chief had conflict on property rights and did not collaborate on property rights, which included land allocation or security from expropriation and external attacks. D. Dummy (0, 100) if the State and the Chief had conflict on public goods provision and did not collaborate on public goods provision, which included public infrastructure, agricultural management, and promoting local development. E. Dummy (0, 100) if household respondents perceived that the State and the Chief were in conflict. Each dependent variable is translated by the amount such that its predicted value just below the cutoff corresponds to its control mean values.

G. *Mechanism*

Table A13 in the Appendix explores whether the effects are driven by towns where the state expansion was more successful. To do so we interact Specification 2 with an indicator if the town has a mayor (*bourgmestre*) today. Note that this variable is post-treatment and one is therefore concerned about post-treatment bias. We are considering this analysis exploratory.

Panel A suggests that the effects on state expansion are not driven by the presence of a mayor. The number of security personnel and police stations increases regardless of mayor existence. Only the increase in inter-governmental transfers seems to be driven by mayors.

Panel B on the other hand indicates that the increases in demand for state governance are amplified in localities with a mayor. Dispute resolution by the state (both land and other disputes) and bribe payment to the state increase further when a mayor is present. Only the increase in formal tax incidence however is not increased. The negative impact of the reform on demand for governance by traditional chiefs also seems to amplified by the existence of mayors.

This analysis provides suggestive evidence that successful state expansion increases the effects on the demand for governance.

Why would citizens react to state expansion by increasing there demand for the state? Our theoretical framework suggests that this is driven by citizens reacting to governance outcomes in public goods provision and property rights. Table V provides suggestive evidence of this channel. Panel A shows the effect of the reform on citizens' perception of the State's domain of authorities and state control. Citizens have increased satisfaction with public good provision and are equally satisfied with the governor and the top locality leader. However Panel B shows that citizens decrease their perception of their chief. Citizens are less satisfied with land allocation, rate their chiefs management skills more negatively, are less likely to say that they improve democracy and have negative vies of their hamlet leader.

Figure 4 considers several alternative mechanisms. First, we consider whether citizens prefer the state because its officials are different on some dimension. Government official characteristics are not different than traditional officials. Trust in institutions is not affected. There is no difference in alignment of public goods preferences or their delivery. Second, we investigate whether state expansion changes local governance to benefit the state. We find no difference in time horizon of rule and no change in ethnic representation.

H. *Effects on Authority*

Finally, we explore whether the reform affected state and traditional authority by examining behavior in our public goods game. Figure 6 shows the coefficients from Specification 3. The first set of coefficients shows that subjects in towns contribute significantly more to the public goods game when hearing an audio message from their governor, while subjects in agglomerations don't contribute additional funds when hearing a message from the governor. The effect sizes are sizable, increasing contribution by 2.98 and 3.54 pp. respectively, raising the willingness to pay to 34.7% and 35.2% (12.7 and 13.4 cents USD from the average endowment of 40 cents). This

Table V: The effects of state expansion on citizens perception of State and Chief effectiveness

A. Citizens' perception of the State's domain of authorities and state control

	Satisfaction with top 3 pub. goods provision (1)	Perceived management talent of the Governor (2)	State should govern locality (3)	Satisfaction with top locality leader (4)
Population Discontinuity	9.343**	−2.972	6.016	−5.333
	(4.403)	(4.930)	(6.265)	(3.910)
Mean Dep. Var	33.82	48.85	47.67	63.09
Observations	752	722	737	747
R^2	0.402	0.181	0.157	0.216

B. Citizens' perception of the Chief's domain of authorities and Chief control

	Satisfaction with land allocation (1)	Perceived management talent of the Chief (2)	Chief strengthens democracy (3)	Satisfaction with hamlet leader (4)
Population Discontinuity	−9.875*	−10.55*	−20.11*	−5.644*
	(5.677)	(6.063)	(10.23)	(3.343)
Mean Dep. Var	75.38	58.47	52.07	60.21
Observations	746	745	748	531
R^2	0.364	0.176	0.263	0.198

Notes: This table presents the estimates of γ_2 coefficients from Equation 2 which regresses outcomes indicated on table header on the population discontinuity, the 2008 population as running variable, their interaction, and pre-treatment geographic covariates as control. The samples in both Panels A and B are household respondents in localities which satisfied our sample inclusion detailed in Subsection C. Panel A presents the effects of state expansion on citizens' perception of the State's domain of authorities and state control. Column (1) indicates citizens' satisfaction with public goods provision that they reported as top priorities (roads, water sources, and schools). Column (2) indicates the perceived management talent of the Governor. Column (3) indicates if state institutions should govern the locality. Column (4) indicates citizens' satisfaction with the locality leader. In Panel B, the dependent variables relate to citizens' perception of the Chief domain of authorities and control. Column (1) indicates citizens' satisfaction with land allocation. Column (2) indicates the perceived management talent of the Chief. Column (3) indicates if the Chief strengthens democracy. Column (4) indicates citizens' satisfaction with the hamlet leader. Standard errors are clustered at the locality level.

suggests that citizens are more responsive to state authority in localities affected by the reform. The next set of coefficients show that the contribution of subjects in towns is not affected by audio messages from their traditional rulers, while the contribution of subjects in villages increases upon hearing such a message. While the estimates are more noisy this suggests that traditional rulers hold authority over citizens in villages. Table A9 in the Appendix shows the results in table form.

To reinforce the interpretation that audio messages from authority enhanced the public goods contribution, we show that the behavioral game without audio message (placebo) did not produce any results (Table A16). We further show that the combined effects of real authority voice and placebo authority are null, except in agglomerations where placebo governor and placebo agglomeration leader amplify the real message of governors (Table A17).

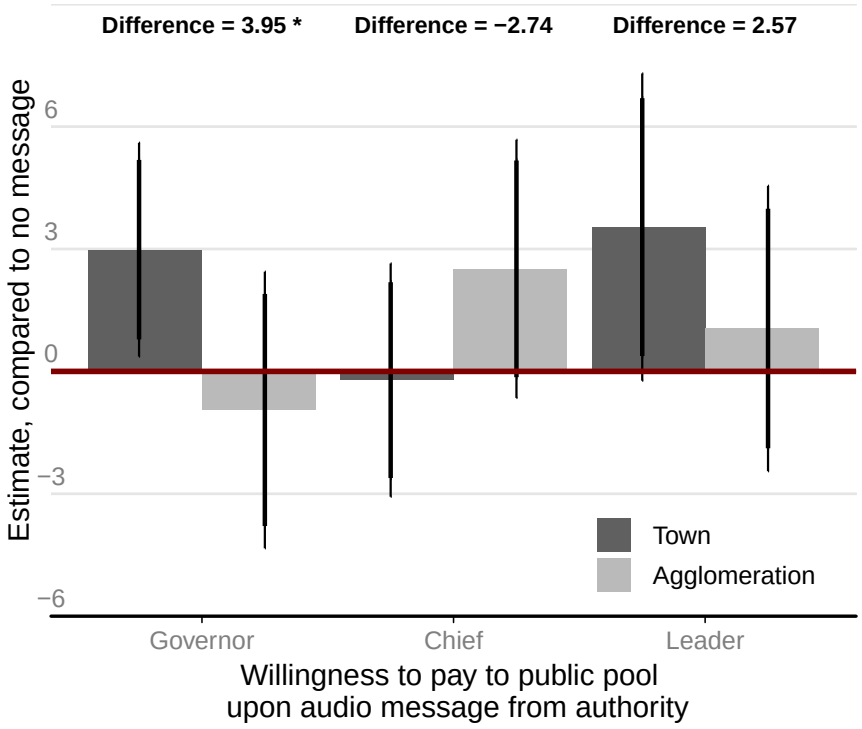
Overall the results from the behavioral games suggest that the reform completely reformed local authority. While traditional authority is paramount in villages, towns now only react to state authority.

7. Robustness

We conduct several exercises to test the robustness of our findings. These can be grouped in three categories: the creation of our population estimate, details of our regression discontinuity specification, and sample composition. Coefficients from our robustness and falsification tests can be found in Figures A13–A14 in the Appendix.

The creation of our 2008 population estimate happens in several steps that rely on different assumptions. We test robustness of each step by slightly changing the process. First, we show robustness to scaling a locality's number of registered voters by a standard country wide ratio. The effects become less precise as is to be expected since our forcing variable is measured with more noise, yet the general results remain. Second, we vary the radius used to calculate a locality's

Figure 6: The effects of contribution to public goods game



Notes: This figure presents the estimates of coefficients from Equation 3 which regresses the percentages of contribution to behavioral games after a household hears the randomized audio message from governor, chief, or locality leader, estimated in the same regression. The observations are at the game-level, in which each household in our sample locality played the behavioral game five times with randomized initial endowments. The independent variables are dummies for governor message, chief message, or locality leader message, estimated in the same equation, controlling for the round number and a dummy for whether household plays the set of game with audio first or after the placebo game. The placebo game is the same set of public goods game without message, but only with indication whether governor, chief, or leader will manage the fund once contributed. Each bar reports the regression coefficients for households in towns or agglomerations, separated by those who hear randomized messages from the authority on the x-axis. The difference between the two sets of bars are estimated using a saturated model, whose interaction effects between the dummy for each type of leader audio message and the dummy for town are reported in square brackets. Errors are clustered at the locality level. Error bars depict the 90th and 95th percentile confidence interval. Control mean indicates the average percentage of funds contributed to public pot for households who did not hear any randomized audio messages before contributing, reported separately for those in town (31.7%) and agglomerations (33.5%).

population growth and assume a constant growth across localities and years. Third, we vary the year used. Fourth, we dispense with this exercise all together and use a locality's 2005 population as reported to us in 2022 by locality leaders.

As all regression discontinuity designs, our studies relies on several assumptions inherent with the design. In Section B we showed balance on historical and geographical variables. We then rerun our results without controls. We also vary the bandwidth used from 10,000 to 20,000. Appendix Figure A12 provides McCrary graphs showing no evidence of manipulation around the threshold. We next assume other thresholds showing that only the true 20,000 threshold (and slight variations) provides the results. Finally, given that we have a handful of towns below the threshold in 2008, we implement a fuzzy regression discontinuity design, the specification for which can be found in Appendix Section A..

We also test several sample compositions. First, we add localities dropped in our main specification. To capture treatment effects for the population of households we inverse weight the regression by probability of being sampled, that is 8 divided by the number of households in the locality. We do a similar adjustment for the probability a locality has been sampled.

Throughout the results remain robustness and our specification choices are confirmed as alternative specifications are generally more noisy. The overall story remains one of imperfect state expansion, increased state-chief conflict, and increased citizen demand for state governance.

8. Conclusion

How can a weak state increase its local authority? This paper provided evidence on this question using a reform in the Democratic Republic of the Congo. We provided a simple model which illustrates how under certain assumptions the entrance of the state can disrupt an existing governance equilibrium, improve public good provision, worsen land allocation, and transfer citizens support from traditional leaders to the state. To test the models implications, we collected a wealth of data on local governance in large agglomerations and towns in rural DRC based on surveys of 532 government agents and 1,072 households across 134 localities.

Our regression discontinuity design exploiting a population threshold in the 2008–2012 reform shows the effect of state expansion in certain localities. The reform was indeed implemented, with localities above the threshold reporting are more likely to be governed by state administrators, have more state personnel, and state public goods provision. As we outline in our theoretical framework the reform increased conflict between state officials and chiefs, notably over property rights. Citizens' demand for governance on the other hand shifted to the state. Households in localities above the threshold are more likely turn to the state to resolve land disputes and less likely to involve the traditional chief. Likewise they are more likely to pay taxes. The reform also shifted authority. Citizens in towns and agglomerations respond differently to messages from authority figures. When playing a public goods game households in agglomerations were significantly more likely to contribute to public goods when they heard an encouragement message from their traditional chief while households in towns responded more to their governor.

The results provide a positive outlook on a fundamental development issue. Herbst (2000) described how due to low population density and resource constraints many African states did not effectively control large parts of their territories. As resource constraints have persisted, expanding the state to the large areas where it currently is not present can appear like an impossible task. Yet, the expansion of the state does not have to be sweeping, nor perfect. Population density is increasing across the continent, and in many cases, population concentrates in rural towns, as it did in the DRC over the last two decades. Our results suggest that states can slowly expand to such areas and reap its benefits in the form of higher revenue and legitimacy, even when such an expansion is flawed.

However, the fact that the reform was imperfectly implmented might have long-term consequences beyond the scope of this paper. We document that ten years afterwards we see no effects on economic development. This raises the question whether eventually the positive impacts on citizens' engagement with the state will disappear and maybe even reverse as citizens become disillusioned with the Congolese state. While we don't find any evidence of this occurring yet, exploring the conditions under which it happen represents a promising avenue for future research.

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State Expansion and Social Responses in the Democratic Republic of the Congo

Soeren J. Henn & Vincent Tanutama

Online Appendix

Appendix A. Qualitative Evidence

A.. On the Imperfect Implementation of the Reform

Ultimately, the implementation of the 2008–2012 reform has been extremely lacking. Qualitative interviews with key stakeholders indicate that Kinshasa's fiscal interest, not constitutional enforcement, determines the operationability of a town.

> "*The problem of Congolese development is that 80% of the country is occupied by the rural population and 20% urban population, but unfortunately 80% of the State budget is consumed in the city where there is only 20% of the population. So to the question of what is the basis of the non-operationalization of the entities newly created by the law on decentralization creating cities and rural towns: if Kinshasa, which is the capital, can find themselves in a state of disrepair, how much more now are the entities? I think that the Congolese State is not capable of making these entities viable. The government has many problems and it is difficult for it at the moment to make these entities operational. This is not his priority at the moment.*"
> **Source**: The Honorable Former Minister of Rural Development, July 12 2022.

> "*With regards to towns, all you have to do is name the administrator for it to be operational.*"
> **Source**: Director of Decentralized Cooperation, in the Ministry of the Interior, Security, Decentralization and Customary Affairs, July 13 2022.

> "*The clearest example [of the central government's interest in making town operational] is Fungurume. Ever since USA and China registered interest to build an enormous copper and cobalt mine there, the central government in Kinshasa quickly scrambled to put it in the regulations and install a state administrator. So they cut it out of the Bayeke Chiefdom.*"
> **Source**: Assistant Director of Office of Democracy, Human Rights, and Governance, USAID, July 7 2022.

B.. On Chiefs Fighting State Expansion

> "*Regarding the collaboration between the state and the decentralized entities such as the chiefdoms or the provinces, for me there are not enough problems but rather the lack of political will. We must work to change mentalities. For the collaborations between the state territories*

and decentralized territorial entities in the area, there are tensions and we have to go there in an educational way to try to attenuate them."
Source: The Honorable Secretary General of the Prime Minister, July 14 2022.

"Before an entity is set up as a town, it requires a favorable opinion from the provincial assembly and to achieve this there is an investigation by the provincial deputies. If the customary chiefs want to act to block or avoid this, it is at the level of their deputies that they can act. And if the customary chiefs are not satisfied, they only have to appeal in due form and the competent authority will examine."
Source: Director of Coordination of Sectoral Decentralization and the Relationship between the Provinces and the Decentralized Territorial Entities, in the Ministry of the Interior, Security, Decentralization and Customary Affairs, July 13 2022.

"Minova is among the villages of the Chiefdom of Buhavu which abounds a lot of wealth and which makes between the money in the chiefdom, certain inhabitants under the influence of the chiefdom did not agree with the creation of the commune under reason that the commune does not have an airport, port, football field, also with the commune there will be multiplication of taxes but the population is still poor.

The chiefdom has introduced a letter at the provincial and central level asking for the cancellation of the creation of the municipality of Minova, they know that if the municipality works they will no longer have the right to land management, taxation and financial management is their request has been answered in favor Minova is removed from the list of municipalities."
Source: Secretary of Minova Township, South Kivu, August 25 2021.

Appendix B. Formal Model

How can we understand the social responses from the introduction of state authority in areas where local authorities have previously provided governance? Our simple theoretical framework builds on the economic theory of clubs, which has been applied to public good provisions in religious organizations (Iannaccone, 1992, Berman and Laitin, 2008), and the textbook firm entry model in industrial organization (Tirole, 1988). We start by considering two groups of actors before state expansion, citizens indexed by $i = 1, \ldots, N$ and the traditional ruler R.

A.. Before State Expansion

Each citizen is their own producer-consumer, who uses individual labor hour L_i and land K_i in order to produce output $Y_i(K_i(e_i), L_i(e_i))$ and consumed at unit price. Both land and labor are functions of effort e_i supplied to the traditional ruler R in order to obtain land at zero cost to the ruler and unit labor cost to each of the citizens.[13] We assume that $K_e > 0$ and $L_e = -1$ because

[13]This assumption parallels the sociology of African traditional rulers who own exclusive property rights over land an derive political power from its allocation (Boone, 2014).

traditional effort increases ruler's willingness to supply land for citizens' utility but reduces own time constraint $T_i = L_i + e_i$. We further assume $K_{ee} > 0$ because citizens are rewarded more land (by the traditional ruler) when contributing more traditional effort e_i. We assume that the traditional ruler guarantees land to all his citizens through supplying equal to or above minimum traditional effort $e_i \geq \underline{e}$ for all i to satisfy minimum livelihood.

Traditional ruler R uses traditional effort e_i from all citizens to produce local public good G. Good G is partially nonrival and excludable, making it a club good, for example schools and hospitals which in our setting were commonly provided by traditional rulers. The production of (club) good G relies on a concave technology denoted by letter R for ruler.

$$G = R(\mathbf{e}) \text{ where } \frac{\partial R}{\partial e_i} > 0 > \frac{\partial^2 R}{\partial e_i^2} \text{ for all } i \tag{A1}$$

Each citizen has an identical linear utility from consumption of output Y and good G.

$$U_i(\mathbf{e}) = U(Y_i,G) = Y_i\big(K_i(e_i), L_i(e_i)\big) + R(\mathbf{e}) \tag{A2}$$

In order to illustrate the argument on the externality that each citizen imposes on the traditional club from public good production, and the efficient taxation by traditional ruler to internalize the excess marginal benefit, we first consider the utility maximization without good G in Equation (A2). Each citizen maximizes utility subject to their time constraint $T_i = L_i + e_i$ and budget constraint, which equates consumption with production income Y_i. Efficient production without consuming good G would then require land acquisition to increase with traditional effort at the marginal rate of transformation between labor L and capital K for each i.

$$\lambda(e_i) \equiv \frac{dY_i}{de_i} = K_e \frac{\partial Y_i}{\partial K_i} + L_e \frac{\partial Y_i}{\partial L_i} = 0 \iff K_e = \frac{\partial Y_i / \partial L_i}{\partial Y_i / \partial K_i} \tag{A3}$$

Production with good G, however, contains externalities from its club production. This is because a citizen can free-ride on another citizen's voluntary traditional effort in producing the local good G. We now consider a utility maximization from also consuming good G as in Equation (A2). Because the voluntary activity generates positive externalities, competitive equilibrium will result in too little traditional effort e_i. Stated differently, the competitive equilibrium choice of production hour at the relative wage rate ignores the last marginal rate of substitution in the optimality condition for the efficient labor supply that a social planner would choose in Equation (A3). That is, under the following condition citizens would prefer less work L_i^* and more traditional effort e_i^*.

$$\begin{aligned} \frac{\partial U_i}{\partial e_i} = \frac{\partial U}{\partial Y_i}\frac{dY_i}{de_i} + \frac{\partial U}{\partial G_i}\frac{dG_i}{de_i} = 0 \\ \underbrace{K_e \frac{\partial Y_i(e_i^*)}{\partial K_i} - \frac{\partial Y_i(e_i^*)}{\partial L_i}}_{<0} + \underbrace{\frac{\partial R(\mathbf{e}^*)}{\partial e_i}}_{>0} = 0 \end{aligned} \tag{A4}$$

The traditional ruler, in order to induce traditional effort $e_i^* > e$ sets a uniform tax rate $\rho(\mathbf{e}^*)$ on production so the reduction in consumption utility compensates for the increase in utility from

good G.[14] This will then induce citizens to work less for own consumption and more for public provision. The level of tax captures the private marginal benefit from club good externalities:

$$\frac{\partial G(\mathbf{e}^*)}{\partial e_i} = \frac{\partial R(\mathbf{e}^*)}{\partial e_i} = \rho(\mathbf{e}^*)\lambda(e_i^*) \iff \rho(\mathbf{e}^*) = \frac{\partial R(\mathbf{e}^*)}{\partial e_i}\lambda(e_i^*)^{-1} \tag{A5}$$

$$\frac{\partial \rho(\mathbf{e}^*)}{\partial e_i} = \underbrace{\lambda(e_i^*)^{-2}}_{>0}\left[\underbrace{R''(\mathbf{e}^*)}_{<0 \text{ Eq(A1)}}\underbrace{\lambda(e_i^*)}_{<0 \text{ Eq(A4)}} - \underbrace{R'(\mathbf{e}^*)}_{>0 \text{ Eq(A1)}}\underbrace{\frac{d\lambda(e_i^*)}{\partial e_i}}_{>0(K_{ee}>0)}\right] \tag{A6}$$

As shown in Equation A6, the tax rate increases with traditional effort as long as $R''\lambda^{-1} > R'K_{ee}^{-1}$. Tax rate should respond the more aggressive is the transfer of land ownership from ruler to citizen. We regard the tax rate on effort as the inverse (labor) demand function of the traditional ruler. Its demand function expresses citizens' demand for the traditional ruler, which increases under the implicit function theorem applied to Equation (A5).

The profit function of the traditional ruler derives from his tax revenue and the utility from club good G, minus the constant marginal effort cost of organizing N citizens to provide the club good G, subject to the total land in the economy $\sum_i^N K_i = \overline{K}$. His efficient land allocation is such that the ratio of marginal utilities from traditional effort between any two citizens after tax equals the ratio of marginal utilities from the transfer of land ownership as a reward for traditional effort.

$$V^R(\rho,\mathbf{e}^*) = N\rho(\mathbf{e}^*)y(e_i^*) + R(\mathbf{e}^*) - cN \tag{A7}$$

$$\frac{\partial V^R(\rho,\mathbf{e}^*)/\partial e_i}{\partial V^R(\rho,\mathbf{e}^*)/\partial e_j} = \frac{\partial K_i(e_i^*)/\partial e_i}{\partial K_j(e_j^*)/\partial e_j} \text{ for all } i \neq j \tag{A8}$$

B.. State Expansion

We are now ready to consider the effects of introduction of another authority, the state S, on the (labor) demands for the state and the chief, as well as on overall provision of public goods, land allocation, and development.

Local public good G is now a function of the production technologies of ruler R and state S which convert citizens effort supplied to each of them, denoted $\mathbf{e}^R$ for effort to ruler R and $\mathbf{e}^S$ for effort to state S. State S converts citizens effort better than ruler R does, reflecting the comparative advantage the state has in providing public goods, for example due to its organization and scale.

$$G = R(\mathbf{e}^R) + S(\mathbf{e}^S) \text{ where } S' > R' > 0 > R'' > S'' \text{ for all } i \tag{A9}$$

Conversely, ruler R has comparative advantage in land conversion, due to traditional social authority. This means $K'(e_i^R) > K'(e_i^S) > 0$ and $K''(e_i^S) > K''(e_i^R) > 0$ for any $e_i^R = e_i^S$.

[14] Traditional rulers, as in the literature of sacrificial religious organizations, can encourage $\mathbf{e}^*$ through political means such as feelings of social duty or social punishments in the case of reneging public good provision. As $\mathbf{e}^*$ may be hard to subsidize as N becomes larger, as well as to preserve symmetry with the taxation from state when it expanded into society, we only consider the role of tax here, effectively controlling the price level faced by citizens.

The utility for each citizen i and the profits for the traditional ruler R and state S are:

$$U_i(\rho,\sigma,\mathbf{e}^R,\mathbf{e}^S) = (1-\rho-\sigma)Y_i(e_i^R,e_i^S) + R(\mathbf{e}^R) + S(\mathbf{e}^S) \tag{A10}$$

$$V^R(\rho,\mathbf{e}^R,\mathbf{e}^S) = \rho N Y_i(e_i^R,e_i^S) + R(\mathbf{e}^R) + S(\mathbf{e}^S) - cN \tag{A11}$$

$$V^S(\sigma,\mathbf{e}^R,\mathbf{e}^S) = \sigma N Y_i(e_i^R,e_i^S) + R(\mathbf{e}^R) + S(\mathbf{e}^S) - cN \tag{A12}$$

In competitive equilibrium, each citizen maximizes their utility subject to time constraint $T_i = L_i + e_i^R + e_i^S$ and budget constraint from equating production and consumption. Because ruler and state efforts enter into equilibrium taxes, the first order conditions of citizens' maximization problem include their marginal returns from production, the tax distortion on club effort, and the externalities from club production, either through traditional ruler or the state.

Proposition 1 *Either state expansion increases demand for the state and reduces the demand for traditional ruler, such that effort $e_i^{S^*} \gg e_i^{R^*}$ for all i and $de_i^{S^*}/d\sigma > 0$ and $de_i^{R^*}/d\rho > 0$, or state expansion decreases demand for the state and increases the demand for traditional ruler, such that effort $e_i^{S^*} \ll e_i^{R^*}$ for all i and $de_i^{R^*}/d\rho > 0$ and $de_i^{S^*}/d\sigma < 0$.*

Proof See Mathematical Appendix C. The demand responses to Ruler's ρ and State's σ are

$$\frac{de_i^{R*}}{d\rho} = \frac{Y\left[R' - S' + \rho\lambda(e_i^{R*}) - \rho\lambda(e_i^{S*})\right]}{\left[R' + \rho\lambda(e_i^{R*})\right]\left[R' + \lambda(e_i^{R*})[1-\rho-\sigma] + Y\right]} \lesseqgtr 0 \text{ iff } e_i^{S*} \gtreqless e_i^{R*} \tag{A13}$$

$$\frac{de_i^{R*}}{d\sigma} = \frac{Y\left[R' - S' + \sigma\lambda(e_i^{R*}) - \sigma\lambda(e_i^{S*})\right]}{\left[R' + \sigma\lambda(e_i^{R*})\right]\left[S' + \lambda(e_i^{S*})[1-\rho-\sigma] + Y\right]} \lesseqgtr 0 \text{ iff } e_i^{S*} \gtreqless e_i^{R*} \tag{A14}$$

$$\frac{de_i^{S*}}{d\rho} = \frac{-Y\left[R' - S' + \rho\lambda(e_i^{R*}) - \rho\lambda(e_i^{S*})\right]}{\left[S' + \rho\lambda(e_i^{S*})\right]\left[R' + \lambda(e_i^{R*})[1-\rho-\sigma] + Y\right]} \gtreqless 0 \text{ iff } e_i^{S*} \gtreqless e_i^{R*} \tag{A15}$$

$$\frac{de_i^{S*}}{d\sigma} = \frac{-Y\left[R' - S' + \sigma\lambda(e_i^{R*}) - \sigma\lambda(e_i^{S*})\right]}{\left[S' + \sigma\lambda(e_i^{S*})\right]\left[S' + \lambda(e_i^{S*})[1-\rho-\sigma] + Y\right]} \gtreqless 0 \text{ iff } e_i^{S*} \gtreqless e_i^{R*} \tag{A16}$$

□

Proposition 1 results from differential comparative advantages of the traditional ruler and the state. If the state were to provide public goods (land allocation) at the same level of chiefs, there would be a utility gain (loss) that each of the ruler will attempt to tax. To take into account of this strategic interaction, we express the profit functions of state and traditional ruler as a function of investment by ruler (traditional effort e_i^R). As is standard in the entry model, finding the strategic response of the profit function decomposes it into the direct effect, indirect effect, and the second-order optimum response on own investment (due to envelope theorem):

$$\frac{dV^S(\mathbf{e}^{R*},\rho(\mathbf{e}^{R*}),\sigma(\mathbf{e}^{R*}))}{de_i^R} = \frac{\partial V^S}{\partial e_i^R} + \frac{\partial V^S}{\partial \rho}\frac{d\rho(e_i^{R*})}{de_i^R} \tag{A17}$$

$$\frac{dV^R(\mathbf{e}^{R*},\rho(\mathbf{e}^{R*}),\sigma(\mathbf{e}^{R*}))}{de_i^R} = \underbrace{\frac{\partial V^R}{\partial e_i^R}}_{\text{Direct}} + \underbrace{\frac{\partial V^R}{\partial \sigma}\frac{d\sigma(e_i^{R*})}{de_i^R}}_{\text{Indirect}} \tag{A18}$$

Using the closed form expressions from Demand Equations (A21)-(A24), we express the above profit responses of Equations (A17) and (A18) in terms of each other:

$$\frac{dV^R}{de_i^R} = \frac{\rho}{\sigma}\frac{dV^S}{de_i^R} + K\left(\frac{d\sigma}{d\rho}\right) \tag{A19}$$

where traditional ruler R's marginal utility increases linearly with state S's marginal utility at a linear rate determined by the equilibrium tax ratio ρ/σ. The intercept K is a function of the equilibrium tax response $d\sigma/d\rho$ as well as the traditional ruler's demand response and direct marginal utilities.

$$K\left(\frac{d\sigma}{d\rho}\right) = R'\left[1-\frac{\rho}{\sigma}\right] \pm \left|\frac{d\rho}{de^R}\right|\left[\frac{\partial V^S}{\partial \rho}\frac{\rho}{\sigma} \mp \frac{\partial V^R}{\partial \sigma}\frac{d\sigma^*}{d\rho} - Y\right] \text{ iff } e_i^{S*} \gtrless e_i^{R*}$$

The strategic relationship on is depicted on Figure A1. Blue lines correspond to points along realizations of Equation (A19) in which traditional effort increases profits of both traditional ruler R and state S. Red in which both profits decrease with traditional effort, green in which only traditional ruler, and yellow in which only the state. Ruler R wants to push the curve upward to obtain the shaded region below the green line where an increase in traditional effort increases his profit but decreases the profit of state S. Conversely, State S wants to push the curve downward to obtain the dotted region above the yellow line where an increase in traditional effort increases his profit but decreases the profit of ruler R. Equilibrium is achieved where the line intersects the zero y-axis or $K = 0$. This is:

$$\frac{d\sigma^*}{d\rho} = \frac{R'(1-\frac{\rho^*}{\sigma^*})}{\left|\frac{d\rho^*}{de^R}\right|\frac{\partial V^{R*}}{\partial \sigma}} \pm \frac{\frac{\partial V^{S*}}{\partial \rho}\frac{\rho^*}{\sigma^*} - Y}{\frac{\partial V^{R*}}{\partial \sigma}} \text{ iff } e_i^{S*} \gtrless e_i^{R*} \tag{A20}$$

the optimal rate of taxation (reaction curve) which eliminates the margin by which ruler R and state R can benefit from traditional effort e_i. Equation (A20) can be negative (positive) under each direction of effort's relative size, implying strategic substitutability (complementarity).

Appendix C. Mathematical Appendix

Proposition 1

Proof The first order conditions of Equation A10 are

$$\frac{\partial U_i}{\partial e_i^R} = \left[1-\rho-\sigma\right]\left[\frac{\partial Y_i}{\partial K_i}\frac{dK_i(e_i^{R*})}{de_i^R} - \frac{\partial Y_i}{\partial L_i}\right] + Y_i\left[1-\frac{\partial \rho}{\partial e_i^R} - \frac{\partial \sigma}{\partial e_i^R}\right] + \frac{\partial R(\mathbf{e}^{R*})}{\partial e_i^R}$$
$$\frac{\partial U_i}{\partial e_i^S} = \left[1-\rho-\sigma\right]\left[\frac{\partial Y_i}{\partial K_i}\frac{dK_i(e_i^{S*})}{de_i^S} - \frac{\partial Y_i}{\partial L_i}\right] + Y_i\left[1-\frac{\partial \rho}{\partial e_i^S} - \frac{\partial \sigma}{\partial e_i^S}\right] + \frac{\partial S(\mathbf{e}^{S*})}{\partial e_i^S}$$

Setting them to 0 and noting that $S' > R' > 0$ for all e_i and $K'(e_i^R) > K'(e_i^S) > 0$ for any $e_i^R = e_i^S$

$$\left[1-\rho-\sigma\right]\left[\frac{\partial Y_i}{\partial K_i}\frac{dK_i(e_i^{S*})}{de_i^S} - \frac{\partial Y_i}{\partial K_i}\frac{dK_i(e_i^{R*})}{de_i^R}\right] = S'(e_i^{S*}) - R'(e_i^{R*}) > 0$$
$$\text{If } S'(e_i^{S*}) - R'(e_i^{R*}) > 0 \implies \lambda(e_i^{S*}) - \lambda(e_i^{R*}) > 0 \implies e_i^{S^*} \gg e_i^{R^*}$$
$$\text{If } S'(e_i^{S*}) - R'(e_i^{R*}) < 0 \implies \lambda(e_i^{S*}) - \lambda(e_i^{R*}) < 0 \implies e_i^{S^*} \ll e_i^{R^*}$$

To set the tax rate and determine the sign of the demand functions, we further set the first order conditions of Equations (A11) and (A12) on each i's traditional and state efforts e_i^R and e_i^S to 0. We obtain the demand and cross-demand functions which depend on the marginal benefits from club goods and individual production, as well as the tax rates. Depending on $e_i^{S^*} \gtrless e_i^{R^*}$

$$\frac{de_i^{R*}}{d\rho} = \frac{Y\left[R' - S' + \rho\lambda(e_i^{R*}) - \rho\lambda(e_i^{S*})\right]}{\left[R' + \rho\lambda(e_i^{R*})\right]\left[R' + \lambda(e_i^{R*})[1-\rho-\sigma] + Y\right]} \lessgtr 0 \tag{A21}$$

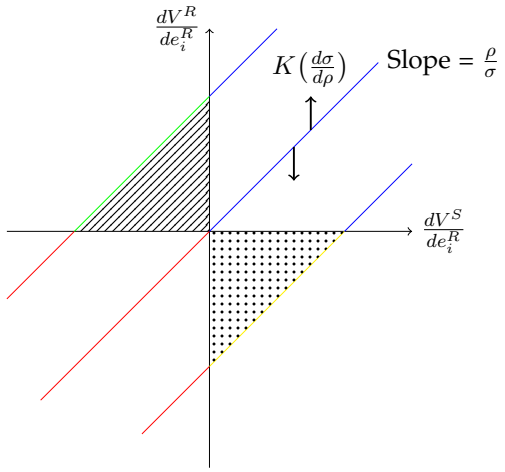
$$\frac{de_i^{R*}}{d\sigma} = \frac{Y\left[R' - S' + \sigma\lambda(e_i^{R*}) - \sigma\lambda(e_i^{S*})\right]}{\left[R' + \sigma\lambda(e_i^{R*})\right]\left[S' + \lambda(e_i^{S*})[1-\rho-\sigma] + Y\right]} \lessgtr 0 \tag{A22}$$

$$\frac{de_i^{S*}}{d\rho} = \frac{-Y\left[R' - S' + \rho\lambda(e_i^{R*}) - \rho\lambda(e_i^{S*})\right]}{\left[S' + \rho\lambda(e_i^{S*})\right]\left[R' + \lambda(e_i^{R*})[1-\rho-\sigma] + Y\right]} \gtrless 0 \tag{A23}$$

$$\frac{de_i^{S*}}{d\sigma} = \frac{-Y\left[R' - S' + \sigma\lambda(e_i^{R*}) - \sigma\lambda(e_i^{S*})\right]}{\left[S' + \sigma\lambda(e_i^{S*})\right]\left[S' + \lambda(e_i^{S*})[1-\rho-\sigma] + Y\right]} \gtrless 0 \tag{A24}$$

The consumption marginal benefit can further be expressed in terms of the marginal benefit from club good and tax rates, $\lambda(e_i^{R*}) = (R' + Y)/(1-\rho-\sigma)$, $\lambda(e_i^{S*}) = (S' + Y)/(1-\rho-\sigma)$. □

Figure A1: Stategic responses of ruler R and state S



Appendix D. Variable Construction

A.. State Expansion Variables

- **State mayor exist:** Whether there is a state mayor in the locality. *(Locality survey)*
- **Number of administrative personnel:** Number of administrative personnel in the locality. *(Locality survey)*
- **Number of security personnel:** Number of security personnel in the locality. *(Locality survey)*

- **Election of the mayor:** Whether the locality head was elected. *(Locality survey)*
- **Key Personnel appointment by the State:** Whether a leader was appointed by a state authority. *(Leader survey)*
- **Key Personnel appointment by the Chief:** Whether a leader was appointed by a traditional authority. *(Leader survey)*
- **Secretariat (Administrative):** Whether the locality has a building that houses the secretariat. *(Locality survey)*
- **Tax office (Fiscal):** Whether the locality has a building that houses the tax office. *(Locality survey)*
- **Public works (Fiscal):** Whether the locality has a building that houses the public works department. *(Locality survey)*
- **State court (Legal):** Whether the locality has a building that houses the state court. *(Locality survey)*
- **Military post (security):** Whether the locality has a building that acts as military post. *(Locality survey)*
- **Police station (Security):** Whether the locality has a building that acts as police station. *(Locality survey)*
- **Tax Collection effort on industries:** Dummy if there are taxed industries in the locality. *(Locality survey)*
- **Log total tax collection:** Total tax collection from all taxes industries in the locality, in log USD. *(Locality survey)*
- **Number of taxable industries:** Number of industries from which the locality received tax payments. *(Locality survey)*
- **Organizational chart exists:** Whether the locality leaders were able to show our researchers an organizational chart. *(Locality survey)*
- **Finance document exists:** Whether the locality leaders were able to show our researchers financial documentation. *(Locality survey)*
- **Inter governmental transfer:** Whether the locality has received money from central or provincial in 2021, 2018 or 2015. *(Locality survey)*

B.. State-Chief Relations Variables

- **Number of areas of cooperation:** Number of areas listed by leader in which chiefs and state officials cooperate. *(Leader survey)*
- **Number of areas of conflict:** Number of areas listed by leader in which chiefs and state officials are in conflict. *(Leader survey)*
- **Conflict on property rights:** Whether the leader lists property rights as an area in which chiefs and state officials are in conflict. *(Leader survey)*
- **Conflict on public goods:** Whether the leader lists public goods provision as an area in which chiefs and state officials are in conflict. *(Leader survey)*
- **Citizen perception of conflict:** Whether the respondent thinks the relationship between the state and chiefs is one of cooperation. *(Household survey)*

C.. Demand for Governance Variables

- **Land dispute resolution by the State:** Whether the respondent has gone to (or would go to) state officials in case of a land dispute. *(Household survey)*
- **Land dispute resolution by the Chief:** Whether the respondent has gone to (or would go to) a traditional leader in case of a land dispute. *(Household survey)*
- **Formal tax incidence:** Whether the respondent has paid taxes in the past month. *(Household survey)*
- **Informal tax incidence:** Whether the respondent participates in communal work, *Salongo*. *(Household survey)*
- **Bribe incidence to the State:** Whether the respondent has paid a bribe to a state official in the past month. *(Household survey)*
- **Bribe incidence to the Chief:** Whether the respondent has paid a bribe to a traditional leader in the past month. *(Household survey)*

D.. Public Goods Provision and Development

- **Public goods (State):** Whether there was public goods provision by the state in the locality in years 2006, 2009, 2012, 2015, 2018, or 2021. *(Locality survey)*
- **Public Goods (Chief):** Whether there was public goods provision by the traditional leaders in the locality in years 2006, 2009, 2012, 2015, 2018, or 2021. *(Locality survey)*
- **Population:** Yearly population in the locality from 2017 to 2021. *(Locality survey)*

- **Household land ownership:** Whether the household owns the land it uses. *(Household survey)*
- **Nighttime lights intensity:** Annual VIIRS Nighttime lights intensity from 2017 to 2021. *Source: Elvidge et al (2017)*
- **Household asset and livestock:** Simple average of (1) number of crops household grows, scaled to 0-100, (2) number of livestocks household owns, scaled to 0-100, and (3) average of household characteristics from roof materials (3 bins), building materials (3 bins), electricity (2 bins), toilet (3 bins), water for drinking (2 bins), and water for washing (2 bins), scaled to 0-100. *(Household survey)*

E.. Citizens Perception of State and Chief Effectiveness Variables

- **Satisfaction with top 3 public goods provison:** Whether the respondent is satisfied with the public goods provision in their three priority areas. *(Household survey)*
- **Perceived management talent of the Governor:** How the respondent rates the management talent of the governor, from 0, 10, 20, to 100. *(Household survey)*
- **State should govern locality:** Whether the respondent believes the state should govern this locality. *(Household survey)*
- **Satisfaction with top locality leader:** Whether the respondent is satisfied with the work done by the locality head. *(Household survey)*
- **Satisfaction with land allocation:** Whether the respondent is satisfied with the land allocation in the locality. *(Household survey)*
- **Perceived management talent of the Chief:** How the respondent rates the management talent of the chief, from 0, 10, 20, to 100. *(Household survey)*
- **Chief strengthens democracy:** Whether the respondent agrees that the chief strengthens democracy. *(Household survey)*
- **Satisfaction with hamlet leader:** Whether the respondent is satisfied with the work down by the hamlet leader, *nyumbakumi*. *(Household survey)*

F.. Control Variables

- **Population Density**: The population density in grid cell in 1880, measured in inhabitants per square kilometer. *Source: Goldewijk, Beusen and Janssen (2010)*
- **Distance to Railway**: The distance of a locality from the nearest railroad built before 1960, measured in kilometers. *Source: Jedwab and Moradi (2015)*

- **Distance to Provincial Capital**: The distance of a locality from the provincial city, measured in kilometers. *Source: OpenStreetMap*
- **Distance to the National Border**: The distance of a locality from the national border, measured in kilometers. *Source: Digital Chart of the World*
- **Distance to Kinshasa**: The distance of a locality from Kinshasa, the capital city, measured in kilometers. *Source: OpenStreetMap*
- **Distance to the Coast**: The distance of a locality from the nearest coastline, measured in kilometers. *Source: Digital Chart of the World*
- **Distance to Historical Cities**: The distance of a locality from the nearest historical city, measured in kilometers. *Source: Chandler (1987)*
- **Cash Crop**: The fraction of each grid cell that is suitable to be used for one of the main historical cash crops: cocoa, coffee, cotton, groundnut, palmoil, sugarcane, tea or tobacco. It is based on the temperature and soil conditions of each grid cell. *Source: Atlas of the Biosphere*
- **Alternative Cash Crop**: The fraction of each grid cell that is suitable to be used for a non-historical cash crops: jatropha and rapseed. It is based on the temperature and soil conditions of each grid cell. *Source: Atlas of the Biosphere*
- **Distance to Catholic and Protestant mission stations**: The distance of a locality from the nearest Catholic or Protestant mission station, measured in kilometers *Source: Nunn (2010)*
- **Agriculture**: The fraction of each grid cell that is suitable to be used for agriculture. It is based on the temperature and soil conditions of each grid cell. *Source: Atlas of the Biosphere*
- **Malaria Ecology Index:**: The index takes into account the prevalence and type of mosquitoes indigenous to a region, their human biting rate, their daily survival rate, and their incubation period. The index has been constructed for 0.5 degree by 0.5 degree grid-cells. *Source: Kiszewski et al. (2004)*
- **Ruggedness**: Averaging the Terrain Ruggedness Index of 30 by 30 arc-second cell. It is measured by dividing the millimeters of elevation difference by the area of the 30 by 30 arc-second cell. *Source: Nunn and Puga (2012)*
- **Elevation**: Average value of elevation for grid cells of 30 Arc-Seconds (equivalent to 250 meters), measured in meters above sea level. *Source: SRTM version 4.1 (NASA)*
- **Latitude**: A locality's latitude, measured in degrees. *Source: Authors' data collection*
- **Longitude**: A locality's longitude, measured in degrees. *Source: Authors' data collection*

Appendix E. Using Behavioral Games to Measure Legitimacy

The use of public goods games to assess the legitimacy of authority leaders is rooted in the concept of legitimacy and common practice in political science. Legitimacy is a fundamental aspect of politics and development that refers to citizens' belief in and justification of the rightfulness of rule (Tyler, 2006, Levi, Sacks, and Tyler, 2009). Despite its significance, measuring legitimacy is challenging because it is that which makes citizens obey an authority. It involves both *subjective beliefs in* and *the justification of* the rightfulness of rule. Legitimacy, defined descriptively, is the subjective belief about political authority and obligations. Weber (1964) stresses the importance of legitimacy, because belief in some social configuration produces social regularities more stable than those resulted from self-interest or from mere rule following. Legitimacy, defined normatively, is the justification of political authority. Since legitimacy legitimizes authority, Buchanan (2002) argues that the justification process must appeal to a moralized epistemology. Raz (1985) argues that justifying legitimacy needs two theses: (1) political authority must enable subjects to better comply with the reasons that apply to them if they accept the authority's rule as authoritatively binding, rather than by trying to follow the reasons which apply to them directly ("normal justification thesis"), that is, an authority generates a duty to be obeyed, (2) rule should be based on reasons which already independently apply to and are relevant to the subjects when followed ("dependence thesis"). Purely descriptive or normative legitimacy is criticized for its limitation to the requirement of the other. Recent developments of lab experiments in political science have attempted to measure legitimacy through behavioral games that allow participants to act as authorities and make decisions with randomized payoffs and costs of compliance (Dickson, Gordon, and Huber, 2015, 2022). Because we want to measure the legitimacy of *real* authority figures, we improve upon Blair (2018)'s conceptualization of public good games with randomized, real authority voices. Our treatment is similar to Grieco (2023)'s intervention in Ghana where he shows subjects videos of traditional leaders encouraging compliance with property tax collection. In summary, public goods game is an imperfect tool to capture the moral residuals of legitimacy but still captures the total effects on demand for authority.

Appendix F. Additional Econometric Specifications

A.. Fuzzy RDD Specification

Since a locality's imputed population in 2008 does not strictly determine town designation we will also consider a fuzzy regression discontinuity design. We begin by estimating the following first stage specification:

$$D_l = \alpha_1 Population_l^{2008} + \alpha_2 Threshold_l + \alpha_3 Threshold_l \times Population_l^{2008} + \chi_l + \Psi_l + \epsilon_l; \quad \text{(A25)}$$

where the outcome, D_l, is for binary indicator whether locality l was designated as a town; $Population_l$ is the locality's imputed population in 2008; $Threshold_l$ is a binary indicator whether the locality had a population above 20,000 in 2008; χ_l is a vector of historical and geographic covariates; and Ψ_l are territory (*territoire*) fixed effects. We will use the estimates from equation A25 to obtain predicted values for town designation, $\hat{D}_l$, and use them in the following second stage specification:

$$Y_{i,l} = \beta_1 Population_l^{2008} + \beta_2 \hat{D}_l + \beta_3 Threshold_l \times Population_l^{2008} + \chi_{i,l} + \Psi_l + \epsilon_l; \quad \text{(A26)}$$

where $Y_{i,l}$ is the outcome for household i in locality l. The coefficient of interest is β_2 and identifies the causal jump of the outcome at the population threshold.

B.. Additional Public Goods Game Specifications

In addition to showing results separately for towns and agglomerations, to analyze the results of our public goods game we also run a specification where we interact the treatment indicators in Equation 3 with town status using the following specification:

$$\begin{aligned} Y_{j,l} = {} & \beta_1 Governor_j + \beta_2 Mwami_j + \beta_3 Locality_j \\ & + \beta_4 Governor_j \times Town_l + \beta_5 Mwami_j \times Town_l + \beta_6 Locality_j \times Town_l + X'_{j,l}\Gamma + \Psi_l + \epsilon_l; \end{aligned} \quad \text{(A27)}$$

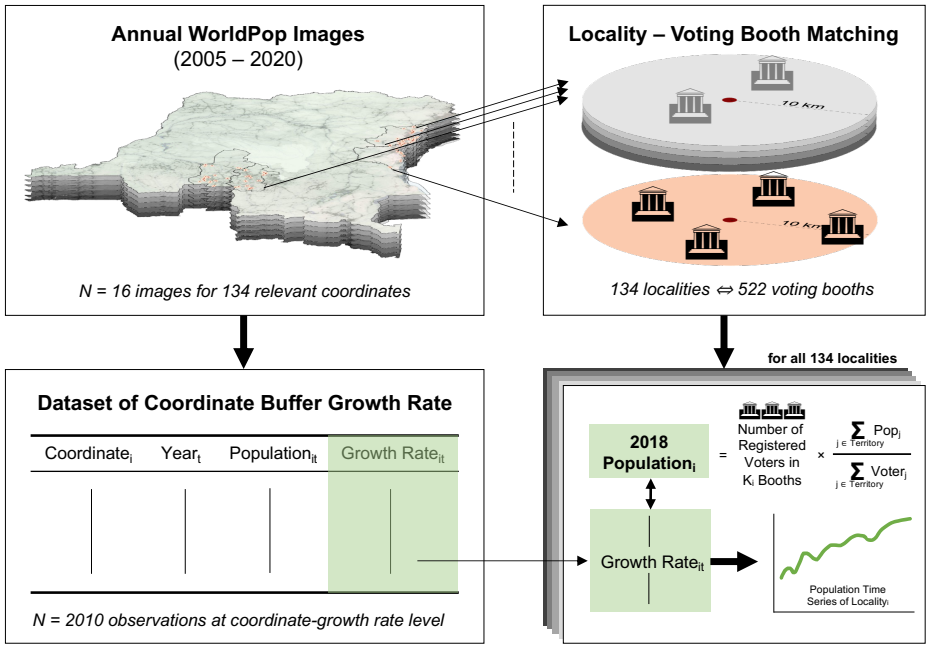
where $Town_l$ is an indicator whether the locality was assigned town status in the 2008–2012 reform.

We also run the following specification where we interact the regression discontinuity design of Equation 2 with the behavioral treatment indicators:

$$\begin{aligned} Y_{j,l} = {} & \gamma_1 Population_l^{2008} + \gamma_2 Threshold_l + \gamma_3 Threshold_l \times Population_l^{2008} \\ & + \gamma_4 Population_l^{2008} \times Governor_j + \gamma_5 Threshold_l \times Governor_j \\ & + \gamma_6 Threshold_l \times Population_l^{2008} \times Governor_j + \gamma_7 Population_l^{2008} \times Mwami_j \\ & + \gamma_8 Threshold_l \times Mwami_j + \gamma_9 Threshold_l \times Population_l^{2008} \times Mwami_j \\ & + \gamma_{10} Population_l^{2008} \times Locality_j + \gamma_{11} Threshold_l \times Locality_j \\ & + \gamma_{12} Threshold_l \times Population_l^{2008} \times Locality_j + X'_{j,l}\Gamma + \Psi_l + \epsilon_l; \end{aligned} \quad \text{(A28)}$$

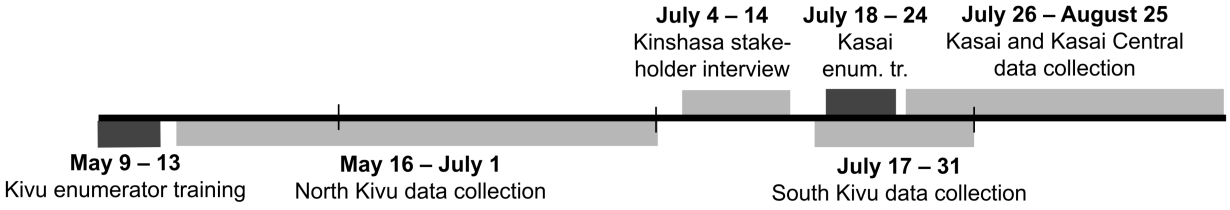
Appendix G. Appendix Figures

Figure A2: Diagram of Population Estimation



Notes: This figure visualizes the process used to estimate each locality's population as described in Section B.

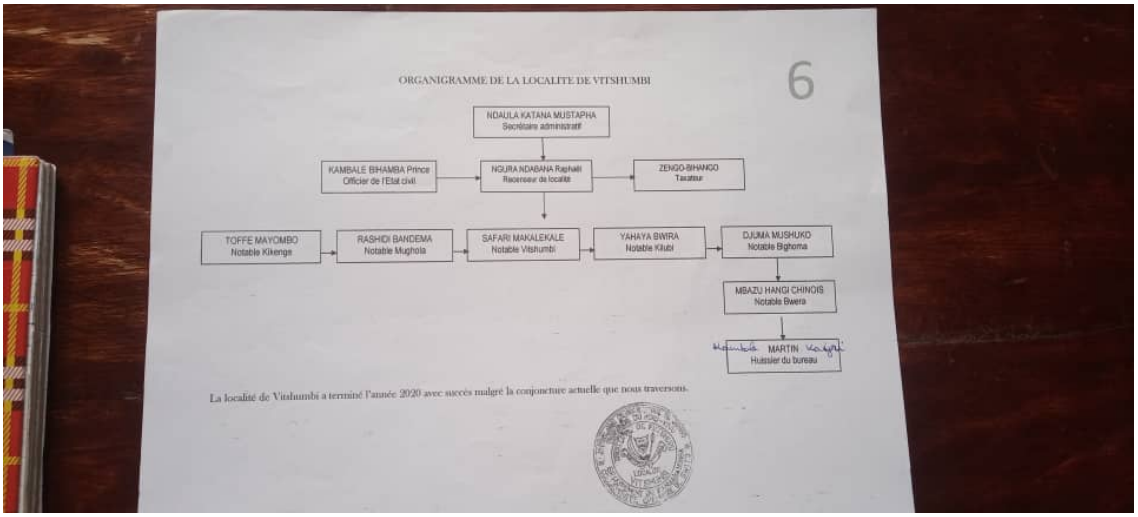
Figure A3: Data collection timeline



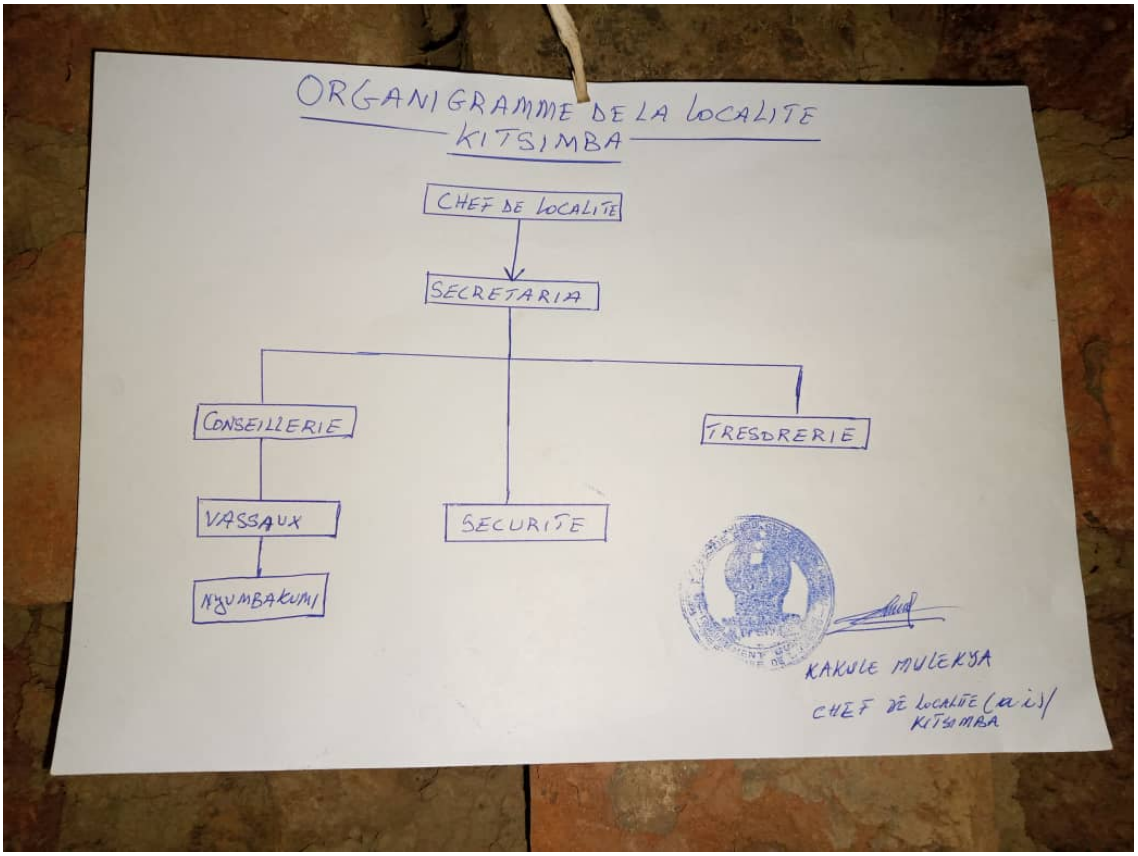
Notes: This figure shows data collection timeline in 2022. Bars below the arrow of time indicate researcher training and data collection for North and South Kivu provinces. Bars above the arrow of time indicate qualitative interviews with stakeholders in Kinshasa, and researcher training and data collection for Kasaï and Kasaï Central provinces.

Figure A4: Sample organizational chart

(a) Printed

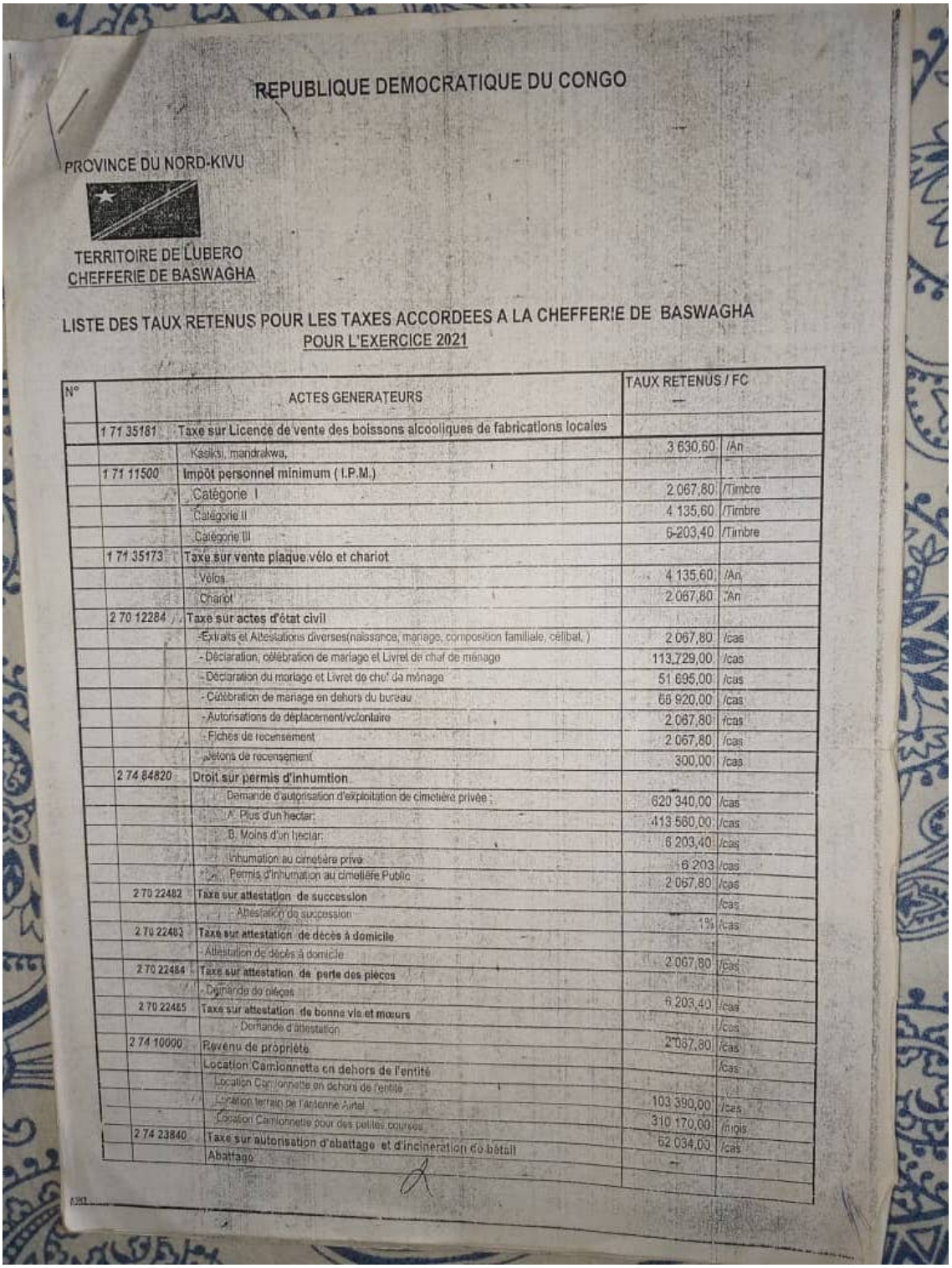


(b) Hand-drawn



Notes: This figure shows two samples of organizational chart of (a) the town administration of Vitshumbi, Rutshuru Territory and (b) the agglomeration administration of Kitsimba, Lubero Territory, both in the North Kivu Province.

Figure A5: Tax code



REPUBLIQUE DEMOCRATIQUE DU CONGO

PROVINCE DU NORD-KIVU

TERRITOIRE DE LUBERO
CHEFFERIE DE BASWAGHA

LISTE DES TAUX RETENUS POUR LES TAXES ACCORDEES A LA CHEFFERIE DE BASWAGHA
POUR L'EXERCICE 2021

N°		ACTES GENERATEURS	TAUX RETENUS / FC	
	1 71 35181	Taxe sur Licence de vente des boissons alcooliques de fabrications locales		
		Kasiksi, mandrakwa,	3 630,60	/An
	1 71 11500	Impôt personnel minimum (I.P.M.)		
		Catégorie I	2 067,80	/Timbre
		Catégorie II	4 135,60	/Timbre
		Catégorie III	6-203,40	/Timbre
	1 71 35173	Taxe sur vente plaque vélo et chariot		
		Vélos	4 135,60	/An
		Chariot	2 067,80	/An
	2 70 12284	Taxe sur actes d'état civil		
		-Extraits et Attestations diverses(naissance, mariage, composition familiale, célibat,)	2 067,80	/cas
		- Déclaration, célébration de mariage et Livret de chef de ménage	113,729,00	/cas
		- Déclaration du mariage et Livret de chef de ménage	51 695,00	/cas
		- Célébration de mariage en dehors du bureau	66 920,00	/cas
		- Autorisations de déplacement/volontaire	2 067,80	/cas
		- Fiches de recensement	2 067,80	/cas
		-Jetons de recensement	300,00	/cas
	2 74 84820	Droit sur permis d'inhumtion		
		Demande d'autorisation d'exploitation de cimetière privée :	620 340,00	/cas
		A. Plus d'un hectar:	413 560,00	/cas
		B. Moins d'un hectar:	6 203,40	/cas
		Inhumation au cimetière privé	6 203	/cas
		Permis d'inhumation au cimetière Public	2 067,80	/cas
	2 70 22482	Taxe sur attestation de succession		/cas
		Attestation de succession	1%	/cas
	2 70 22483	Taxe sur attestation de décès à domicile		
		Attestation de décès à domicile	2 067,80	/cas
	2 70 22484	Taxe sur attestation de perte des pièces		
		Demande de pièces	6 203,40	/cas
	2 70 22485	Taxe sur attestation de bonne vie et mœurs		/cas
		Demande d'attestation	2 067,80	/cas
	2 74 10000	Revenu de propriété		/cas
		Location Camionnette en dehors de l'entité		
		Location Camionnette en dehors de l'entité	103 390,00	/cas
		Location terrain de l'antenne Airtel	310 170,00	/mois
	2 74 23840	Taxe sur autorisation d'abattage et d'incineration de bétail	62 034,00	/cas
		Abattage		

Notes: This figure shows the first page of the tax code from 2021 which circulates in all agglomerations and towns to show which non-agricultural activities are included in the fiscal mobilization efforts of the government. The unit and tax amount are formally indicated.

Figure A6: Template audio transcription

Mesdames et messieurs, chers compatriotes,

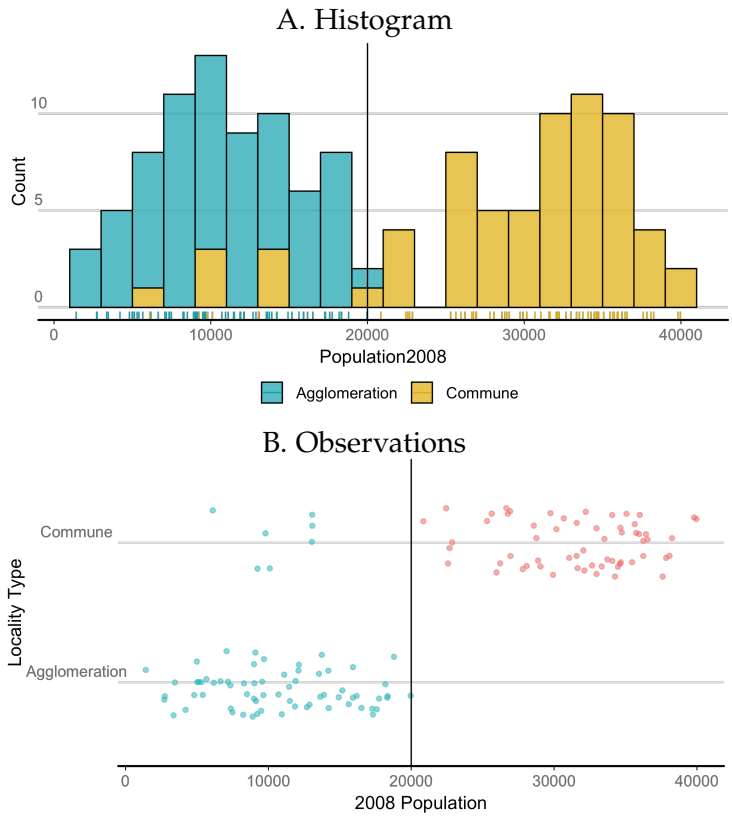
Moi c'est [nom]. Je suis [position] en charge de [responsabilité] dans la [province/localité]. Je vous appelle et vous sensibilise aujourd'hui en vous tous à participer à la création de fonds publique et de caisse du trésor publique, par le paiement de taxes et de la contribution que chacun peut faire pourque l'État puisse avoir le moyen de continuer à développer notre [province/localité] en particulier, et la République Démocratique du Congo en général. Donc les représentatifs qui passent, il faut les accueillir et essayer de participer pour que nous-même nous soyons les garants de développement de notre pays et de notre [province/localité].

Ladies and gentlemen, dear compatriots,

My name is [name]. I am [position] in charge of [responsibility] in the [province/locality]. I call and urge you today to participate in the creation of public funds and the public treasury, through the payment of taxes and the contribution that each one can make so that the State have the means to continue to develop our [province/locality] in particular, and the Democratic Republic of Congo in general. Therefore, we must welcome the representatives who pass by and try to participate in this contribution so that we ourselves are the guarantors of the development of our country and our [province/locality].

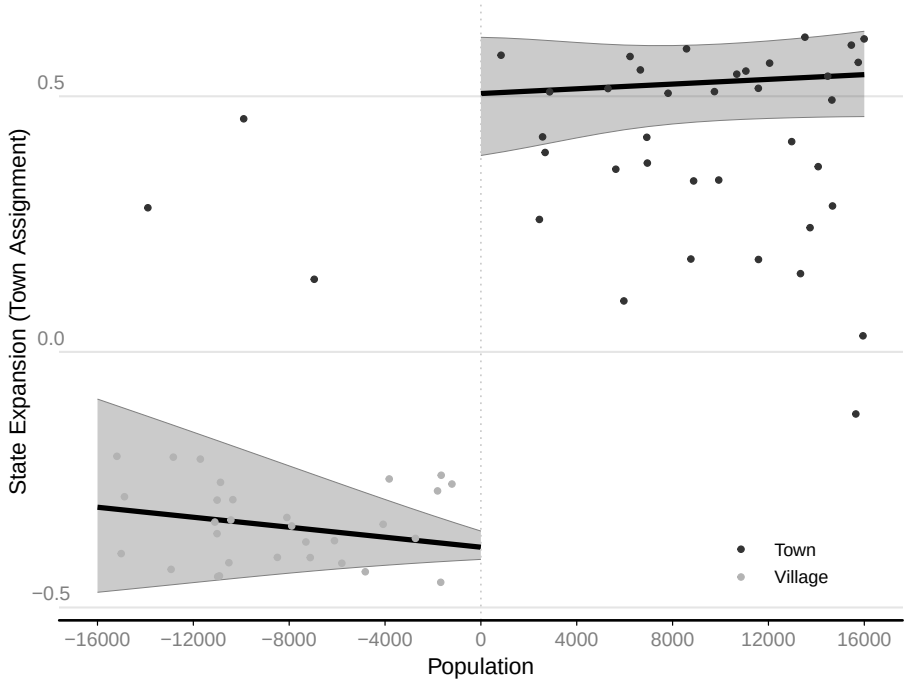
Notes: This figure shows the transcription of the template audio message read by authority figures to encourage citizens to contribute in the public goods game. Messages are obtained from each governor and each locality leader such that household members will receive messages from the relevant authority figures in their localities. The template was given in French and would be read aloud in relevant local languages (Swahili in the Kivus and Tshiluba in the Kasaï, although even more local languages in localities with a large presence of that ethno-linguistic majority were also used.)

Figure A7: Population of agglomerations and Towns



Notes: This figure plots the distribution of localities' imputed population in 2008 using election data and satellite estimates and their status of agglomerations or towns. Panel A shows a histogram and Panel B plots each data point. There are 46 towns and 50 agglomerations in the sample. The sample excludes (1) 4 localities which were capital cities of territories, sectors, chiefdoms, (2) 10 previous cities, (3) 14 agglomerations which are co-located with towns.

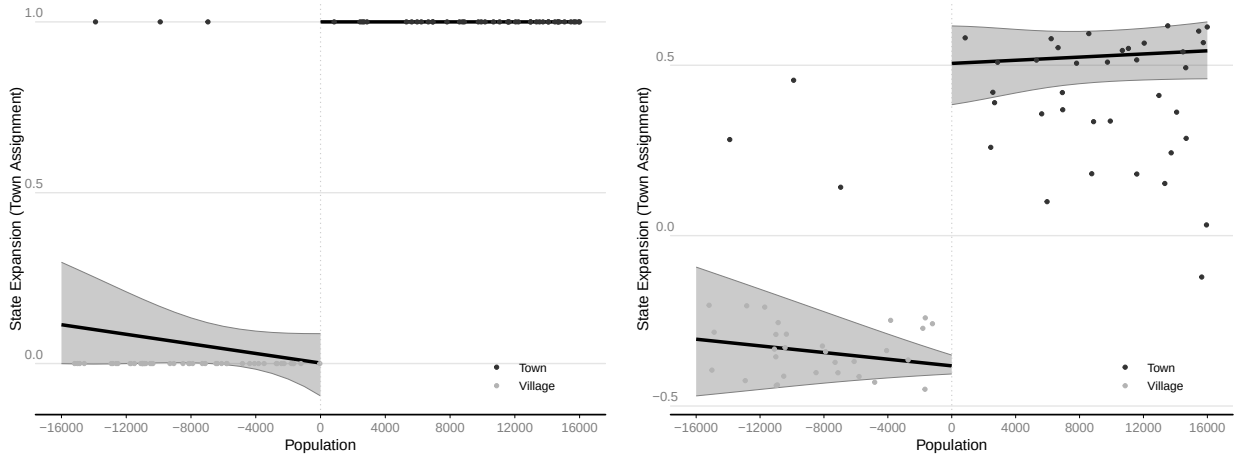
Figure A8: Effect of Population on Town Assignment (Residualized)



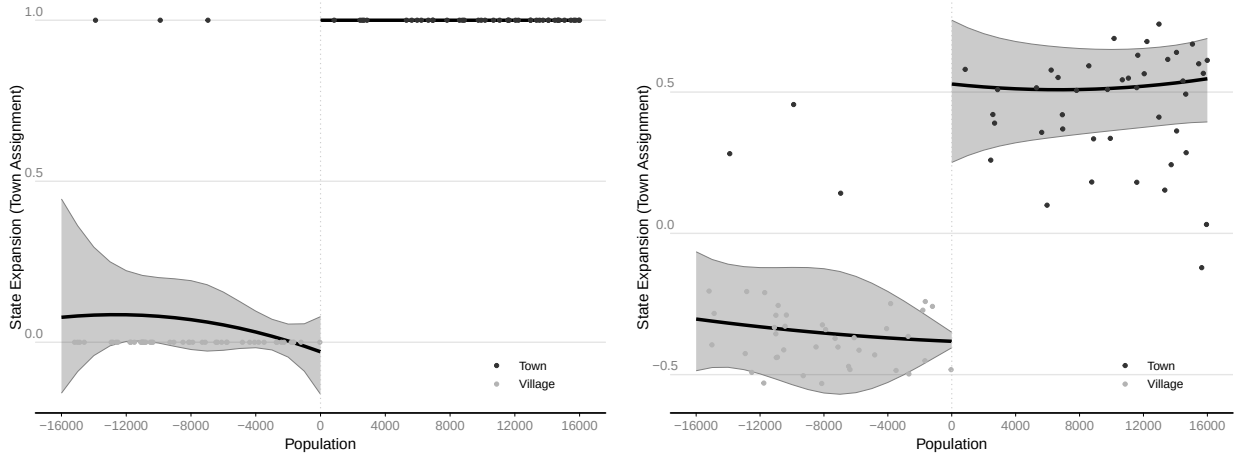
Notes: This figure plots the state expansion on population margin in 2005, residualized on geographic controls, using our locality samples as the unit of observation. Red dots are localities assigned as traditionally-governed ("Agglomeration"), whereas black dots are localities assigned as state-governed ("Town"). The figure regresses state expansion on linear population margin term. The line and confidence interval show the predicted probability of state expansion on either side of the population discontinuity, as derived from our first-stage OLS regression with full locality sample. There are 45 towns and 49 agglomerations in the sample. The sample excludes (1) 4 localities which were capital cities of territories, sectors, chiefdoms, (2) 10 previous cities, (3) 14 agglomerations which are co-located with towns as mentioned in Section 5C.

Figure A9: Effect of Population on State Expansion (First Stage RD)

A. Linear Fit

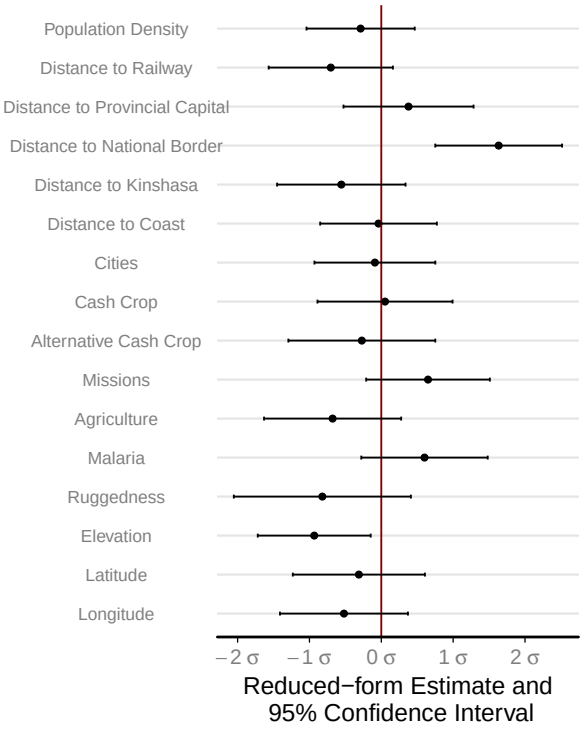


B. Quadratic Fit



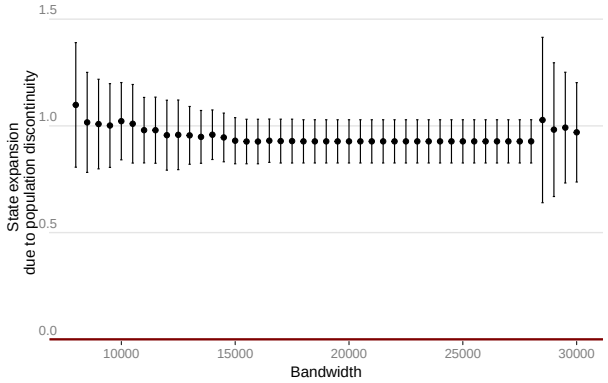
Notes: This figure plots the state expansion on imputed 2008 population, residualized on geographic controls, using our locality samples as the unit of observation. Red dots are localities assigned as traditionally-governed ("Agglomeration"), whereas black dots are localities assigned as state-governed ("Commune"). Panel A regresses state expansion on linear population margin term, while Panel B does on quadratic term. The line and confidence interval show the predicted probability of state expansion on either side of the population discontinuity, as derived from our first-stage OLS regression with full locality sample. There are 45 towns and 49 agglomerations in the sample. The sample excludes (1) 4 localities which were capital cities of territories, sectors, chiefdoms, (2) 10 previous cities, (3) 14 agglomerations which are co-located with towns.

Figure A10: Effect of Population Discontinuity on Geographic Pre-treatment Covariates (Balance Table)



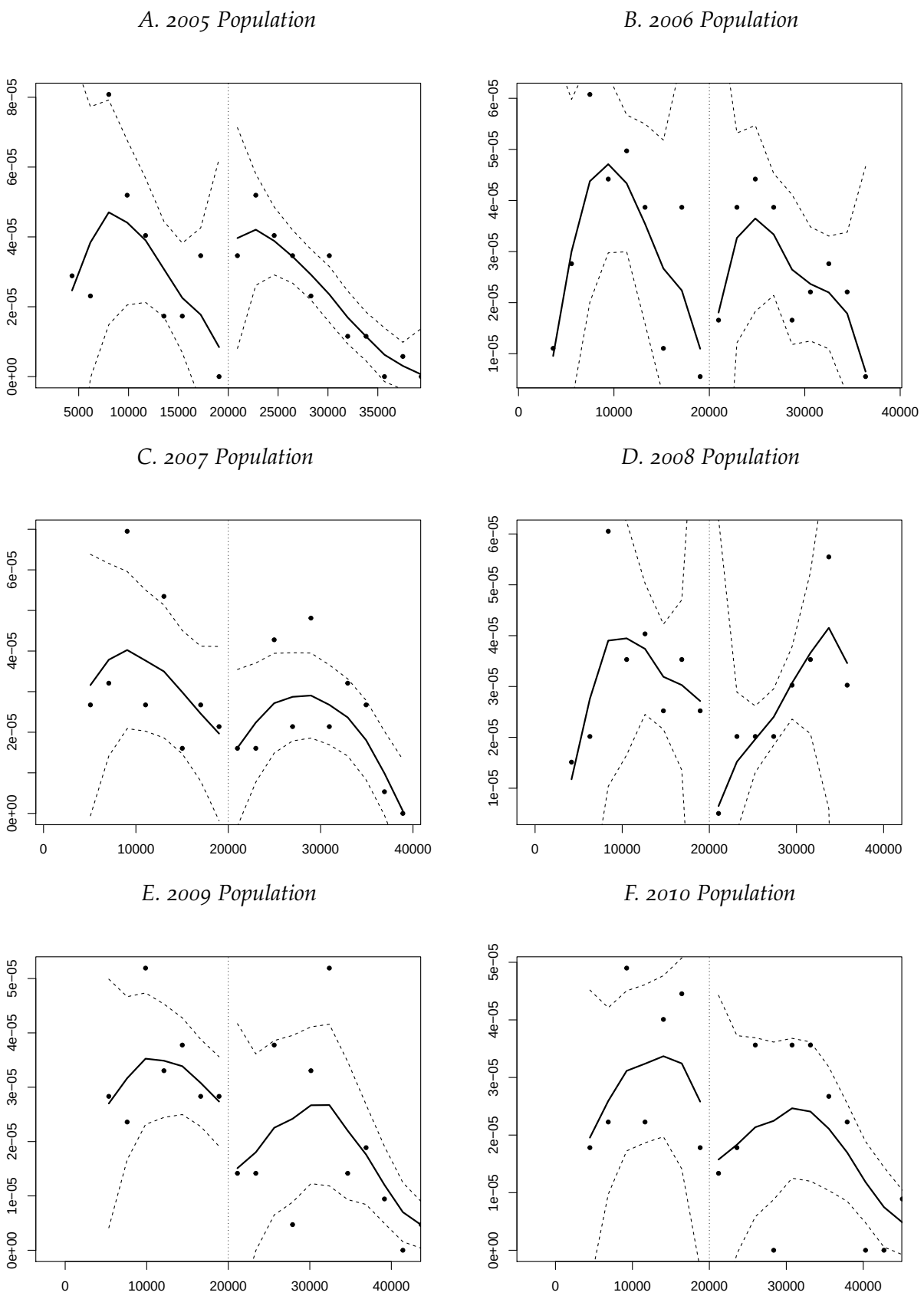
Notes: This figure plots the point estimates and their 95% confidence intervals of the reduced-form coefficient on population discontinuity from the regression of geographic pre-treatment covariates. The specifications control for population margin running variable and its interaction with population discontinuity. Standard errors are clustered at the locality level.

Figure A11: Effect of Population on State Expansion (First Stage RD), by bandwidth



Notes: This figure plots the point estimates and their 95% confidence intervals of the coefficient on population discontinuity from the first stage regression of state expansion, with varying bandwidth size depicted on the x-axis. Regressions control for geographic and historical pre-treatment covariates. Standard errors are clustered at the locality level.

Figure A12: McCrary density test plot



Notes: This figure plots the point McCrary density plots for our imputed populations fro 2005 to 2010.

Figure A13: Robustness of the effects of state expansion on control and bandwidth specifications

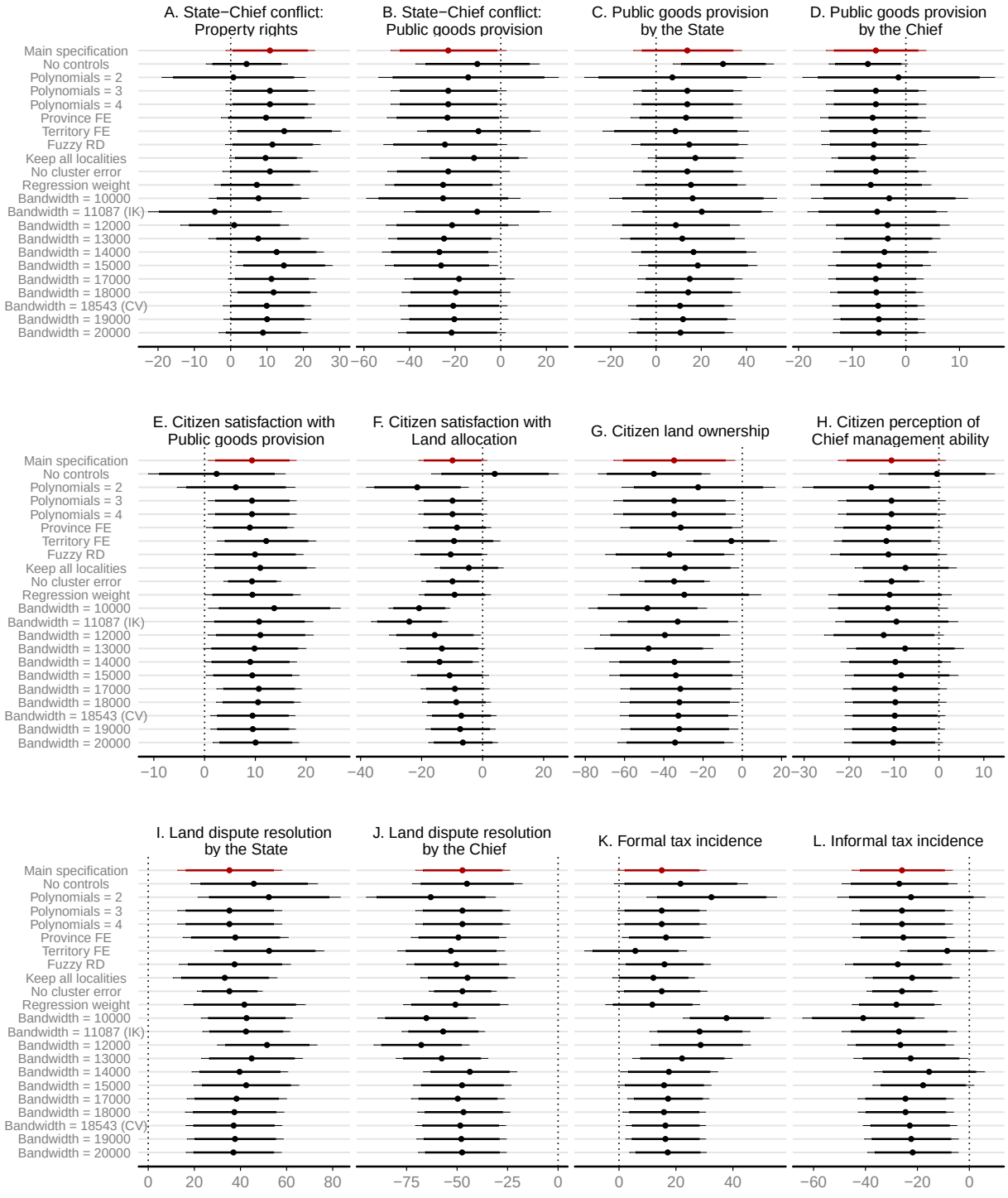
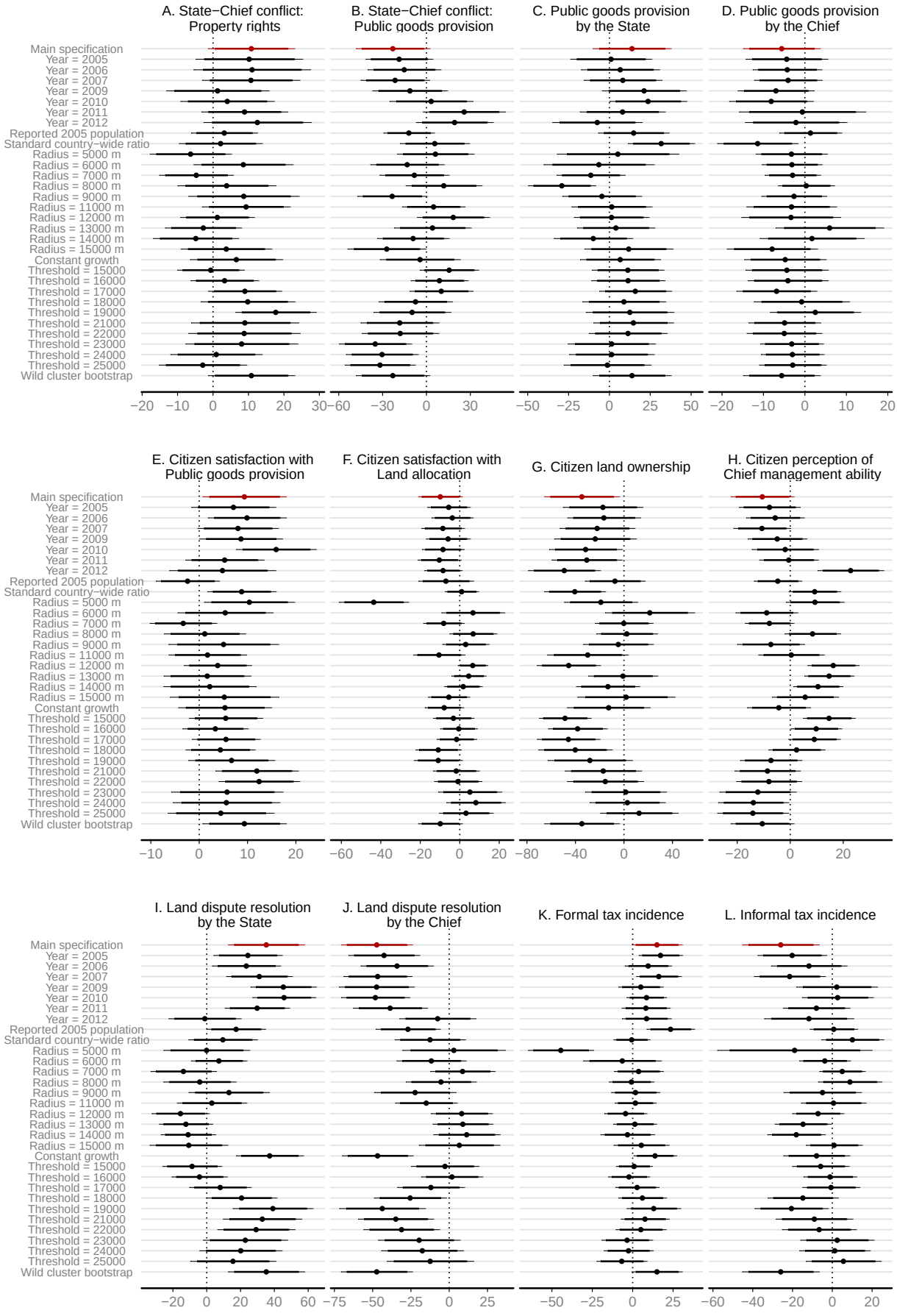


Figure A14: Falsification of the effects of state expansion on alternative specifications



Appendix H. Appendix Tables

Table A1: Number of eligible towns by province

Province	Number of Eligible Towns
North Kivu	26
Kasaï Central	16
Kasaï	14
South Kivu	11
Tshopo	9
Bas-Uele	7
Mai-Ndombe	7
Maniema	7
Ituri	6
Kongo Central	6
Lomami	6
Kwango	5
Kasaï-Oriental	4
Kwilu	4
Haut-Uele	3
Sankuru	3
Mongala	2
Equateur	1
Haut-Lomami	1
Haut-Katanga	0
Lualaba	0
Nord-Ubangi	0
Sud-Ubangi	0
Tanganyika	0
Tshuapa	0
Kinshasa	0
Total	**139**

Table A2: Localities surveyed

Province	Number of towns	Number of agglomerations
North Kivu	26	26
Kasaï Central	16	16
Kasaï	14	14
South Kivu	10	10
Total	**67**	**67**

Table A3: List of registered voters, satellite population estimate, and ratio with territories for all sample towns and agglomerations

Province Name	Town Name	Registered Voter (2018)	Imputed Population	District Ratio	Province Name	Agglomeration Name	Registered Voter (2018)	Imputed Population	District Ratio
North Kivu	Mangina	13937	50536	0.276	North Kivu	Kyatsaba	8939	32413	0.276
North Kivu	Kasindi	18077	65548	0.276	North Kivu	Kalemia	6178	22402	0.276
North Kivu	Lume	16246	58908	0.276	North Kivu	Kavisire	4707	17068	0.276
North Kivu	Kipese	16246	40859	0.398	North Kivu	Luseke	5317	13372	0.398
North Kivu	Masereka	19425	48854	0.398	North Kivu	Kitsimba	4903	12331	0.398
North Kivu	Luhotu	18510	46553	0.398	North Kivu	Magheria	8581	21581	0.398
North Kivu	Ndjiapanda	13733	34539	0.398	North Kivu	Changanda	4063	10219	0.398
North Kivu	Kibumba	14414	61932	0.233	North Kivu	Chegera	5171	22218	0.233
North Kivu	Kilambo	21480	46492	0.462	North Kivu	Nyabiondo	10030	21709	0.462
North Kivu	Kirumbu	22937	49645	0.462	North Kivu	Mweso	13994	30289	0.462
North Kivu	Nyamitaba	25941	56147	0.462	North Kivu	Muheto	11607	25122	0.462
North Kivu	Sake	19380	41946	0.462	North Kivu	Nzulo	9099	19694	0.462
North Kivu	Rubaya	24370	52747	0.462	North Kivu	Kibabi	6275	13582	0.462
North Kivu	Ngungu	21181	45844	0.462	North Kivu	Luzirantaka	12092	26172	0.462
North Kivu	Bambo	17567	37969	0.463	North Kivu	Bugina	7531	16277	0.463
North Kivu	Nyanzale	23240	50230	0.463	North Kivu	Bishusha	7039	15214	0.463
North Kivu	Kibirizi	13012	28124	0.463	North Kivu	Kikuku	5113	11051	0.463
North Kivu	Vitshumbi	25408	54916	0.463	North Kivu	Kiringa	5702	12324	0.463
North Kivu	Buseregenyi	20001	43229	0.463	North Kivu	Kalengera	10936	23637	0.463
North Kivu	Rubare	21626	46742	0.463	North Kivu	Kako	4545	9823	0.463
North Kivu	Nyamilima	20626	44580	0.463	North Kivu	Katwighuru	7460	16124	0.463
North Kivu	Ishasha	25967	56124	0.463	North Kivu	Ntamugenga	6104	13193	0.463
North Kivu	Mubi	13349	37198	0.359	North Kivu	Bilobilo	3922	10929	0.359
North Kivu	Pinga	16392	45678	0.359	North Kivu	Bushimoo	2438	6794	0.359
North Kivu	Ndjingala	11971	33358	0.359	North Kivu	Osokari	647	1803	0.359
North Kivu	Hombo North	20316	56612	0.359	North Kivu	Chambucha	4676	13030	0.359
South Kivu	Lulimba	21784	48768	0.447	South Kivu	Misisi	9783	21901	0.447
South Kivu	Mboko	16235	36345	0.447	South Kivu	Lweba	3749	8393	0.447
South Kivu	Kavumu	31212	45631	0.684	South Kivu	Nyamakana	5879	8595	0.684
South Kivu	Miti	28760	42046	0.684	South Kivu	Kamakombe	11582	16933	0.684
South Kivu	Nyabibwe	19631	58149	0.338	South Kivu	Kabulu	9881	29268	0.338
South Kivu	Minova	17224	51019	0.338	South Kivu	Kalungu	5748	17026	0.338
South Kivu	Hombo South	17390	51511	0.338	South Kivu	Irangi	2556	7571	0.338
South Kivu	Kiliba	19963	47516	0.420	South Kivu	Kabulimbo	11657	27746	0.420
South Kivu	Luvungi	24680	58743	0.420	South Kivu	Luberizi	6006	14295	0.420
South Kivu	Nyangezi	20631	56487	0.365	South Kivu	Cibimbi	10460	28639	0.365
South Kivu	Kamanyola	15776	43194	0.365	South Kivu	Kashenyi	6863	18791	0.365
Kasai	Kamako	14980	77896	0.192	Kasai	Lupemba	4090	21268	0.192
Kasai	Ngombe	11947	62125	0.192	Kasai	Muyeji	4405	22906	0.192
Kasai	Mayi Munene	11462	59603	0.192	Kasai	Lungundi	5293	27524	0.192
Kasai	Kamwesha	17561	91317	0.192	Kasai	Tshibulu	4245	22074	0.192
Kasai	Nyanga	9202	47851	0.192	Kasai	Mbango	4835	25142	0.192
Kasai	Nzadi	13635	70902	0.192	Kasai	Kisamba	4080	21216	0.192
Kasai	Katanga	9319	48459	0.192	Kasai	Bakwa Ndjila	2741	14253	0.192
Kasai	Shambwanda	4351	22625	0.192	Kasai	Kanzenze	5747	29884	0.192
Kasai	Ndjindji	10822	56275	0.192	Kasai	Kisama	4384	22797	0.192
Kasai	Lukombo	4904	25501	0.192	Kasai	Ngondo	2750	14300	0.192
Kasai	Kabemba	4670	23360	0.253	Kasai	Konyi	1895	7497	0.253
Kasai	Mibalayi	12528	49614	0.253	Kasai	Shamashenge	1182	4681	0.253
Kasai	Mapangu	10391	41151	0.253	Kasai	Ndjembe	2612	10344	0.253
Kasai	Kakenge	12586	45787	0.275	Kasai	Nkinda	3569	12984	0.275
Kasai Central	Tshikula	7982	45113	0.177	Kasai Central	Kasangidi	5162	29175	0.177
Kasai Central	Ngadi-A-Pemba	14314	57514	0.249	Kasai Central	Mukalenge Mulolo	5548	26788	0.249
Kasai Central	Tulume	13001	52238	0.249	Kasai Central	Nsakazaji	4303	17290	0.249
Kasai Central	Masuika	10820	43475	0.249	Kasai Central	Ulongo	4719	18961	0.249
Kasai Central	Yangala	10645	42772	0.249	Kasai Central	Mundembu	6337	25462	0.249
Kasai Central	Samwanda	13908	55883	0.249	Kasai Central	Mbumba	4267	17145	0.249
Kasai Central	Luambo	9940	39939	0.249	Kasai Central	Kalamba Mbuji	7914	31799	0.249
Kasai Central	Luemba	13890	50421	0.275	Kasai Central	Bashimuluamba	3411	12382	0.275
Kasai Central	Kalwebo	12642	45891	0.275	Kasai Central	Mahumbu	7825	28405	0.275
Kasai Central	Matamba	16033	58200	0.275	Kasai Central	Benamande	3671	13326	0.275
Kasai Central	Bilomba	14710	53398	0.275	Kasai Central	Bikuta	2534	9198	0.275
Kasai Central	Benaleka	15147	69826	0.217	Kasai Central	Beyabwanga	4660	21482	0.217
Kasai Central	Bana Ba Ntumba	4484	15484	0.389	Kasai Central	Bena Kalombo Ndondo	2677	6887	0.389
Kasai Central	Katende	4432	16395	0.389	Kasai Central	Bakuakanyingi	3308	8510	0.389
Kasai Central	Lubwinshi	6179	23380	0.389	Kasai Central	Bakwa Tshibasu	3379	8693	0.389
Kasai Central	Munkamba	13251	34089	0.389	Kasai Central	Bakua Kanda	3213	8266	0.389

Table A4: Summary Statistics of Households

	Town		Agglomeration		
	Mean	S.D.	Mean	S.D.	Significance
	(1)	(2)	(3)	(4)	(3)-(1)
Household characteristics					
Household size	7.90	(2.75)	7.81	(3.18)	
Years of education	8.50	(4.01)	8.30	(3.81)	
Asset wealth index	0.54	(0.18)	0.51	(0.18)	***
Farmer = 1	0.52	(0.5)	0.61	(0.49)	***
Trader = 1	0.11	(0.31)	0.07	(0.26)	**
Teacher = 1	0.07	(0.26)	0.08	(0.27)	
Government worker = 1	0.02	(0.14)	0.01	(0.09)	*
Owns land title = 1	0.07	(0.26)	0.05	(0.21)	*
Dispute resolution = State	0.31	(0.46)	0.05	(0.22)	***
Dispute resolution = Chief	0.50	(0.50)	0.80	(0.40)	***
Religious organization = 1	0.62	(0.49)	0.63	(0.48)	
Savings Group = 1	0.42	(0.49)	0.37	(0.48)	
Voluntary association = 1	0.23	(0.42)	0.24	(0.43)	
Regular Salongo participation = 1	0.77	(0.38)	0.80	(0.36)	
Reason = Duty	0.93	(0.26)	0.95	(0.23)	
Reason = Social pressure	0.13	(0.34)	0.12	(0.32)	
Reason = Fear of punishment	0.10	(0.30)	0.09	(0.28)	
Perception of socio-conomic mobility, position $0-10$					
Respondent	4.53	(1.72)	4.32	(1.73)	**
Respondent's parent	4.90	(2.08)	4.74	(2.05)	
Respondent's child	7.66	(1.65)	7.50	(1.69)	
Trust, $0-10$					
People of same ethnicity	6.60	(1.77)	6.68	(1.66)	
Locality chief	6.43	(1.68)	6.45	(1.71)	
Traditional government	6.00	(1.88)	6.19	(1.97)	
Central government	5.38	(2.16)	5.33	(2.13)	
Provincial government	5.26	(1.9)	5.23	(1.92)	
Governor	5.02	(2.01)	5.08	(1.99)	
Army	5.37	(2.37)	5.40	(2.29)	
Police	5.23	(1.91)	5.03	(1.86)	*
Courts	4.20	(2.04)	4.29	(2.03)	
Perception of authority, $0-10$					
Governor influence	4.18	(3.53)	3.99	(3.39)	
Traditional chief influence	6.61	(3.33)	7.12	(2.96)	***
Satisfied with governor	5.61	(3.17)	5.52	(3.03)	
Satisfied with chief	6.94	(2.97)	7.34	(2.72)	**
Governor corruption	4.70	(2.41)	4.65	(2.29)	
Traditional chief corruption	3.41	(2.25)	3.22	(2.26)	
Governor ability	4.86	(2.13)	4.91	(1.99)	
Traditional chief ability	5.66	(2.08)	6.04	(1.97)	***
Bourgmestre ability	6.50	(4.22)	6.25	(1.5)	
Village chief ability	6.45	(3.91)	6.39	(3.1)	
Number of household respondents	536		536		

Notes: This table presents the summary statistics (mean and standard deviation) of the household characteristics from our sample of 1072 households in 134 localities, as well as the statistical significance of the t-test difference in means between the two samples. Asset wealth index is the normalized [0-1] index which contains the level of household assets (toilet, water, roof, electricity, flooring). Salongo is weekend public cooperation to achieve public tasks, for example, road-cleaning; picket.

Table A5: Summary statistics of infrastructural state capacity, by locality type

	Town		Agglomeration		
	Mean	S.D.	Mean	S.D.	Significance
	(1)	(2)	(3)	(4)	(3)-(1)
Panel A: Locality Characteristics					
Population					
in 2008	29,490	(7,903)	10,695	(4,731)	***
in 2012	36,902	(11,207)	13,227	(5,734)	***
in 2021	57,813	(18,454)	21,138	(9,215)	***
# Households	7,987	(6,483)	3,663	(3,013)	***
# Registered Voters	15,797	(6,035)	5,761	(2,910)	***
Agriculture (% of households)	70.4	(15.4)	78.7	(12.2)	***
Agricultural land (m^2 per capita)	5395	(10465)	4345	(9486)	
Daily manual wage ($)	1.91	(2.4)	1.26	(0.97)	**
Bourgmestre exists	0.37	(0.49)	0.04	(0.21)	***
# Govt. Buildings	1.97	(1.5)	1.28	(1.32)	***
# Local Personnel	28.57	(26.43)	14.54	(25.27)	***
# Admin. Personnel	9.03	(12.58)	6.3	(8.74)	
# Security Personnel	19.54	(23.16)	8.24	(20.91)	***
# Central govt. personnel	74.3	(114.1)	29.1	(36.7)	***
# Schools per 1,000 people	0.64	(0.52)	0.64	(0.95)	
# Health centers per 1,000 people	0.19	(0.15)	0.16	(0.13)	
# Markets per 1,000 people	0.05	(0.11)	0.04	(0.05)	
# Weddings per 1,000 people	1.13	(1.31)	1.13	(1.36)	
# Bars per 1,000 people	0.41	(0.49)	0.39	(0.52)	
Nightlights Density	1.15	(0.75)	1.14	(0.51)	
Number of localities	67		67		
Panel B: Government Agent Characteristics					
Personnel Profile					
Male = 1	0.94	(0.23)	0.97	(0.16)	*
Age	50.2	(12.1)	49.5	(11.4)	
Married = 1	0.96	(0.19)	0.96	(0.19)	
Years of education	11.4	(3.05)	10.2	(3.26)	***
At least some college education	0.26	(0.44)	0.12	(0.33)	***
Party-affiliated	0.30	(0.46)	0.23	(0.42)	*
Tshisekedi coalition, if party-affiliated	0.44	(0.5)	0.40	(0.49)	
Part of ethnic majority in locality	0.71	(0.45)	0.75	(0.44)	
Work and employment characteristics					
Finite time horizon	0.78	(0.42)	0.82	(0.39)	
Work hour/week	32.3	(13.9)	29.9	(12.2)	**
Time proportion on tasks (%)					
Administrative	28.8	(18.8)	27.4	(19.8)	
Internal meeting	11.3	(6.81)	11.1	(6.23)	
Community meeting	22.5	(15.7)	26.0	(16.8)	**
Public site visit	9.09	(6.91)	8.91	(7.15)	
Public works	7.09	(6.01)	6.6	(5.52)	
Non-public administration	9.73	(11.5)	9.15	(9.79)	
Labor incentives					
Received salary	0.50	(0.50)	0.46	(0.50)	
Annual salary if received ($, 2021)	624.80	(655.07)	455.06	(415.72)	**
Promotion incentives exist	0.15	(0.26)	0.15	(0.29)	
Training exists for underperformers	0.04	(0.13)	0.03	(0.13)	
Collaborative culture	0.65	(0.15)	0.66	(0.16)	
Number of govt. respondents	264		268		

Notes: This table presents the summary statistics (mean and standard deviation) of the social, economic, and political organization of our sample localities, as well as the statistical significance of the t-test difference in means between the two samples. Panel A displays the characteristics of the 134 localities in our sample, towns and agglomerations combined. Panel B displays the characteristics of 532 government agents in our sample localities. Responses for Panel A are derived from a collective survey of the locality, for which 4

Table A6: Effect of Population Discontinuity on Geographic Pre-treatment Covariates (Balance Table)

	Longitude (1)	Latitude (2)	Elevation (3)	Ruggedness (4)	Malaria (5)	Agriculture (6)	Missions (7)	Cities (8)
Population Discontinuity	-1.920	-0.8027	-50.39**	-10.85	36.32	-20.70	204.6	-19.99
	(1.680)	(1.207)	(21.65)	(8.315)	(27.12)	(14.88)	(138.1)	(96.10)
Mean Dep. Var	25.78	-3.574	108.2	12.92	67.05	39.98	532.6	1,014.3
Observations	106	106	106	106	106	106	106	106
R^2	0.06690	0.04895	0.07361	0.07016	0.08043	0.07025	0.02772	0.02984

	Cashcrop (9)	Alternative Cashcrop (10)	Population Density (11)	Distance to Railway (12)	Distance to Coast (13)	Distance to Natl. Border (14)	Distance to Kinshasa (15)	Distance to Prov. Capital (16)
Population Discontinuity	10.04	-52.13	-11.27	-58.57	-6.220	126.3***	-23.10	25.54
	(92.92)	(100.3)	(15.05)	(36.75)	(66.66)	(34.79)	(18.94)	(31.12)
Mean Dep. Var	541.8	433.3	31.11	146.3	1,062.0	81.13	120.7	95.14
Observations	106	106	106	106	106	106	106	106
R^2	0.00260	0.00496	0.03201	0.03268	0.03806	0.23614	0.07291	0.01880

Notes: This table presents the reduced-form regression coefficients of geographic pre-treatement covariates on population discontinuity and controlling for population margin as running variable and their interaction. Standard errors are clustered at the locality level. There are 46 towns and 50 agglomerations in the sample, using our sample selection criteria.

Table A7: Effect of Population on State Expansion, by population year

	state							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Population Discontinuity	1.000^{***}	1.057^{***}	1.085^{***}	0.9909^{***}	1.024^{***}	0.9985^{***}	0.9821^{***}	0.9768^{***}
	(5.19×10^{-16})	(0.0583)	(0.0696)	(0.0299)	(0.0527)	(0.0449)	(0.0408)	(0.0397)
R^2	1	0.89583	0.85480	0.88014	0.85833	0.88165	0.88860	0.89349
Observations	24	36	47	66	78	94	101	106

Notes: This table presents the first-stage regression coefficients of state expansion (commune assignment = 1) on 1, population discontinuity, population margin as running variable, and their interaction, using our locality samples as the unit of observation. The table only reports the population discontinuity coefficients. Each panel indicates for what year the population was imputed to be used in the running variable and discontinuity. Each column indicates which bandwidth was used. Standard errors are clustered at the locality level. There are 46 towns and 50 agglomerations in the sample. The sample excludes (1) 4 localities which were capital cities of territories, sectors, chiefdoms, (2) 10 previous cities, and (3) 14 agglomerations which are co-located with towns.

Table A8: The effects of state expansion on supply and demand of governance

A. The effects on the relationship between the State and the Chief

	Number of areas of cooperation (1)	Number of areas of conflict (2)	Conflict on property rights (3)	Conflict on public goods (4)	Citizen perception of conflict (5)
Population Discontinuity	−0.7739**	0.2300	10.81*	−23.03*	16.10*
	(0.3276)	(0.2300)	(6.223)	(12.86)	(9.405)
Mean Dep. Var	1.820	0.880	5.260	46.43	57.70
Observations	376	376	376	376	744
R^2	0.203	0.161	0.098	0.099	0.216

B. The effects on demand for the State and the Chief

	Land dispute resolution (State) (1)	Formal tax incidence (State) (2)	Bribe incidence to the State (3)	Land dispute resolution (Chief) (4)	Informal tax incidence (Chief) (5)	Bribe incidence to the Chief (6)
Population Discontinuity	35.22***	15.02*	5.645	−47.36***	−25.94***	−1.081
	(11.50)	(7.918)	(7.594)	(11.87)	(9.845)	(8.773)
Mean Dep. Var	18.84	27.43	12.41	65.30	87.70	27.33
Observations	752	752	752	752	748	752
R^2	0.280	0.225	0.082	0.234	0.134	0.087

Notes: This table presents the coefficients on the population discontinuity from Equation 2, with standard errors clustered at the locality level. The samples are government officials or household respondents in sample localities around the 16,000 bandwidth. In Panel A, the dependent variables on each of the columns are: (1) Number of areas of cooperation between the State and the Chief, among a list of areas of authorities, where government officials were free to select multiple options which indicated where they collaborate. (2) Number of areas of conflict between the State and the Chief, where similarly to A government officials were free to select multiple options of areas of conflict. (3) Dummy (0, 100) if the State and the Chief had conflict on property rights and did not collaborate on property rights, which included land allocation or security from expropriation and external attacks. (4) Dummy (0, 100) if the State and the Chief had conflict on public goods provision and did not collaborate on public goods provision, which included public infrastructure, agricultural management, and promoting local development. (5) Dummy (0, 100) if household respondents perceived that the State and the Chief were in conflict. In Panel B, the dependent variables on each of the columns are: (1) Land dispute resolution by the State is a dummy variable of land disputes being resolved by state personnel (mayor, police, tribunal) if households had a land dispute in the past year (actual) or being potentially assigned to state personnel if households did not have a land dispute in the past year (hypothetical). (2) Formal tax incidence measures the dummy variable if households paid taxes for taxable industries as listed in the Example Form on Appendix Figure A5. (3) Bribe incidence to the State measures if households paid the State personnel in gifts, bribe, or in-kind for any public activity in the past month, or if households paid bribes instead of taxes when paying for taxable industry to the State. (4) Land dispute by the Chief similarly measures the dummy variable of actual or hypothetical land disputes resolved by the chief personnel (chief, chief agents, heads of subvillages). (5) Informal tax incidence measures the dummy variable if households participated in public works program organized by the Chief (Salongo) at least once in the past month. (6) Bribe incidence to the Chief similarly measures if households paid to the Chief personnel for any activity or when paying for taxable industry to the Chief.

Table A9: The effects of state expansion on contribution to public goods game

	% funds contributed to public pot upon hearing randomized audio message from ...					
	(1)	(2)	(3) (1−2)	(4)	(5)	(6) (4−5)
Governor	2.98**	−0.946	[3.95*]	2.75**	−1.08	[3.87*]
	(1.34)	(1.73)	(2.17)	(1.29)	(1.71)	(2.14)
Leader	3.54*	1.05	[2.57]	2.72	0.314	[2.66]
	(1.92)	(1.78)	(2.61)	(1.75)	(1.71)	(2.58)
Chief	−0.214	2.51	[−2.74]	−0.020	2.56	[−2.61]
	(1.46)	(1.61)	(2.18)	(1.49)	(1.64)	(2.22)
Control Mean	31.7	33.5		31.7	33.5	
Observations	2,153	2,076		2,153	2,076	
R^2	0.011	0.007		0.044	0.023	
Locality	Town	Village		Town	Village	
Province FE				✓	✓	

Notes: This table presents the estimates of coefficients from Equation which regresses the percentages of contribution to behavioral games after a household hears the randomized audio message from governor, chief, or locality leader, estimated in the same regression. The observations are at the game-level, in which each household in our sample locality played the behavioral game five times with randomized initial endowments. The independent variables are dummies for governor message, chief message, or locality leader message, estimated in the same equation, controlling for the round number and a dummy for whether household plays the set of game with audio first or after the placebo game. The placebo game is the same set of public goods game without message, but only with indication whether governor, chief, or leader will manage the fund once contributed. Column (1) reports the regression coefficients for households in town, Column (2) does for those in agglomerations. Columns (4) and (5) add province fixed effects to control for unobserved characteristics of the province, including governor qualities. Columns (7) and (8) add locality fixed effects to control for unobserved characteristics of the locality, including the quality of traditional and locality leaders in the localities. The difference between the two sets of columns are estimated using a saturated model, whose interaction effects between the dummy for each type of leader audio message and the dummy for town are reported in square brackets. Errors are clustered at the locality level. Control mean indicates the average percentage of funds contributed to public pot for households who did not hear any randomized audio messages before contributing, reported separately for those in town and agglomerations.

Table A10: Effect of Population Discontinuity on Geographic Pre-treatment Covariates (Balance Table)

	Longitude (1)	Latitude (2)	Elevation (3)	Ruggedness (4)	Malaria (5)	Agriculture (6)	Missions (7)	Cities (8)
Fitted state entry	3.343	3.395	17.43	4.001	−0.1253	2.984	−2.308	9.185
	(3.340)	(2.390)	(40.16)	(13.15)	(5.223)	(2.985)	(2.714)	(19.79)
Mean Dep. Var	25.78	-3.580	108.2	12.92	6.770	4	5.330	101.4
Observations	95	95	95	95	95	94	95	95
R^2	−0.11439	−0.25428	0.01644	0.01886	0.00424	−0.10660	−0.12532	−0.00438

	Cashcrop (9)	Alternative Cashcrop (10)	Population Density (11)	Distance to Railway (12)	Distance to Coast (13)	Distance to Natl. Border (14)	Distance to Kinshasa (15)	Distance to Prov. Capital (16)
Fitted state entry	4.297	−1.568	6.377	−61.15	6.515	−52.11	3.812	34.20
	(19.95)	(22.44)	(4.615)	(71.46)	(14.39)	(61.81)	(3.755)	(58.09)
Mean Dep. Var	54.18	43.33	3.110	145.2	106.2	81.13	12.07	95.14
Observations	95	95	95	95	95	95	95	95
R^2	0.02998	0.07659	−0.95182	−0.04494	0.00200	−0.05893	−0.11506	−0.01516

Notes: This table presents the second-stage regression coefficients of geographic pre-treatement covariates on fitted state expansion (commune assignment = 1), where state expansion is instrumented with population discontinuity and controlling for population margin as running variable and their interaction. Standard errors are clustered at the locality level. There are 46 towns and 50 agglomerations in the sample, using our sample selection criteria.

Table A11: The effects of state expansion on internal state administration

A. The effects on distribution of time spent on tasks

	Administrative Affairs (1)	Site visit (Field) (2)	Public Goods Provision (3)	Meeting (Internal) (4)	Meeting (Citizens) (5)	Other Categories (6)
Population	11.24*	−4.847**	−5.818***	0.8839	1.999	−0.0520
Discontinuity	(6.198)	(2.100)	(1.590)	(2.430)	(5.454)	(20.13)
Mean Dep. Var	28.10	9	6.850	19.73	24.23	24.57
Observations	375	375	374	375	375	47
R^2	0.017	0.021	0.066	0.008	0.015	0.054

B. The effects on bureaucratic network

	Work with principal ($\geq$ 1/week) (1)	Rendezvous w. principal ($\geq$ 1/week) (2)	Network Degree (3)	Network Connectedness (4)	# Local Agents Appointed by Governor (5)	# Local Agents Appointed by Chief (6)
Population	23.05*	39.02**	0.6162	−0.0393	0.3159	−0.6119***
Discontinuity	(13.27)	(15.29)	(1.082)	(0.0487)	(0.2363)	(0.2295)
Mean Dep. Var	78.00	53.00	4.350	0.3500	0.2500	0.5500
Observations	79	79	94	94	94	94
R^2	0.029	0.069	0.034	0.018	0.093	0.138

C. The effects on labor incentives

	Work hour (per week) (1)	Salary indicator (2)	Salary per year (3)	Promotion Incentive (4)	Training Incentive (5)	Collaborative Culture (6)
Population	−2.522	−27.19	145.8	−3.006	3.292	−3.843
Discontinuity	(4.130)	(16.78)	(334.7)	(10.73)	(3.187)	(6.122)
Mean Dep. Var	31.06	47.74	543.0	14.97	3.870	65.54
Observations	375	376	172	376	375	375
R^2	0.030	0.016	0.020	0.008	0.013	0.009

Notes:

Table A12: The effects of state expansion on time horizons of authority

A. The effects on citizens' preference for authority and time horizon

	Preference for State (1)	Preference for Chief (2)	Expectation of State (3)	Expectation of Chief (4)
Population Discontinuity	−7.186	−5.383	−4.129	−12.59
	(17.41)	(15.40)	(18.82)	(15.61)
Mean Dep. Var	60.54	28.64	52.33	32.37
Observations	752	752	752	752
R^2	0.025	0.034	0.024	0.056

B. The effects on governments' preference for authority and time horizon

	Preference for State (1)	Preference for Chief (2)	Expectation of State (3)	Expectation of Chief (4)	Time Horizon of Position (5)
Population Discontinuity	6.002	−13.15	15.27	−18.74	−5.835*
	(17.47)	(14.89)	(17.88)	(17.01)	(3.229)
Mean Dep. Var	47.65	44.44	46.14	44.44	13.66
Observations	375	375	375	375	375
R^2	0.081	0.094	0.097	0.097	0.018

Notes:

Table A13: The effects of state expansion by presence of state mayor

	Number of Administrative Personnel (1)	Number of Security Personnel (2)	Tax Office (Fiscal) (3)	State Court (Legal) (4)	Police Station (Security) Industries (5)	Tax Collection Effort on Transfer (6)	Inter-governmental Exists (7)	Organizational Chart (8)	Land Ownership by State (9)	Land Ownership by Chief (10)
Population Discontinuity	7.047	40.80**	21.05	9.785	58.35***	−2.071	31.27	−9.530	7.431	−24.55
	(5.161)	(16.95)	(18.98)	(14.69)	(21.98)	(13.17)	(22.72)	(26.39)	(6.400)	(16.62)
State Mayor	5.269	−1.766	15.29	18.08	−5.132	19.66***	85.84***	10.08	3.201	14.04
	(6.095)	(1.774)	(25.66)	(24.78)	(23.43)	(7.458)	(6.395)	(23.19)	(4.201)	(20.43)
Population Discontinuity × State Mayor	−2.282	−16.53***	−29.01	−18.11	−18.63	−16.46	−50.72***	−32.21	1.222	−27.72
	(7.730)	(5.596)	(27.60)	(26.22)	(28.08)	(11.73)	(16.74)	(28.27)	(5.975)	(23.00)
$\widehat{\beta_2} + \widehat{\beta_3} = 0$	2.987	−18.297 ***	−13.724 **	−0.024	−23.761 **	3.206	35.122 **	−22.128 **	4.423 **	−13.679 **
	(4.755)	(5.307)	(10.166)	(8.574)	(15.476)	(9.052)	(15.472)	(16.158)	(4.25)	(10.574)
$\widehat{\beta_1} + \widehat{\beta_2} + \widehat{\beta_3} = 0$	10.034 **	22.505 **	7.326	9.761	34.589 **	1.134	66.392 ***	−31.658 **	11.854 **	−38.231 **
	(8.202)	(15.299)	(21.66)	(15.36)	(24.936)	(16.229)	(23.939)	(27.126)	(7.856)	(18.583)
Mean Dep. Var	7.660	13.89	14.93	8.960	47.01	89.55	29.85	50.75	9.840	60.78
Observations	94	94	94	94	94	94	94	94	94	94
R^2	0.044	0.273	0.039	0.027	0.125	0.030	0.270	0.059	0.085	0.054

	Land Dispute Resolution by State (1)	General Dispute Resolution by State (2)	State Should Collect Taxes (3)	Bribe Incidence to State (4)	Formal Incidence (5)	Land Dispute Resolution by Chief (6)	General Dispute Resolution by Chief (7)	Chief Should Collect Taxes (8)	Bribe Incidence to Chief (9)	Informal Incidence (Salongo) (10)
Population Discontinuity	37.00***	39.71***	7.820	12.31*	25.65**	−36.07***	−31.23**	−20.49	0.3239	−26.22**
	(12.23)	(12.17)	(14.08)	(6.319)	(12.14)	(13.20)	(13.82)	(14.48)	(7.982)	(12.08)
State Mayor	8.592	6.628	7.262	−2.859	14.65	−36.81**	−33.21*	−2.562	−0.8542	−11.81
	(13.27)	(14.74)	(21.33)	(3.729)	(17.44)	(18.12)	(18.74)	(18.76)	(9.202)	(17.85)
Population Discontinuity × State Mayor	14.87	13.77	−5.134	16.27**	−25.68	12.94	4.810	−17.44	−6.349	9.741
	(16.08)	(17.53)	(22.95)	(6.191)	(19.33)	(19.88)	(20.52)	(20.57)	(11.28)	(19.45)
$\widehat{\beta_2} + \widehat{\beta_3} = 0$	23.46 ***	20.401 **	2.129	13.414 ***	−11.038 **	−23.873 ***	−28.405 ***	−20.005 **	−7.203 **	−2.068
	(9.08)	(9.482)	(8.477)	(4.943)	(8.327)	(8.172)	(8.353)	(8.446)	(6.515)	(7.748)
$\widehat{\beta_1} + \widehat{\beta_2} + \widehat{\beta_3} = 0$	60.462 ***	60.109 ***	9.949 **	25.725 ***	14.614 **	−59.946 ***	−59.631 ***	−40.494 ***	−6.879 **	−28.287 **
	(14.7)	(14.516)	(14.581)	(7.787)	(11.412)	(15.525)	(14.383)	(14.085)	(9.423)	(11.69)
Mean Dep. Var	18.84	26.40	70.62	10.17	27.52	65.30	58.86	42.72	26.21	87.70
Observations	752	752	752	752	752	752	752	752	752	748
R^2	0.158	0.094	0.017	0.035	0.043	0.125	0.101	0.033	0.020	0.035

Notes:

Table A14: The effects of state expansion on contribution to public goods game

	% funds contributed to public pot upon hearing randomized audio message								
	(1)	(2)	(1)−(2)	(3)	(4)	(3)−(4)	(5)	(6)	(5)−(6)
Governor	2.94**	−0.833	[3.94*]	2.74**	−1.17	[3.97*]	1.73	−0.951	[2.77]
	(1.33)	(1.66)	(2.17)	(1.25)	(1.63)	(2.12)	(1.21)	(1.71)	(2.13)
Observations	968	930		968	930		968	930	
R^2	0.016	0.018		0.050	0.059		0.277	0.260	
Chief	−0.112	2.52	[−2.67]	0.107	2.58	[−2.54]	−0.920	2.70	[−3.63*]
	(1.45)	(1.63)	(2.18)	(1.45)	(1.65)	(2.20)	(1.34)	(1.64)	(2.10)
Observations	858	895		858	895		858	895	
R^2	0.007	0.009		0.037	0.018		0.285	0.214	
Leader	3.86**	1.04	[2.57]	3.05*	0.593	[2.67]	2.84*	1.78	[0.850]
	(1.88)	(1.77)	(2.57)	(1.64)	(1.63)	(2.54)	(1.50)	(1.55)	(2.11)
Observations	1,253	1,151		1,253	1,151		1,253	1,151	
R^2	0.014	0.0010		0.046	0.008		0.301	0.238	
Control Mean	33.4	34.7		33.4	34.7		33.4	34.7	
Locality	Town	Village		Town	Village		Town	Village	
Province FE				✓	✓				
Locality FE							✓	✓	

Notes: This table presents the estimates of coefficients from Equation which regresses the percentages of contribution to behavioral games after a household hears the randomized audio message from governor, chief, or locality leader, estimated separately for each leader type compared to household observations which did not hear any audio message. The observations are at the game-level, in which each household in our sample locality played the behavioral game five times with randomized initial endowments. The independent variables for each cell of the table is the dummy for message from each leader type, that is, governor, chief, or locality leader, controlling for the round number and a dummy for whether household plays the set of game with audio first or after the placebo game. The placebo game is the same set of public goods game without message, but only with indication whether governor, chief, or leader will manage the fund once contributed. Column (1) reports the regression coefficients for households in town, Column (2) does for those in agglomerations. Columns (3) and (4) add province fixed effects to control for unobserved characteristics of the province, including governor qualities. Columns (5) and (6) add locality fixed effects to control for unobserved characteristics of the locality, including the quality of traditional and locality leaders in the localities. The difference between the two sets of columns are estimated using a saturated model, whose interaction effects between the dummy for each type of leader audio message and the dummy for town are reported in square brackets. Errors are clustered at the locality level. Control mean indicates the average percentage of funds contributed to public pot for households who did not hear any randomized audio messages before contributing, reported separately for those in town and agglomerations.

Table A15: The effects of state expansion on the substitution patterns in the domains of influence of state and traditional governments

A. The effects on land disputes and their resolution

	Resolution by State	Resolution by Chiefs	Land Dispute Incidence	Household Land Ownership	State Land Ownership	Chief Land Ownership
	(1)	(2)	(3)	(4)	(5)	(6)
Fitted state entry	45.85***	−45.21***	1.764	−45.10***	13.16*	0.7344
	(13.79)	(13.74)	(5.008)	(14.56)	(7.064)	(11.16)
Mean Dep. Var	18.84	65.30	9.420	43.13	4.130	12.68
Observations	752	752	752	734	734	734
R^2	0.152	0.108	0.001	0.033	0.008	0.004

B. The effects on tax incidence and demand for governance

	Tax Incidence	Payment to State	Payment to Chiefs	Preference for State	Preference for Chiefs	Salongo Participation
	(1)	(2)	(3)	(4)	(5)	(6)
Fitted state entry	21.64*	−0.5419	0.1031	−7.196	−5.391	−34.92**
	(12.03)	(3.474)	(1.757)	(17.48)	(15.40)	(14.12)
Mean Dep. Var	27.43	3.260	1.590	60.54	28.64	79.15
Observations	752	752	752	752	752	748
R^2	0.020	0.013	0.018	0.018	0.039	0.003

C. The effects on corruption and nepotism

	Frequency of Others' Corruption	Own Equivalent Response	Amount of Bribe Demands	Patronage (obtaining position)	Patronage (giving position)	Agrees with Meritocratic Selection
	(1)	(2)	(3)	(4)	(5)	(6)
Fitted state entry	−3.118	−12.89	−18.48	−2.909	−7.752	−1.990
	(9.175)	(8.163)	(11.86)	(20.21)	(23.73)	(10.05)
Mean Dep. Var	42.64	87.41	27.71	67.91	64.29	74.78
Observations	375	373	375	150	94	376
R^2	0.018	0.025	0.056	0.082	0.059	0.029

Notes: This table presents the estimates of β_2 coefficients from Equation A26 which regresses outcomes indicated on table header on town designation, which is instrumented by the population discontinuity. The regressions include the 2005 population as running variable, its interaction with population discontinuity, and pre-treatment geographic covariates as control. The sample is household respondents in localities which satisfied our sample inclusion detailed in Subsection C. Panel A presents the effects of state expansion on land dispute and resolution outcomes. The dependent variables are resolution by state, which is the incidence (%) of land dispute resolution by *bourgmestres*, police, and other state governments and their judiciary branches if households reported ever having disputes, and hypothetically to them if household respondents had disputes to be resolved (Column 1); resolution by chiefs is land resolution by traditional chiefs and their traditional government agents, for example, *notable* or *nyumbakumi*, if households reported ever having disputes, and hypothetically to them if household respondents had disputes to be resolved (Column 2); land dispute incidence is dummy variable times 100 if households experienced land disputes in the past year (Column 3); land ownership is dummy variable times 100 if household owns land (Column 4); land title incidence is dummy variable times 100 if household owns land title/registration. Panel B presents the effects of state expansion on tax incidence and the demand for the state. The dependent variables are tax incidence, which is dummy variable times 100 if household paid formal taxes in the last year, whose purposes in rural DRC are often for business or commercial establishments (Column 1); payment to state is if taxes were paid to state governments and their instruments (Column 2); payment to chief is if taxes were paid to traditional governments and their instruments (Column 3); preference for state/chief is a dummy variable times 100 if household responds "state government"/"chief government" to the question "Who should govern your locality?" (Columns 4 and 5). Standard errors are clustered at the locality level.

Table A16: The effects of state expansion on contribution to public goods game (placebo)

	% funds contributed to public pot upon being told about authority (Placebo)								
	(1)	(2)	(3) (1−2)	(4)	(5)	(6) (4−5)	(7)	(8)	(9) (7−8)
Governor	−2.00	0.298	[−2.33]	−1.93	0.275	[−2.24]	−2.63**	0.686	[−3.32]
	(1.29)	(1.75)	(2.17)	(1.32)	(1.77)	(2.21)	(1.30)	(1.81)	(2.22)
Chief	−1.51	−2.79*	[1.26]	−1.57	−2.98*	[1.47]	−0.942	−1.52	[0.561]
	(1.67)	(1.59)	(2.30)	(1.78)	(1.67)	(2.45)	(1.58)	(1.56)	(2.22)
Leader	2.15	1.81	[0.460]	0.994	1.13	[0.303]	0.555	3.32**	[-2.77]
	(1.60)	(1.80)	(2.42)	(1.55)	(1.79)	(2.44)	(1.41)	(1.53)	(2.08)
Control Mean	33.6	34.2		33.6	34.2		33.6	34.2	
Observations	2,153	2,076		2,153	2,076		2,153	2,076	
R^2	0.012	0.012		0.043	0.026		0.239	0.189	
Locality	Town	Village		Town	Village		Town	Village	
Province FE				✓	✓	✓			
Locality FE							✓	✓	✓

Notes: This table presents the estimates of coefficients from Equation which regresses the percentages of contribution to behavioral games after the researcher told the household that governor, chief, or locality leader encouraged them to contribute and will manage the public pool, estimated in the same regression. The observations are at the game-level, in which each household in our sample locality played the behavioral game five times with randomized initial endowments. The independent variables are dummies for governor authority, chief authority, or locality leader authority, estimated in the same equation, controlling for the round number and a dummy for whether household plays the set of game with audio first or after the placebo game. Column (1) reports the regression coefficients for households in town, Column (2) does for those in agglomerations. Columns (4) and (5) add province fixed effects to control for unobserved characteristics of the province, including governor qualities. Columns (7) and (8) add locality fixed effects to control for unobserved characteristics of the locality, including the quality of traditional and locality leaders in the localities. The difference between the two sets of columns are estimated using a saturated model, whose interaction effects between the dummy for each type of leader audio message and the dummy for town are reported in square brackets. Errors are clustered at the locality level. Control mean indicates the average percentage of funds contributed to public pot for households who did not hear about encouragement before contributing, reported separately for those in town and agglomerations.

Table A17: Effects of Authority Message and Placebo Authority on Public Goods Contribution

	% funds contributed to public pot in the audio-augmented game series					
	(1)	(2)	(3)	(4)	(5)	(6)
Governor	2.38	−6.07**	3.12**	−1.44	2.39*	−1.60
	(1.98)	(3.00)	(1.34)	(1.77)	(1.39)	(1.75)
Chief	−0.711	2.03	−0.374	1.85	−3.11	−0.403
	(1.60)	(1.79)	(1.53)	(1.75)	(3.05)	(2.74)
Leader	2.70	0.444	0.414	4.29	2.46	0.169
	(1.80)	(1.75)	(2.76)	(3.32)	(1.79)	(1.79)
Placebo Governor	−2.52	−2.15	−3.39*	1.69	−2.95*	−0.646
	(1.68)	(2.06)	(1.75)	(2.22)	(1.66)	(2.14)
Placebo Chief	−1.85	−3.61*	0.506	−1.51	-4.08**	-3.54*
	(2.10)	(2.10)	(1.80)	(1.94)	(1.85)	(1.95)
Placebo Leader	1.49	−0.511	−1.06	3.25*	1.88	1.20
	(1.86)	(2.12)	(1.58)	(1.88)	(1.85)	(2.26)
Governor × Placebo Governor	0.853	8.69**				
	(3.75)	(3.67)				
Governor × Placebo Chief	0.399	1.30				
	(3.68)	(3.87)				
Governor × Placebo Leader	−0.142	7.93*				
	(3.21)	(3.96)				
Leader × Placebo Governor			4.87	−5.22		
			(4.39)	(4.62)		
Leader × Placebo Chief			−4.90	−4.83		
			(3.92)	(3.62)		
Leader × Placebo Leader			6.47*	−5.10		
			(3.60)	(4.43)		
Chief × Placebo Governor					3.41	3.95
					(4.40)	(3.47)
Chief × Placebo Chief					11.6**	2.98
					(4.51)	(3.43)
Chief × Placebo Leader					−2.79	1.93
					(4.51)	(4.04)
Locality	Town	Village	Town	Village	Town	Village
Control Mean	32.3	33.9	32.3	33.9	32.3	33.9
Observations	2,153	2,076	2,153	2,076	2,153	2,076
R^2	0.021	0.028	0.038	0.021	0.038	0.019

Table A18: Effects of Authority Message and Placebo Authority on Public Goods Contribution (Audio-Augmented Game First, then Placebo Game)

	% funds contributed to public pot in the audio-augmented game series					
	(1)	(2)	(3)	(4)	(5)	(6)
Governor	2.59	−4.90	4.03*	−2.83	3.37	−2.80
	(2.69)	(3.69)	(2.03)	(2.43)	(2.16)	(2.38)
Chief	0.282	4.86*	0.524	4.46*	−5.84	−1.79
	(2.43)	(2.63)	(2.22)	(2.55)	(4.53)	(3.21)
Leader	−0.072	1.42	1.07	5.20	0.247	1.03
	(2.19)	(2.61)	(3.67)	(4.71)	(2.16)	(2.56)
Placebo Governor	−4.26	−2.90	−4.07	−1.13	−4.23	−3.21
	(3.15)	(3.06)	(2.82)	(2.40)	(2.54)	(2.70)
Placebo Chief	−3.70	−3.84	1.14	−1.99	−6.56**	−5.84**
	(3.01)	(3.39)	(2.77)	(2.89)	(2.75)	(2.90)
Placebo Leader	2.20	−1.05	−0.166	2.35	1.02	−1.11
	(2.60)	(3.19)	(2.36)	(2.82)	(2.65)	(3.09)
Governor × Placebo Governor	3.76	3.30				
	(5.54)	(6.03)				
Governor × Placebo Chief	1.53	−0.442				
	(4.10)	(5.01)				
Governor × Placebo Leader	−1.66	5.14				
	(4.01)	(4.46)				
Leader × Placebo Governor			3.93	−2.87		
			(5.57)	(6.13)		
Leader × Placebo Chief			−11.0**	−6.40		
			(4.18)	(6.04)		
Leader × Placebo Leader			2.97	−5.71		
			(4.10)	(5.95)		
Chief × Placebo Governor					6.43	6.31
					(5.86)	(3.98)
Chief × Placebo Chief					17.1***	10.6**
					(6.28)	(4.23)
Chief × Placebo Leader					3.14	7.21
					(6.56)	(5.18)
Locality	Town	Village	Town	Village	Town	Village
Control Mean	33.6	32.6	33.6	32.6	33.6	32.6
Observations	1,240	1,154	1,240	1,154	1,240	1,154
R^2	0.027	0.038	0.051	0.039	0.043	0.041

Table A19: Effects of Authority Message and Placebo Authority on Public Goods Contribution (Placebo Game First, then Audio-Augmented Game)

	% funds contributed to public pot in the audio-augmented game series					
	(1)	(2)	(3)	(4)	(5)	(6)
Governor	2.60	−7.21	2.22	0.314	1.21	0.229
	(3.14)	(4.59)	(2.00)	(2.56)	(2.11)	(2.55)
Chief	−1.17	−0.617	−0.960	−0.560	0.515	1.46
	(2.71)	(2.33)	(2.55)	(2.41)	(4.55)	(4.25)
Leader	7.16**	−0.623	−0.851	3.21	6.33**	−0.653
	(2.77)	(2.21)	(4.23)	(3.94)	(2.73)	(2.21)
Placebo Governor	−0.746	−1.59	−2.67	4.11	−1.58	2.02
	(2.40)	(2.91)	(2.21)	(3.40)	(1.96)	(3.22)
Placebo Chief	0.976	−3.39	0.002	−0.754	−0.417	−0.706
	(3.03)	(2.37)	(2.56)	(2.83)	(2.96)	(2.45)
Placebo Leader	1.26	−0.476	−1.51	4.30	3.95*	4.47
	(2.70)	(2.16)	(2.27)	(2.64)	(2.19)	(2.82)
Governor × Placebo Governor	−4.18	13.3**				
	(5.29)	(5.05)				
Governor × Placebo Chief	−1.54	3.42				
	(5.39)	(5.50)				
Governor × Placebo Leader	1.24	13.0**				
	(4.47)	(6.25)				
Leader × Placebo Governor			6.74	−7.47		
			(6.35)	(5.75)		
Leader × Placebo Chief			5.64	−3.33		
			(7.12)	(3.96)		
Leader × Placebo Leader			13.0**	−4.27		
			(5.42)	(4.88)		
Chief × Placebo Governor					0.181	1.51
					(5.73)	(6.01)
Chief × Placebo Chief					4.84	−4.21
					(6.22)	(5.37)
Chief × Placebo Leader					−9.04*	−4.93
					(5.34)	(5.50)
Locality	Town	Village	Town	Village	Town	Village
Control Mean	30.5	35.3	30.5	35.3	30.5	35.3
Observations	913	922	913	922	913	922
R^2	0.057	0.044	0.071	0.022	0.076	0.023

Table A20: The effects of state expansion by number of towns split in chiefdoms

	Number of Administrative Personnel (1)	Number of Security Personnel (2)	Tax Office (Fiscal) (3)	State Court (Legal) (4)	Police Station (Security) Industries (5)	Tax Collection Effort on Transfer (6)	Inter-governmental Exists (7)	Organizational Chart (8)	Land Ownership by State (9)	Land Ownership by Chief (10)
Population Discontinuity	12.43	31.81	13.56	12.28	46.87	4.330	45.28*	−18.95	12.21	−46.96**
	(7.509)	(21.18)	(22.78)	(17.83)	(28.82)	(20.92)	(26.41)	(29.84)	(7.742)	(19.74)
Population Discontinuity × Towns Split	−1.950	0.8628	0.4127	−0.8134	1.708	−2.376	0.9942	1.058	−1.593	6.880
	(1.328)	(2.894)	(3.610)	(3.871)	(6.768)	(6.195)	(6.181)	(6.718)	(1.448)	(4.746)
b2 + b3	−1.982 **	0.064	−3.94 **	0.99	4.865 **	−2.574	8.581 **	4.122 **	−2.615 **	0.204
se1	(1.07)	(2.052)	(2.964)	(3.013)	(5.101)	(4.028)	(4.777)	(4.787)	(1.212)	(3.23)
b1 + b2 + b3	10.444 **	31.873 **	9.623	13.265 **	51.733 **	1.756	53.862 **	−14.827	9.592 **	−46.761 **
se1	(6.766)	(20.916)	(21.131)	(16.953)	(26.379)	(18.389)	(24.375)	(28.621)	(7.29)	(18.952)
Mean Dep. Var	7.660	13.89	14.93	8.960	47.01	89.55	29.85	50.75	9.840	60.78
Observations	94	94	94	94	94	94	94	94	94	94
R^2	0.061	0.218	0.049	0.016	0.116	0.022	0.140	0.049	0.128	0.078

	Land Dispute Resolution by State (1)	General Dispute Resolution by State (2)	State Should Collect Taxes (3)	Bribe Incidence to State (4)	Formal Incidence (5)	Land Dispute Resolution by Chief (6)	General Dispute Resolution by Chief (7)	Chief Should Collect Taxes (8)	Bribe Incidence to Chief (9)	Informal Incidence (Salongo) (10)
Population Discontinuity	49.12***	55.92***	5.625	12.59	20.97	−49.38***	−53.96***	−21.96	−9.082	−27.70**
	(16.93)	(15.92)	(15.35)	(9.096)	(14.15)	(17.11)	(16.65)	(16.36)	(10.59)	(11.51)
Population Discontinuity × Towns Split	−1.749	−3.981	0.3860	1.843	−0.0112	1.823	5.334	−1.792	2.413	−0.0024
	(3.177)	(3.350)	(4.254)	(1.532)	(2.913)	(3.802)	(3.941)	(3.818)	(2.268)	(2.589)
b2 + b3	−3.092 **	−4.285 **	−5.753 **	−0.097	−1.874 **	1.072	4.311 **	4.07 **	−1.68 **	-2.08 **
se1	(3.037)	(2.893)	(2.821)	(1.254)	(2.319)	(2.839)	(2.793)	(2.965)	(1.808)	(2.322)
b1 + b2 + b3	46.031 ***	51.632 ***	−0.128	12.489 **	19.096 **	−48.311 ***	−49.654 ***	−17.894 **	−10.763 **	−29.778 ***
se1	(15.192)	(14.631)	(14.314)	(8.576)	(13.462)	(15.93)	(15.852)	(15.239)	(9.587)	(10.99)
Mean Dep. Var	18.84	26.40	70.62	10.17	27.52	65.30	58.86	42.72	26.21	87.70
Observations	752	752	752	752	752	752	752	752	752	748
R^2	0.127	0.081	0.055	0.021	0.036	0.078	0.058	0.040	0.030	0.038

Notes:

Table A21: The effects of state expansion on development by presence of state mayor

	il_asset (1)	il_land (2)	primary (3)	tertiary (4)	eval_1 (5)	eval_2 (6)
Population Discontinuity	-0.0275	-0.1059	-0.0656	0.0746	-0.4808	-0.4281
	(0.0403)	(0.0677)	(0.0787)	(0.0639)	(0.3908)	(0.5895)
State Mayor	0.0134	-0.0109	-0.0400	0.0212	0.2895	-0.5579
	(0.0353)	(0.0198)	(0.1001)	(0.0909)	(0.5077)	(0.6621)
Population Discontinuity × State Mayor	-0.0671	0.0217	0.0108	0.0633	-0.2358	0.7296
	(0.0457)	(0.0400)	(0.1184)	(0.1048)	(0.6198)	(0.7711)
Mean Dep. Var	0.4400	0.3500	0.8300	0.1500	-0.3900	3.150
b2 + b3	-0.054 **	0.011	-0.029	0.084 **	0.054	0.172
se1	(0.029)	(0.035)	(0.063)	(0.052)	(0.356)	(0.395)
b1 + b2 + b3	-0.081 **	-0.095 **	-0.095 **	0.159 **	-0.427 **	-0.256
se1	(0.043)	(0.061)	(0.084)	(0.085)	(0.538)	(0.709)
Observations	752	752	752	752	748	749
R^2	0.038	0.018	0.012	0.013	0.006	0.009

Notes:

Table A22: The effects of state expansion on development by presence of state mayor

	nla20 (1)	economy_industry (2)	z_educ (3)	z_infr (4)	pg_state (5)	pg_chief (6)
Population Discontinuity	-0.1542	0.0051	0.3055	0.0159	0.3580***	-0.0689*
	(0.1820)	(0.0992)	(0.1890)	(0.2123)	(0.1085)	(0.0384)
State Mayor	-0.0516	-0.0281	0.1266	-0.2657***	0.0502	-0.0259
	(0.1009)	(0.0482)	(0.1987)	(0.0878)	(0.0597)	(0.0183)
Population Discontinuity × State Mayor	-0.0883	-0.1041	-0.2184	0.0796	-0.2165*	0.0212
	(0.1428)	(0.0712)	(0.2615)	(0.1479)	(0.1108)	(0.0238)
Mean Dep. Var	1.150	0.1900	2.030	1.240	0.3300	0.0200
b2 + b3	-0.14 **	-0.132 **	-0.092	-0.186 **	-0.166 **	-0.005
se1	(0.101)	(0.052)	(0.17)	(0.119)	(0.093)	(0.015)
b1 + b2 + b3	-0.294 **	-0.127 **	0.214 **	-0.17 **	0.192 **	-0.074 **
se1	(0.169)	(0.094)	(0.286)	(0.195)	(0.14)	(0.038)
Observations	94	94	94	94	94	94
R^2	0.023	0.113	0.127	0.113	0.153	0.039

Notes:

Table A23: The effects of state expansion on development

A. The effects on indicators of economic development at the household level

	Household Asset (1)	Household Electrification (2)	Land Ownership (3)	Livestock Ownership (4)	Agricultural Occupation (5)	Merchant Occupation (6)
Fitted state entry	7.730	20.95	−7.332	7.619	16.03	12.38
	(6.881)	(18.02)	(13.21)	(18.62)	(20.26)	(9.918)
Mean Dep. Var	52.46	36.57	93.66	79.66	56.53	9.140
Observations	760	760	760	760	760	760
R^2	0.302	0.273	0.035	0.071	0.077	0.044

B. The effects on indicators of economic development at the locality level

	Nightlights Density (1)	Nightlights Growth (2)	Market per 1000 people (3)	School per 1000 people (4)	Health Ctr. per 1000 people (5)	Primary Sect. Economy (6)
State entry	−0.5927	−28.91	0.0437	0.5244	−0.0261	−12.06
(Fitted)	(0.8489)	(30.67)	(0.0452)	(0.5670)	(0.0861)	(12.97)
Mean Dep. Var	1.150	23.12	0.0400	0.6400	0.1800	74.58
Observations	95	95	95	95	95	95
R^2	0.137	0.075	0.261	0.147	0.425	0.387

Notes: This table presents the estimates of β_2 coefficients from Equation A26 which regresses outcomes indicated on table header on town designation, which is instrumented by the population discontinuity. The regressions include the 2005 population as running variable, its interaction with population discontinuity, and pre-treatment geographic covariates as control. The sample in Panel A is household respondents in localities which satisfied our sample inclusion detailed in Subsection C, while that in panel B is the localities which satisfied sample inclusion. Panel A presents the effects of state expansion on development outcomes at the household level. The dependent variables are composite index of household asset wealth, which linearly combines house roof and building materials, type of toilet, type of water source for drinking, type of water source for washing, normalized to 0-100 (Column 1); household electrification is a dummy variable times 100 if household is electrified (through central grids or micro-grids) (Column 2); land ownership is a dummy variable times 100 if household owns land for agricultural or commercial use (Column 3); livestock ownership is a dummy variable times 100 if household owns livestock (Column 4); agricultural/merchant occupation is a dummy variable times 100 if household reported being a farmer/agricultural worker (Column 5) or a merchant/trader as primary source of household income (Columns 5 and 6). Panel B presents the effects of state expansion on development at the locality level. The dependent variables are nightlights density in 2020 (intensity per square km) obtained from buffer of radius 10km from the locality centroid (Column 1); nightlights growth is the amount that nightlights has grown in the locality buffer from 2012 to 2020 (Column 2); market/school/health centers per 1000 people are the number of said establishments per 1000 people living in the locality as an indicator of economic access from the trade/commercial, educational, and human capital perspectives (Columns 3, 4, and 5); primary sector economy is the percentage of population in the locality employed in agriculture, forestry, fishing, and husbandry (Column 6). Standard errors are clustered at the locality level.

Table A24: The effects of state expansion on contribution to public goods game

	% funds contributed to public pot upon hearing randomized audio message								
	(1)	(2)	(1)−(2)	(3)	(4)	(3)−(4)	(5)	(6)	(5)−(6)
Governor	1.38	0.496	[0.881]	1.14	0.449	[0.690]	.	0.777	[−0.859]
	(1.26)	(1.94)	(2.31)	(1.22)	(1.95)	(2.29)	(.)	(1.95)	(2.26)
Chief	0.3	2.58	[−2.28]	0.35	2.68	[−2.33]	.	2.68	[−2.71]
	(1.39)	(1.86)	(2.33)	(1.39)	(1.88)	(2.32)	(.)	(1.76)	(2.25)
Leader	2.41	2.16	[0.242]	1.59	1.45	[0.141]	.	4.00**	[−2.37]
	(1.64)	(2.15)	(2.70)	(1.51)	(2.14)	(2.67)	(.)	(1.84)	(2.26)
Observations	4,229	4,229	4,229	4,229	4,229	4,229	4,229	4,229	4,229
R^2	0.006	0.006	0.006	0.028	0.028	0.028	0.212	0.212	0.212
State Entry	Yes	No	Δ	Yes	No	Δ	Yes	No	Δ
Province FE				✓	✓				
Locality FE							✓	✓	

Notes: This table presents the estimates of the interaction effects between population discontinuity and type of randomized leader message, from Equation $Y = \beta_0 + \beta_1 \times c + \beta_2 \times Governor + \beta_3 \times c \times Governor + \beta_4 \times Mwami + \beta_5 \times c \times Mwami + \beta_6 \times Leader + \beta_7 \times c \times Leader + \beta_8 \times population + \beta_9 \times c \times population + X'\Gamma + \epsilon$.

Figure A15: Alignment in Public Goods Priorities between Towns and Agglomerations

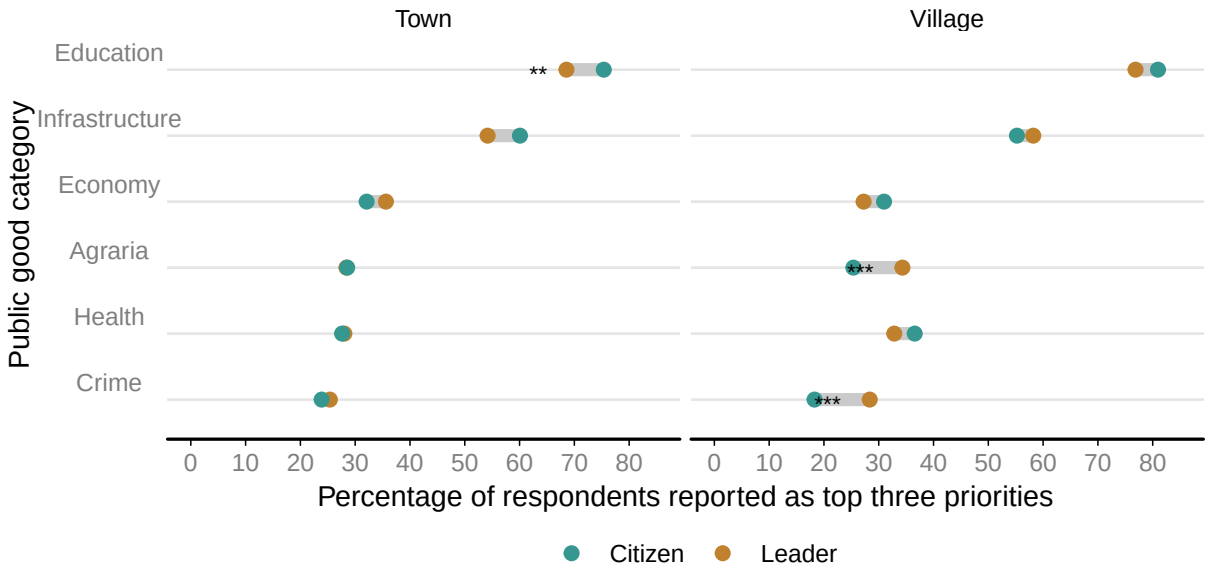


Table A25: Effect of State Expansion on Trust

	Central Govt. (1)	Provincial Govt. (2)	Territory Govt. (3)	Police (4)	Army (5)	Courts (6)	Chief (7)	Leader (8)	Governor (9)
Population Discontinuity	0.3228 (0.5435)	0.1113 (0.3962)	-0.4215 (0.4111)	-0.0573 (0.4427)	-0.0029 (0.7046)	0.1183 (0.5613)	-0.0772 (0.5520)	-0.7504 (0.4826)	-0.1420 (0.4760)
Mean Dep. Var	5.350	5.240	5.570	5.130	5.390	4.240	6.090	6.440	5.050
Observations	750	752	751	736	676	658	745	749	750
R^2	0.123	0.124	0.068	0.086	0.099	0.116	0.148	0.116	0.120

Table A26: Effect of State Expansion on Perception, Land Ownership, and Time Horizon

	Leader Mgmt (1)	Vill Chief Mgmt (2)	Governor Mgmt (3)	Chief Mgmt (4)	land_own (5)	land_state (6)	land_chief (7)	timehz_state (8)	timehz_chief (9)	timehz_popul (10)
Population Discontinuity	-0.5333 (0.3910)	-0.5644* (0.3343)	-0.2972 (0.4930)	-1.055* (0.6063)	-34.75** (15.74)	3.057 (4.454)	2.548 (9.781)	7.401 (10.67)	-13.43 (10.32)	4.874 (9.945)
Mean Dep. Var	6.310	6.020	4.890	5.850	43.13	4.130	12.68	52.33	32.37	15.11
Observations	747	531	722	745	734	734	734	752	752	752
R^2	0.216	0.198	0.181	0.176	0.149	0.160	0.176	0.373	0.269	0.198

Table A27: Effect of State Expansion on Leader Ability to get Things Done (Self-Report)

	quant_long_score_1	quant_long_score_2	quant_long_score_3
	(1)	(2)	(3)
Population Discontinuity	0.7626	-0.2389	-0.3850
	(0.5523)	(0.5417)	(0.5648)
Mean Dep. Var	5.070	5.220	5.380
Observations	375	371	362
R^2	0.260	0.220	0.245

Appendix I. References

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