Can Rural Property Tax Generate Revenue? A Simple Accounting Exercise in Sierra Leone*

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How should governments in sub-Saharan Africa boost own-source revenue? Currently, governments in Sub-Saharan Africa rely heavily on indirect taxes, relative to their counterparts in richer countries. Between 2010 and 2020, governments in sub-Saharan Africa, on average, raised nearly twice as much tax revenue from indirect taxes (9.3%) as they did from direct taxes (5%).[1] Whereas, between 2010 and 2020, governments in rich countries, on average, raised roughly the same amount of revenue from both direct and indirect taxes (11% of GDP from both sources).[2] A key component of direct tax revenue in rich countries is property tax, which accounted for roughly 10% of direct taxes between 2010 and 2020.[3] In contrast, property tax revenue is marginal in sub-Saharan Africa. For the 27 (of 48) countries where at least one year of property tax revenue data is available between 2010 and 2020, property tax revenue is equals 0.13% of GDP, accounting for roughly 2.6% of direct taxes on average. Note that this likely overestimates average property tax revenue across the continent, as the 21 countries with missing property tax revenue in the GRD dataset likely generate below average property tax revenue.

To the extent that governments in Africa currently collect property tax, they focus on urban centers and scholarly attention primary has been devoted to the urban context (e.g., Brockmeyer et al., 2021; Weigel, 2020; Knebelmann et al., 2023). There is a clear logic for prioritizing urban centers: they contain higher-value properties that are more densely concentrated than rural areas, presumably increasing the return and lowering the cost of collection for each property. However, that property tax might be more efficiently collected in urban centers, compared to rural areas, does not imply that property tax *should not* be collected in rural areas. In this research note, I explore policymakers decision to expand property taxation into rural areas in the context of developing countries.

A policymaker weighing the costs and benefits of rural taxation must first consider the potential net revenue that can be extracted from rural areas. Ultimately, this is an empirical question that requires reliable data on the costs and potential revenue associated with rural taxation. Unfortunately, little such reliable data exists. In this project, I seek to fill this gap by measuring village-level costs and potential revenue associated with property taxation in rural Sierra Leone (Kono District).[4] The primary variable cost associated with rural tax collection in this context is tax collector transportation costs. I estimate village-level travel costs by obtaining quotes from motorbike drivers on the travel cost between a tax collector's residence and the set of villages for which a given collector is responsible. I estimate village-level potential revenue with data on the number and type of building structures in each village. I investigate potential revenue under several scenarios through simulation exercises.

[1] Indirect taxes include taxes on goods and services and taxes on international trade. Direct taxes refer taxes on income, payroll taxes, and taxes on property.

[2] Calculations made by the author using the UNU-WIDER Government Revenue Dataset (Version 2021). I use variables for direct and indirect revenue that excluded social contributions and resource revenue. For each country, I average across available data for years between 2010 and 2020. "Rich countries" refers to the set of "high-income" in the World Bank's income group classification.

[3] Again, calculated by author. Averaging across country averages using available data for high-income countries.

[4] Rural, in this context, implies the set of villages and small towns outside of the district HQ town of Koidu. There is no connection to the electricity grid, or piped water. There are no paved roads and roads infrastructure is bad, and often terrible. I consider a set of 1139 towns and villages across Kono District; the largest town has 841 building structures; the median town/village has 17. The 75th and 25th percentile towns have 33 and 8 buildings, respectively.

Based on a set of simulations, I find that property tax in poor, sparsely populated rural areas can generate positive net revenues. While these gains are modest—maximum net revenue under full compliance is $94,171 in my baseline model—they can provide a meaningful source of local government revenue in a context where incomes are near the bottom of the global distribution and where there are potentially large returns to government spending. For example, while revenue from rural property tax is will be insufficient to undertaken large-scale infrastructure development, local government could use revenue to complement and maintain development projects implemented by central government or NGOs.

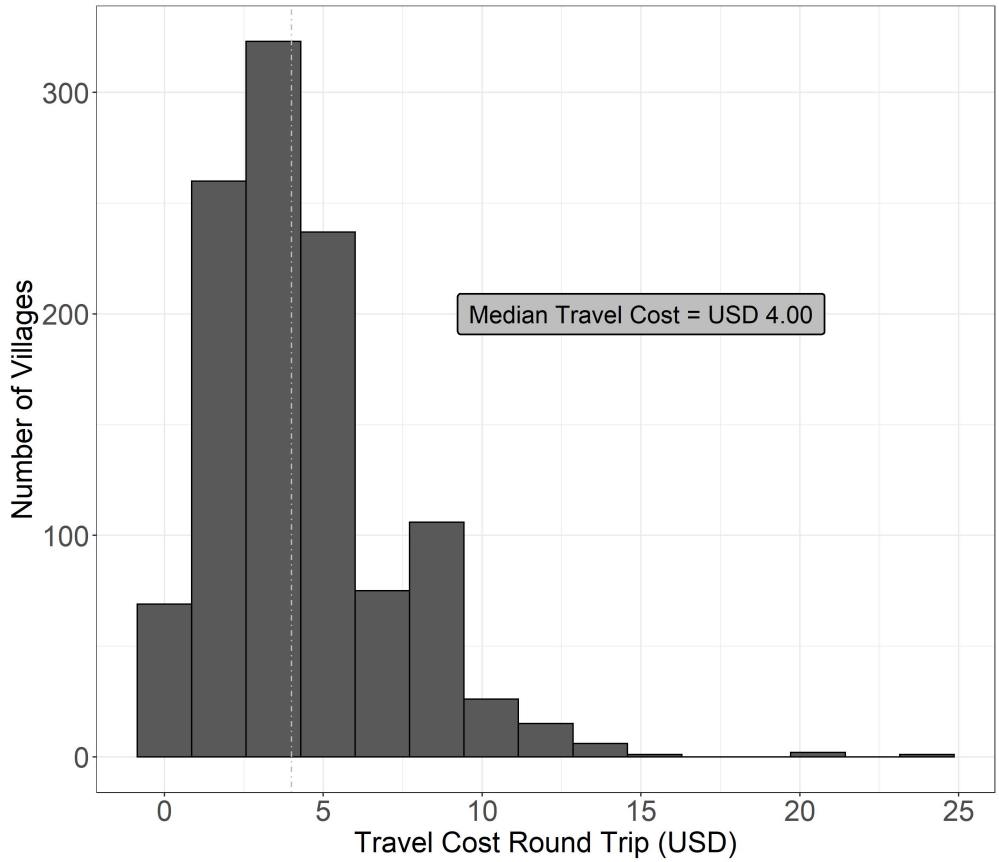
These simulations also highlight several features of rural tax collection. First, to increase net revenue, policymakers should prioritize increasing compliance over reducing collection costs. While both compliance rates and collection costs are clearly central factors determining net revenue, I argue that compliance is more important: simulations show that maximum (and unrealistic) efficiency gains in tax collectors' travel behavior (i.e., reductions in travel cost) increase net revenue by the same magnitude as a 15% increase increase in tax compliance; Various policy interventions have been shown to increase compliance by that magnitude (e.g., Balan et al., 2022; Okunogbe et al., 2021; Khan et al., 2019). Second, I show that much of the revenue generated from rural taxation is likely to come from a small subset of the total villages. This is both because *potential* revenue is concentrated, but also because many small villages are not visited at all: in the status quo collection scheme where tax collectors pay their own transport and keep a portion of the collected revenue (i.e., pay-for-performance), the majority of villages will not be visited by tax collectors because it is uneconomical to do so. Third, I highlight several trade-offs between salary-based and pay-for-performance (PFP) models of tax collector compensation. When compliance rates and monitoring costs are held fixed, salary-based compensation models outperform PFP methods. This is because PFP collectors elect not to visit many villages, even if doing so would generate positive net revenue for the government. That is, PFP compensation concentrates the tax burden, relative to salary-based collector compensation. Yet, PFP is still likely preferable in low capacity settings, as they require less monitoring and likely lead to higher compliance rates. Hybrid compensation models may be the best option for policymakers looking to balance collection efficiency with concerns about the distribution of the tax burden.

I conclude by situating these results in policymakers broader calculus for taxing rural areas. Efficiently extracting resources from rural areas may not be the only, or even the primary, motivation for taxing them. The decision of if, and how, to tax rural areas may impact citizens' perceptions about the fairness of the tax system, thereby affecting compliance rates in both rural and urban areas. If this is the case, counter-intuitively, taxing rural areas may a pro-poor policy, generating additional revenue elsewhere to be plowed into rural development. Moreover, policy-makers also face state-building motivations for taxing rural areas, where taxation serves the broader function of legitimating state institutions, which may help state leaders achieve their other policy objectives.

Estimating Tax Collection Travel Costs

In 2018, the Kono District Council (KDC) initiated a tax reform aimed at systematically collecting property taxes on residential buildings in rural areas for the first time. In 2021, as in prior years, tax collection was done in person. The KDC has divided the district in 27 tax zones, with a single resident collector being responsible for collecting property tax in each tax zone. Under the status quo collection scheme, tax collectors are responsible for providing their own transportation to villages to collect taxes—the local government provides neither motorbikes nor upfront financing. As such, most collectors hire motorbike taxis when traveling to and from villages during tax collection. With this in mind, I compiled a dataset of tax collection travel costs by recording the price of a motorbike taxi from each tax collectors' residence to each village in their tax zone. To do this, I had a research assistant visit the "bike park"—a place where motorcycle taxis gather to wait for customers—closest to each tax collectors' residence and ask the price to visit each of the villages in the tax zone. Figure 1 presents a histogram of these travel costs. We collect this data for all tax zones except the four tax zones in Nimikoro chiefdom, where tax collectors were not named in 2021; these tax zones are therefore not included in this analysis. Of the remaining 1138 villages, I was able to obtain travel cost estimates for all but 17. I drop these villages from the analysis.[5]

Figure 1: Distribution of Travel Costs From Collectors' Residence to Each Village in Tax Zone



[5]It is important to note that the cost of visiting a given village to collect taxes is not necessarily the full cost from the collector's residence to that village—a collector could visit multiple villages in the same day. I analyze and discuss this possibility.

Estimating Village-level Potential Revenue

This section describes my strategy for estimating potential property tax revenue in 1,121 rural villages in the 23 tax zones in Kono that had tax collectors assigned in 2021.[6] In 2021, building were classified as one of nine types, each with its own tax rate. Appendix Table 1 maps each building type to its 2021 tax rate. As the village potential revenue is simply the sum of the tax rate levied on each building in a given village, we could calculate village-level potential revenue by observing the number of building in each of the nine building categories in each village. In reality, I do not have such fine-grained data for all villages. Instead, I combine three sources of data to estimate village-level potential revenue.

1. *2021 Tax Collector Potential Revenue Assessment:* Tax collectors were instructed to complete this assessment in all villages that they visited for tax collection, though the completion percentage was less than 100%. In 2021, this assessment was completed in 128 villages. For the assessment, the tax collector counted the number of building that fall under each of the nine housing categories, before commencing tax collection. This allows me to exactly calculate potential revenue in villages where I have this data.
2. *2019 Tax Collector Potential Revenue Assessment:* Tax collectors also completed a potential revenue assessment in 2019. In the 2019 assessment (and tax season), there were only four categories of housing type: (i) wattle house, (ii) mud brick house, (iii) concrete house, and (iv) multi-story house. In this survey, tax collectors count the number of buildings that fall under each of these four housing categories. I have data from this assessment in an additional 217 villages, beyond the 128 villages where I have the 2021 assessment data.
3. *2015 National Census data:* In villages where I do not have data from either the 2021 or 2019 potential revenue assessment, I rely on data from the 2015 National Census. Census data contain a measure of the number of building structures in each community. Unfortunately, census data does not contain information about the type of building structure.

For villages where I have the 2021 assessment, I exactly calculate potential revenue.[7] For villages where I have data from a 2019 assessment, but no 2021 assessment, I estimate 2021 potential revenue by reweighing 2019 assessment data. As noted above, the 2019 assessment categorizes building into one of four possible structure types, rather than the nine structure categories used in 2021. However, the nine categories for 2021 fit within the four housing categories used in 2019. For example, a building recorded as "mud house" in the 2019 assessment may have either a thatched or zinc roof, which would imply different tax rates in 2021. In these cases, I estimate the 2021 tax rate as the sum of the possible tax rates times the proportion of buildings in each category in the 2021 tax assessment. For example, in the 2021 assessment, 69% of mud houses had zinc roofs and 31% had thatch roofs. Therefore, I use 26,900 SLL (0.69*30,000 SLL + 0.31*20,000 SLL) as the potential revenue for a house listed as "wattle house" in the 2019 tax collector survey. In villages

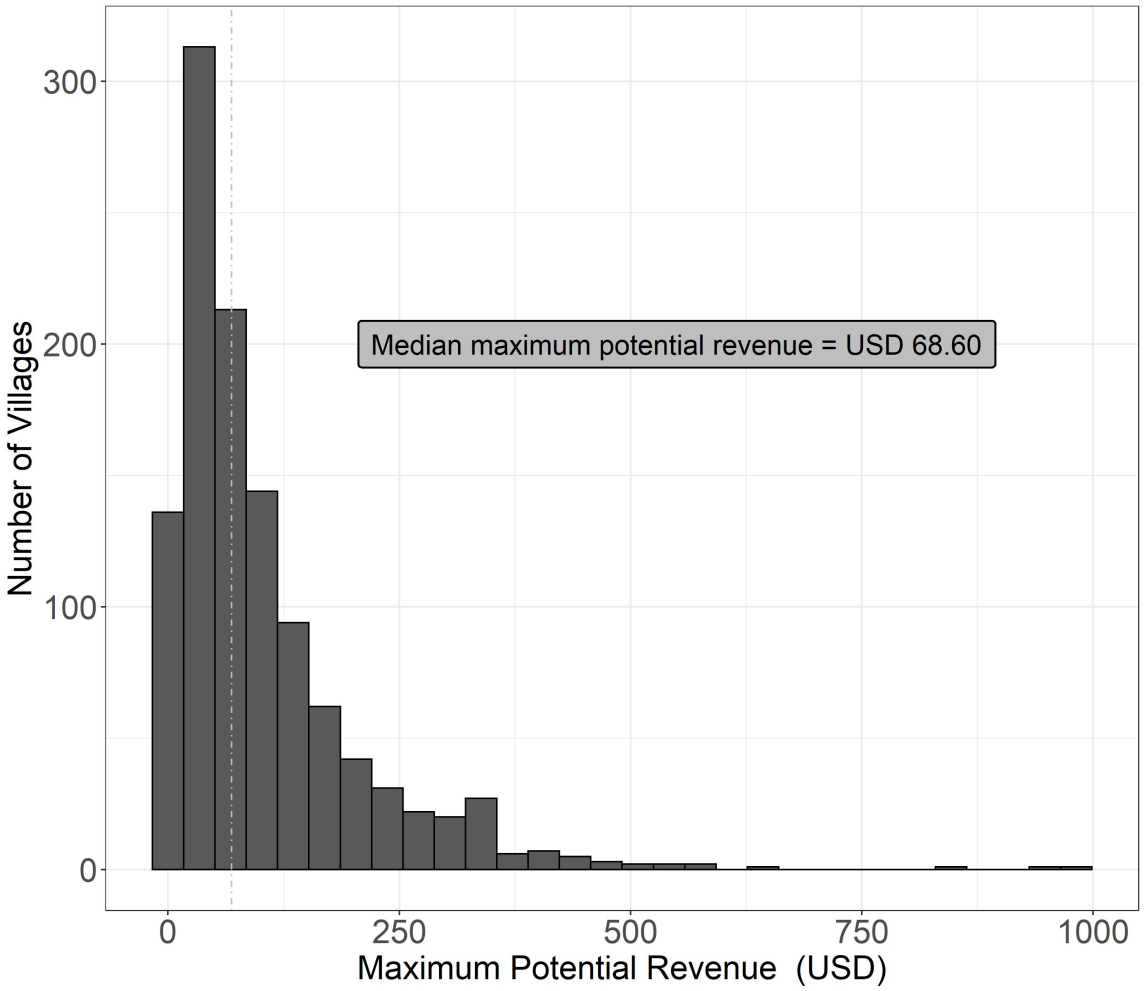
[6] Recall that tax collectors were not assigned in four tax zones in Nimikoro Chiefdom.

[7] The village potential revenue is calculated as the number of building structures in a given category, multiplied by the tax associated with that category, summing across each category.

where I have data from neither the 2019 or 2021 assessment, I rely on 2015 National Census data. As noted above, the census data contains information about the number of building structures in each village, but not the type of building. To estimate potential revenue from the census data, I multiply the number of building structures in a villages times the average potential revenue for each building (calculated from assessment data). Appendix Table 2 displays the number of villages that rely on each of the above three strategies to estimate potential revenue.

Figure 2 displays the distribution of potential revenue across villages.[8] The long right tail implies that potential revenue is fairly concentrated in a handful of major towns. For example, villages with the highest 1% of potential revenue (11 villages) contain 11.2% of the district's potential revenue; villages in the top 10% of potential revenue account for 38.3% of the district's total potential revenue. In contrast, villages that have potential revenue below the median (i.e., bottom 50% in potential revenue) account for only 15.4% of the district's potential revenue.

Figure 2: Distribution of Village Level Maximum Potential Property Tax Revenue



[8]Note that I exclude from the histogram four villages that have potential revenue above 10 million SLL: Njaiama - Sewafe (39,145,000); Yormandu (23,710,000); Kayima (13,050,000); Kombayendeh (12,810,000)

Is Positive Net Revenue Possible?

Now that we have a village-level data set of travel costs and potential revenue, how can we estimate net revenue? Net revenue is the sum of potential revenue times the compliance rate in all villages visited by tax collectors, minus the cost of collecting that revenue. In my analysis, I directly estimate, and account for, costs associated with tax collectors' compensation and transportation to villages to collect taxes. I discuss other costs (e.g., monitoring costs) and their potential magnitudes.

The status quo approach for compensating tax collectors in Kono District is to use a pay-for-performance (PFP) model, also commonly referred to as "tax farming". In this model, tax collectors pay their own travel costs, but keep a percentage of what they collect. This allows collectors to recoup their travel costs and receive compensation for their collection efforts. In 2021, tax collector kept 13% of the tax revenue they collected; I use that figure in the analysis. In practice, the PFP system functioned as follows. The collector writes a tax receipt in exchange for a cash payment from a property owner, and deposits this money in an account at a local bank in the chiefdom (called a Community Bank).[9] At the end of the tax collection season, the valuation department counts up the receipts for a given collector and pays out their 13% from the money deposited in the Community Bank account. It was agreed that collectors could use some of the collected money to finance their transportation; this would then be deducted from what they are owed at the end of the tax season.

Which villages does the tax collector visit in her tax zone? It seems naive to assume collectors will visit all villages in their zone, regardless of the costs and benefits of doing so. Under a PFP collection model, we should expect tax collectors to visit a village only if their expected take home-portion of the collected revenue outweighs the cost of traveling there.[10] Moreover, there is also an opportunity cost for collectors setting out to collect taxes in the villages—if the amount they take home barely covers their transportation costs, they might decide the day would be better spent working on their farm, or no working at all. For the analysis, I assume collectors opt not to visit villages where their net compensation is less than USD 3.[11]

Note that if the PFP collector decides to visit some villages multiple times, and increases net revenue by doing so, the costs associated with these additional trips are not faced by the government.[12] This is because the costs associated with additional visits are faced only by the collector; if the collector judges that another trip will generate sufficient revenue to cover their transportation and opportunity costs, they have incentive to make that additional trip. But the government still receives 87% of the collected revenue, regardless of

[9] Or, if no community bank exists in the given chiefdom, collectors would deposit money in the local government's account in the district capital.

[10] Note that the "take home portion of expected revenue" = compliance rate*total potential revenue*percent collector keeps.

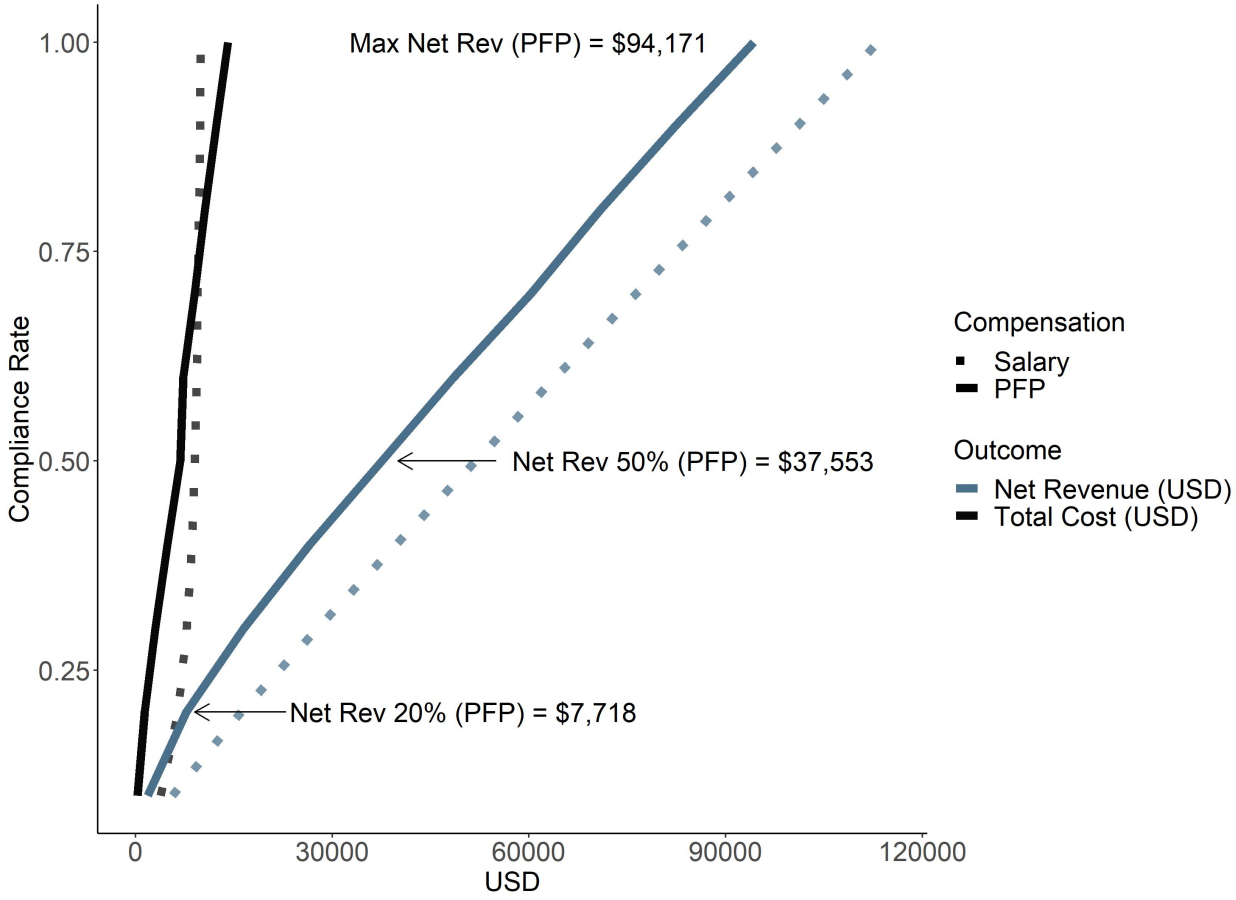
[11] This is based on the 2021 minimum wage of 600,000 SLL, equivalent to USD 60 per month (USD 3 for 20 working days). It is important to note, however, that wage work in rural areas is uncommon and almost the entire rural workforce is employed in agriculture (World Bank Poverty Assessment 2014).

[12] Why would visiting a village a second time increase compliance? It could be that the time between visits has alleviated liquidity constrains that prevented payment the first time around; alternatively, a follow-up visit may signal government capacity and increased propensity to take enforcement action. However, in a PFP model, the total net revenue received by government is not affected by the number of visits a collector makes to a given village.

how many trips the collector made.

Figure 3 presents potential net revenue estimates at a range of compliance levels. The solid blue line presents net revenue estimates from the baseline model: collectors are compensated through a PFP scheme and visit only a single village at a time, before returning home. We see that 20% compliance achieves $7,718; 50% compliance generates $37,553; and the maximum net revenue is $94,171. The solid black line represents total costs of collection.

Figure 3: Is Positive Net Revenue Possible?



While these revenue figures may appear small, this reflects the local economic context, rather than the magnitude of the tax rates. Sierra Leone is one of the poorest countries in the world, with a per capital GDP (current USD) of $461, ahead of only Burundi, Afghanistan, and Central African Republic.[13] While those figures average across rural and urban population, rural populations (the focus on this study) are poorer than city dwellers—for example, poverty rates in rural Sierra Leone are three times higher than in urban areas (60% vs. 20%).[14] Indeed, a 2013 survey in rural Sierra Leone estimated average household income at $200 (Van den Boogaard et al., 2019). Given the average property tax rate of $4.13, this suggests that property tax

[13] According to the World Bank.
[14] World Bank Policy and Equity Brief 2020

rates are roughly 1 to 2 percent of household income, which is similar to median property tax rates in some states in the US. In the United States, the median property tax paid in the median state ($2,447 in Ohio) is 3.9% of median income ($61,938); in other states, the ratio of property tax to household income is closer to Kono. For example, the median property tax paid in South Carolina is 1.8% median household income.[15]

On the one hand, these estimates may be optimistic, as several costs are not accounted for. First, I do not consider the cost of transmitting tax demands. If this is done with in-person delivery, the costs will be non-negligible. I estimate the upper bound cost associated with transmitting tax demands at $5,676, which is the total cost of a government agent, salaried at $5 per day, visiting all villages, assuming they visit two villages at a time.[16] More realistically, a delivery team could likely visit three times as many villages per day, and a delivery cost of under $2,000 seems more reasonable. Still, this presents a significant upfront cost and local councils should consider more cost-effective methods of making tax demands. One strategy would be to collaborate with other government agencies to communicate with property owners. For example, the National Election Commission maintains a database of registered voters that contains contact information. Another strategy would be to work with Chiefdom Councils to obtain the phone numbers of all village chiefs in the district and inform these chiefs of the tax liability structure through phone calls and follow-up texts. Of course, it would have to be determined that these are legally viable way of transmitting tax demands.[17]

Second, supervision costs are not considered. In a PFP model, the purpose of monitoring is not to prevent shirking—tax collectors have monetary incentive to collect revenue—but rather to discourage collusion and tax collector abuse. Monitoring would take the form of village visits ("spot-checks") from valuation clerks at the local council; the goal of these visits would be to look for signs of collusion and receive any complaints against the collector.[18] The valuation clerks who would conduct these spot checks are already salaried at local government and the valuation department has motorbikes for this purpose. Therefore, the cost associated with these spot-checks is fuel cost. With fuel less than $1 per liter, assuming an average of 5 liters per visited village, 100 villages could be spot-checked for under $500.

On the other hand, these estimates may be conservative. First, all else equal, governments can increase net revenue by paying collectors a salary (dot-dash lines in Figure 3), rather than relying on PFP compensation: at a 50% compliance rate, net revenue with salary-based collectors is 38.1% higher. This is because a PFP compensation model strongly limits the number of villages visited by tax collectors, relative to salary-based compensation models. If government offers collectors a salary, government has discretion over where a

[15] South Carolina pays the fifth least property tax of the 50 US states ($1,024) and has a median household income of $58,234. Massachusetts, by contrast, pays the fifth most ($5,091), equivalent to 5.7% of household income ($89,026). Income and property tax rates from the US Census bureau.

[16] This is based of analyses of salary-based tax collectors.

[17] Note that the structure of tax rates—a flat rate for each of several building types—means that homeowners can easily determine their tax rate themselves, if provided the requisite information.

[18] Collusion in our context looks like this: After a tax payer has paid, the collector writes a receipt. The local government can check if the receipts add up to the total amount collected and returned by the collector. However, upon visiting a property that should pay 50,000 SLL, there is little to stop a collector from writing a receipt for 40,000 SL in exchange for a payment of 45,000 SLL, then pocketing the balance 5,000. A "spot-check" supervisory system may deter this behavior, because the supervisory team can check that property owners have paid the rate that they should have.

collector visits. To maximize revenue, government should instruct collectors to visit villages where the expected net revenue outweighs the costs of traveling to the village plus the collector's day rate. So if the travel cost to visit a village is \$5 and the tax collector is compensated with \$5 / day, the government will send the collector to visit that village if they expect revenue collected to exceed \$10.[19] By contrast, to visit that same village, a PFP collector would need to expect to collect \$61.6.[20] Simulations bare this out: at a 50% compliance rate, collectors visit 87.5% of villages in the salary-based compensation model, but only 33.8% of villages in the PPF model.

Yet, *all else equal* is a significant caveat. With a salary-based model, substantial monitoring is likely required. While it is fairly straightforward to confirm that a tax collector has at least visited a village (for example, by collecting a GPS location), it is less straightforward to ensure that the collector has actually made a serious attempt at collecting taxes. A collector looking to minimize their time investment and maximize their popularity could simply show up in a village, record a GPS location, say hello to a few friends, then leave reporting they were unable to collect any taxes and collect their day rate. Moreover, there is good evidence that PFP increases effective compliance rates (Khan et al., 2016). Finally, in a salary-based model, the government would have to pay for collectors to make additional trips to certain villages.[21] Given that the higher monitoring costs and lower compliance rates associated with salary-based collection may swamp the net revenue benefits described in Figure 3, I believe the PFP estimates are appropriate, rather than conservative.

Second, I may be making conservative assumptions regarding tax collectors' travel behavior.[22] Specifically, I calculate travel costs by assuming that tax collectors only visit one village at a time, always returning back to their resident village before making another collection trip. But many villages are close to one another and a collector can reduce their travel costs by visiting multiple villages on the same trip. This also allows them to visit more villages at a given compliance rate. Figure 4 presents results when we assume that tax collectors can visit two villages on the same trip. To make these estimates, I first place villages in pairs based on geographic proximity, and then calculate revenue and cost statistics at the pair level.[23]

The solid lines in Figure 4 show net revenue (left panel) when collectors visit only one village at a time and the dashed blue line shows net revenue when they visit villages in pairs. Unsurprisingly, net revenue is higher when collectors can visit villages in pairs; visiting villages in pairs increases net revenue by (i)

[19] A day rate salary of \$5 for tax collectors is quite competitive and is high enough to attract many interested applicants; it could likely be reduced by 20% and still attract an abundance of applicants. As noted, that is 66% higher than minimum wage.

[20] Collecting \$61.6 generates 8\$ for the collector, equaling the sum of their opportunity cost (\$3) and transport cost (\$5).

[21] I estimate the cost of visiting all villages in a salary-based model at \$5,676. Given how concentrated revenues are, and the likelihood that these larger villages are easier to reach for tax collectors, we might expect an additional trip to the top 20% of villages to cost 20% of traveling to all, which would be \$1,135.

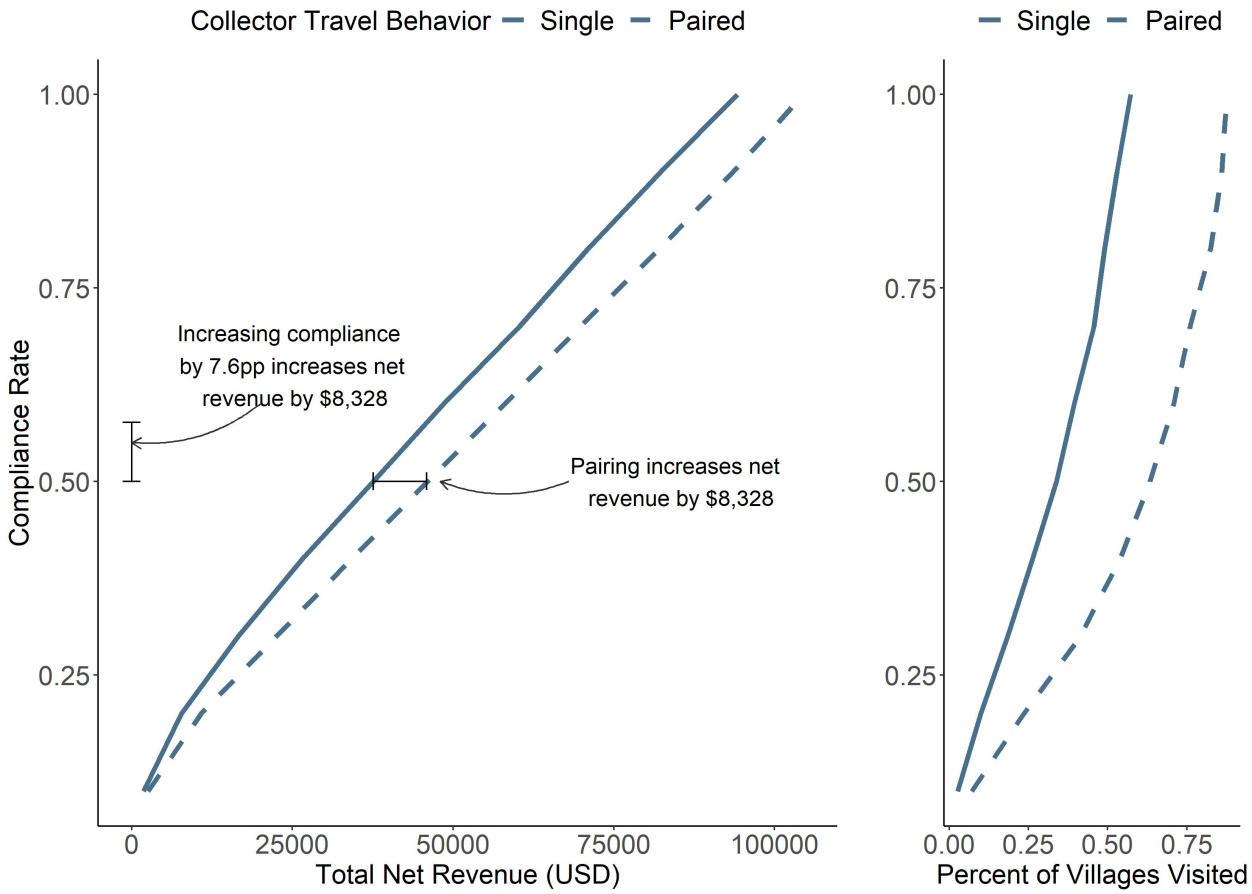
[22] There is a third way in which these estimates may be conservative. Transportation costs assume that a collector separately hires a motorbike rider for every leg of the journey. That is the status quo. But local governments could buy motorbikes outright, or rent them long-term, which would likely reduce transport costs.

[23] Specifically, I randomly select a village and pair it with the village closest to it. I then remove both villages from the data set, randomly select another village, and pair that to the most geographically proximate village. And so on. Gross revenue is the sum of the potential revenue of both villages in the pair times the compliance rate. Travel cost to a pair is taken to be the highest travel cost value in each pair. Net revenue is calculated at the pair level as pair level gross revenue minus travel cost.

reducing the average travel cost to each village visited and (ii) by increasing the number of villages that collectors decide to visit (right panel). At a compliance rate of 50%, visiting villages in pairs increases net revenue increases by $8,328 (22.1%).

Assuming that collectors visit only one village at a time may be conservative because, in PFP models, collectors have incentive to visit multiple villages in one trip if that maximizes the trip's net revenue. Yet, assuming that collectors will visit villages in pairs is likely to be overly optimistic. The best evidence for this assertion comes from a travel travel subsidy program set up by the KDC, which incentivized tax collectors to visit far-off, "hard to reach" villages. The subsidies worked: with their travel costs fully subsidized, collectors were much more likely to visit hard to reach villages. However, we found no evidence that collectors visited additional villages proximate to the one they were subsidized to visit.[24] This implies that collectors often visit villages one at a time; and that the best estimates for PFP collection likely lie nearer to the solid line than the dashed line in Figure 4.

Figure 4: Increasing Collection Efficiency Improves Compliance



While at baseline collectors are likely to visit more than one village per day, on average, it is unlikely travel

[24] More details can be found in a report written by the author about this subsidy program.

efficiency can be improved to have them visit two villages per day, on average (as is assumed with the dotted line in Figure 4). Therefore, the gap between the solid and the dotted lines is likely larger than the *maximum* net revenue gains that can be obtained by reducing travel costs associated with in-person collection. However, a similar net revenue gain can be achieved by a realistic, if impressive, jump in compliance. For example, the $8,328 net revenue generated by an extreme (and implausible) change in the efficiency of tax collectors' travel behavior, is obtained with a 7.6 percentage point increase in compliance, which represents a 15% jump over the baseline level. While those gains are impressive, they are inline with the effects of various policy interventions and should be considered achievable medium-term compliance gains.[25] There is a policy lesson here: strategies to improve the efficiency of tax collector's travel help, but not as much as strategies that boost compliance.

In summary, rural taxation can generate positive net revenue for local governments, even if in-person tax collection is undoubtedly less efficient than tax administration in rich countries. While the estimates I present in Figure 3 do not include the cost of intensive monitoring, I believe this is defensible given the compensation structure for tax collectors: PFP collectors require less monitoring. My estimates also leave out the cost of transmitting tax demands. Given the simple structure of tax rates, local governments should consider low-cost methods for communicating these rates. While my estimates show that, all else equal, salary-based compensation for collectors will increase net revenue, there are good reasons to believe that sticking with PFP compensation keeps monitoring costs down and compliance level up. Finally, policymakers may find it easier to move the needle on net revenues by focusing on taxpayer compliance, rather that tax collectors' travel efficiency.

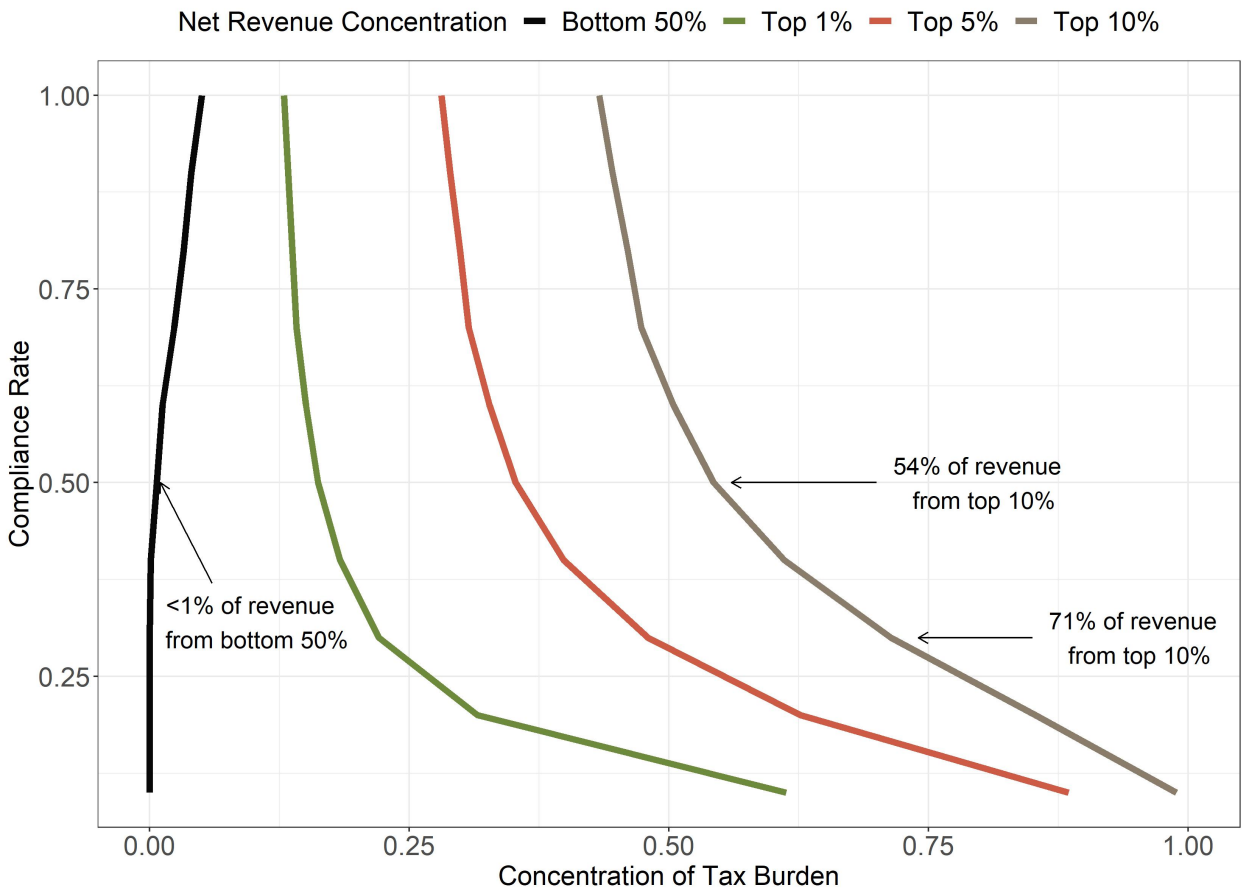
The Concentration of the Rural Tax Burden

The simple accounting exercise also reveals that revenue extraction is heavily concentrated in a subset of villages. Figure 5 visualizes this concentration, where each line presents the percent of net revenue extracted from a given subgroup, across the range of compliance levels. For example, the brown line (far right) depicts the percent of total net revenue that is extracted from villages in the top decile of potential net revenue. When compliance is 50%, this group generates 54% of the total net revenue. The tax take is more concentrated at lower compliance levels. For example, moving from 50% compliance to 30% increases the percent of net revenue generated from the top decile from 54% to 71%. The majority of villages contribute very little revenue. At full compliance, villages with below median potential revenue (i.e., "bottom 50%") contribute only 5% of the overall net revenue.[26]

[25] For example, Balan et al. (2022) report that using city chiefs as tax collectors in DRC, rather than state agents, increases collected revenue by 43%; Okunogbe et al. (2021) reports that enforcement and legibility messages sent to property owners in Liberia increases compliance rates by a factor of four; and the performance-based mechanism for bureaucratic assignment evaluated by Khan et al. (2019) increases revenues by 30-41 percent.

[26] Note that if all villages had equal potential revenue, half of the villages would contribute 50% to net revenue.

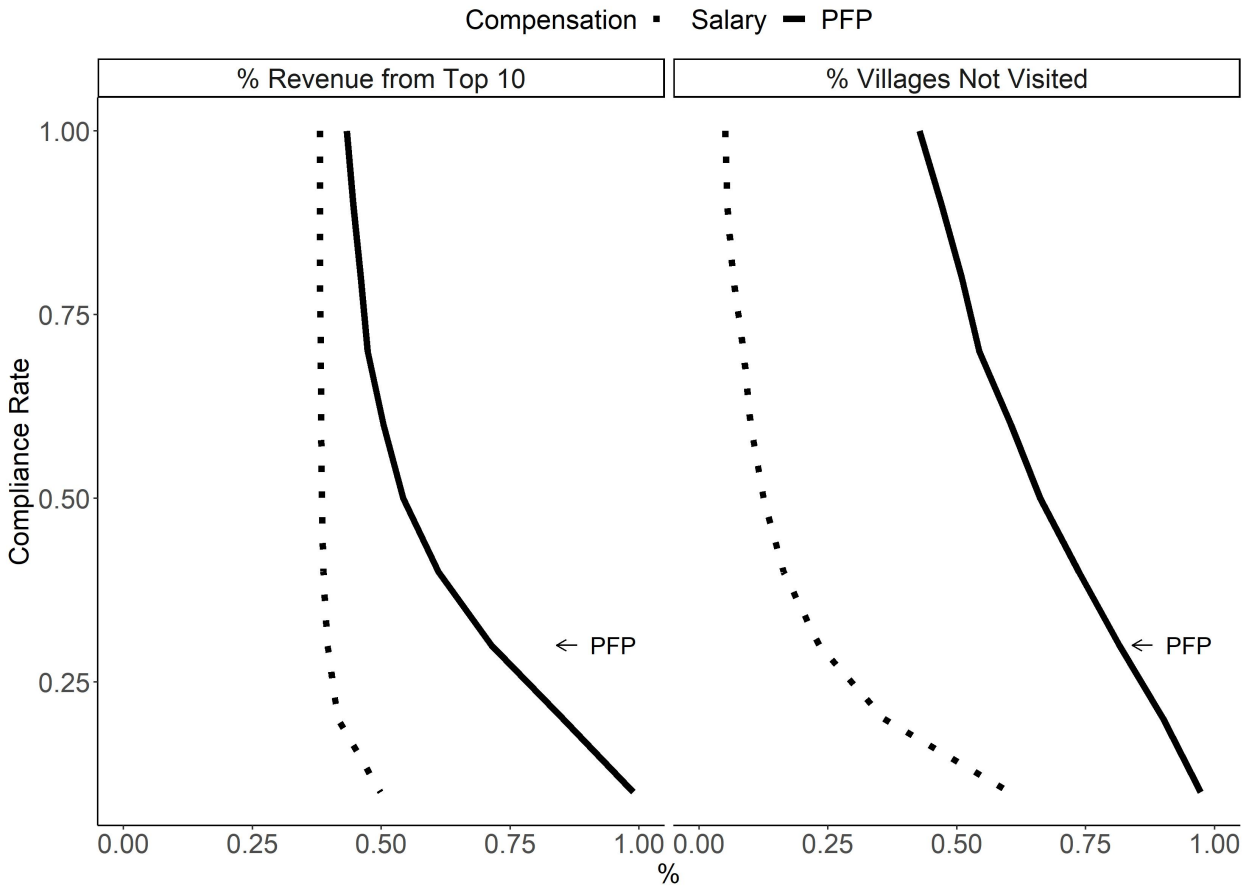
Figure 5: Concentration of the Rural Tax Burden



A major reason for this concentration is that tax collectors decide not to visit many villages because doing so is uneconomical. As Figure 6 shows (right panel), even at full compliance, PFP collectors do not visit 43% villages. At 50% compliance PFP collectors *do not* visit 66% of villages; this figure increases to 90% when compliance drops to 20%. Figure 6 also highlights the extent to which the concentration of extraction is exacerbated by PFP collection, by also considering concentration statistics for salary-based collectors. We can see that the percent of total net revenue generated from the top 10% (left panel) is always lower for salary-based collectors; the concentration gap is larger at lower levels of compliance. At full compliance, salary-based collectors only leave 5% of villages unvisited (right panel). At 40% compliance only 16% of villages are left unvisited by salary-based collectors; the corresponding statistic for PFP collectors is 74%.

Importantly, note that these findings about the distribution of the tax burden assumes that compliance levels are equal across villages. If, for example, compliance rates are higher in larger villages than in smaller ones (because they are richer, for example), concentration rates will be higher. If, on the other hand, compliance rates are higher in smaller villages, the burden of tax collection will be less concentrated than the estimates provided here.

Figure 6: Concentration of Tax Burden: PFP vs. Salary



Policy Implications

These analyses have several implications for policy. First, taxing rural areas can generate modest, though potentially meaningful revenue for local governments. While potential revenues are insufficient for large-scale development projects, rural taxation could supply local governments with discretionary revenue for projects to reach long-hanging benefits. One strategy would be to use revenue to complement and maintain projects implemented by central government or NGOs. Central government and NGOs have built many school building, heath centers, and water points across Kono. However, these projects often fall into partial or complete disrepair due to a lack of maintenance. For example, rooms of a hospital or school are unusable because of a collapsed roof or a broken hand pump makes a well more difficult to use.[27] KDC could use its own source revenue to maintain developments projects and the stock of existing public goods. Given the low cost of labor and locally sourced materials (e.g., mud bricks), a own-source revenue budget of $30,000 could be used to undertake 50 maintenance projects of $600.

Second, given the concentration of potential revenues, taxes will be most efficiently extracted from larger,

[27] Other examples include: broken lights, leaky ceilings, missing school furniture, and broken generators

more easily reached villages. Considered narrowly, a policymaker motivated only by local revenue extraction should ignore villages that have potential revenue below the median—these villages contribute little to the overall revenue take. If a policymaker wanted to further simplify their task, focusing on the 10% of villages with the most potential revenue is a good bet, as at least 50% of the net revenue take would be extracted from these villages. But even policymakers who are strictly motivated by revenue maximization should be wary of this approach; the distribution of the tax burden may impact the perceived fairness of the tax system, and in turn tax compliance and revenue. It seems possible that extending the tax net into rural areas may impact the compliance rates of property owners in urban areas, who have higher tax liabilities. That is, rural taxation may increase perceptions of fairness for urban property owners, and thereby increase compliance. A similar logic may play out *within* rural areas: While potential revenue in rural areas may be concentrated in a small subset of villages, compliance rates in these villages may be a function of the breadth of the tax net (i.e., the number of villages tax in rural areas). If the breadth of taxation impacts compliance rates, there may be pro-poor motivations for taxing poorer, rural areas.[28] If government transfers and public services disproportionately benefit the poor, and expanding the tax net increases revenue raise in richer areas (through higher compliance rates), the tax imposed on rural areas may be outweighed by the additional services paid for by the increased revenue from richer areas. Counter-intuitively, taxing rural areas may do more to redistribute wealth than not taxing them at all. Policymakers who take these arguments seriously may want to avoid focusing their attention solely on high potential areas, whether they be urban or rural. As far as I am aware, their is little evidence for or against the hypothesis that expanding the breadth of taxation increases compliance rates.

Third, the way that tax collectors are compensated has implications revenue generation, especially the distribution of the tax burden. Given the lower cost of monitoring, pay-for-performance collection is likely to be the default compensation package for many low-capacity local governments thinking about collecting revenue. However, if the choice of which villages to visit is left up to PFP collectors alone, most villages will not be visited at all, a situation likely to be seen as unfair by property owners in visited villages. Policymakers should consider methods for getting PFP collectors to visit a greater number of villages: a subsidy program that pays the travel cost for collectors to visit villages they would otherwise not visit may be one good option.

Of course, policymakers may have motivations for rural taxation that extend beyond revenue maximization. Another motivation for tax collection in rural areas follows a state-building logic, where the goal of taxation is to create social contract links between state (or state authorities) and citizens. By this logic, policymakers tax rural areas to engage these citizens with the state and legitimate the state to citizens. In this way, systematic tax expansion is itself be an act of legitimization. Thus legitimated, state leaders might find that citizens are more likely to comply their other directives and policies, and more likely to engage with state institutions, such as courts, school, and hospitals. Some evidence for this logic can be found in the exciting new research from Weigel and Ngindu (2021).

[28] This line of argument runs contrary to suggestions that expanding the tax net into poor, rural areas increases inequalities.

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Appendices

A Appendix Tables

Structure Type	Tax Rate (SLL)
Mud house (“wattle house”) with thatch roof	SLL 20,000
Mud house (“wattle house”) with zinc roof	SLL 30,000
Mud brick house (Not plastered)	SLL 40,000
Mud brick house (plastered)	SLL 50,000
Mud bricks house with toilet facilities	SLL 80,000
Cement house without toilet facilities	SLL 120,000
Cement house with toilet facilities	SLL 150,000
Two-story house (i.e., one above ground)	SLL 300,000
Multi-story house (more than 2 stories)	SLL 400,000

Table 1: Tax Rates by building type

Potential Revenue Estimation Strategy	N
Relies on 2021 tax assessment	128
Relies on 2019 tax assessment	217
Relies on 2015 census data	794
Total	**1139**

Table 2: Data for Estimating Potential Revenue