Pre-Analysis Plan: Informal Taxation by Chiefs in Rural Sierra Leone

Andrés F. Rodríguez

I Motivation

- Traditional leaders (chiefs) are highly influential leaders in sub-Saharan Africa, particularly in rural areas where national states have little capacity to oversee or implement policies (Herbst, 2000; Baldwin, 2015).

    - One particular role they play is coordinating public good provision, usually when external organizations aim to fund development projects in their communities (Bulte *et al.*, 2018).
    - In these situations where communities need to coordinate the provision of a public good, it is common that chiefs end up informally taxing citizens through labor, in-kind, or money contributions (Olken and Singhal, 2011; van den Boogaard *et al.*, 2019).

- This institutional arrangement has some pros and cons identified by previous work:

    - Chiefs are particularly effective at solving collective action problems, which makes them well suited to mobilize resources for development programs (Baldwin and Raffler, 2019; Bulte *et al.*, 2018).
    - Nonetheless, the capacity chiefs have to mobilize resources is not always perceived as a good institutional quality.
        * Chiefs do not face electoral accountability, so they do not have explicit incentives to redistribute nor act in the interest of the majority. This means chief's capacity can actually be a form of elite capture (Acemoglu *et al.*, 2014).
        * This also has historical roots as chiefs have traditionally been in charge of commanding labor to work communal lands which mostly burdens the young and poor (Peters and Richards, 2011; Albrecht, 2017).
        * Overall, this can explain why previous work finds evidence suggesting chiefs are on average regressive through their informal taxation schemes (van den Boogaard *et al.*, 2019; Walker, 2018).
    - Previous work seems to suggest there is a tradeoff. Chiefs are important for their capacity get people to cooperate but this comes at the expense of possibly putting relatively high costs on the poorest citizen's.

- This paper uses a field experiment to understand better the role chiefs play in allocating the costs of public good provision associated to development projects.

    - I specifically aim to uncover if the relative merit of involving chiefs in selecting contributors for development projects to achieve more cooperation from citizens is also associated to larger burdens to the poorest households in the communities these projects try to help.

- To answer this general question:

    - I focus on measuring whether people engage in costly actions to avoid contributions to a public good and use this to approximate the incidence of informal taxation schemes. This improves on previous work by measuring incidence (economic decisions are altered in the face of redistribution) and not volume of contributions. The latter includes voluntary payments common in this

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setting. This approach is inspired by work done around social or kin taxation (Jakiela and Ozier, 2016; Boltz *et al.*, 2019; Carranza *et al.*, 2022).

– I leverage the controlled nature of the experiment to compare how citizens react to chiefs being in charge of selecting contributors to a public good relative to their behavior under alternative redistribution schemes that are not naturally occurring. These alternatives are: (i) a random selection mechanism that assigns everyone the same probability of being selected to contribute, and (ii) a progressive mechanism that uses a proxy-means-test like approach to select the wealthiest participants as contributors. This allows me to better assess the advantages of involving chiefs in development work and disentangle whether there is a trade-off associated to chief's discretion when informally taxing citizens.

• Thus, the specific questions I aim to answer are:

1. Do households engage is less costly actions to avoid contributions when chefs distribute the costs of a public good relative to alternative mechanisms?

2. Are relatively poor households particularly engaging in costs to avoid contributions when chiefs are in charge of redistribution? If so, can this be reversed via a simple and explicitly progressive approach to selecting contributors?

II Experimental Design

II.A General Description (Possibly Intro)

• To measure costly actions to avoid public good contributions, I run a field experiment in multiple communities of rural Sierra Leone which implements different variants of a program that offers simple jobs to people over a span of two days per community.

– In control communities, participants are recruited on the first day and are asked to express whether they prefer to work on day 1 (that day) or on day 2 (the next day).

  ∗ The job is a simple name classification task. This is framed to participants as an NGO that needs help from native Sierra Leoneans to classify names.

  ∗ The program pays slightly more for people that delay their work, so this decision captures how impatient participants are.

– In randomly treated communities, I implement the same procedure but additionally introduce a real public good problem around the work environment. This means that some people will work for themselves while others will be selected to work for a public good. The public good will be funding their local clinic.

  ∗ This public good problem will only apply for people who work on the second day of the experiment. Thus, participants can avoid contributions by becoming more impatient and preferring to work on day 1[1]. Doing this is costly since working earlier pays less.

  ∗ As a result, comparing the revealed impatience of participants in treated versus control communities allows to me capture the incidence of this type of informal taxation schemes. That is, how much economic decisions are affected in the face of redistribution.

  ∗ Importantly, this approach also has the benefit that a participant can avoid contributions by masking this behavior behind more impatience. This reduces the pressure to behave according to social norms (social desirability bias) which is particularly worrisome when asking people about their traditional leaders.

• Given this measurement strategy to estimate the incidence of informal taxation schemes that select contributors for a public good, I compare the extent to which people engage in costly actions to avoid contributions among different selection mechanisms.

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[1] This resembles the behavioral response identified by Exley (2016) but with risk preferences, where participants display relatively more risk aversion when risk can be used as an excuse to avoid charitable donations.

- In treated communities (where the public good is introduced), I randomly assign one of three selection mechanisms to decide who has to contribute to the public good by working for their local clinic.
  * Participants are explained their assigned mechanism in detail when they are recruited, hence their decisions regarding which day to work are incentive compatible. That is, behavior reflect their beliefs about each mechanism's likelihood of selecting them to contribute and possibly their valuation of the public good if they display other-regarding preferences (see Appendix A).

- The three mechanisms I study are:

  - Random selection : Every participant has 50% of being selected to work for the clinic. This allows me understand how participants in my experiment engage in redistribution when the selection mechanism assigns to every participant the same likelihood of being selected.
    * This treatment arm is useful because it provides an ideal benchmark of a transparent informal tax that is homogenous across participants. Thus, it allows me to recovers any "residual" heterogeneity in behavior that cannot be explained by participants being targeted by contributions. For example, this can pickup variation explained by differences in participant's valuation of the experimental public good.

  - Chiefs selection: Village chiefs in the communities where the experiment takes place are asked to select who has to work for the clinic and who can work for themselves. This allows me to study the status quo mechanism to select contributors.

  - Progressive selection: Using a proxy-means-test like approach capturing household material wealth, this mechanisms implements a simple progressive approach to select the wealthiest participants to work for the public good and letting the relatively poor work for themselves.
    * This treatment arm allows me to test a simple policy alternative that is commonly used in development work to target subsidies (a problem that mirrors selecting citizens to tax). It can act as a (possibly naive) proof-of-concept to learn how do communities react to progressive approaches to redistribution in a setting where is hard to measure people's income or wealth.
    * It also helps me uncover the possible tensions that exist when informal taxation schemes aim to be progressive, which might inform the incentives chiefs operate under the status quo.

II.B More details: Control arm

- In the control communities, where participants do not participate in any public good provision, the experiment works as follows:

  - Participants are all recruited in day 1. On this day I collect basic demographic data on them and they learn about the the program that offers them a simple job (working on a one-hour job doing a name classification task requiring them to assign gender and ethnicity to Sierra Leonean names).

  - The program takes place over two days in each community, so participants can work in any of the two days. On day 1 they get to express their preference for working either that same day or the next one.

  - Specifically, the survey elicits how much money are participants willing to forgo in order to work one earlier using multiple price lists (MPL)[2]
    * Participants make multiple decisions of the type: Do you prefer working for $X today or $Y tomorrow, for different values of X and a fixed value of Y, where $X \leq Y$.

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[2]Although this approach is not the cleanest method to uncover impatience according to the behavioral literature, it is relatively simple and widely used (Cohen *et al.*, 2020). More complex alternatives, relying on convex-budget optimization and real effort tasks (e.g.Andreoni and Sprenger (2012) and Augenblick *et al.* (2015)) can run into problems when done on field settings. See for example the challenges highlighted by Aggarwal *et al.* (2022).

* After all participants answer their MPL questions, one of them at random is implemented to decide which day they work and how much they get paid. Thus, some workers will be selected to complete the job on day 1 and others on day 2. This random process is implemented such that at least two thirds of the sample for each community work on the second day based on piloting data. This is explained throughly to participants making sure they understand that (i) they have influence over when they work, but (ii) a random process can also alter the outcome.
  * Importantly, this guarantees incentive compatibility of the main outcome of the experiment which is how much money are participants willing to forgo in order to work one day earlier.
  – In the control arm all participants work for themselves. Hence, the main outcome measured by the MPL captures the baseline level of impatience pariticipants exhibit in this field experiment.

II.C   More details: Treatment arms

- The main difference of the experimental protocol in treated communities happens in day 1. Additionally to all that happens in the control arm, participants are also told that some of the people working on day 2 can be selected to work for their local clinic as the NGO providing the jobs also wants to promote local development more broadly.

  – Participants are explained what it means to be selected: People selected to work for the clinic will complete the job as everyone else, but a high share (90%) of the money they generate will be donated to their local clinic.

    * These donations are done by the research team after all participants in a community have completed the experimental work task. Participants do not operate as intermediaries and the donations are fully enforced, making the incentives more salient.

  – On the contrary, participants who are not selected get to keep most of their experimental income and will donate to the clinic only a small symbolic amount (10%). This guarantees that everybody contributes but the selection mechanism is key to determining who bears most of the costs of the public good.

  – Participants are also explained in detail the mechanism deciding who will work for the clinic and who will not. The exact mechanism to be used is randomized at the community level between (i) random selection, (ii) chiefs select, (iii) progressive selection as explained above.

    * Importantly, this information will be delivered on day 1 before participants express their impatience over working one day earlier through the MPL.
    * This means that participants do not know whether they will be selected or not when answering the MPL, they just know the mechanisms that will be used to select contributors. As a result, what is key in the experiment is participant's beliefs of each mechanism and how that affects their decisions in the experiment.

- Some design details:

  – The experiment focuses on mechanisms selecting people to work for a public good as this kind of "labor tax" is common in our context. Multiple development projects or local public goods require beneficiaries to provide labor (e.g. doing tasks like building or cooking). This type of informal tax on labor is more prevalent than tax rates on income or wealth, as earnings vary a lot and wealth is hard to measure in rural economies.

  – The selection mechanism will be perfectly enforced. This choice is made only simplify the study in order to focus on how costs of public goods are distributed. Enforcement of contributions is an important dimension this experiment abstracts away from, particularly since traditional leaders likely to be better at providing public goods because of their enforcing capacity. I choose to study the incidence of selection mechanisms under perfect enforcement as it is informative of the inherent redistribution tension of informal taxation schemes, even when abstracting on the coercive means different institutions can use to enforce contributions.

- The three variants of the selection mechanism I test are:

  1. Random selection: This variant allows me to observe how do participants react to a selection mechanism that homogeneously distributes the burden of contributions by assigning the same probability of selection to everyone.
     - This allows me to uncover how different participants, particularly along the wealth dimension, react to the existence of a public good and a mechanism that homogeneously selects contributors. If there are any differences among participants that drive the willingness to contribute but are unrelated to the selection mechanisms being biased, this treatment arm should capture that.

  2. Chief (headman) selects: This arm captures the status quo of how collective action problems are solved in rural SL where local chiefs distribute the costs of public goods with full discretion.
     - Importantly, this arm requires the collaboration of local chiefs with this program. Chiefs in all arms are informed of the program's existence from day 1, as is customary when doing of any type fieldwork. However, only chiefs in this arm will be asked at the end of the first day of work in each community to select who they believe should work for the clinic among the participants working on the second day.
     - I do not claim the selection decisions by chiefs perfectly reflect their behavior outside of this experimental setting as they do them under the observation of enumerators. Nonetheless, what matters for the interpretation of the experimental results is that the behavior of participants reflects their beliefs about what chiefs usually do when given the power to select contributors. Thus, for this problem to affect the results would require participants to engage in anticipatory behavior and second order reasoning. I do my best to prevent this from happening by framing the whole experiment as a development initiative conducted by an NGO.

  3. Progressive selection: I finally test with this arm if a policy tool usually used to target relatively poor households with subsidies can be used for the dual problem of selecting who should bare the costs of public good provision.
     - As before, the experiment allows me to compare this mechanism to the status quo of chiefs doing selection both in their overall efficiency associated to average costly actions observed as well as how they are distributed along the wealth dimension.
     - In particular, testing the redistributive properties of this approach is interesting since even if the mechanism aims to redistribute resources towards the less wealthy, what matters is whether participants believe this mechanisms works and as a result do not engage in inefficient costly behavior if they think they are not wealthy. This is thus informative more broadly of the consequences of using any observable wealth-based approach relying on surveys to redistribute resources.

II.D   Outcomes and heterogeneity covariates

- The main outcome I will analyze is the the willingness to pay (WTP) of participants in order to work one day earlier in the experiment. In other words, this is how much money are participants willing to give up to work and receive payment one day sooner.
  - As mentioned before, this outcome will be high for impatient agents.
  - But with the introduction of the public good and the possibility of being asked to contribute, this outcome also captures participants' perceived likelihood of being selected to contribute (higher likelihood $\rightarrow$ higher WTP).
    * This comes up in a simple model (Appendix) where agents are completely selfish and don't value their public good contributions
    * When agents care about the public good, this outcome is also affected by participants prosociality or valuation of the public good (more prosocial or value of PG$\rightarrow$ lower WTP)

- A key part of this paper is studying heterogeneities in behavior change by wealth of participants (at the household level). To do this, I will use a simple wealth index that captures multiple dimension of material wellbeing for rural households.
    - The wealth index includes: household materials; household ownership of different kinds of assets including animals or land; access to services like water, sanitation, or electricity; food and health insecurity; and stated ability to pay for emergencies.
    - I will also collect information about participant's income and income variance, as well as subjective assessments of wealth by other community members. This information will be useful to also test whether observed heterogeneity in this experiment is better explain by alternatives measures of wellbeing.

II.E Sample and randomization

- Randomization will be done at the community level, hence communities will be assigned to one of four experimental arms (control, random, chief, progressive)
    - I will first sample health centers or clinics in rural Sierra Leone and identify their catchment areas.
    - In each catchment area I will sample four rural communities relatively disconnected from urban centers and will assign each community to one of the experimental arms.
    - As a result, within each catchment area (geographic area) I will create experimental variation of exposure to the work experiment with and without a public good, and within the exposed communities variation in terms of the selection mechanism implemented.

- The experiment will be conducted on around 108 communities in rural Sierra Leone.
    - These communities will be sampled from 3 districts in the country to also identify regional variation in behavior and perceptions of traditional leaders.
    - I expect to sample around 15 participants per community, hence I will have an expected sample size of 1620 individual observations, with a fourth in each experimental arm.

III Hypothesis to Test and Empirical Strategy

Notation:

- Denote a for catchment areas, c for communities, and i for participants in the experiment.

- Experimental arms will be assigned at the community level and within catchment areas.
    - $Control_c, Random_c, Chief_c, Progressive_c$

- Each participant i will have an associated wealth-index ($wealth_i$)
    - Using this index, I classify each participant into three groups based on their position on the wealth distribution of their community ($Low, Mid, High$)

- Y_{ica} is the main outcome, participant $i's$ WTP to work one day earlier in the experiment.

- Thus, my main specification will be:

$$Y_{ica} = \mu_a + \beta_1 Random_c + \beta_2 Chief_c + \beta_3 Progressive_c + \varepsilon_{ica}$$

- For the heterogeneity analysis I will use β_j^k for $j \in \{1, 2, 3\}$ and $k \in \{Low, Mid, High\}$ to denote the treatment effect foreach wealth group.

Hypothesis on average effects:

- H1: Having chiefs decide contributors to a public good is relatively efficient as on average people engage is less costly actions to avoid contributions when they are involved.

    - $0 \leq \beta_2 < \beta_1$

- H1.1: Chiefs are so important to solve collective action problems that they actually promote prosocial behavior and make participants more patient in the experiment.

    - $\beta_2 < 0$

- H2: A progressive mechanism is relatively inefficient as it particularly targets individuals that are likely to engage in costly actions to avoid contributions

    - $\beta_1 < \beta_3$

- H2.2: A progressive mechanism is less efficient than the status-quo mechanism of involving chiefs.

    - $\beta_2 < \beta_3$

Hypothesis about heterogenous effects:

- H3: Chiefs are regressive in the sense that particularly the poorest participants engage in costly actions when chiefs are in charge of selection

    - $\beta_2^{Low} > \beta_1^{Low}$
    - β_2^k is decreasing, more so than β_1^k, for $k \in \{Low, Mid, High\}$ (or equivalent test with interaction of wealth score)

- H4: A progressive mechanism fulfills its objective, so when it is used to select contributors the poorest participants engage in less costly actions than alternative mechanisms

    - $\beta_3^{Low} < \beta_1^{Low}$
    - β_3^k is increasing, more so than β_1^k, for $k \in \{Low, Mid, High\}$ (or equivalent test with interaction of wealth score)

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A   Simple Model

Let's consider the baseline situation of an agent that has to allocate work between two periods according to the following problem:

- Effort on the first period e_1 translates to consumption $c_1 = e_1$

- Effort on the second period e_2 has a premium w, so $c_2 = we_2$

- Agent has an instantaneous utility function $u(c)$ and discount factor β

Thus the agent solves:
$$\max \quad u(e_1) + \beta u(we_2) \quad s.t. \quad e_1 + e_2 = 1$$

This has solution implicitly given by:
$$\frac{u'(e_1^*)}{u'(we_2^*)} = \beta w_2$$

What this implies is that the allocation of effort is completely determined by the impatience of the agent β and the curvature of their utility function u'. As a result, differences in behavior in the control treatment arm are associated to differences in these underlying behavioral parameters.

Selfish agent and a public good

Now let's consider what happens when an agent that does not internalize the benefits of a public good faces a selection mechanism that with likelihood p selects them to work for the public good. When selected agents stop earning in the second period for themselves.

With this modification the agent solves:
$$\max \quad u(e_1) + \beta(1-p)u(we_2) \quad s.t. \quad e_1 + e_2 = 1$$

This has solution implicitly given by:
$$\frac{u'(e_1^*)}{u'(we_2^*)} = \beta(1-p)w$$

Here we can see that the possibility of being selected simply decreases the effective discount factor in this problem. As a result, in this experiment the likelihood of being selected to contribute maps one-to-one to an increase in revealed impatience.

Agents that value the public good

When agents internalize the value of the public good the prediction of increased revealed impatience with the introduction of the public good is not always true. Now imagine the agent values the marginal contribution of their effort to the public good in period 2 by α.

Now the agent solves:
$$\max \quad u(e_1) + \beta\left[(1-p)u(we_2) + p\alpha e_2\right] \quad s.t. \quad e_1 + e_2 = 1$$

This has solution implicitly given by:
$$u'(e_1^*) = \beta\left(p\alpha + (1-p)wu'(we_2^*)\right)$$

This modification implies that prosocial agent can act more patiently with the introduction of a public good and its selection mechanism for a large enough value of α. Thus, the experiment can also reveal whether agents are vary prosocial if they react to the possibility of being selected by being more patient. More generally this mechanism can dampen the observed increase in impatience when a public good is introduced in the experiment.

Takeaways from the model

Given the results above, I want to highlight three important points that stem from this analysis and that are useful to interpret the experimental results, particularly when discussing heterogeneity by wealth groups (low, mid, high).

1. Differences in behavior across participants in the control arms reflect differences in the underlying behavioral parameters that affect the baseline condition (e.i. discount factor and curvature of utility).

2. Differences in how participants react to the random selection mechanism are additionally informative of the value participants assign to the public good. Since the random selection mechanisms imposes the same probability of selection p_i to every participant, heterogeneity in participant's responses is associated to their impatience, curvature, and importantly their valuation of the public good.

3. The two points above make clear why the random selection mechanism is useful even though it is not policy relevant. It allows me to uncover underlying heterogeneities that are important to uncover before studying whether the chiefs or a progressive mechanism have heterogeneous effects in this context.