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Ask a local: Improving the public pricing of land titles in urban Tanzania

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Abstract

Information on willingness-to-pay is key for public pricing and allocation of services but not easily collected. Studying land titles in Dar-es-Salaam, we ask whether local leaders know and will reveal plot owners' willingness-to-pay. We randomly assign leaders to predict under different settings then elicit owners' actual willingness-to-pay. Demand is substantial, but below exorbitant fees. Leaders can predict the aggregate demand curve and distinguish variation across owners. Predictions worsen when used to target subsidies, but adding cash incentives mitigates this. Finally, we demonstrate that leader-elicited information can improve the public pricing of title deeds, raising uptake while maintaining public funds.

JEL codes: O17; H40; R21; D80

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1 Introduction

Information on willingness-to-pay (WTP) can provide a key input for pricing policy guiding the magnitude and targeting of subsidies (Berry et al. 2020). However, the central government typically lacks the capacity to extract this information. This is especially the case in developing countries where market transactions are frequently off the record. At the same time, community leaders have local information and so also the potential to raise state capacity if they are integrated in its processes (Balan et al. 2022). Local leaders often operate through informal or semi-formal practices and are a common feature of communities across Africa.[1] Since the colonial era, informal and customary property institutions in many areas of Africa have had a strong reliance on local leaders (Boone 2014). While the growing importance of the state can be seen as eclipsing their role, these leaders can be complementary to state capacity when they are formally integrated (Henn 2020).

We focus on one important state function, that is, the provision of formal title deeds. Much land in urban Africa is allocated low values of built capital, remains unplanned, and is settled under informal property rights (UN Habitat 2016, Lall et al. 2017). And yet, the development of these cities depends on the establishment of strong property rights (Henderson et al. 2021, Djankov et al. 2020). Formalisation creates transparency in prices enabling functional urban land markets, and improved property records facilitating taxation (Collier et al. 2017). More generally, property rights can reduce expropriation risk, lower the cost of property protection, and remove barriers to credit (Besley & Ghatak 2010).[2] However, establishing property rights is costly for cash-strapped governments in sub-Saharan Africa.[3] To recover program costs, plot-specific fees are charged for title deeds once neighbourhoods are surveyed and entered into a town plan. The charging of these fees reduces the uptake of title deeds, which can cause a bottleneck in the process of formalisation in many African cities (Omar 2017, Sheuya & Burra 2016, Moses & Chiwambo 2018, Bezu & Holden 2014).[4] Therefore we focus on the role that publicly set fees have in limiting the uptake of title deeds, while we recognise that are also frictions that distort demand that could be addressed separately.[5]

[1]Nevertheless, leader relations to the state are not uniform. Across countries, they may or may not be part of the state apparatus, democratically elected, or given political or administrative functions (Manara & Pani 2020*c*). To be transparent, in Section 2.2 we detail the role and responsibilities of our leaders and recognise that this may differ for leaders in different settings.

[2]There is evidence that property rights have a positive impact on investment in rural Africa (Besley 1995, Goldstein & Udry 2008). For urban land, evidence is concentrated in South America, where research finds impacts on household investment, education and labour supply (Field 2007, Galiani & Schargrodsky 2010).

[3]Title deeds require surveying and town planning to meet legal standards. There are scale economies to surveying, and so governments make efforts to coordinate these processes en masse.

[4]This bottleneck appears substantial in Dar es Salaam where formal titles account for only 20-25% of residential surveyed (i.e. title deed eligible) plots.

[5]Notably, in Section 7.2 we document large delays in the administrative process that produces title deeds:

If local leaders know and truthfully reveal information on plot owners' WTP for title deeds, the state can use this information to better target fees, for example by charging less to owners with lower WTP. Better targeted fees could raise uptake and make formalisation inclusive for the urban poor and financially viable for the government. However, extracting this information can be difficult depending on the incentives of the leaders. For example, leaders may wish to favour co-ethnics as they have been found to do in the slum rental markets of Nairobi (Marx et al. 2019). However, evidence from Indonesia suggests that, while leaders do favour their relatives in targeted government transfer programs, the extent to which they do so is minimal in terms of welfare cost (Alatas et al. 2019). Three obvious questions arise which are the focus of our paper: Are leaders informed about the WTP for title deeds? If so, will they share this information accurately when they are able to influence the prices faced by plot owners in their neighbourhoods? And, can this elicited information be used in practice to improve the public pricing of title deeds?

To answer these questions we conduct a randomized control trial with local leaders and elicit WTP for title deeds from (informal) plot owners in Dar es Salaam, Tanzania.[6] We randomly assign leaders to predict the WTP of individual plot owners under three different environments. The first environment is the *control* group where leaders are told that their predictions will only be used for research. The second environment is the *stakes* group where leaders are told that, by predicting lower WTP, they raise the chance that plot owners receive subsidies. The third environment is the *incentives* group where leaders are told that they can influence subsidies in the same way as the stakes group, but also that they can receive a cash payment for accurate predictions. We then elicit the property owners' actual WTP for title deeds using the Becker-deGroot-Marschak (BDM) method which incentivises owners to truthfully reveal their preferences.[7] With data from these two field exercises we can compare, both in the aggregate and at an individual level, how leaders' predictions of WTP relate to the elicited values from owners, and how this relationship between predictions and truth depend on the experimental environment assigned to leaders. Finally, we demonstrate how leader information could be used in practice by the government to update the fees they

only half of purchased title deeds are processed after 18 months. This is reinforced in Section 4.2 where the most common ranked 'cost' in acquiring a title deed is the time and effort. Another potential hurdle highlighted by our respondents is credit constraints, with one third claiming that they would pay more if given the time to save.

[6]Our plot owners are informal in that they have valid and recognised claims to the land, but do not have the government documentation (title deeds) to prove this.

[7]The BDM method was originally developed by Becker et al. (1964) and is still used at the frontier of applied work (Berry et al. 2020). Despite concerns that the BDM mechanism may deteriorate participant comprehension or trust, recent work has shown that comprehension is high in real world settings (Burchardi et al. 2021). Further work in the field shows that the BDM mechanism yields credible estimates of the demand curve (Cole et al. 2020, Cole & Fernando 2020).

charge. Using data on leader predictions we calibrate fees to match a government objective function and then using data on WTP we report counterfactual revenue and uptake.

This paper is related to the literature studying the use of agents to target subsidies. This literature has studied various targets including poverty, high returns to loans, and corruption (Olken 2009, Niehaus et al. 2013, Basurto et al. 2018). Agents may have different preferences from the social planner and strategically give misleading information. In a related paper, Hussam et al. (2022) test whether cash incentives can encourage entrepreneurs to report which of their peers have the highest marginal returns to a loan. Our paper is, to the best of our knowledge, the first to study whether agents (local leaders) can be used to extract information on WTP.

This paper is also related to the literature on eliciting WTP for non-market based goods. In a related paper, Ali et al. (2016) estimate the demand for title deeds in a neighbourhood of Dar es Salaam using a take-it-or-leave-it randomisation of title fees. Their method estimates mean compliance conditional on fee size, so it cannot be used to determine individual WTP. In another related paper, Berry et al. (2020) elicit WTP for water filters using the BDM method. This method does allow the researcher to estimate individual WTP; however, the policy maker cannot use it to set fees in practice since it relies on the credible incentive that the customer will be able to buy the good at a random price. By eliciting third-party information, our paper provides a method that both identifies individual WTP and that can be practically implemented.

In another related study, Balan et al. (2022) show that tax collection by local elites can raise more revenue than collection by state agents. Their evidence suggests that the primary mechanism is informational advantages of chiefs: enabling chiefs to better target tax visits based on households' underlying payment propensities. The authors test this with a treatment arm where state collectors meet with local chiefs and indicate, address by address, willingness and ability to pay taxes. Our paper sheds light on this mechanism of local leaders as state capacity by directly measuring the ability of local leaders to predict WTP (for title deeds in our case), and by studying the conditions under which this information can be accurately extracted.

Finally, this paper is related to the literature on demand for title deeds in Tanzania specifically. Despite low uptake, this literature suggests that there is a demand for land titles. In fact, qualitative research suggests that formalisation policies rally considerable social support (Manara & Pani 2020*b*). However, it is argued that the price of registration constitutes a considerable barrier (Kusiluka & Chiwambo 2018, Magina et al. 2020, Omar 2017). Our paper contributes to this literature by quantitatively estimating demand for full statutory property rights independent of the prevailing price.

Our paper makes three contributions. First, we challenge the view that the low uptake of title deeds is due to plot owners not recognising, or not needing, the benefits of tenure formalisation (Briggs 2011). We provide evidence of significant demand for title deeds, albeit at lower prices than the government is currently charging. We calculate that there are private gains to title deed provision about 25% above the cost of surveying and planning. This suggests that better targeted fees could raise uptake and make formalisation more inclusive while still financially viable for the government.

Our second contribution is to show that local leaders' predictions can be used to improve the pricing policy for title deeds. We also demonstrate that leaders' predictions can be used to accurately approximate the aggregate demand curve and to distinguish variation in WTP across owners in their neighbourhood. This translates to an improved ability to set fees. In particular, we show that, by using leader predictions of WTP, the state could recalibrate parameters in its current fee function to raise revenue by 30% compared to the status quo, or increase uptake by six times while raising funds equivalent to the status quo. Therefore, community leaders have knowledge of the local demand for land titles that can be useful in practice.

Our third contribution is to show that leaders act strategically when the information they provide influences the allocation of subsidies in their neighborhood. Compared to a control group where there are no stakes at play, we find that leaders overstate WTP in a setting where subsidies will be given if they assign lower WTP, i.e. leaders make titles more expensive when given the opportunity. We discuss this initially counter-intuitive result in depth, and through follow up interviews comment on several possible explanations. A potential explanation is that leaders may try to block uptake of title deeds since they represent competition for a main source of their compensation: earning tips for validating customary ownership. Further, despite overstating WTP on average, leaders are not overstating those whom they believe are the poorest and so the burden of their overstatement falls mostly on the remainder. Finally, we show that there is no evidence of these distortions for a group of leaders randomly assigned to an environment where they are also offered a simple cash payment for ex-post accuracy. These results suggests that leaders can provide valuable information to the state if they are formally compensated.

The paper proceeds as follows. Section 2 describes the title deeds, neighbourhoods, and leaders being studied. The data collection and experiment are described in Section 3, and sample descriptives on leaders, plot owners, and their WTP are provided in 4. Results in section 5 show leaders' ability to predict demand on the aggregate and across owners. Section 6 discusses why and demonstrates how leader predictions can improve pricing in practice. We discuss results from short follow up studies in Section 7, and in section 8 we conclude by

summarising our findings.

2 Setting

2.1 What are the neighbourhoods and title deeds being studied?

Our study was conducted in Kilungule A and B, two mtaas in Ubungo Municipality of Dar es Salaam shown in Figure A3.[8] This area can be described as suburban middle class with household incomes around $100 per month.[9] Here, the Tanzanian Ministry of Lands, Housing and Human Settlements Development (MLHHSD) designed and implemented a pilot project of land tenure formalisation starting in 2016. We focus on fifteen neighbourhoods that participated in this pilot program. The neighbourhood unit that we study is called *shina* in Swahili and typically contains 250 plots. At the time of our study (2019), surveying was complete and invoices already issued to plot owners in these neighbourhoods. The government had fronted the fixed costs of surveying and planning, and now plot owners can pay their invoice to acquire a title. After the first three years uptake was less than 13%. We focus on owners of plots who had yet to pay their invoice by the start of the intervention, which was over three years since the commencement of the formalisation project.

The title that we study is a legal document of ownership, Certificate of Right of Occupancy (CRO), that is supplied by the MLHHSD and provides the highest protection by law in the country. A CRO formally recognizes a 66 year lease of a plot of land from the government. Legally, a CRO provides private benefits such as protection from government-led expropriation, use as collateral with formal banks, and legal transferability of land.[10] Title deeds also come with an added tax burden. In particular, owners with a CRO must pay land rent to the MLHHSD (Franzen & McCluskey 2017). However, the land rent is relatively small and often not collected. Further, all properties, not only those with a CRO, are subject to the property tax (Franzen & McCluskey 2017).

The main cost to the provision of title deeds is surveying and town planning. A plot of land must be surveyed and approved by the municipal town planning office to be eligible for

[8] A mtaa can typically contain a few thousand plots, and it is the smallest administrative unit and the lowest level of local government in Tanzania.

[9] All monetary values in the paper are in 2019 US dollars. To convert from 2019 Tanzanian shillings where needed, we use the exchange rates from Penn World Tables 9.0 (Feenstra et al. 2015). The exchange rate at the time of our study (2019) was 2,288 Tanzanian shillings per US dollar.

[10] More specifically, owners of a CRO who are expropriated by the government are entitled to higher compensation (Wolff et al. 2018). For banks, an informal sale agreement can be sufficient proof of ownership, but only for small loans. With a CRO, loans are typically only limited by the collateral value (Manara & Pani 2020*a*). For land sales, while there is a vibrant informal market, sales without a CRO are susceptible to scamming. Wolff et al. (2018) describe a case where a single plot was sold to over 30 individuals.

a CRO. There are scale economies to surveying: a standalone plot may cost around $2,615 while the average cost drops to 17% of this when 10 plots are surveyed at once, 5.8% for 100 plots, and for large projects over 1,000 plots the average cost is only about $87.45.[11] For this reason the MLHHSD formalisation program first surveys plots for entire neighbourhoods and then tries to recoup the fixed cost by charging fees for the uptake of title deeds.

The costs of this program include survey, planning, and administration. However, fees are not only charged for these costs, but also include premiums. Figure A2 shows an example of an invoice with a breakdown of charges. The invoices include two premiums: a mark-up used to subsidise future surveying projects (Revolving Fund), and a mark-up to raise government revenue in general (Premium). Some fees are fixed (Application, CRO, and Deed Plan), while all others vary with plot size and land value. Trying to capture rents above program costs, especially in light of low uptake, raises concerns over the effectiveness of the government's strategy to supply affordable CROs. Better information on WTP could improve the way these fees are targeted across different plots and neighbourhoods.

2.2 Local leaders and their objective function

The local leaders that we study are called *mjumbe*, or *wajumbe* (plural) in Swahili. They represent formal political parties at the shina level, however they are unofficial and unpaid positions and so bear a quasi-formal status (Manara 2020). We include all wajumbe that have been active for at least one mandate since the announcement of the formalisation project. Almost all wajumbe are also residents of the neighbourhood, and in many cases are recognised as community elders.

Every four years, mjumbe are selected at the shina level. First, the party elected at the mtaa level appoints candidates for each shina. Then, residents registered with the party vote for their preferred candidate. After being elected, each mjumbe appoints several assistants who must be approved by the party committee. We include assistants in our analysis since they typically collaborate with wajumbe, and act on their behalf when the latter are absent.

While the role of local leaders is mostly political on paper, in practice it also encompasses social and administrative tasks beyond an official mandate. For example, wajumbe organise and encourage residents' attendance of public meetings. Furthermore, they are involved in solving family disputes, issuing identification letters (e.g. to banks, schools and government), monitoring service provision (e.g. waste collection) and facilitating government projects (e.g. distribution of IDs). Finally, the mtaa chairman and executive officer often engage wajumbe as witnesses in cases of land dispute and, more generally, to validate informal ownership

[11] These figures are based on author's discussions with two of Tanzania's leading survey companies.

when this is required by third parties, e.g. prospective buyers, municipal or bank officers (Manara & Pani 2020*c*). Serving as a witness is one of the few opportunities that a mjumbe can be paid for her services.[12] In fact, wajumbe are the ultimate source of knowledge on local land matters. For this reason, we argue that wajumbe may have useful information on demand for title deeds. However, for this same reason, the transition from informal to formal property rights may jeopardize the role of wajumbe.

Given the characteristics, selection process, and role of the leaders what can we conclude about their objective function? Certainly wajumbe are not passive agents when it comes to the allocation of title deeds. Incentives could motivate behaviour in a variety of ways: First, since they are members of community and neighbours to plot owners, they may have social and personal ties within their community and therefore favour these individuals over the objectives of the central government. Second, favouritism towards the local community could manifest in different ways. Wajumbe could favour personally connected individuals (e.g. relatives), or they may choose to act more equitably since they are responsible for and invested in the community and so wish to preserve social cohesion. Third, they are selected by the party in power at the mtaa level which could align or oppose the mandate of the central government. Therefore, wajumbe may choose to act against or in support of the government's agenda to raise the uptake of title deeds. Finally, since the responsibilities of wajumbe largely depend on the existence of an informal land tenure system, they may be incentivised to maintain the status quo by interfering with land formalisation.

3 Data Collection and Experiment Procedure

We conduct two surveys: one with 90 local leaders under three experimental settings and the other with 146 plot owners including BDM price elicitation for the title deed to their plot. The full timeline of the study is outlined below and depicted in Figure A1. In brief, first we collected data for the sampling process, then we conducted the leader survey and experiment, and finally, we held information sessions with plot owners and after a few weeks we invited them for their price elicitation sessions. These passages are fully described in this section. Lastly, we conducted two rounds of follow-up data collection in January and October 2020 to gather administrative records on the history of each invoices file and to interview a sample of leaders who had taken part in our experiment. We present and analyse these data in Sections 7.1 and 7.2.

[12] As noted above the party does not pay wajumbe for their work. However, they often earn informal tips from individuals who require their services.

3.1 Sample Selection

We first sample owners who had yet to pay their invoice by the start of the intervention. We collected CRO invoice records of all 1,482 invoiced plots in our study area and matched 1,401 of these to geo-located plot boundaries. Of these, only 13% had purchased their title deed, even though 97% had been invoiced over six months earlier and 28% had been invoiced over two years earlier. From this population we randomly sampled 15 invoiced plots from each neighbourhood in our study area, for a total of 225 plots. We stratified our sampling so that low, medium, and high value plots were represented in each neighbourhood. We then conducted a rapid survey of the selected plot owners in order to gather their contact information, occupancy (i.e. owner-occupier or absentee landlord), and their social connection to each leader (i.e. whether they knew or ever interacted with their leaders).

Following the invoice collection, we conducted a census of the 96 leaders in our study area which allowed us to match them to neighbourhoods, classify their party affiliation (CCM or Chadema) and hierarchical position (main leader or leader assistant), and geo-locate their residence. Leaders were then randomised to one of three treatment groups explained below.[13] In figure A5 we map the neighbourhoods, plots, and leader homes in our study area. This highlights the many-to-many relationship between local leaders and plot owners. Each plot is assigned to exactly one neighbourhood, and each of these neighbourhoods have a collection of leaders (typically 5). Therefore for each plot owner we have multiple leaders, and in the analysis below we are able to look at variation within-plot across leaders.

All randomisation (sampling plot owners and leader treatment assignment) was done mechanically during a series of public meetings where the process could be observed. For the assignment to treatment, leaders were simply assigned to a 'red', 'green', or 'blue' team so that they were unaware of their actual treatment. Despite the potential for mechanical error, this was an important procedure to garner trust with the community. It also provided a practical experience with randomisation so that those who also participated in the BDM at the end of the study were already familiar with the lottery process.

3.2 Leader Survey and Experiment

We conducted surveys with the leaders one month in advance of the first plot owner price elicitation session. All 96 leaders in our study area were invited to participate and 90 (93.8 percent) attended and completed the survey. The questionnaire consisted of demographics, a CRO knowledge test, social network mapping, and predictions of plot owner characteristics.

[13] We stratified the leader randomisation based on political affiliation and physical and social proximity to sampled invoiced plots.

The network and prediction questions all related to the owners of the 15 selected plots in each leaders' respective neighbourhood. For reference the leaders were given both official names and nicknames of each owner as well as a photo of the particular plot that was selected.

The survey concluded with price elicitation tasks. Leaders were asked to rank each of the 15 plot owners in their neighbourhood in terms of their WTP for the title deed. After ranking, leaders had also to predict, for each plot owner, their exact WTP.[14] Each leader conducted the task under one of three treatment groups.

Leaders assigned to the *control* group were told that the research was conducted for academic purposes only. They were encouraged to be as truthful and accurate as possible to enable high quality research. Finally, they were ensured that their answers would not be used to change any procedure over the course of the study.

Leaders in the *stakes* group were informed that their responses to the price elicitation tasks would be used to change procedures in the remaining study. In particular, to help decide which plot owners would have higher chances to win large discounts through the lottery. If leaders suggested a plot owner had a low WTP, we would adjust the distribution of discounts available in the lottery to this plot owner so as to make it more likely that they win a high discount.[15]

Finally, leaders in the *incentives* group received the same instructions as the stakes group, but they had the opportunity to earn cash for their accuracy. We adopted an ex-post payment rule that would be implementable in a policy setting.[16] Leaders were given simple payment examples to work through. Each leader was reminded that being as truthful and accurate as possible was the best way to earn the cash. At the end, the leader with the most points was paid $13 and the four runner-ups were paid $8.56 each.

3.3 Owner Information Sessions

We invited all 225 sampled plot owners to attend an information session to introduce them to our project, two to three weeks before their actual research session. The focus of the information session was on familiarising the respondents with the BDM procedure. They were told that, during the research session, they would be asked "What is the maximum price

[14]The exact scripts used can be found in Appendix D.

[15]We adjusted the distribution of available discounts based on an average of leader predictions for the same plot owner, therefore mitigating concerns over the ethical aspects of this treatment.

[16]Before the price elicitation tasks, leaders were explained that, at the end of the study, we would pick one price level and observe which plot owners stated WTP above that price. For each plot owner with stated WTP above the threshold price, leaders would get a number of points corresponding to the assigned ranking position of that plot owner. This is implementable in a real world setting, since the policy maker will observe which of the plot owners do in fact uptake titles. If titles were purchased by owners for whom the leader ranked high, then the leader was accurate.

that you would and could pay in the next 10 days for your invoice towards your title deed?". We then explained the concept of WTP both in theory and with examples. They were told that on research day they would have an opportunity to commit to pay their invoice if it was offered at a price they could afford, and so it was important that they thought carefully over the following weeks about their WTP for the title deed. We then explained the specifics of the BDM method and that their best strategy was to determine for themselves their true WTP and then reveal exactly that price to the surveyor. We used theory and examples to show why this was the best strategy for them. We finished the session by practising with volunteers for either a soda or an aerial photo of their plot. Throughout the session we asked for feedback from respondents until it was clear they understood.

Owners were given at least two weeks between the information session and the price elicitation session. During this period they were encouraged to consult others (family, joint plot owners, friends, etc.) on their WTP and plan out a strategy for gathering the funds they may need if they won a discount. This time was also used to sort out individual issues with each invoice. Some of these issues were simple for us and the municipal land office to accommodate, such as the misspelling of names, partial payments already made, and the addition of spouses to invoices. On few exceptional circumstances, we allowed 'decision makers' to participate on behalf of the true owner on the invoice.[17] For other issues we had to drop invoices from our sample. This was the case where, by the time of starting the study, invoices had already been fully paid or the plots sold (12 cases), where at least one owner had deceased (3 cases), or had conflicts (1 case) over the rightful ownership. After discarding these issues there were 209 remaining invoiced plots.

3.4 Owner Survey and Price Elicitation

We invited the 209 eligible plot owners to participate in a survey and price elicitation lottery, and 146 of these attended. In Table A1 we check whether the attriters differ from the plots included in our survey. Results suggest that the attrited plots look to be of higher value (larger lot sizes and higher invoice values), though estimates are imprecise. Given this attrition, our estimates of WTP to follow may be downward biased relative to the true WTP in the population.

The survey collected information on demographics, a CRO knowledge test, sentiments towards tenure security, and perceived costs and benefits of a CRO. Following the survey

[17]This was done in two exceptional cases, one where the plot owner had been living in Canada for over thirty years and his brother was the de facto owner of the plot, and a second where the plot owner was disabled and her son took on responsibility for the plot. In both cases the decision maker was responsible for paying the invoice, and in neither case did we change the name of the plot owner on the invoice.

each respondent participated in the BDM price elicitation. This began with a practice round where the respondents were randomly assigned the opportunity to purchase either a soda or an aerial photo of their plot (see Figure A4 for an example) through the BDM mechanism. Following the practice, they were offered the opportunity to acquire the title deed for their plot at a discounted invoice price, again through the BDM mechanism. If the respondent won the discount, they were scheduled to make their payment within ten days.[18]

The BDM procedure that we implement closely follows that of Berry et al. (2020) with slight adjustments to our context. Respondents stated their WTP (bid) and participated in a lottery extracting a new invoice price (draw). According to standard BDM procedure, if the draw was lower or equal to their bid, they would be offered the title deed at the new discounted price, and if the draw was higher, they would not be offered a new price. Each BDM session began with a description of the procedure followed by a practice for either a soda or an aerial photo of their plot before proceeding with their invoice. Scripts can be found in Appendix E. Practice rounds enabled respondents to understand that their bid should represent the maximum price they could and would like to pay, their bid could not be changed after the lottery, and, upon winning, they must make the according payment within ten days. Once the bid for the invoice was finalized, a price was drawn which determined whether the respondent would pay for the invoice at the drawn price.[19]

There were 39 respondents who drew prices lower than their bid and so won a discounted invoice value. For each, we confirmed that they could pay and that they had a plan to collect the necessary funds, and had them sign off on their bid value and draw outcome. All participants received a $4.38 cash allowance for their participation, and winners were required to use this as a down-payment in order to discourage overstating their WTP. Still, five (12.8 percent) of the winners did not complete the purchase.[20]

[18]Because the title deed cost was high for many households we did not ask for immediate payment. First, asking respondents to bring the full amount of cash necessary to cover their bid value would be a significant wasted effort in the case that they did not win. The second reason was to allow enough time to gather funds from family, friends, or micro-lending groups. In fact, 15% of respondents admitted asking the financial support of family and friends to make higher bids.

[19]Our respondents drew 1 of 75 plastic balls from an opaque jug. Each ball corresponded to a price between 0 and their full invoice value which was recorded on a reference sheet. The exact distribution depended on the size of their plot. In order to maintain goodwill the distribution of prices was shown upon request just before the price was drawn and none of the respondents asked to change their bid after seeing the distribution. A full description of the distributions can be found in Appendix F.

[20]Three of these cited unforeseen health issues with a family member that became a priority for the funds that were allocated to the title deed. One was unable to borrow the money that she had expected to. The last one went away on business and was unwilling to arrange a representative to make her payment.

4 Data and Sample Descriptives

4.1 Summary Statistics and Balance

In Table A2 we present mean characteristics for the whole sample of both the plot owners (column 1) and leaders (column 2). Compared to leaders, plot owners tend to be younger and more highly educated but score worse on a short quiz about CROs and have lower household monthly incomes. While the majority of owners are male there is a significant share of female ownership (73% of plots have sole ownership, and 36% of these are owned by women). This is in line with previous findings that the cultural environment in Dar es Salaam is not particularly opposed to co-titling or female ownership (Ali et al. 2016). Leaders are also slightly more likely to be men, but 40% of them are women. Considering potential heirs, 92% of plots are owned by individuals with at least one child.

The average CRO invoice value is $230, while 34% of owners have a monthly income below $45 and 65% below $130. Most plots are occupied by their owners, still 28% are owned by absentee landlords. A full 86% of plots were acquired by purchase, as opposed to inheritance or squatting, though only 24% of all plots have a informal certificate of sale. Half of the plots are owned by individuals with at least one other plot in Tanzania.

Leaders themselves tend to own their homes. A full 94% own the plot they live on, while the remainder all live on a plot owned by a member of their household. Leaders typically have a long history of residence in our study area. While only 7% have settled in the past six years, a substantial 38% have been living there for over 19 years. Out of the fifteen owners sampled for each neighbourhood, leaders know on average 12 of these, though only 4.3 have ever come to the leader for official assistance. Leaders do not have very strong social connections to the owners in our study: of the 15 plot owners, 0.22 owners are family, 1.4 are friends, 1.8 meet together regularly for religious purposes, and 1.3 are considered highly esteemed by the community.

Also presented in Table A2 are balance checks: differences in leaders' characteristics between *stakes* and *control* groups (column 3) and differences between *incentives* and *control* groups (column 4). There are only a few marginally significant differences, though standard errors are large. The *stakes* group has fewer women and more leaders with household income below $43 compared to the *control* group. The *incentives* group has more leaders with their home plot surveyed than the *control* group. In our analysis of treatment effects below we show robustness to the inclusion of all three as controls.

4.2 Demand for CROs

Figure 1a describes the demand for CROs elicited through the BDM. The figure plots, for each price, the share of plot owners whose bid was greater than or equal to that price.[21] While the full sample of plot owners were not willing to purchase a title deed at their invoiced price there is still a significant amount of demand for CROs. Just under forty percent of plot owners would be willing to pay $100, more than the monthly income of most households in our sample. However, demand is still much below invoice fees that are currently being charged. The median invoice in our sample is $219, at such a price less than 10 percent of plot owners would be willing to pay. Even if all plots were charged $74, the minimum invoice value observed in our sample, roughly half of plot owners would not purchase a title deed.

[Figure 1 here]

We can also explore heterogeneity in WTP by plot and plot owner characteristics. Table A3 reports coefficients from regressions of WTP on owner characteristics (gender, age, income, education, and plot size). In columns 1 and 2, point estimates suggest that sole female owners and young owners have higher WTP, though they are not significant. In column 3, compared to low income, WTP is $39 higher from owners in the middle income category, and $73 more from high income owners.[22] Column 4, shows that the highly educated also have higher WTP, however in column 6 this is explained away by the other characteristics. Finally, column 5 shows that the plot size is a strong determinant of WTP; an extra 100 square meters in plot size corresponds to another $10 in WTP.

In order to better understand the determinants of WTP, we asked respondents to rank the perceived costs and benefits of title deeds by their importance in determining WTP. The benefits most frequently ranked first were: protection from expropriation (34%), protection from boundary disputes (30%), protection of heirs from disputes (16%), and access to loans (13%).[23] The costs most frequently ranked first were: time and effort to acquire title deed (58%), paying land rent (27%), following planning regulations (8%), and paying extra informal payments to acquire title deed (7%). Further, we asked respondents to give us alternate bids for the hypothetical that title deeds did not provide each of these benefits. Accordingly, if title deeds did not provide protection from expropriation, the average WTP would fall 20%. Protection from boundary disputes was valued at 28%, protection of heirs 20%, and

[21] This is done by running successive logit regressions at each price point and correcting for heteroskedasticity in the calculation of the confidence intervals.

[22] Middle income refers to households with monthly income 44 and 131 USD. High income refers to households with monthly income over 131 USD.

[23] Lower ranked benefits included protection of capital investment, increasing the sale value of the plot, attracting buyers, easing sale or sub-division, and enabling municipal planning.

accessing loans 13%. Similarly, we asked for alternate bids under the hypothetical that title deeds did not incur each cost. The average WTP would rise by 8% if the title deed did not require time and effort to acquire, and 9% if land rent was not required. Finally, we also asked respondents whether they would have bid higher if given 90 days (instead of 10) to collect the payment to cover their bid, and if so by how much would they raise their bid. A full 30% claimed they would have bid more, and their average willingness to pay would rise by about 52%. This suggests that credit and liquidity constraints could be an issue, and therefore a payment plan that paid for title deeds in installments could improve uptake.

4.3 Leader Predictions of Standard Characteristics

Before investigating whether leaders have accurate knowledge of the WTP for CROs, we first check if they have knowledge on a more conventional set of plot characteristics. In Table A4 we present results from regressions based on the model:

$$y_{ol} = \beta \hat{y}_{ol} + x_l' \gamma + \epsilon_{ol} \tag{1}$$

where y_{ol} is a characteristic of plot o related to leader l, $\hat{y}_{ol}$ is leader l's prediction of plot o's characteristic and x_l is a vector of leader controls.

Table A4 shows that leaders predictions of plot and plot owner characteristics are positively associated with their true characteristics. For columns 1-3 we use the within-neighbourhood rank of the plot owner characteristic as dependent variable. In panel A column 1, leaders are able to distinguish between owners with higher or lower income. Our estimate of 0.2 implies that, an individual predicted to be five positions higher in the ranking is on average 1 position higher in the rank of plot owners' income. This estimate for income rank is very similar as those found by Hussam et al. (2022) for Indian entrepreneurs' predictions of their peer's income rank.[24] In columns 2 and 3 we show predictions of the invoice value rank are positively associated with the true invoice value rank. Column 2 uses our surveyed sample of plots, and column 3 uses the full set of plots (i.e. including plots that did not attend our survey). Therefore column 3 signals that our plot owner survey sample is not selected towards plots that are easier to predict. In columns 4 and 5 we can see that leaders have a limited ability to predict whether plot owners have paid their property tax or if they have an informal certificate of sale. However, looking within neighbourhood (panel b) standard errors improve and suggest leaders do have some ability to predict individuals that (claim to) have paid property tax. Finally, adding controls for leader characteristics (panel C) results

[24]Hussam et al. (2022) find an estimate of 0.18 for income, 0.2 for profits, and 0.22 for assets.

in slightly larger estimates in both columns 5 and 6.

5 Results

5.1 Leader Predictions of Aggregate Willingness-to-Pay

In Figure 1 panels b-d we compare demand for CROs elicited from the BDM mechanism with that elicited from local leaders. For the BDM demand curve we plot, for each price, the share of plot owners whose bid was above that price. We follow a similar procedure for the leader predicted demand curve, but use the leader prediction of the plot owner's WTP instead of the owner's bid.[25]

In Figure 1b, we only use leaders in the *control* group and compare the demand curve based on their responses with the BDM results. The curves are strikingly similar whether demand is elicited from the BDM mechanism or predicted by leaders. At least on an aggregate level, leaders seem to have knowledge of the distribution of WTP in their neighbourhoods.

When leaders are told that their responses will be used to determine the likelihood that a plot owner receives a discount (i.e. those in the *stakes* group) they distort their responses. Figure 1c uses only leaders under the *stakes* treatment and compares the demand curve based on their responses with that based on the BDM. For most prices where demand is positive there is a large gap between the two curves. This suggests that, despite their predictive ability, eliciting aggregate demand from leaders may be difficult in a setting where their responses are used to set prices for CROs in the community. This result is interesting because it enables us to further explore the objective function and motivations of the leaders. In particular, we discuss whether overstatement of WTP in the stakes group could suggest that leaders may be trying to prevent the uptake of title deeds because they see the formal system as a competing one, or whether they may be trying to decrease the chances of high discounts for some in order to facilitate others, e.g. the poorest. In Section 7.1, we elaborate on this discussion and rule out alternative explanations, like whether the result is driven by misinterpretation of the task or experimenter demand effects.

Offering a monetary incentive to leaders for their predictive accuracy in addition to being able to influence discounts (i.e. the *incentives* group) can mitigate the distortions created in the *stakes* environment. Figure 1d uses only leaders under the *incentives* treatment and compares the demand curve based on their responses with that based on the BDM. Whether

[25]Since there are multiple leaders for any given owner, and so multiple predictions of their WTP, we cluster standard errors at the plot owner level and weight predictions so that each owner gets a total weight of one. The same 146 plots are used to construct both the BDM and leader predicted demand curves.

demand is elicited from the BDM mechanism or predicted by leaders with incentives, the curves are statistically indistinguishable. This is not only due to wide confidence intervals. The largest gap between the point estimates of leader and BDM elicited demand curves is a 0.08 point difference, and for the majority of price points the gap is less than a 0.03 point difference. The cash incentive has shrunk the gap that occurs when leaders are told that their responses will used to determine discounts.

In Appendix Figure A6 we use an alternative method of comparing predictions and true WTP in the form of QQ plots. In panel (a), we plot the distribution of baseline fees against the distribution of BDM bids showing that the fees are always higher than WTP at equivalent points in the distribution. In panel (b) leader predictions in the control group line up tightly along the 45-degree line. In panel (c) the leader predictions in the stakes group lies above the 45-degree line at all points, and well above the 45-degree line at the higher end of the distribution. In panel (d) we see that predictions from the incentives group of leaders again follows to 45-degree line closely.

[Table 1 here]

In Table 1 panel A we test for treatment effects on the prediction error, which is the difference between leader l's prediction of owner o's WTP and owner o's own WTP (i.e. $u_{ol} = \widehat{w}_{ol} - w_o$). So positive differences represent an overestimate by the leader. The results in panel A confirm what is shown in the graphs: the stakes group tends to overpredict, while prediction errors in the incentives group are statistically indistinguishable from those in the control group. In column 1, the stakes group significantly overpredicts by about $41 on average. Notably, the insignificant constant suggests that the control group does not over- nor underpredict on average. Looking across column 2 and 3 we see that our estimates are not sensitive to comparisons within neighbourhood, or even within plot. In columns 4-6, leader controls strengthen the stakes treatment effect both in magnitude and precision.[26]

5.2 Leader predictions of willingness-to-pay across owners

While leaders may be able to predict the aggregate distribution of demand fairly well, it remains to be seen if they can also distinguish WTP between individuals. In this section we describe the ability of leaders to distinguish variation across individuals. We start with

[26]Controls include all unbalanced leader characteristics from Table A2 (leader gender, leader household income bracket, a dummy for leaders home plot being surveyed) as well as leader surveyor fixed effects.

Table 2 that shows results from regressions based on the model:

$$w_o = \beta \widehat{w}_{ol} + x'_{ol}\gamma + \epsilon_{ol} \tag{2}$$

where w_o is WTP of owner o, $\widehat{w}_{ol}$ is leader l's prediction of plot o's WTP and x_{ol} is a set of controls.

Results in Table 2 panel A show that leader predictions are positively associated with true WTP for a variety of measures. Column 1 measures WTP in USD, and the coefficient suggests that an individual predicted to bid \$10 above the average will tend to bid \$2.03 more. Column 2 shows a similar results using the within neighbourhood rank of WTP. Columns 3 and 4 consider the prediction of being the top or bottom rank in the neighbourhood. These estimates suggest that an individual is 14.7 percentage points more likely to be the highest WTP in the neighbourhood if predicted to be so, and 24.2 percentage points more likely to be the lowest WTP if predicted so.[27] Finally, columns 5 and 6 show similar results if we look at indicators for individuals in the top and bottom 10% of the WTP distribution. Looking across panels we can see that these coefficients are stable to the inclusion of neighbourhood fixed effects (panel B), and controls for leader characteristics (panel C).

[Table 2 here]

This evidence suggests that leaders have knowledge of individual WTP, and yet, they may distort their responses across owners if it can help certain plot owners win discounts. We saw in the previous section that there is, on average, overprediction of WTP in the stakes group. Here we test whether treatment effects distort predictions beyond a level shift (e.g., if the stakes groups makes larger predictions errors for some owners compared to others).[28]

In Table 1 panel B we test for treatment effects on the absolute value of the demeaned prediction error. Specifically we take as dependent variable $\widetilde{u}_{ol} = abs[u_{ol} - \overline{u}_{T(l)}]$, where again the prediction error is $u_{ol} = \widehat{w}_{ol} - w_o$ and $\overline{u}_{T(l)}$ is the average prediction error in treatment group T. The results show that the stakes group does not distort their responses uniformly across owners. In column 1 the dispersion is significantly higher in the stakes group, and statistically indistinguishable in the incentives group compared to the control. Looking within neighbourhood (cols. 2 and 5), and within plot owner (cols. 3 and 6) give the

[27] We note that one of the largest land surveying companies in Tanzania consults local leaders before charging fees. In one of their larger projects, they used leader information to waive fees for about 2% of the plot owners deemed most in need of a discount. Our evidence suggests that leaders are quite capable of identifying the correct plot owners for this 'free lunch' program.

[28] We do not find any evidence that the slope on leaders' predictions varies by treatment group. These null results were presented in an earlier version of the paper (Manara & Regan 2020).

same qualitative results and improve the standard errors. This approach allows us to reject that there is some constant overstatement of WTP in the stakes group, instead prediction errors must be larger for some individuals than others.

In Table A5 we investigate which individuals get overpredicted the most by the stakes groups leaders by looking at hetorogeneity in prediction errors. Specifically, using only the sample of stakes group leaders, we run regressions of leader prediction errors (u_{ol}) on owner characteristics (panel A) leader-owner relationships (panel B), and leader characteristics (panel C). Selection of characteristics is guided by our follow-up interviews with leaders from the stakes group (see Section 7.1).[29] In panel A we look at variation within neighbourhood, results show that owners who could be seen as in need (are poor, have low education, are old, single female owners, or have children) are slightly less overstated, however these estimates are never significantly different from zero. In panel B, we look at variation within leader. In column 1 we find that leaders relatively underpredict those owners who they believe to be the poorest by about \$43, which is the magnitude as the average gap between stakes and control. There is no significant difference for those believed interested in using their land to take a loan (col. 2), or bequethment (col. 3), or for those that the leader considers family or friend (col. 4). However, we do find that leaders tend to significantly over predict those with whom they regularly meet at religious gatherings. Finally, in panel C we look at variation in leader characteristics within neighbourhood. Results show that leaders who are poor or with low education understate WTP relative to their peers, though only the latter is significant. We find similarly signed estimates for old leaders, those who have paid for their own title deed, and are from the opposition party, though again none are significant.

To summarize, we find evidence that differences between predictions and actual WTP are more dispersed in the stakes group (after accounting for the large mean shift in the stakes group), and that most of the mean shift can be explained by leaders over predicting WTP of owners who they do not believe to be poor. An interpretation of this is that leaders overpredict on average, but when doing so they aim to avoid harming the poorest. In Section 7.1 below, we discuss potential mechanisms behind this average overstatement.

5.3 Horse races with observable characteristics

We horse race leader predictions with observable property characteristics in regressions on WTP. First, we use the invoice value which is set by the government using a formula based on ward level land values, plot area and land use. Second, we consider estimates of property

[29] In these interviews, leaders emphasized that they believed most of their peers would have tried to increase the chances of high discounts for at least some plot owners (examples given were elders, the poor, those with pending loans, and those with dependent children).

value based on photos of the plot, and local knowledge of the area.[30] Finally, we look at a set of non-manipulable characteristics of the plot. Results are in Appendix Table A6.

Panel A uses invoice value with column 1 showing that it is strongly related to WTP, though column 2 demonstrates that the coefficient on leader prediction is still positive and significant conditional on invoice value. This is also true for the rank (cols. 3 and 4). However, when looking at the top rank leaders do not add much conditional on invoice value (cols. 5 and 6). Instead, when considering the bottom rank (cols. 7 and 8), leaders are effective while the invoice value is not. Finally we note that, while variation in invoice value closely follows that of WTP, the average is more than 2.7 times higher.

In panel B we use the estimated property value. Across all measures of WTP, leader predictions explain variation conditional on property value. Finally, in panel C we add a whole set of property features (plot size, and dummies for built plot, gated plot, painted tin roof, and plastered walls). All together the coefficient of determination is high at 0.39 (col. 1). Even so, leader prediction still has a positive coefficient conditional on these features (col. 2). Similar results hold in ranks (cols 3 and 4). Interestingly, again the leaders are particularly capable of distinguishing the lowest rank (col. 8). Overall, we can conclude that leaders predictions capture variation in WTP beyond observable property characteristics.

6 Putting predictions to practice

In this paper we propose that the state can more effectively target fees to both neighbourhoods and individual plots by collaborating with leaders who have local knowledge. First we should consider whether it is sensible that the government charges fees for title deeds at all. Why not just give away the titles for free, or at marginal cost, and fund the projects through tax revenue? Aside from the fact that charging of fees for title deeds is enshrined in Tanzanian law (United Republic of Tanzania 1999), there are two reasons why this may not be advisable. First, is that the government may not be able to secure the necessary funds to do so, or the efficiency of raising public funds may be so low as to make it unviable. This may be especially true if channels of raising revenue are limited or wasteful as is the case in many developing countries (Pomeranz & Vila-Belda 2019). Secondly, a growing body of research underscores that building capacity for revenue collection is important for state development (Besley & Persson 2014), so raising state capacity to effectively charge fees may

[30]The valuations were conducted by three students from Ardhi University, a local university which specialises in surveying, planning, and valuation. These students have been trained in methods used for property valuation, and the approach they follow is similar to the procedure used by local governments and the Ministry of Lands.

bolster intrinsic motivation to contribute to public funds.

6.1 Potential gains from first degree price discrimination

What are the merits to price discrimination over a flat fee in theory? Following the setting of title deed provision in Tanzania, let us consider the case where the government sets a fee for a service or good to cover the fixed costs of provision. To do so, they must charge a markup above marginal cost which, under a uniform price, creates deadweight loss. The deadweight loss comes in the form of Harberger triangles which are limited in size, but there can also be significant losses if the government is only willing to to implement projects that are expected to fund themselves (Kremer & Snyder 2018).[31] In theory, a planner with perfect information can recover these losses by charging individual-specific fees below individual WTP. We outline this reasoning in more detail in Appendix Section C.1.

As long as the total WTP covers project cost, then there are potential gains from first degree price discrimination. We do a back-of-the-envelope calculation to determine whether the WTP in our setting is high enough to cover the cost of the project. Currently, 13% of invoices have been paid and their average fee was $269, so about $35 was raised on average. In our sample of the remaining plots, the average WTP was $87.79. Taking this figure as representative for the entire 87% of unpaid invoices, the maximum revenue that could be extracted from the remainder is $73.77, averaged across the entire population. Together the average potential revenue is about $108.[32] Considering that the average cost of surveying a plot is about $87.41 for large projects (quote from two private survey companies), we can see that the costs of the project are covered and there is an average gain of $21 per plot.

Therefore the gains outweigh the costs by abut 24%, even only counting the private gains to the title document. Notably, the WTP for the title deed which we elicited in our study, does not capture the overall private gains to formalisation. In fact, plot owners already perceive large benefits to the surveying and plot delineation regardless of the acquisition of the title document.[33] Thus the overall private gains are larger than those captured by WTP for the title alone. This suggests that the gains to formalisation can outweigh the costs of surveying and planning in this setting, despite extremely low levels of title deed uptake.

[31] This reasoning is similar in spirit to Romer (1994) who shows the potential for large gains from trade when 'new' goods are introduced in the market by raising enough revenue to cover a fixed cost of entry.

[32] Note that this is a conservative estimate since the WTP of the 13% of plot owners who have already paid, must have had a WTP above their invoiced fee. Here we assume that their WTP was equal to the fee.

[33] For instance, a major perceived benefit was that the plot delineation mitigated encroachment of neighbours either into one's own plot or into public land. Based on 43 in-depth interviews with a sub-sample of plot owners.

6.2 Implementing price discrimination in practice

While first degree price discrimination has the potential to raise welfare in theory, it has obvious practical issues. First, is the lack of capacity to extract individual willingness to pay. While we argue that leader information can be used to raise state capacity, it is clear that perfect information on WTP is infeasible. Second, it may be simply illegal or at least politically difficult to charge individualised fees. We know of no Tanzanian law that would explicitly prohibit this.[34] However, it is reasonable that the government may be reluctant to do so anticipating public backlash. Third, it may be difficult for the government to credibly stick to individualised prices. For instance, a plot owner may hold out for a lower price knowing that the government is willing to charge less to otherwise identical plots.

Given the practical issues with first degree price discrimination, how can the leaders' information on WTP be useful in practice? Instead of charging individualised fees, the information from leaders could be used to improve the third degree price discrimination practice already employed by the government.[35] With perfect information, third degree price discrimination would recover no more, and likely less, deadweight loss than first degree. However in practice this is a more viable option. There is already precedent in Tanzania that fees for title deeds are charged based on land use, location, and plot size. Further, in our sample of plot owners, 86% of respondents believe that it is fair to charge different invoices to different plots. The holdout problem is also mitigated since prices are set on explicit observable characteristics.

Therefore improving the way the state sets their fees based on observable characteristics could improve the allocation of titles and lead to welfare gains. However, the issue of low government capacity remains for third degree price discrimination since the central planner still has little information on how WTP varies across plots of different sizes and in different locations. In Section 6.3 we demonstrate how leaders' predictions can be used to improve the way government sets their fees, and calculate the gains in our empirical setting.

6.3 Can leader information be used to improve public pricing?

There are many different possible models with which to set title deed fees as a function of plot characteristics. Here we focus on the exact same functional form that is currently used

[34]For instance, the 1999 Land Act provides no definition about the methods by which fees must be determined, and simply states that "The Minister ... shall prescribe the rates of fees for all matters in respect of which, by this Act, prescribed fees are required to be paid by any person and shall keep such fees under continuous review." (United Republic of Tanzania 1999).

[35]We note that second degree price discrimination has been skipped over here since it relates to pricing based on quantity demanded.

to set fees. This allows us to evaluate the usefulness of leader information, without assuming which alternative characteristics the government would be open to discriminating upon. We show that even under this restrictive functional form, leaders predictions can substantially improve public pricing of title deeds.

The government currently charges fees to plots based on three characteristics: plot size, plot use, and average land value in the local ward. In our study area there is no variation in the average land value and the vast majority of plots are residential. Therefore the invoice fees in our study area are based on a function of plot size. In particular the fees can be written as a linear function with three parameters.

$$p_i = \alpha + \beta \text{ size}_i + \delta[D_i^{300} + D_i^{800} + D_i^{2500}] \tag{3}$$

where p_i is the fee for property i, size_i is plot size in square metres, and D_i^{300}, D_i^{800}, and D_i^{2500} are indicator if plot size is above 300, 800, and 2500 square metres respectively. The parameter α determines the base price level, β determines the linear relationship between fee and plot size, and δ is a discrete jump at the three plot size thresholds.[36] Across the country, these parameters are set at the ward level, highlighting the need for local information. In our study area, the baseline parameters are $(\alpha, \beta, \delta) = (127, 0.18, 27)$. At these parameter values, current uptake is 13% and revenue is \$34.97 per plot. We take private gains to be zero: a direct result of the assumption from the previous section that all properties that have chosen to uptake have WTP exactly equal their fee.

To evaluate the practical usefulness of leader information, we present counterfactual uptake, revenue, and private gains for parameter values calibrated to leader predictions. Let us start by denoting the vector of demand for given parameter values as $q(\alpha, \beta, \delta)$ and the vector of leader predicted demand as $\widehat{q}(\alpha, \beta, \delta)$. Where each element is defined as:

$$q(\alpha, \beta, \delta)_i = \begin{cases} 1 \text{ if } w_i \geq p(\alpha, \beta, \delta)_i \ , \\ 0 \text{ otherwise} \end{cases} \quad \text{and} \quad \widehat{q}(\alpha, \beta, \delta)_i = \begin{cases} 1 \text{ if } \widehat{w}_i \geq p(\alpha, \beta, \delta)_i \ , \\ 0 \text{ otherwise} \end{cases} \tag{4}$$

where w_i is actual WTP, and $\widehat{w}_i$ is leader predicted WTP of plot i. The data on w_i is based on the BDM elicited WTP in our sample (representative of %87 of the population), and on the paid fee in the case of early payers (13% of the population). The data on $\widehat{w}_i$ is based on leader predictions. We pool predictions from the control and incentives groups and take the median value for each individual property owner so we have exactly one measure for each

[36] Plots above 300 square meters are charged an extra δ, those above 800 square meters an extra 2δ, and those above 2,500 square meters an extra 3δ.

owner.[37]

We consider two scenarios with different government objective functions: first, revenue maximising (i.e. parameter values solve argmax $p \cdot \widehat{q}$), and second, maximising uptake while meeting a self funding constraint (i.e. parameter values solve argmax $\sum \widehat{q}_i$, s.t. $p \cdot \widehat{q} > \underline{r}$). For each scenario, we then report the counterfactual uptake ($\sum q_i$), revenue ($p \cdot q$), and private gains ($\sum (w_i - p_i) q_i$).

In Table 3 we give results of these exercises. Panel A describes the current pricing strategy. The current parameters are given in the first three columns, and the next three columns show current revenue, uptake, and private gains are given. Panel B describes the results when we choose parameter values to maximise revenue. Here, we consider three different choices for setting fees: Uniform pricing (i.e. constraining $\beta = 0$, and $\delta = 0$), third degree price discrimination (i.e. allowing all three parameters to be chosen freely), and first degree price discrimination (charging each property owner a personalized fee). There are a few takeaways. First, leader information can improve revenue from the status quo. Allowing all three parameters to be calibrated to leader predictions (panel B, row 2) results in average revenue of \$46, up 30% from current revenue (panel A). Second, even though the objective is to maximise revenue, the lowering of fees also raises uptake significantly and consequently there is also an increase in private gains. This is simply because in our setting the current prices are too high on average. Third, while third degree price discrimination performs better than uniform pricing (revenue is \$46 compared to \$43), first degree price discrimination does worst of all. This is because leaders prediction errors at the individual level are too noisy, and each overprediction of individual WTP results in zero revenue. Fourth, the last column shows the ideal potential uptake if the government had perfect information on willingness to pay. We can see that both uniform and third degree price discrimination based on leaders' predictions capture most of the total potential revenue from such pricing strategies (e.g. under third degree price discrimination, leader calibrated parameters yield \$46 in revenue, while perfect information would yield \$49). Fifth, and finally, we can see that despite improvements in revenue, we still cannot extract enough to cover the average cost of \$87.

Panel C describes the results for the scenario when the government aims to maximise uptake while holding expected revenue fixed. We have seen that none of our pricing strategies using leader information can cover the average cost of titling. So, instead we ask how much could the government improve on uptake while raising the same revenue it has raised to date. That is we set the self funding constraint $\underline{r} = \$35$. Here we consider uniform pricing

[37]We also lack leader predictions for the sample of 13% who uptook early. We fill in these by taking a random draw for each property under the assumption that the difference in log leader prediction and log WTP for these early payers is normally distributed with the sample mean and variance of in our sample of surveyed plots.

and third degree price discrimination. The results show that uptake could be significantly improved while holding revenue close to what is raised currently. In particular, uniform pricing can raise uptake sixfold from it's current 13% to 80%. Notably, revenue is slightly lower in this case since the constraint in the maximisation problem is also based on expected revenue given leaders' predictions. Still, revenue in this scenario is only 5% below the $35 target. These results demonstrate that leader information could significantly improve uptake while keeping revenue at current rates.

[Table 3 here]

6.3.1 Leader information extraction under a policy environment

We have shown that leader information elicited in our setting can significantly raise uptake from the status quo, so there is potential value to gathering this information. But how would the ability of leaders to acquire this information change once this is put to practice as a policy? There are two good reasons to not be overly concerned. First, using a simple form of third degree price discrimination based on easily observed characteristics, our proposed policy limits the incentive of plot owners to conceal behaviour because they are charged a price that depends on the behaviour of many others. Second, community leaders are responsible for many community affairs, and so it is not clear that plot owners would be able or willing to avoid interactions more generally just to hide information that could potentially influence their title deed fee.

Nevertheless we should be wary that such a policy could diminish the ability of leaders to gather information by changing the way that plot owners interact with their leaders. This could also have adverse unintended consequences if plot owners become reluctant to approach leaders for their services in general. For instance, it may discourage individuals from going to their leaders for help resolving neighbourly disputes over property, or taking loans (which require ownership verification from their leader). Therefore any implementation of this policy should monitor whether the leaders ability to predict WTP becomes diminished, or whether there is evidence of other side effects to plot owner relationships with leaders.

7 Discussion

7.1 Why do leaders in stakes overstate willingness-to-pay?

In January 2020, we conducted follow-up interviews with leaders from the stakes group. The purpose of the interviews was to better understand why these leaders had overpredicted

WTP on average (Figure 1c). As explained in the script (Appendix D), leaders in the stakes group had been given the opportunity to raise the chance of a discount for plot owners in their neighbourhood. To do so they needed to tell the enumerators that WTP was low for these plot owners. Perhaps counter-intuitively we find that these leaders did the opposite: they overstated WTP on average compared to both the control and incentives groups. As an investigation into the motivations of this result we conducted follow-up interviews to assess whether the script was understood incorrectly, and what other reasons may have caused the upward bias. The results of these interviews show some evidence of experimenter demand effects and potential for misunderstanding of the script. We discuss this in detail in Appendix Section C.2 and argue that it is unlikely that either of these explanations were responsible for the overstatement of WTP found in the stakes group.

So, with little evidence that the overstatement of WTP by leaders in the stakes group was driven by misunderstanding or experimenter demand effects, we return to the leaders' objective function laid out in Section 2.2 as a potential explanation. We hypothesized that leaders' incentives in the allocation of title deeds could be driven by various factors. First, they may wish to favour their neighbours and community members (either as a whole or on an individual level). In this case, we would expect leaders to state a low WTP for their neighbours in general so that they receive larger subsidies. However, we find the opposite. Second, leaders could be motivated by their accountability to their party and how its interests align with the central state. In this case, we would expect leaders in the CCM party to respond accurately since it is in their interest to raise the uptake of title deeds. However, we find no evidence that the overstatement varies by party affiliation. Further, leaders may be motivated by fear that their role in the informal land tenure system could be eclipsed by formalisation. Due to concern that formalisation will marginalise their position and diminish their opportunities to earn tips, leaders may wish to decrease the chances of discounts and prevent the uptake of title deeds in their community. This is a plausible explanation for why leaders in the stakes group would have overstated WTP across the board, ultimately though we have no direct evidence for this.

Importantly we note that these incentives could be better aligned if leaders were incorporated into the formal system and paid for their work. On a macro scale, it has be shown that leaders and the state tend to be complements in countries where leaders are formally integrated into national institutions, and substitutes otherwise (Henn 2020). In our setting we find corroborating evidence on a very micro scale. Also, during our follow up interviews, most leaders claimed a desire to raise formalisation in their neighbourhood. In their opinion, the government would get twofold advantages from a closer collaboration with leaders. On the one hand, they can provide information on the local demand for titles, as demonstrated

in this paper. On the other, "leaders are essential to emphasise the project and motivate people to pay for the title deed" (Leader 12). Indeed, in this context plot owners tend to follow the advice of their leaders, because they "trust the wajumbe" (Leader 8) and "have little information, despite urging the title deed" (Leader 20).

7.2 The supply side of title uptake

Following our study, we explored the supply side of land titles more closely. Here we give a brief description of the title deed process and describe some of the hurdles faced. In January and October 2020, several months following the price elicitation sessions, we collected data for the titled status of plots in our study area. In a new centralised digital system, the land officers at Ubungo Municipality check off steps of the title acquisition process allowing us to follow the history of each title. The results are summarised in Table A7. We break the plots down into three groups: 'discounted' refers to plots that won a discount in the BDM procedure and therefore were paid during the study, 'full price' refers to plots that did not win a discount in the BDM procedure but may have nevertheless been paid since the time of the study, and 'attriters' refers to plots with owners who declined our invitation to attend but may have nevertheless been paid since our study. Two stages of the acquisition process are recorded. Once titles are 'allocated' this means that the title has been approved and is available for collection, and once titles are 'collected' this means that the owner has physically collected the title from the municipality.

Our findings show that title collection, even for those plots that were entirely paid for as part of our study, has been very low. By October 2020, a full sixteen months after the discounted titles had been paid for at the municipality, the rate of title collection was 44% for those plots that won a discounted price, 2% for those that did not win, and 7% for the attriters. As we would expect, those plots which were paid for as part of our study are more likely to have had their title collected. However, even for this group, less than half of the titles were collected.

Further, this low collection rate cannot be explained by low demand. While there is evidence that plot owners may be slow to pick up their titles (across all groups, 20 plots had been allocated titles but only 6 collected at the eight month mark), after sixteen months all but one of the allocated titles had been collected. This shows that once titles have been prepared by the municipality, the plot owners are willing to incur the final monetary and opportunity cost of travel in order to pick up their title. Therefore the limiting factor in collection seems to be the allocation step.

The allocation step being a limiting factor points to bottlenecks on the supply side. For

example, among the 39 discounted plots, many titles had stalled because the municipality needed to amend mistakes in the cadastral drawings and database, including simple typos or major issues of overlapping plot boundaries. Unfortunately, sixteen months after completing the payment, 49% of the discounted plots are stalled at this stage. This evidence highlights that the survey process can produce significant bottlenecks if poorly organised and rushed, as many of our respondents complained.

To conclude, we find that there are significant supply constraints in the title acquisition process. Even after titles have been paid for the collection rate is very low. This is not due to a lack of demand or interest from the plot owner, as all plot owners collect their titles once they have been allocated by the municipality. Long delays to title collection are a result of mistakenly drawn cadastral surveys and incorrect government records.

8 Conclusion

African governments adopt land tenure reforms to counteract the socio-economic issues connected with unplanned and rapid urbanisation, essentially pushing for a transition from informal land tenure to formal law. These reforms are challenged by low uptake of title deeds in much of urban Africa. We study two neighbourhoods of Dar es Salaam which were the location of of a recent formalisation project. Despite registering only 13% uptake, we find that demand for formal property rights here is substantial. On average, plot owners are willing-to-pay about 25% above average cost. This is much higher demand than is found in previous work in Dar es Salaam (Ali et al. 2016).[38] Drawing on this result, we challenge the view that low uptake reflects plot owners not recognizing the benefits of formalisation.

However, demand remains considerably lower than current fees, with the average invoice value being more than two and a half times the average WTP. Our conservative back-of-the-envelope calculation suggests that, if the government were perfectly able to target fees based on WTP, the gains would outwiehg the costs by 25% exclusive of the gains due to externalities and those already received through the surveying and planning process.

This study has proposed that, in order to better target fees, community leaders can provide useful information on the local demand for titles. These leaders are typically involved in the land matters of unplanned settlements and so have an intimate knowledge of local demand. To summarise, this argument is supported by three sets of evidence. First, local leaders have accurate information about the aggregate demand curve in their neighbourhoods and they can distinguish variation in WTP across plot owners. Second, whilst leaders predictions

[38]However, results are not easily comparable, because Ali et al. (2016) study two neighbourhoods closer to the city-centre, where the land value is higher and plots are smaller.

of aggregate demand deteriorate under an environment where their responses are used to allocate subsidies, an incentive scheme of cash payments for ex-post accuracy can correct for this misreporting. Third, we show that leaders information could be used to choose parameter values for the current pricing function that could raise uptake from 13% to 80% and keep revenue roughly fixed.

Altogether, this evidence suggests that the local knowledge of leaders can be used to set prices of land titles in combination with the current price discriminating formula based on local land value, landuse and plot size. As argued, this pricing strategy would help to make formalisation projects financially viable and, crucially, more inclusive of the urban poor. However, it is important that leaders are adequately incorporated into the formal system if they are expected to be cooperative. In fact, interviews with leaders suggest that they are keen to support the governments formalisation endeavours and facilitate vulnerable plot owners in achieving higher tenure security. Thus, we recommend that these key actors of informal institutions are not left behind in the transition to formal property rights. Finally, we underscore the need for more empirical research on the supply side of land titling, whereby bottlenecks can provide significant disincentives to the uptake of titles.

Table 1: Treatment Effects on Leader Predictions of WTP

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Prediction error, dependent variable $= \widehat{w}_{ol} - w_o$						
Stakes	41.16***	40.92***	40.92***	51.43***	58.82***	58.82***
	(15.62)	(12.44)	(13.53)	(14.66)	(10.69)	(11.64)
Incentives	16.51	21.02	21.02	12.36	14.63	14.63
	(13.53)	(13.94)	(15.16)	(12.93)	(12.74)	(13.88)
Constant	4.095	2.742	2.742	1.875	-1.393	-1.393
	(9.725)	(7.639)	(8.308)	(9.502)	(6.570)	(7.158)
Shina FE		✓	✓		✓	✓
Plot FE			✓			✓
Controls				✓	✓	✓
Observations	876	876	876	876	876	876
R^2	0.0731	0.142	0.530	0.172	0.246	0.633
Panel B: Absolute demeaned error, dependent variable $= abs[u_{ol} - \overline{u}_{T(l)}]$						
Stakes	16.12*	13.85**	13.85**	15.37*	21.27***	21.27***
	(8.719)	(5.814)	(6.323)	(8.453)	(6.600)	(7.191)
Incentives	-4.450	2.202	2.202	-10.70	-2.862	-2.862
	(6.547)	(6.254)	(6.801)	(7.404)	(8.083)	(8.807)
Constant	65.38***	64.04***	64.04***	67.63***	63.10***	63.10***
	(4.736)	(3.415)	(3.714)	(4.821)	(3.946)	(4.300)
Shina FE		✓	✓		✓	✓
Plot FE			✓			✓
Controls				✓	✓	✓
Observations	876	876	876	876	876	876
R^2	0.0532	0.0995	0.428	0.0933	0.130	0.459

Note: This table presents estimates of treatment effects on leaders predictions. Each observation is a plot-leader pair. In panel A, the dependent variable is the prediction error: the difference between the leader's prediction and actual willingness-to-pay. In panel B, the dependent variable is the absolute demeaned error: the absolute value of the leader's prediction error minus the treatment group average prediction error. All columns represent regressions on treatment group dummies with different sets of controls. Leader randomization strata fixed effects are always included. Where indicated, regressions include shina (neighbourhood) fixed effects, plot fixed effects, and a set of controls (leader gender, leader household income bracket, a dummy for leader's home plot being surveyed, and fixed effects for the ID of the leader's surveyor). Standard errors in parentheses are clustered at leader level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 2: leaders' predictions of willingness-to-pay across owners

	(1) WTP	(2) WTP Rank	(3) Top Rank	(4) Bottom Rank	(5) Top 10%	(6) Bottom 10%
Panel A: Baseline controls						
Leader Prediction	0.203***	0.199***	0.147***	0.242***	0.106***	0.215***
	(0.0447)	(0.0237)	(0.0510)	(0.0545)	(0.0359)	(0.0591)
Mean outcome	85.07	3.48	0.11	0.19	0.08	0.08
Observations	876	876	876	876	876	876
R^2	0.0707	0.105	0.0218	0.0441	0.0280	0.0297
within-R^2	0.0547	0.0912	0.0191	0.0350	0.0162	0.0163
Panel B: + controls for neighbourhood FE						
Leader Prediction	0.211***	0.200***	0.146***	0.243***	0.114***	0.118***
	(0.0444)	(0.0237)	(0.0515)	(0.0548)	(0.0355)	(0.0446)
Observations	876	876	876	876	876	876
R^2	0.125	0.179	0.0319	0.117	0.0793	0.141
within-R^2	0.0581	0.0963	0.0188	0.0382	0.0192	0.0044
Panel C: + leader characteristic controls						
Leader Prediction	0.251***	0.200***	0.146***	0.243***	0.128***	0.140***
	(0.0564)	(0.0239)	(0.0520)	(0.0554)	(0.0385)	(0.0504)
Observations	876	876	876	876	876	876
R^2	0.136	0.179	0.0319	0.117	0.0817	0.142
within-R^2	0.0694	0.0962	0.0187	0.0382	0.0216	0.0053

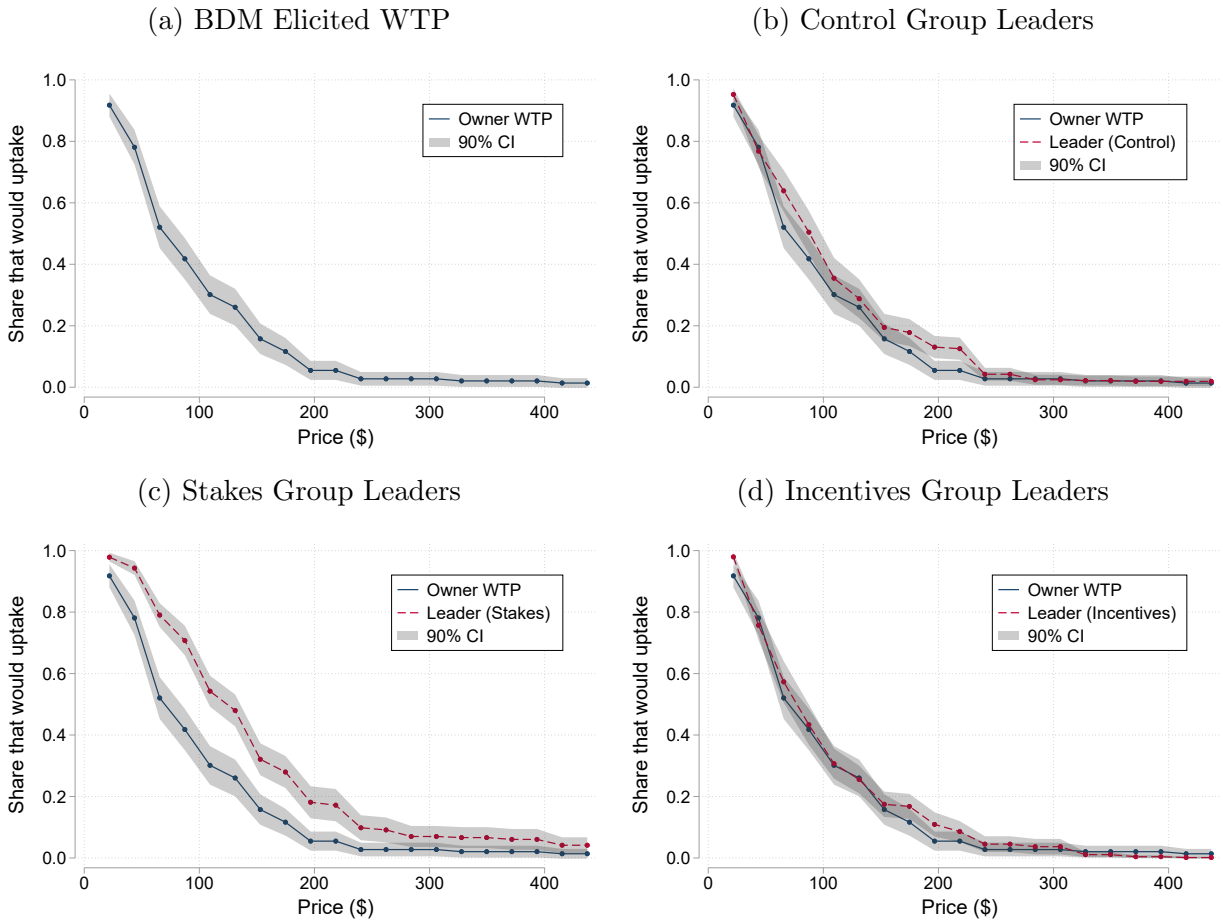
Note: This table presents coefficients from regressions of willingness-to-pay on leader's predicitons of willingness-to-pay. Each observation is a leader-plot owner pair. Each column is a different measure of willingness-to-pay: col. 1 in USD, col. 2 is the within neighbourhood rank, col. 3 is an indicator for the highest in the neighbourhood, col. 4 is an indicator for the lowest, col.5 is an indicator if in the top 10% of the full distribution, and col. 5 if in the bottom 10% of the full distribution. Leader treatment group and randomization strata fixed effects are always included as controls. Each panel represents a different set of controls: panel A has no additional controls, panel B adds shina (neighbourhood) fixed effects, and panel C further adds a set of controls (leader gender, leader household income bracket, a dummy for leader's home plot being surveyed, and fixed effects for the ID of the leader's surveyor). Standard errors in parentheses are clustered at leader level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 3: Using leader information to raise revenue and uptake

Pricing	Parameter Values			Counterfactual Outcomes			
	α	β	δ	Revenue	Uptake	Private Gains ($)	
Panel A: Current pricing							
Current	127	.18	27	$35	13%	$0	
Panel B: Maximising revenue							Revenue with Perfect Info
Uniform	88	.	.	$43	48%	$45	$45
Third degree	66	0	22	$46	53%	$45	$49
First degree	.	.	.	$34	37%	$59	$108
Panel C: Maximising uptake							Uptake with Perfect Info
Uniform	42	.	.	$33	80%	$69	80%
Third degree	22	0	22	$32	86%	$71	80%

Note: This table reports counterfactual revenue, uptake, and welfare gains using leader information to set prices. The first three columns give the fee function parameter values, the next three give revenue, uptake and privates gains for these parameters, and the last column gives the ideal government objective if using perfect information on willingness-to-pay. Panel A is based on the current pricing, Panel B is based on pricing if the government aimed to maximise revenue, and Panel C is based on pricing if the government aimed to maximise uptake conditional on raising current revenue ($37).

Figure 1: BDM Elicited and Leader Predicted Demand Curves



Notes: This Figure plots demand curves for CROs. The estimated share that would uptake is plotted for a range of prices at intervals of roughly $22. Confidence intervals at the 90% level are plotted as shaded gray. Standard errors are calculated using logit regressions and clustering at the plot level. All panels plots the demand curve based on BDM elicited WTP with a solid line: each dot indicates the share of respondents with a BDM bid greater than or equal to the corresponding price. Panels (b-d) plot the demand curves implied by the leader predictions in the control, stakes, and incentives groups respectively with a dashed line: each dot indicates the share of respondents with a leader predicted WTP greater than or equal to the corresponding price. Leader predictions (which can have multiple occurrences within treatment) are weighted so each owner gets a weight of one.

Appendices - not for publication

A Additional Tables

Table A1: Attrition Checks

	(1) Lot Size (sq-m)	(2) Gated	(3) Plaster Wall	(4) Invoice Value (USD)
Panel A: Full sample of plots				
Attrited	149.5*	0.0909	0.0866	32.43*
	(84.70)	(0.0554)	(0.0659)	(18.41)
Constant	463.7***	0.137***	0.610***	233.6***
	(32.82)	(0.0286)	(0.0406)	(7.546)
Observations	225	225	225	225
Panel B: Invited sample of plots				
Attrited	153.5	0.0694	0.0730	32.08
	(98.86)	(0.0587)	(0.0715)	(21.22)
Constant	463.7***	0.137***	0.610***	233.6***
	(32.84)	(0.0286)	(0.0406)	(7.548)
Observations	209	209	209	209

Note: This table presents coefficients from regressions of plot characteristics on a dummy for the plot being included in our survey. Each observation is a plot. The full sample is the 225 randomly sampled plots and the invited sample is the 209 plots that were eligible for the survey. Robust standard errors in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A2: Owner and Leader Summary and Balance

Plots		Leaders			
	(1)		(2)	(3)	(4)
	Mean		Mean	Diff Stakes-Contr	Diff Incent-Contr
Sole ownership	0.73				
	(0.037)				
Sole ownership and female	0.26	Female	0.40	-0.24*	-0.15
	(0.036)		(0.052)	(0.124)	(0.130)
Under 40 years old	0.23	Under 40 years old	0.07	0.06	0.04
	(0.035)		(0.026)	(0.064)	(0.058)
Over 60 years old	0.20	Over 60 years old	0.33	0.09	0.11
	(0.033)		(0.050)	(0.120)	(0.123)
Educ. primary or less	0.48	Educ. primary or less	0.57	0.05	0.05
	(0.041)		(0.053)	(0.129)	(0.131)
Educ. above secondary	0.27	Educ. above secondary	0.12	-0.07	-0.06
	(0.037)		(0.035)	(0.087)	(0.090)
Monthly HH income < 45	0.34	Monthly HH income < 45	0.19	0.25**	0.00
	(0.039)		(0.041)	(0.104)	(0.080)
Monthly HH income > 130	0.35	Monthly HH income > 130	0.42	-0.08	0.05
	(0.040)		(0.052)	(0.127)	(0.132)
Avg. CRO quiz score	4.9	Avg. CRO quiz score	7.4	0.15	0.08
	(0.114)		(0.124)	(0.309)	(0.318)
No children	0.08	Opposition party	0.14	0.03	0.00
	(0.022)		(0.037)	(0.092)	(0.091)
Over 4 children	0.32	Assistant leader	0.39	-0.05	0.01
	(0.039)		(0.052)	(0.126)	(0.130)
Absentee Owner	0.28	Owns their home plot	0.94	0.00	0.03
	(0.037)		(0.024)	(0.064)	(0.058)
Acquired in last 6 years	0.11	Settled in last 6 years	0.07	-0.03	0.04
	(0.026)		(0.026)	(0.056)	(0.074)
Acquired over 19 years	0.34	Settled over 19 years	0.38	-0.01	-0.06
	(0.039)		(0.051)	(0.127)	(0.128)
Acquired by purchase	0.86	Home plot surveyed	0.91	0.07	0.17**
	(0.029)		(0.030)	(0.087)	(0.070)
Has sale certificate	0.25	Count of 15 owners known at all	12	0.54	1.1
	(0.036)		(0.321)	(0.807)	(0.773)
Owns another plot	0.50	Count of 15 owners use services at all	4.3	1.7	0.33
	(0.042)		(0.465)	(1.19)	(1.01)
Owns another surveyed plot	0.25	Count of 15 owners family members	0.22	0.09	-0.03
	(0.036)		(0.052)	(0.130)	(0.114)
Owns another titled plot	0.10	Count of 15 owners close friends	1.4	-0.41	-0.08
	(0.024)		(0.142)	(0.358)	(0.363)
Avg. invoice value (USD)	230	Count of 15 owners religious affiliation	1.8	-0.48	0.07
	(7.84)		(0.267)	(0.646)	(0.757)
Avg. plot area (sqm)	464	Count of 15 owners highly esteemed	1.3	0.02	0.08
	(32.8)		(0.124)	(0.297)	(0.330)
Avg. BDM bid (USD)	85				
	(6.36)				
N	146	N	90		

*$p \leq 0.10$, **$p \leq 0.05$, ***$p \leq 0.01$ for difference=0 t-test
Standard errors in parentheses

Table A3: Heterogeneity in Willingness-to-pay

	(1)	(2)	(3)	(4)	(5)	(6)
Sole Female	17.93					18.60
	(16.19)					(14.35)
Joint Owners	-5.085					3.844
	(14.86)					(11.65)
Age 40-60		-22.59				-21.78
		(18.52)				(16.52)
Age 60+		-27.81				-35.77*
		(20.87)				(19.50)
Middle Income			38.66***			32.66***
			(11.30)			(11.55)
High Income			73.69***			44.82***
			(14.90)			(13.10)
Secondary Education				18.33		0.623
				(11.35)		(11.42)
Higher Education				64.39***		14.23
				(18.72)		(15.43)
Lot Size (sq-m)					0.106***	0.0973***
					(0.0311)	(0.0313)
Observations	146	146	146	146	146	146
R^2	0.014	0.014	0.155	0.115	0.302	0.423

Note: This table presents coefficients from regressions of willingness-to-pay on plot and plot owner characteristics. Each observation is a plot. The dependent variable is always the willingness-to-pay in USD. The category middle income refers to households with monthly income 44 and 131 USD. The category high income refers to households with monthly income over 131 USD. Robust standard errors in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A4: Leader Predictions of Standard Characteristics

	(1) Income Rank	(2) Invoice Rank	(3) Invoice Rank Full	(4) Property Tax Paid	(5) Certificate of Sale
Panel A: Predictions					
Leader Prediction	0.202***	0.323***	0.337***	0.0612	0.0378
	(0.0190)	(0.0328)	(0.0291)	(0.0371)	(0.0386)
Mean outcome	3.33	5.43	8.00	0.45	0.25
Observations	876	876	1349	876	876
R^2	0.130	0.108	0.114	0.0204	0.0225
within-R^2	0.113	0.103	0.113	0.002	0.001
Panel B: + controls for neighbourhood FE					
Leader Prediction	0.201***	0.301***	0.337***	0.0584**	0.0294
	(0.0194)	(0.0344)	(0.0293)	(0.0257)	(0.0179)
Observations	876	876	1349	876	876
R^2	0.251	0.123	0.114	0.143	0.181
within-R^2	0.124	0.089	0.113	0.002	-0.000
Panel C: + leader characteristic controls					
Leader Prediction	0.201***	0.301***	0.337***	0.0731**	0.0838*
	(0.0196)	(0.0347)	(0.0295)	(0.0322)	(0.0500)
Observations	876	876	1349	876	876
R^2	0.251	0.123	0.114	0.144	0.183
within-R^2	0.124	0.089	0.113	0.003	0.002

Note: This Table presents coefficients from regressions of standard plot characteristics on leader's predicitons of those characteristics. Each observation is a leader-plot pair. Column 1 the dependent variable is the within neighbourhood rank of plot owner's income. The dependent variable in columns 2 and 3 is the within neighbourhood rank of invoice value. Column 2 restricts the sample to respondent owners, while column 3 includes all invoices. Column 4 the dependent variable is an indicator if the plot owner reported paying property tax in 2018. Column 5 the dependent variable is an indicator if the plot owner reported having a certificate of sale. Leader treatment group and randomization strata fixed effects are always included as controls. Each panel represents a different set of controls: panel A has no additional controls, panel B adds shina (neighbourhood) fixed effects, and panel C further adds a set of controls (leader gender, leader household income bracket, a dummy for leader's home plot being surveyed, and fixed effects for the ID of the leader's surveyor). Standard errors in parentheses are clustered at leader level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A5: Heterogeneity in overprediction by the stakes group

Panel A: Characteristics of the owner

	(1) Very poor	(2) Low Education	(3) Age>60	(4) Sole Female Owner	(5) Has Children
Group Difference	-4.046	-1.927	-1.636	-7.244	-6.059
	(22.84)	(15.78)	(24.12)	(12.17)	(15.88)
Observations	302	302	302	302	302
R^2	0.156	0.156	0.156	0.156	0.156

Panel B: Leader beliefs and leader-owner relationships

	(1) Believed poorest	(2) Believed interested in loans	(3) Believed interested in bequeathment	(4) Family or friend	(5) Meet at religious gatherings
Group Difference	-42.66**	-3.485	18.60	0.0190	81.55**
	(15.58)	(24.92)	(21.82)	(28.54)	(32.62)
Observations	302	302	302	302	302
R^2	0.363	0.339	0.341	0.339	0.368

Panel C: Leader Characteristics

	(1) Poor	(2) Low Education	(3) Age>60	(4) Paid own title deed	(5) Opposition Party
Group Difference	-47.75	-50.02**	-41.99	-30.02	-6.047
	(28.49)	(24.32)	(32.24)	(33.81)	(29.15)
Observations	302	302	302	302	302
R^2	0.177	0.182	0.170	0.162	0.156

Note: This table presents results on heterogeneity of the overprediction in the stakes group. Each observation is a leader-plot pair. The dependent variable is always leader prediction error ($\hat{w}_{ol} - w_o$). Neighbourhood fixed effects are included in all models, and panel B also includes leader fixed effects. Panel A uses owner indicators: in col. 1 household income is below 22 USD, col. 2 no more than primary education, col. 3 is over 60, col 4. is owned solely by a woman, and col. 5 at least one child. Panel B uses leader-owner indicators: col. 1 the leader believes that the owner is in the bottom third in terms of income, col. 2 the leader believes that the owner is interested in using their land as collateral, col. 3 the leader believes that the owner wishes to bequeath their plot, col. 4 family members or friends, and col. 5 meet together for religious gatherings. Panel C uses leader indicators: col. 1 household income is below 44 USD, col. 2 has no more than primary education, col. 3 is over 60 years old, col. 4 has paid for the title deed to their plot, and col. 5 belongs to the opposition party. Standard errors in parentheses are clustered at leader level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A6: Willingness-to-pay, leader predictions, and observable characteristics

	(1) WTP	(2) WTP	(3) WTP Rank	(4) WTP Rank	(5) Top Rank	(6) Top Rank	(7) Bottom Rank	(8) Bottom Rank	(9) Top 10%	(10) Top 10%	(11) Bottom 10%	(12) Bottom 10%
Panel A: Invoice Value												
Invoice	0.457***	0.435***	0.260***	0.225***	0.445***	0.432***	0.0434	0.0263	-0.0834***	-0.0795***	0.160***	0.154***
	(0.0484)	(0.0487)	(0.0153)	(0.0191)	(0.0587)	(0.0596)	(0.0494)	(0.0514)	(0.00961)	(0.00986)	(0.0435)	(0.0424)
Prediction		0.0915***		0.146***		0.0632		0.240***		0.104***		0.201***
		(0.0306)		(0.0233)		(0.0434)		(0.0549)		(0.0356)		(0.0583)
N	876	876	876	876	876	876	876	876	876	876	876	876
within-R^2	0.2970	0.3068	0.1557	0.2015	0.1828	0.1854	0.0000	0.0343	0.0070	0.0225	0.0263	0.0404
Panel B: Property Value (1,000 USD)												
Property Value	0.172**	0.0430	0.104***	0.0576***	0.00380	-0.0255	0.0133	-0.0230	0.332***	0.321***	-0.0972***	-0.0995***
	(0.0699)	(0.0831)	(0.00862)	(0.0126)	(0.0440)	(0.0509)	(0.0614)	(0.0600)	(0.0582)	(0.0568)	(0.0140)	(0.0141)
Prediction		0.200***		0.176***		0.150***		0.244***		0.0869***		0.217***
		(0.0468)		(0.0282)		(0.0529)		(0.0552)		(0.0318)		(0.0569)
N	876	876	875	875	876	876	876	876	876	876	876	876
within-R^2	0.0022	0.0538	0.0378	0.1008	-0.0012	0.0183	-0.0011	0.0341	0.0804	0.0909	0.0052	0.0219
Panel C: Property Features												
Plot Size	0.101***	0.0982***	0.192***	0.179***	0.546***	0.536***	0.175***	0.160**	-0.0673***	-0.0631***	0.209***	0.203***
	(0.0104)	(0.0106)	(0.00982)	(0.0113)	(0.0693)	(0.0711)	(0.0633)	(0.0656)	(0.00969)	(0.0106)	(0.0542)	(0.0531)
Built Plot	-60.19***	-58.18***	-0.792**	-0.571*	-0.172***	-0.162***	-0.0129	-0.0260	-0.312***	-0.302***	0.155***	0.151***
	(11.88)	(11.88)	(0.329)	(0.304)	(0.0452)	(0.0454)	(0.0631)	(0.0624)	(0.0438)	(0.0420)	(0.0215)	(0.0215)
Gated Plot	51.97***	50.52***	0.934***	0.813***	0.119***	0.113***	-0.125***	-0.113***	0.136***	0.129***	-0.00296	-0.00103
	(7.234)	(7.235)	(0.158)	(0.156)	(0.0394)	(0.0389)	(0.0306)	(0.0306)	(0.0311)	(0.0307)	(0.0202)	(0.0196)
Good Roof	-21.88***	-23.05***	-0.326*	-0.562***	-0.101***	-0.112***	-0.0488	-0.0429	-0.0810***	-0.0883***	-0.0726***	-0.0701***
	(7.556)	(7.654)	(0.168)	(0.171)	(0.0367)	(0.0353)	(0.0324)	(0.0330)	(0.0220)	(0.0217)	(0.0161)	(0.0161)
Good Walls	18.05***	17.02***	0.602***	0.494***	0.0530***	0.0500***	-0.0852**	-0.0696**	0.0570***	0.0543***	-0.0896***	-0.0896***
	(4.750)	(4.695)	(0.161)	(0.167)	(0.0136)	(0.0137)	(0.0331)	(0.0325)	(0.0158)	(0.0158)	(0.0230)	(0.0230)
Prediction		0.0556*		0.126***		0.0610		0.208***		0.0758**		0.177***
		(0.0294)		(0.0226)		(0.0479)		(0.0543)		(0.0290)		(0.0533)
N	876	876	875	875	876	876	876	876	876	876	876	876
within-R^2	0.3912	0.3943	0.2330	0.2632	0.2063	0.2084	0.0404	0.0658	0.1140	0.1216	0.1010	0.1117

Note: This table presents coefficients from regressions of willingness-to-pay on leader's predictions of willingness-to-pay and observable characteristics of the property. Each observation is a leader-plot owner pair. Each column is a different transformation of willingness-to-pay: column 1 in USD, column 2 is the within neighbourhood rank, column 3 is an indicator for the highest in the neighbourhood, and column 4 is an indicator for the lowest. Leader treatment group and randomization strata fixed effects are always included as controls. Each panel represents a different set of observable characteristics: panel A uses the invoice value, panel B estimated property value, and panel C uses property features (plot size, an indicator if the plot is built upon, if it is gated, if it's roof is painted, and if its walls are plastered). Standard errors in parentheses are clustered at leader level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A7: Title acquisition process

	Discounted	Full price	Attriters
Number of plots	39	107	73
Titles allocated after 8 months	14	2	4
Titles collected after 8 months	4	0	2
Titles allocated after 16 months	17	3	5
Titles collected after 16 months	17	2	5

Notes: This table reports the progress of title acquisition for three groups of plots: the 'Discounted' column refers to the group of plots that won a discount in the BDM procedure and therefore were paid for during the study, the 'Full price' column refers to the group of plots that did not win a discount in the BDM procedure may have nevertheless been paid for since the time of the study, and the 'Attriters' column refers to the group of plots who's owners were invited to attend the study but declined or did not show up. The first row reports the total number of plots in each group. The following rows report the status of these plots at two stages: the 'Titles allocated' rows count the plots that have been granted a title, and the 'Titles collected' rows count the plots where the title has been physically collected by the owner from the municipality. We record each of these stages at two points in time: once after 8 months (January 2020) an once after 16 months (October 2020).

B Additional Figures

Figure A1: Project Timeline

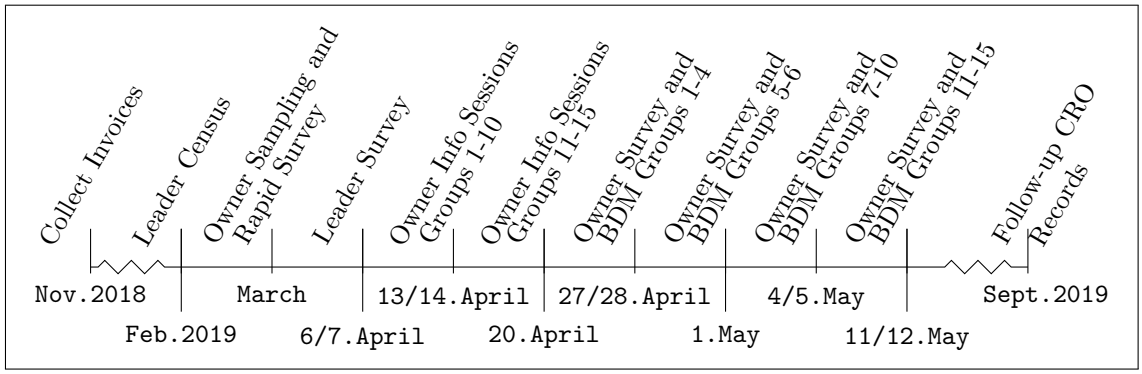


Figure A2: Example of an Invoice for a CRO

UBUNGO MUNICIPAL COUNCIL

Invoice

Date: 07-Nov-2018

Invoice No: 1368046

TO: [redacted]

P.O Box [redacted]

DAR ES SALAAM

LOT ID: [redacted], LOT NUMBER: [redacted], AREA: 484 SQM

BLOCK: 4 KILUNGULE B KIMARA IN UBUNGO, DAR ES SALAAM

Description	Amount	Amount Due
Application Fee	20,000.00	20,000.00
Land rent From 1st April, 2018 to 30th June, 2018	3,630.00	3,630.00
Registration Fee	2,904.00	2,904.00
Certificate of Occupancy Fee	50,000.00	50,000.00
Deed Plan Fee	20,000.00	20,000.00
Survey Fee	16,940.00	16,940.00
Stamp Duty	816.00	816.00
Premium	181,500.00	181,500.00
Revolving Fund	120,000.00	120,000.00
TOTAL	**415,790.00**	**415,790.00**

Please pay in A/C Name: Katibu Mkuu Ardhi, A/C NO: 20101000025, Bank: NMB

OPERATIONAL COST	**140,000.00**	**140,000.00**

Please pay in A/C Name: Ubungo Municipal Council, A/C NO: 0150235213100, Bank: CRDB

Figure A3: Location of Study Area in Dar es Salaam

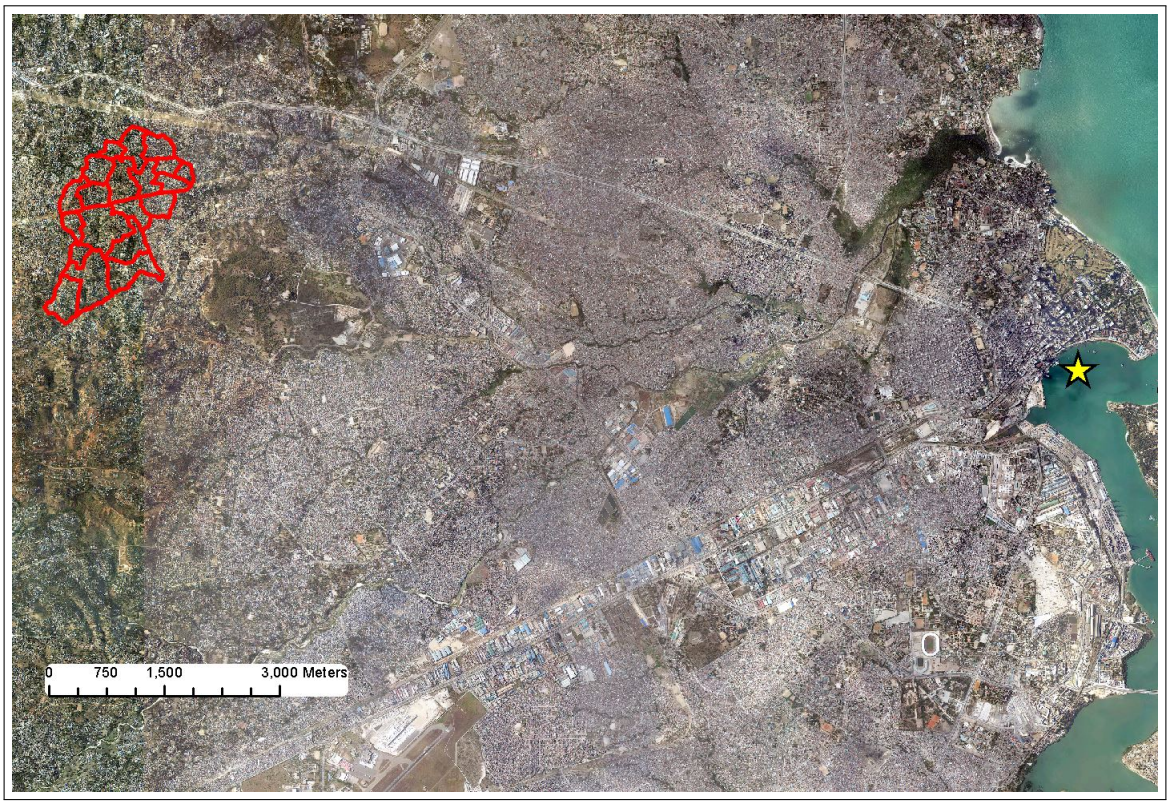


Figure A4: Example of a Plot Photo

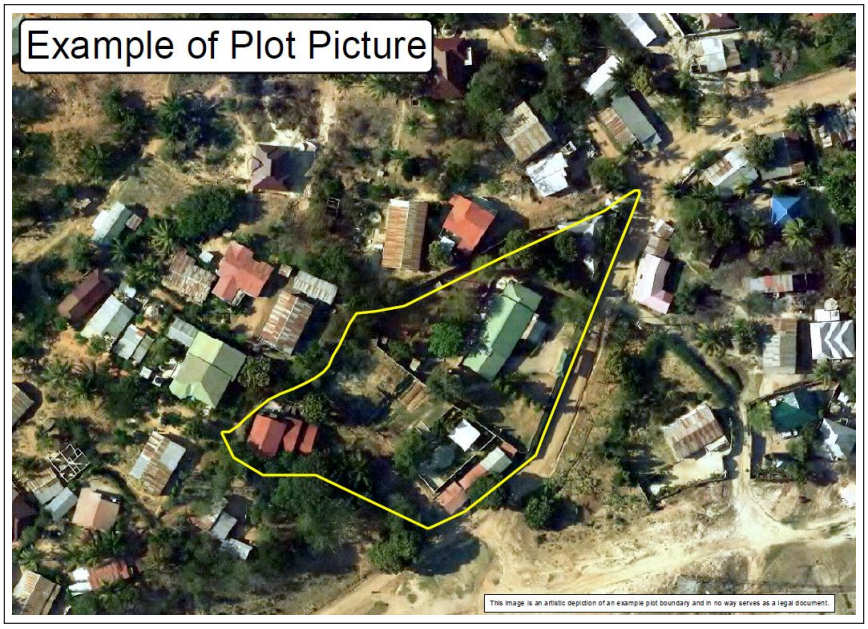
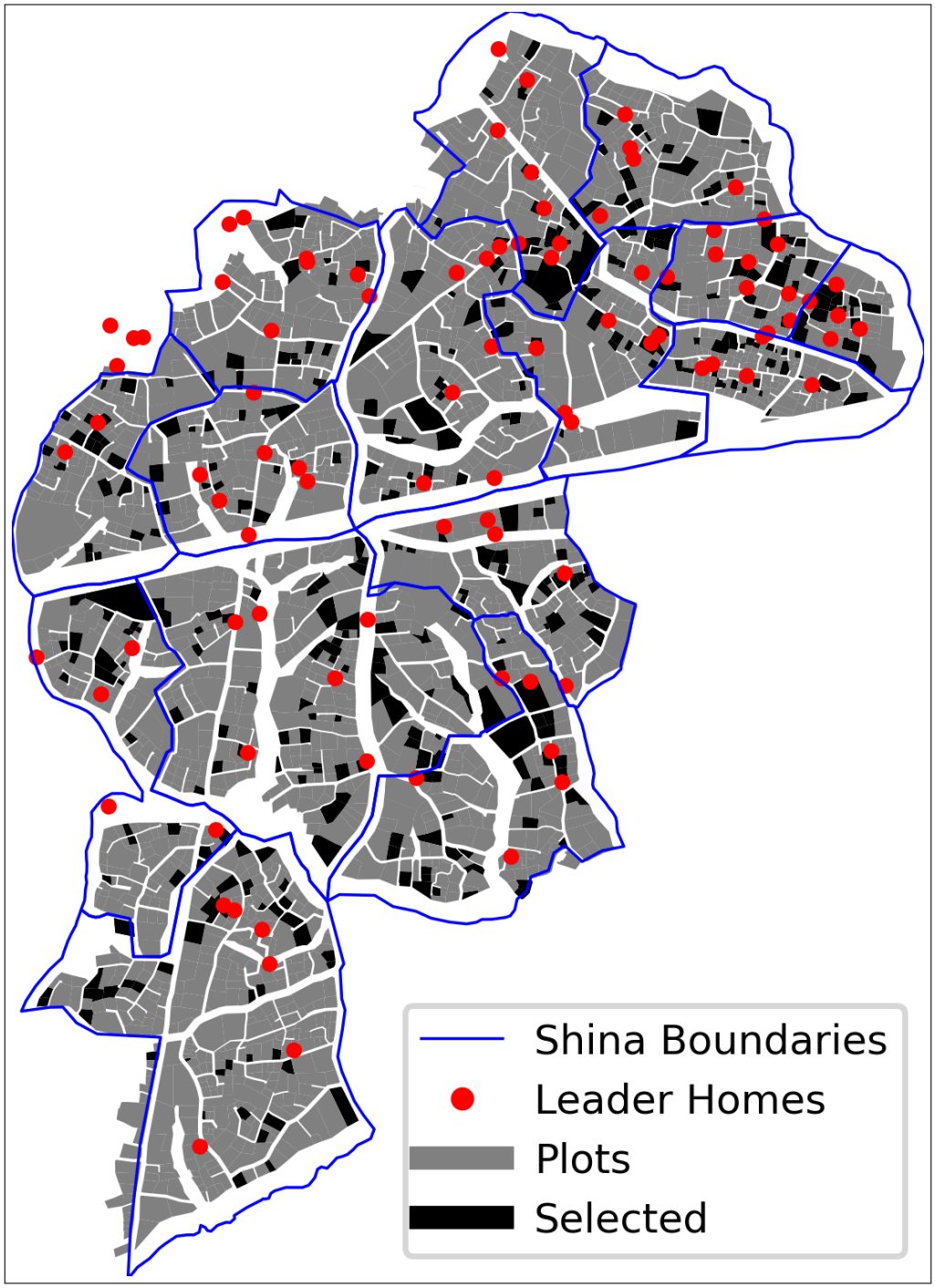


Figure A5: Map of plots and leaders

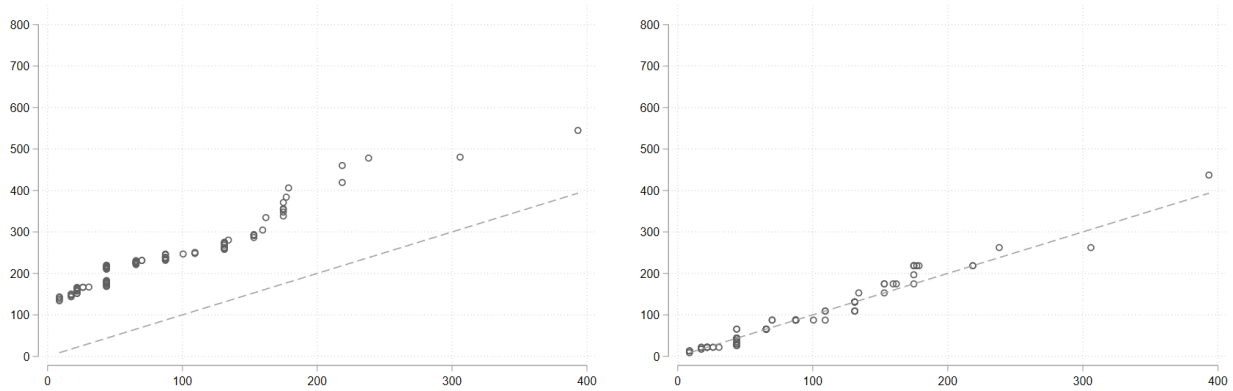


Notes: This figure maps our study area. The fifteen neighbourhood (shina) boundaries are given by blue lines, the leader homes are marked by red dots, the sampled plots are in black and the remainder are in grey.

Figure A6: QQ plots of willingness-to-pay

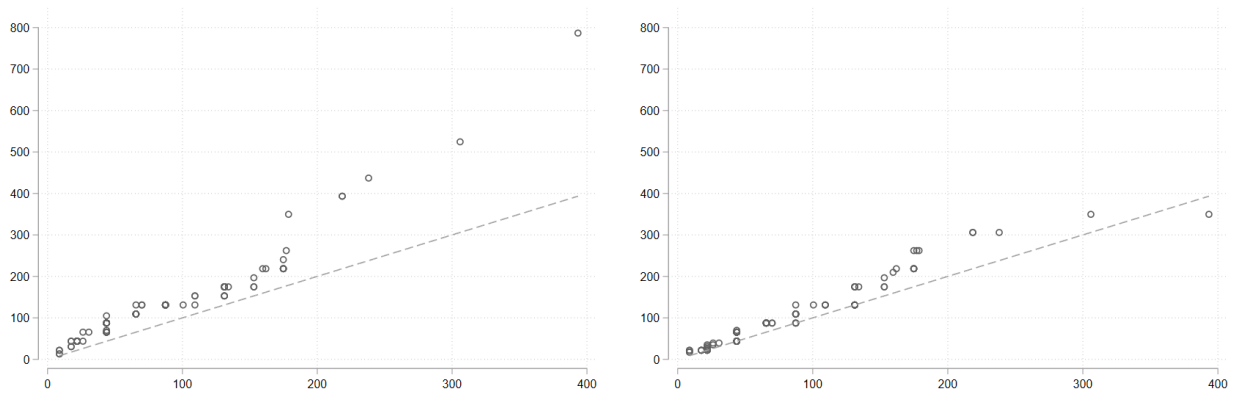
(a) Baseline Fees

(b) Control Group Leaders



(c) Stakes Group Leaders

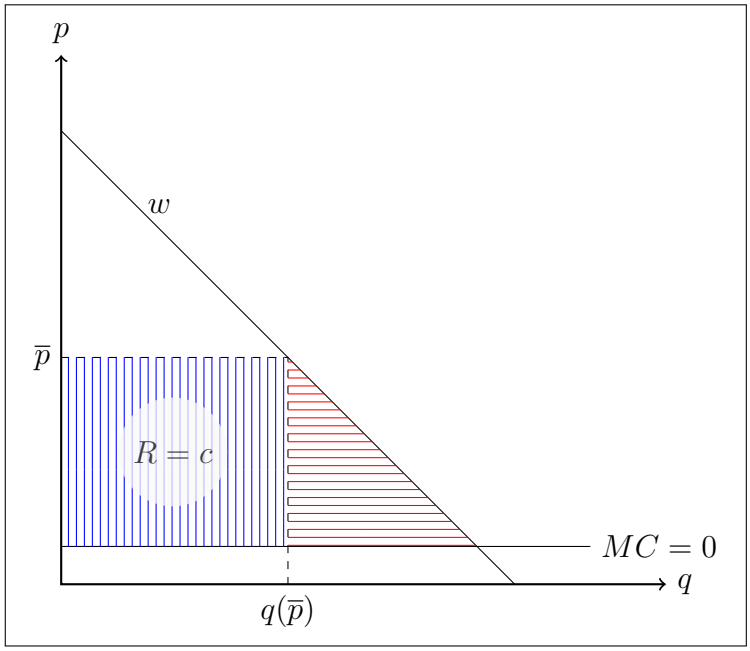
(d) Incentives Group Leaders



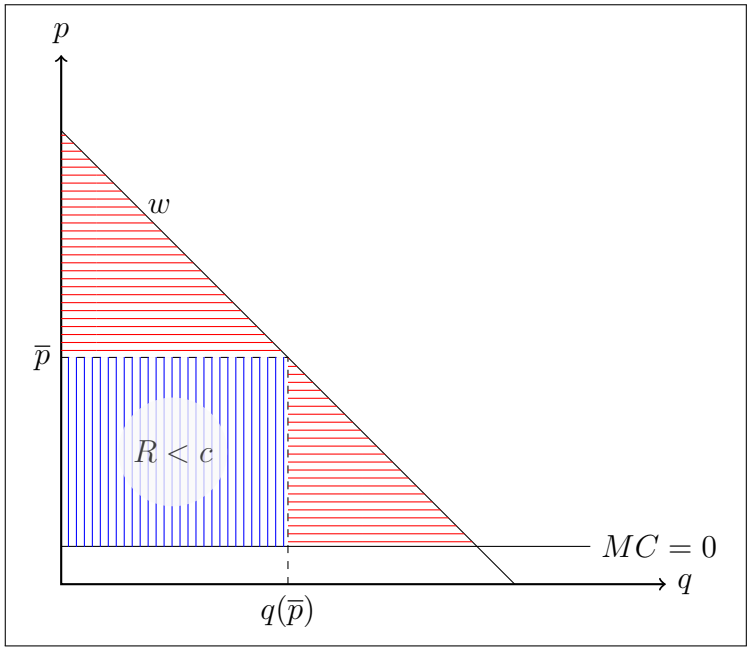
Notes: This figure shows QQ plots for baseline fees being charged and leader predictions of WTP. Each dot is plotted at the predicted value (y-axis) vs. the actual value (x-axis) at a given percentile. Panel a uses the distribution of baseline fees on the y-axis. Panels b-d use the distribution of leader predictions for control, stakes, and incentives treatment groups respectively. In each panel, the x-axis is based on the distribution of true WTP from the BDM estimates. The dashed line represents the 45-degree line.

Figure A7: Theory Example

(a) Deadweight loss if expected revenue covers funding constraint



(b) Deadweight loss if expected revenue doesn't cover funding constraint



Notes: This figure shows simple examples from section C.1. Revnues are given by the vertical striped blue pattern, and deadweight loss is given by the horizontal striped red pattern. In panel a deadweight loss is considered in the case where the government expects to cover their funding constraint ($R \equiv \overline{p}q(\overline{p}) = c$) and therefore chooses to implement the project. In panel b deadweight loss is considered in the case where the government expects to be unable to cover their funding constraint ($R \equiv \overline{p}q(\overline{p}) < c$) and therefore chooses to not to implement the project.

C Additional Notes

C.1 First-degree price discrimination can be welfare improving

Here we provide a simple theoretical example that shows how first degree price discrimination can be welfare improving in a setting in which the government is allocating services to citizens. There are two cases in which first degree price discrimination can theoretically lead to gains which are laid out below, and are depicted in figure A7.

Consider a policy maker who chooses whether to invest in a publicly provided good or service for a neighbourhood, and what fee to charge for it's provision. To implement the project the policy maker must pay a fixed cost of c, and for simplicity we assume the marginal cost is constant and zero. The neighbourhood is a continuum of plots with measure one, and plots are denoted by their WTP $w > 0$. The fee charged is denoted by $p > 0$, and the share of plots that uptake for a given price is $q(p) \in [0, 1]$ with $q'(p) \leq 0$. Define the fee that maximises revenue as p^*. We assume that the policy maker maximizes social welfare, but is constrained to self-finance the project. So the policy maker chooses the lowest fee $\bar{p}$ such that total revenue is equal to cost $q(\bar{p})\bar{p} = c$, and if no such fee exists (i.e. maximised revenue is below $p^* < c$) the policy maker chooses not to invest. We breakdown the potential welfare gains to first degree price discrimination in both these scenarios below.

First, consider the case $q(p^*)p^* \geq c$ so that the policy maker chooses to invest. In this case, first degree price discrimination can be used to recover the Harberger triangle deadweight loss, which is $\int_0^{\bar{p}} w dw$. With perfect information of w there are many potential prices that the policy maker could set to recover this deadweight loss. The simplest example of this would be to waive fees for individuals with low WTP, i.e. set $\bar{p} = \frac{c}{q(\bar{p})}$ if $w \geq \bar{p}$ and zero otherwise. Thus, in this case price discrimination can lead to gains through the recovery of the Harberger triangle deadweight loss as depicted in panel a of Figure A7.

Second, consider the case $q(p^*)p^* < c$ so that the policy maker chooses to not to invest. In this setting the deadweight loss is $\int w dw - c$ and it can be recovered through first degree price discrimination by making the entire project viable. Again, with perfect information of w there are many potential prices that the policy maker could set to recover this deadweight loss. The simplest example is to charge plots their WTP and return a lump sum back to all plots, i.e. $\bar{p} = w$. The potential gains in this setting can be significantly larger than recovery of the Harberger triangle deadweight loss (Kremer & Snyder 2018).[39] For example, in the knife-edge case where $p^* = c - \epsilon$ the gains will be the Harberger triangle deadweight loss plus the consumer surplus from all plots with $w > p^*$. Therefore, in this case price discrimination

[39]This reasoning is similar in spirit to Romer (1994) who shows the potential for large gains from trade when 'new' goods are introduced in the market by raising enough revenue to cover a fixed cost of entry.

can lead to gains through the recovery of deadweight loss which can be even larger than the Harberger triangle as depicted in panel b of Figure A7.

C.2 Follow up interviews of stakes group leaders

In January 2020, we conducted follow-up interviews with a sub-sample (72 percent) of leaders in the stakes group. The purpose of the interviews was to better understand why these leaders had overpredicted WTP on average (Figure 1c). As explained in the script (Appendix D), leaders in the stakes group had been given the opportunity to raise the chance of a discount for plot owners in their neighbourhood. To do so they needed to tell the enumerators that WTP was low for these plot owners. Perhaps counter-intuitively we find that these leaders did the opposite: they overstated WTP on average compared to both the control and incentives groups. As an investigation into the motivations of this result we conducted follow-up interviews to assess whether the script was understood incorrectly, and what other reasons may have caused the upward bias. The interviews were structured by first, presenting the same script from the leaders' experimental session, second a simple test of their understanding of the script, and finally a short questionnaire.[40]

First, it is not clear that experimenter demand effects could have drove the stakes group to overstate WTP. As evidence of demand effects, 39% of respondents suggested that most of their fellow leaders would worry about depicting a certain image of their area and themselves. It is possible that leaders overstated the local WTP in order to demonstrate to the researchers that their neighbourhood is not too poor, or that they do not intend to take advantage of the study. The desire to not appear poor should reasonably affect the control group in the same way as the stakes group. The second explanation could indeed explain a differential effect for the stakes group since the control group was not given power over how discounts were determined. However, this would imply that the experimenter bias is so strong that they actively harm the chances of their neighbourhood receiving discounts in order to appear favourably to the researchers. Therefore, while there is evidence of experimenter demand effects, we think it is unlikely this caused the stakes group to overstate WTP compared to the control group.

Second, our evidence suggests that this result was unlikely to have been driven by a simple misunderstanding of the script. It is important to note that, leaders would have had to

[40]For the test, leaders were asked multiple choice questions, such as: 'If a leader wants to increase the chances of high discount for a plot owner which he knows has WTP 200,000 TSh, what WTP should he predict? (Options: 100,000 TSh, 200,000 TSh, 300,000 TSh)', and 'If the leader wants to increase the plot owner's chances of high discount, where should he place her plot in the ranking? (Options: At the bottom, In the middle, At the top)'.

systematically interpret the script in the opposite way as intended in order for a misunderstanding to explain the overstatement of WTP in the stakes group. Based on our survey results, we find that all but one leader demonstrated a strong understanding of the script by correctly answering the test questions. Furthermore, 65% of respondents confirmed that most of their fellow leaders would interpret the script correctly.[41] However, after being informed of the counter-intuitive results, 78% indicated difficult comprehension as a plausible explanation, and a few leaders admitted they were initially confused by the task. Thus, although the evidence suggests a systematic ability to interpret the script correctly, it is nonetheless possible that some leaders misinterpreted the task on the day of their experimental session.[42] To conclude, our results point at another potential misunderstanding, which might explain why leaders overstated exclusively in the upper two thirds of the perceived income rank. Leaders may have thought that, by decreasing the discount chances of the wealthier, this would raise the chances of high discounts for the poor whilst also maintaining a certain image of their neighbourhood. Thus, they aimed to help the poor by overstating WTP of all but those they perceive as poor, rather than understating just for the poor. This hypothesis is compatible with the experimenter demand effects explanation presented above.

[41] We asked respondents if most of their fellow leaders would understand the script correctly with the intuition that is easier to admit that the majority, instead of oneself, found the questionnaire hard to comprehend.

[42] This might be the result of both script lack of clarity and the experimental environment. Tension and fatigue on the day of experimental sessions may have increased the propensity to misunderstand a complex script.

D Leader Experimental Scripts (English)

Section 5: Experiment

Task 1

For this task, you are asked to think about all plot owners of Kilungule A and B and the maximum price that they would pay for a title deed in the next couple of months. For instance, I would not buy a soda if the shop keeper charged 10,000. If the price was lowered to 1,000 or 800 I still would not buy, but if the shop keeper lowered the price further to 500 I would buy the soda. So the maximum price that I would pay for a soda is 500.

39.1 Out of 100, how many plot owners of Kilungule A and B would take up the title deed in the next couple of months if the price was zero, that is, if the Government was giving it for free?		
Input a number X from 0 to 100		
39.2 So, does it mean that (100 – X) plot owners would NOT take even if the Government was giving it for free?	YES	NO

Note: Proceed only if the respondent responds YES to 39.2. Otherwise call Assistance.

40.1 Out of 100, how many plot owners of Kilungule A and B would pay for the title deed in the next couple of months if their invoice price was:		
		Input a number X from 0 to 100
40.1	100,000	
40.2	200,000	
40.3	300,000	
40.4	400,000	
40.5	500,000	
40.6	600,000	
40.7	700,000	
40.8	800,000	
40.9	900,000	
40.10	1 mio	
40.11	1 mio & 100,000	
40.12	1 mio & 200,000	
40.13	1 mio & 300,000	
40.14	1 mio & 400,000	
40.15	1 mio & 500,000	
40.16	1 mio & 600,000	
40.17	1 mio & 700,000	
40.18	1 mio & 800,000	
40.19	1 mio & 900,000	
40.20	2 mio	
40.21	2 mio & 100,000	
40.22	2 mio & 200,000	
40.23	2 mio & 300,000	
40.24	2 mio & 400,000	
40.25	2 mio & 500,000	
40.26	2 mio & 600,000	
40.27	2 mio & 700,000	
40.28	2 mio & 800,000	
40.29	2 mio & 900,000	
40.30	3 mio	

Notes: Normally, as the price increases, the number of people who would purchase at that price decreases or stays the same. So the ODK will NOT let you proceed if the number X inserted for a response (e.g. 41.20) is bigger than the previous response (e.g. 41.19). If your respondent consistently gives higher numbers for
increasing prices, call Assistance.

!!! Stop the question when the respondent gives response: 0 "zero" !!!
!!! The ODK will allow you to go above 3 mio, if necessary !!!

Task 2

For this task, you are asked to think about the selected plot owners from your shina and the **maximum price** that each plot owner would pay for a title deed in the next couple of months.

41.1 Please rank the selected plot owners from your shina from the highest to the lowest willingness to pay. At the top place, rank the plot owner who would pay the highest price. At the bottom place, rank the plot owner who would pay the lowest price.

41.2 Please, indicate the maximum price that each plot owner would pay for a title deed in the next couple of months.

	41.1 Plot ID	**41.2 Max price that plot owner would pay for a title deed in the next couple of months**
HIGHEST PRICE		
SECOND PLACE		
THIRD PLACE		
FOURTH PLACE		
FIFTH PLACE		
SIXTH PLACE		
SEVENTH PLACE		
EIGHTH PLACE		
NINTH PLACE		
TENTH PLACE		
ELEVENTH PLACE		
TWELFTH PLACE		
THIRTEENTH PLACE		
FOURTEENTH PLACE		
LOWEST PRICE		

Note: You can write any number in intervals of 50,000 OR **'zero'** for plot owners who would only take up if the title deed was for free OR **'less than 0'** for plot owners who would NOT take up even if it was for free.
!!! Respondents can indicate the same maximum price for two or more plot owners !!!

INTRUCTIONS

SCRIPT 1: Control Group

Congratulations, you made it to the final section of the questionnaire! Now we are going to assign you two final tasks. As before, your responses will be used for research purposes only.

With this research, we want to understand how much leaders know about the plot owners of Kilungule A and B, especially those living in their shinas, and how accurate is their knowledge. We encourage you to be as truthful and accurate as possible. In this way, you will allow us to produce high quality research and you will demonstrate your knowledge as a leader!

Your answers will NOT be used to change anything we do in the course of the study.

SCRIPT 2: Treatment 1

Congratulations, you made it to the final section of the questionnaire! Now we are going to assign you two final tasks. Differently from previous questions, your responses to this section will NOT be used for research purposes only. Before presenting each task, we will explain very clearly how we will use your responses. Please listen carefully and do not hesitate to ask any questions.

Before Task 1

As you know, all plot owners participating in the research will have the chance to win a discount on the price of the title deed through a lottery process. Our objective is to get as many plot owners titled as possible within our budget.

With Task 1, we ask to leaders on **the capacity of plot owners of Kilungule A and B to pay for a title deed**. This information will allow us to decide how much discount we should make available through the lottery.

So, do you understand that with your responses to Task 1 you can influence the discounts that plot owners can get? For example, if we find out from you and other leaders that the capacity to pay is very low we will make more discount available to be won through the lottery.

Proceed with task 1

Before Task 2

As you know, all plot owners participating in the research will have the chance to win a discount on the price of the title deed through a lottery process. Our objective is to get as many plot owners titled as possible within our budget.

With Task 2, we ask to leaders what **is the capacity of each of the selected plot owners from their shina to pay for a title deed**. We will take this information into account when deciding to whom we should make available higher discounts through the lottery.

So, do you understand that with your responses to Task 2 you can influence the discounts that plot owners in your shina can get? For example, if leaders of a shina suggest that a plot owner has a very low capacity to pay we will make more likely that this plot owner wins a higher discount through the lottery.

Proceed with task 2

SCRIPT 3: Treatment 2

Note that you will earn points for performing well on the two tasks. At the end of the study, we will reward the 5 leaders with the best scores with some monetary prizes: 30,000 to the 1st place, 20,000 to each of the next four! So, this is your opportunity to show your knowledge and win a prize!

Incentive for Task 1

As part of the research, we will interview plot owners on their capacity to pay for the title deed. At the end of the study, we will pick one price level and count the number of plot owners of Kilungule A and B who would pay at least that price.

Task 1 allows us to measure how good you are at predicting that number. You will earn points depending on the correctness of your responses to Task 1. Be as truthful and accurate as you can if you want to win the prize!

For simplicity, I am going to explain the rule that we will use to assign points through an example.

- Suppose that I ask you: *how many letters come before C in the alphabet?*
- The correct response is obviously: *2, that is, letters A and B.*
- You will earn:
    - 2 points for responding 2 (correct response)
    - 1 point for responding 1 or 3 (wrong response)
    - 0 points for responding 0 or 4 (wrong response)

This simple example shows that the more accurate responses will earn more points.

Incentive for Task 2

As part of the research, we will interview plot owners on their capacity to pay for the title deed. At the end of the study, we will pick one price level and observe which plot owners from your shina would pay at least that price.

Task 2 allows us to verify if those who have higher capacity to pay are the same that you rank higher in Task 2. Ranking at the highest places those plot owners that have the highest capacity to pay will earn you points! Be as truthful and accurate as you can if you want to win the prize!

For simplicity, I am going to explain the rule that we will use to assign points through an example.

- Suppose that I ask you to *rank four letters of the alphabet from the first to the fourth.*
- There are several possible rankings of which only one is correct.

Option 1: CORRECT		Option 2: NOT CORRECT	
1	A	1	D
2	B	2	B
3	C	3	C
4	D	4	A

- To allocate points, we will pick one letter, say for example B.
- We will cross out letter B and all letters coming before B, as in the table below.

Option 1: CORRECT		Option 2: NOT CORRECT	
~~1~~	~~A~~	1	D
~~2~~	~~B~~	~~2~~	~~B~~
3	C	3	C
4	D	~~4~~	~~A~~

- We will then sum up the remaining numbers.

Option 1: CORRECT	Option 2: NOT CORRECT
3+4=7	1+3=4
TOT 7	**TOT 4**

- As you can see, respondents who give the correct ranking (Option 1) will score 7 points, while respondents who give an incorrect ranking (for example, Option 2) will score 4 points only.

This simple example shows that the more accurate rankings will earn more points.

E BDM Scripts (English)

Section 2: BDM

BDM Instructions **SHEET 1**

Read exactly from the script, do not say anything that is not in the script.

READ:

- We would like to share the cost of your invoice, but the price that you will pay is not yet fixed. It will be determined by chance in a lottery that we will play at the end of this survey.
- You will not have to spend any more towards the invoice than you really want to.
- You may even be able to buy it for less.
- If you do not want to pay anything, state this, and you will not have to.

Here is how the Lottery works:

- I will ask you to tell me the maximum price that you would and could pay in the next 10 days towards the invoice for your title deed. Let us call this your ***bid***.
- If you state your bid at 'zero' it means that you are not willing to pay anything. By placing a bid larger than 'zero', you declare yourself willing and able to pay that amount in the next 10 days.
- Therefore, you **must** state a bid that you are ABLE to pay in the next 10 days.
- We will write your bid down on a piece of paper and return to the lottery after finishing the survey.
- At the Lottery table there is a cup with many different balls with different numbers on them. They represent discounted prices for your invoice.
- After the survey, we will sit at the Lottery table and pick a ball from the cup.
  If the number you pick (your **draw**) corresponds to a price that is greater than your bid, then you will not be offered any discount. You will receive your allowance straight away.
- If the number you pick (your ***draw***) corresponds to a price that is less than or equal to your bid:
  - You will pay that price for your invoice in the next 10 days.
  - You will not receive your allowance until that payment has been made.
- If you win a discount and you fail to pay within the 10 days, as agreed, you will
  - loose the discount
  - loose the allowance
- In any case, if you wish, you will be able to pay for your invoice at the original price at any time.

Final notes:

- You can withdraw yourself from the study at any time with no consequences for yourself.
- You will only have one chance to play the lottery for your invoice.
- You cannot change your bid once the lottery has occurred.

Answer any questions respondent has.

To read ONLY upon request:

What happens if you win a discount at the Lottery:

- You will have 7 days to collect the money. From day 8 to 10 you will go to Ubungo Municipality with the researchers.
- You will pay the discounted price that was drawn at the Lottery. The discount will be paid, at the same time, from the research budget.
- Thus, your invoice will be paid fully and you will receive a receipt of the full payment.

The receipt and the title deed will display only the name(s) of the plot owners. Thus, your title deed will be as valid as if it was purchased outside of the research project.

2.1 Which item has the respondent been assigned to practice on?	Soda	Picture of Plot

BDM Practice **SHEET 2** (plot picture)

REMEMBER: Get respondent to state HIGHEST price they are WILLING AND ABLE to pay right now

Let us practice the lottery together. We will play the same lottery, but this time instead of playing for your invoice we will play for a satellite picture of your plot.

1) What is the maximum price that you would and could pay for this picture? We will call that amount your "bid".

[Respondent states a price X]

2) Now, we proceed with the lottery.
   a. If we draw a number that is equal to **X** or less than **X**, you will buy the picture at the discounted price drawn.
   b. If we draw a number greater than **X**, you will not be offered any discount.
   c. You cannot change your stated maximum price after the lottery has occurred.
   d. Do you understand?

3) Please, tell me –if we extract **[X + 100 TSh]** now through the lottery, what happens?

Correct Response: they are not offered any discount and can NOT buy the picture.

If respondent does not give the correct answer, explain the rules again and then ask question again -> go back to 2).

4) And if we extract **[X - 100 TSh]** now through the lottery, what happens?

Correct Response: they will purchase the picture at [X - 100 TSh].

If respondent does not give the correct answer (both that they will purchase and at the correct price), explain the rules again and then ask question again -> go back to 2).

5) If we draw **[X + 100 TSh**], will you regret NOT being offered that discounted price?
   a. If YES -> proceed to 6.
   b. If NO -> skip to 7.
6) If yes, do you want to change your bid to **[X + 100 TSh**]?
   a. If YES -> Ok, your new bid is **[X + 100 TSh**].
   -> Go back to 2) with [X + 100 TSh] as new bid.
   b. If NO -> proceed to 7.
7) So, is **X** truly the most you would want to pay?
   a. If YES -> proceed to 8.
   b. If NO -> go back to 1.
8) If you draw **X**, you must be able to pay **X** right now. Are you able to pay **X** right now?
   a. If YES -> proceed to 9.
   b. If NO -> What is the maximum price that you would and are ABLE to pay now?
   -> Go back to 1.

9) Could you please show to me the amount you have stated you are willing to pay?

a. **If YES -> proceed to 10.**
b. **If NO -> Go back to 8.**

Wait for respondent to show that she has enough funds for Final Bid.
Record respondents Final Bid (Section 2 question 2.2.1)

2.2.1 Record Respondent's Final Bid **[X]**	TSh

10) Now you will draw a price from the cup. If you draw **X** or less, you will buy the picture at the price you draw. If you draw more than **X**, you will not be able to buy the picture. Are you ready to pick a ball?

Mix balls in cup, hold cup above eye level of respondent and have her pick a ball without looking

11) Now you can draw a ball from the cup.

Let respondent draw ball. Together, look at the ball and read the price picked. [Drawn price is Y]
Record Drawn Price (Section 2 question 2.2.2)
Record if Drawn price is lower/equal to or higher than Final Bid (Section 2 question 2.2.3)

2.2.2 What price did you draw? **[Y]**	TSh
2.2.3 Was the price drawn Higher or lower/equal to the bid?	Higher
	Lower or Equal

12) Let us look at the ball together
    a. **[If Y <= X]:** The price is **Y** which is [less than/equal to] the amount you said you would and are able to pay for this picture. You can now buy the picture at this price.

    -> Exchange payment for picture.

    b. **[If Y > X]:** The price is **Y** which is greater than the amount you said you would be willing to spend for this picture. You can NOT purchase the picture.

13) Do you have any questions about the game?

Address any questions or concerns respondent has. Make sure she understands rules of game.

BDM **SHEET 3** (Invoice for Title Deed)

REMEMBER: Get respondent to state HIGHEST price they are WILLING AND ABLE to pay within 10 days.

READ:

- Now you will play to pay for your Invoice
- Your invoice value is **[state value minus deductions from questionnaire]**, you will not be offered a price above this value or below zero.
- Recall the informational meeting held by us in the last weeks
- Have you thought about how much you would and could to pay for your invoice?
- Will you have the funds available within no more than 10 days?

Let's begin:

1) What is the maximum price that you would and could pay for your invoice? We will call that amount your "bid".

[Respondent states a price X]

2) After finishing the questionnaire, we will proceed with the lottery.
   - If we draw a number that is equal to **X** or less than **X**, you will pay for your invoice at the discounted price drawn.
   - If we draw a number greater than **X**, you will not be offered any discount.
   - You cannot change your stated maximum price after the lottery has occurred.
   - Do you understand?

3) Please, tell me –if we extract **[X + 5,000 TSh]** through the lottery, what will happen?

Correct Response: they will not be offered any discount to their invoice.

If respondent does not give the correct answer, explain the rules again and then ask question again -> go back to 2).

4) And if we will extract **[X - 5,000 TSh]** now through the lottery, what will happen?

Correct Response: they will pay for the invoice at [X - 5,000 TSh] in the next 10 days.

If respondent does not give the correct answer (both that they will purchase and at the correct price), explain the rules again and then ask question again -> go back to 2).

5) If we draw **[X + 5,000 TSh]**, will you regret NOT being offered that discounted price?
   - **If YES -> proceed to 6.**
   - **If NO -> skip to 7.**
6) If yes, do you want to change your bid to **[X + 5,000 TSh]**?
   - **If YES ->** Ok, your new bid is **[X + 5,000 TSh]**.
     -> Go back to 2) with [X + 5,000 TSh] as new bid.
   - **If NO -> proceed to 7.**
7) So, is **X** truly the most you would want to pay?
   - **If YES -> proceed to 8.**
   - **If NO -> go back to 1.**

8) If you draw **X**, you must be able to pay **X** within 10 days. Are you able to pay **X** within 10 days?
   - **If YES -> proceed to 10.**
   - **If NO ->** What is the maximum price that you would and are ABLE to pay within 10 days from now?
     -> Go back to 1.

9) Do you confirm that you have a plan to collect the money in 7 days in order to make the payment within 10 days?
   - **If YES -> proceed to 10.**
   - **If NO -> Go back to 8.**

10) If the lottery draws a price **X** or below **X** we will keep your allowance on hold until your payment has been made at Ubungo Municipality. Do you accept to have your allowance on hold if you win?
   - **If YES ->** OK, this is your final bid. We are now going to write it down and seal the envelope.
   - **If NO ->** start again from 1)

Record respondents Final Bid (Section 2 question 2.3)

2.3 Record Respondent's Final Bid **[WTP_0]**	TSh

11) You're bid is now sealed and cannot be changed. We will proceed with the lottery after finishing the remainder of the questionnaire.

Surveyor, write [WTP_0] in the envelope, make the respondent sign and seal the envelope

Surveyor, do you confirm that the envelope has been sealed and the plot owner is aware he cannot change his response in section 2?	YES	NO

F BDM Distributions

Discounts for a plot below or equal to 200 square metres

The integers below ranging from 1-75 represent the lottery balls.

Each ball a corresponding percentage below it.

The percentage represents the discouted price as a percentage of the full invoice value (e.g. 0% means a price of 0 TSh, 50% is a price of half the total invoice cost, 75% is three quarters the full invoice price, etc.).

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0%	0%	0%	1%	1%	2%	2%	3%	3%	4%	5%	6%	6%	7%	8%
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	21%	22%	23%	24%
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
26%	27%	28%	30%	31%	32%	34%	35%	37%	38%	39%	41%	43%	44%	46%
46	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
47%	49%	50%	52%	54%	55%	57%	59%	60%	62%	64%	66%	67%	69%	71%
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
73%	75%	77%	78%	80%	82%	84%	86%	88%	90%	92%	94%	96%	98%	100%

Discounts for a plot above 200 and below or equal to 300 square metres

The integers below ranging from 1-75 represent the lottery balls.

Each ball a corresponding percentage below it.

The percentage represents the discouted price as a percentage of the full invoice value (e.g. 0% means a price of 0 TSh, 50% is a price of half the total invoice cost, 75% is three quarters the full invoice price, etc.).

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
0%	1%	2%	3%	4%	5%	6%	7%	8%	10%	11%	12%	13%	15%	16%
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
17%	18%	20%	21%	22%	23%	25%	26%	27%	29%	30%	31%	33%	34%	35%
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
37%	38%	39%	41%	42%	44%	45%	46%	48%	49%	51%	52%	53%	55%	56%
46	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
58%	59%	60%	62%	63%	65%	66%	68%	69%	70%	72%	73%	75%	76%	78%
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
79%	81%	82%	84%	85%	87%	88%	90%	91%	93%	94%	96%	97%	99%	100%

Discounts for a plot above 300 and below or equal to 400 square metres

The integers below ranging from 1-75 represent the lottery balls.

Each ball a corresponding percentage below it.

The percentage represents the discouted price as a percentage of the full invoice value (e.g. 0% means a price of 0 TSh, 50% is a price of half the total invoice cost, 75% is three quarters the full invoice price, etc.).

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
0%	5%	7%	10%	12%	14%	16%	18%	20%	22%	24%	25%	27%	29%	30%
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
32%	33%	35%	36%	38%	39%	40%	42%	43%	44%	46%	47%	48%	50%	51%
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
52%	53%	55%	56%	57%	58%	60%	61%	62%	63%	64%	65%	67%	68%	69%
46	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
70%	71%	72%	73%	74%	75%	76%	78%	79%	80%	81%	82%	83%	84%	85%
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
86%	87%	88%	89%	90%	91%	92%	93%	94%	95%	96%	97%	98%	99%	100%

Discounts for a plot above 400 and below or equal to 500 square metres

The integers below ranging from 1-75 represent the lottery balls.

Each ball a corresponding percentage below it.

The percentage represents the discouted price as a percentage of the full invoice value (e.g. 0% means a price of 0 TSh, 50% is a price of half the total invoice cost, 75% is three quarters the full invoice price, etc.).

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
0%	6%	9%	12%	14%	16%	19%	21%	23%	24%	26%	28%	30%	31%	33%
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
34%	36%	37%	39%	40%	42%	43%	44%	46%	47%	48%	50%	51%	52%	53%
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
55%	56%	57%	58%	59%	61%	62%	63%	64%	65%	66%	67%	68%	70%	71%
46	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
72%	73%	74%	75%	76%	77%	78%	79%	80%	81%	82%	83%	84%	85%	86%
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
87%	88%	89%	90%	91%	92%	93%	94%	94%	95%	96%	97%	98%	99%	100%

Discounts for a plot above 500 and below or equal to 700 square metres

The integers below ranging from 1-75 represent the lottery balls.

Each ball a corresponding percentage below it.

The percentage represents the discouted price as a percentage of the full invoice value (e.g. 0% means a price of 0 TSh, 50% is a price of half the total invoice cost, 75% is three quarters the full invoice price, etc.).

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
0%	9%	13%	16%	19%	22%	24%	26%	28%	30%	32%	34%	35%	37%	39%
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
40%	42%	43%	45%	46%	47%	49%	50%	51%	53%	54%	55%	56%	57%	59%
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
60%	61%	62%	63%	64%	65%	66%	67%	68%	69%	70%	71%	72%	73%	74%
46	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
75%	76%	77%	78%	79%	80%	81%	82%	83%	84%	84%	85%	86%	87%	88%
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
89%	90%	90%	91%	92%	93%	94%	94%	95%	96%	97%	98%	98%	99%	100%

Discounts for a plot above 700 and below or equal to 1000 square metres

The integers below ranging from 1-75 represent the lottery balls.

Each ball a corresponding percentage below it.

The percentage represents the discouted price as a percentage of the full invoice value (e.g. 0% means a price of 0 TSh, 50% is a price of half the total invoice cost, 75% is three quarters the full invoice price, etc.).

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
0%	16%	22%	26%	29%	32%	35%	37%	39%	41%	43%	45%	47%	48%	50%
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
51%	53%	54%	55%	56%	58%	59%	60%	61%	62%	63%	64%	65%	66%	67%
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
68%	69%	70%	71%	72%	73%	74%	75%	76%	76%	77%	78%	79%	80%	80%
46	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
81%	82%	83%	83%	84%	85%	86%	86%	87%	88%	88%	89%	90%	90%	91%
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
92%	92%	93%	93%	94%	95%	95%	96%	97%	97%	98%	98%	99%	99%	100%

Discounts for a plot above 1000 and below or equal to 2000 square metres

The integers below ranging from 1-75 represent the lottery balls.

Each ball a corresponding percentage below it.

The percentage represents the discouted price as a percentage of the full invoice value (e.g. 0% means a price of 0 TSh, 50% is a price of half the total invoice cost, 75% is three quarters the full invoice price, etc.).

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
0%	29%	35%	39%	43%	46%	48%	50%	52%	54%	56%	58%	59%	60%	62%
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
63%	64%	65%	66%	67%	68%	69%	70%	71%	72%	73%	74%	75%	75%	76%
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
77%	78%	78%	79%	80%	80%	81%	82%	82%	83%	84%	84%	85%	85%	86%
46	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
87%	87%	88%	88%	89%	89%	90%	90%	91%	91%	92%	92%	93%	93%	94%
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
94%	95%	95%	95%	96%	96%	97%	97%	98%	98%	98%	99%	99%	100%	100%

Discounts for a plot above 2000 square metres

The integers below ranging from 1-75 represent the lottery balls.

Each ball a corresponding percentage below it.

The percentage represents the discouted price as a percentage of the full invoice value (e.g. 0% means a price of 0 TSh, 50% is a price of half the total invoice cost, 75% is three quarters the full invoice price, etc.).

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
0%	55%	60%	64%	66%	69%	70%	72%	73%	74%	76%	77%	78%	78%	79%
16	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
80%	81%	81%	82%	83%	83%	84%	84%	85%	85%	86%	86%	87%	87%	88%
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
88%	89%	89%	89%	90%	90%	90%	91%	91%	91%	92%	92%	92%	93%	93%
46	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
93%	94%	94%	94%	94%	95%	95%	95%	95%	96%	96%	96%	96%	97%	97%
61	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
97%	97%	98%	98%	98%	98%	98%	99%	99%	99%	99%	99%	100%	100%	100%

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