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The Price of Empowerment

Land Titling and
Female Inclusion in
Urban Tanzania

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The price of empowerment:
Land titling and female inclusion in urban Tanzania

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Abstract

While multiple studies have shown that a woman's control over land is positively associated with bargaining power outcomes, few have succeeded in highlighting successful methods for increasing this control. We report on a policy experiment in an unplanned settlement in Dar es Salaam, Tanzania, that provided access to formal land titles to informal settlers at randomized prices, with additional price discounts conditional on designating a woman as owner or co-owner of the land in question. Results show that the household's are highly responsive to price incentives, as households offered a small conditional discount are roughly 30% more likely to co-title their land. Despite these large differences, households offered conditional discounts are just as likely to purchase a formal land title as those offered general discounts. We discuss the implications of these results for the expected bargaining power impacts of the intervention.

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1 Introduction

Large-scale land titling programs are becoming more popular in the developing world.[1]. As more countries embrace formal tenure systems characterized by private, individual ownership, researchers have endeavored to answer basic questions about the impact of these schemes. The focus has predominantly been on salient household or parcel-level impacts of formal tenure such as reductions in expropriation risk, enabling access to credit and transferability of property. Less attention has been given to intrahousehold effects of land titling, particularly with respect to impacts on bargaining power, where it is plausible that the shift from complex, informal tenure systems to formal ones could have substantial impacts.

The potential for an interaction between intrahousehold bargaining and titling programs becomes clearer when examining the equity of past titling schemes. While some programs have made joint-titling between husband and wife a requirement, realised female inclusion rates are often lower than the desired level (Deere & Len 2001, Payne et al. 20007). If women are being left off of formal land titles, it is possible that these programs might at best maintain what might already be an unfavorable status quo, and at worst strip women of the claims to land that they might already hold under customary law.

This paper presents results from a unique experiment in the unplanned settlements of Dar es Salaam, Tanzania, a context where formal land titles have only been available for a short time and self-reported *de facto* female ownership is quite low.[2] The experiment involves two levels of intervention: one which drastically reduces the cost of an expensive prerequisite to obtaining title for a random subset of households in the settlement. The second level uses a lottery system to introduce random variation in the price of the title that households face, with some households being assigned discounts

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[1]Payne, et al. (20007)'s review of the literature found relevant examples in over 35 countries

[2]Only 13% of dual-headed households in our sample report a woman as being an owner of their land, with only 50% reporting that a woman must be consulted in the event of sale, transfer or rental.

which are conditional, only applying if the household includes a woman as owner on the title application.

Using data on each household's decision to purchase a land title and which household members were included as owners, we show that not only do vouchers have a positive impact on purchase of land titles, but households receiving conditional subsidies are just as likely to purchase as those receiving unconditional subsidies, indicating that conditionality does not depress demand. We go on to show that, conditional on purchasing a land title, households receiving conditional subsidies are strongly and significantly more likely to include a woman's name on a title. While these results are encouraging, there is a concern that households might not be treating this decision as if it has significant bargaining power effects. To investigate this further, we investigate whether voucher assignments are more or less effective in households with higher levels of ex-ante bargaining power, as measured using baseline household characteristics.

Section 2 discusses the motivation for the intervention, previous literature on the impact of female ownership on bargaining power outcomes, and the context of land rights in urban Tanzania. Section 3 discusses the experiment at length and presents relevant gender and bargaining power data from a baseline survey. Section 4 presents the experimental results and we conclude with Section 5.

2 Background and motivation

2.1 Titling, land ownership and bargaining power outcomes

While evidence of the impact of formal joint-titling on women's outcomes is limited, there are a number of studies which associate improvements in women's property rights with other desirable outcomes such as measures of female empowerment, child health, education and women's welfare, all of which are associated with increases in bargaining power. For example, self-reported ownership of land is positively correlated child health status and measures of empowerment in Nepal (Allendorf 2007) and with expenditure

on good associated with female bargaining power in Ghana (Doss 2005). Inheritance rights, in particular, appear to matter: Peterman (2011) shows that women in rural Tanzania who face improvements in inheritance rights are more likely to enter the labor market and earn higher wages. Both Goyal, et al. (2010) and Roy (2008) have found a positive impact of India's Hindu Succession Act, which extended inheritance rights to women, on outcomes such as female education self-reported autonomy.

There is also growing evidence that formal land titling itself can be advantageous to women. Using data from a Peruvian titling program with a distinct focus on joint-titling, Field (2003) demonstrated a link between title acquisition and subsequent fertility reduction. Galiani & Schargrodsky (2010) show that titling in Buenos Aires resulted in reduction in household size and higher levels of child education. Preliminary evidence from Rwanda has also shown that titling programs can be successful at increasing perceived female ownership and the recording of inheritance rights (Ali, et al. 2011).

While it is clear that land titling has the capacity to improve the lot of women in developing countries, most of these studies are unable to distinguish the overall impact of titling from the *additional* impact of joint-titling. This distinction might seem less crucial in contexts where land titling is compulsory, but in the face of large costs for formalization (Woodruff 2001) governments are often resorting to demand-driven approaches. In a setting where a policymaker is concerned with inducing households to both purchase a title and co-title, the relative impacts of these two outcomes vis--vis the demand effect of requiring households to co-title becomes key. If making joint-titling a requirement depresses a household's demand for titling, we might be concerned with identifying the 'price of empowerment', the subsidy required to offset that reduction in demand.

This paper aims to shed light on both these questions: is it possible to induce households to joint-title in a demand-driven context and can this be done without adverse effects on take up of land titles?

2.2   The Tanzanian context

After decades spent trapped in informality, Tanzania's unplanned, urban settlements finally moved closer to formal recognition with the introduction of the 1999 Land Act. Described as being among the most sophisticated land legislation on the continent, the Land Act granted tenure security to these urban settlements, explicitly recognized the rights of women to own land and providing the basis for the use of land as collateral (Alden Wily 2003).

The Land Act also created two new forms of title in urban and peri-urban areas: the residential licence (RL) and the certificate of right of occupancy (CRO). A residential license is a 5 year leasehold which provides limited tenure security, but is not transferrable nor useful as collateral. By contrast, the 99-year CRO is considered to be full land title with a legal basis for use as collateral as well as a strong degree of tenure security and full right of transfer. The Ministry of Lands, tasked with ushering unplanned settlements into formality, opted to focus first on expanding the coverage of residential licenses as a means of providing a stepping stone to CRO ownership. However, in the face of low levels of demand for RLs,[3] the scheme lost momentum. Similarly, take up of CROs has been extremely limited, due largely to the costly eligibility requirements, which include a full cadastral survey of the land in question. We exploit this requirement in the first phase of our experiment by randomly treating blocks of households with a cadastral survey in order to reduce the cost of obtaining a CRO.

The Land Act also has several provisions relating directly to the ownership status and rights of spouses. The default ownership state of spouses is known as occupancy-in-common, which allows for equal shares which can be sold (with consent of the other occupiers) or treated as part of an individual owner's estate. The result is that each occupier or owner has substantial control over the land—other owners are unable to sell, lease or mortgage the land out without the consent of each other owner. The Land Act then goes on to define, perhaps with less precision, whether or not spouses are likely

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[3]Author's calculations from the Kinondoni municipal database suggests take up of residential license is well below 40%

to be considered as co-occupiers:

> Where a spouse obtains land under a right of occupancy for the co-occupation, and use of both spouses or where there is more than one wife, there shall be a presumption that, unless a provision in the certificate of occupancy or certificate of customary occupancy clearly states that one spouse is taking the right of occupancy in his or her name only...the spouses will hold the land as occupiers in common and, unless the Presumption is rebutted in the manner stated in this subsection, the Registrar shall register the spouses as joint occupiers accordingly.

The law appears ambiguous enough to allow for spouses to register land in their name and their name only. In practice, this appears to be the case: municipal records reveal that over 90% of residential licenses are registered in one name only. Getting one's name onto a CRO application appears to be a crucial step in cementing legal ownership.

The land act does contain some provisions which might mitigate the power differential between listed owners and their spouses—subsequent provisions (listed in Table A) allow for spouses who have invested in the land to be considered co-occupiers by default and requiring owners who decide to sell or mortgage to obtain the consent of their spouses. The likelihood that these particular provisions are enforced is uncertain.

3 Experiment and baseline data

The setting for the main experiment is Kinondoni, one of the three municipalities constituting Dar es Salaam. The two communities in which the experiment was carried out are two adjacent unplanned settlements located approximately five kilometers from the city center, known as Mburahati Barafu and Kigogo Kati. Typical of unplanned settlements, both communities (known as sub-wards or *mitaa*) have extremely low levels of infrastructure and access to public services, with some parcels located on flood-prone or sloping land. Basic parcel characteristics from the municipal database

Table 1: Summary Statistics on Parcel Characteristics

	Kinondoni Municipality	Kigogo Kati	Mburahati Barafu
Formal employment	49.9%	44.6%	44.3%
Size and Value of Property			
Area in square meters	439	264	247
Property value in '000 TSh.	12,562	9,939	8,910
Land rent in TSh.	3,679	2,125	1,907
Accessibility to the Property			
No access	1.3%	1.1%	1.1%
Foot path	55.2%	71.3%	82.0%
Feeder road	36.4%	19.8%	16.2%
Main road	5.5%	6.6%	0.6%
Highway	1.6%	1.1%	0.0%
Access to Public Utilities			
Piped water (incl. public)	22.7%	22.0%	5.6%
Electricity connection	46.1%	38.6%	35.1%
Waste removal services			
Burn/buried on plot	35.4%	25.4%	55.7%
Gutter/river/street	20.0%	49.6%	35.4%
Collected by priv. company	40.8%	24.4%	8.4%
Collected by municipality	3.8%	0.7%	0.5%
Number of properties	65,535	1,474	990

Source: Authors' calculations based on the land registry maintained by Kinondoni Municipality.

are presented in table 1 alongside average characteristics for all of Kinondoni. Together, the subwards make up close to 4% of the total population of Kinondoni, but are substantially worse off in terms of property value and size, accessibility and access the public utilities and waste removal. Less than half of all households are involved in informal employment.

The experiment itself involves several interventions and levels of randomization:

1. **Cadastral survey and repayment programme**: blocks of parcels of land were identified randomly selected intro treatment and control groups. Treatment blocks were cadastral surveyed en masse, with

residents given the option to repay the heavily-subsidized cost in exchange for a land title, drastically bringing down the cost of a CRO for residents.

2. **Random price variation within treatment blocks**: households within treatment blocks were randomly allocated voucher redeemable for different levels of discount on the final price of a land title.

3. **Voucher conditionality**: roughly half of these vouchers were conditional, with households only able to use them if a female household member was included as an owner on the CRO application

To date, the intervention has only been completed fully in Mburahati Barafu, which we will focus on for our experiment results. The rest of this section will describe these interventions in more detail, including the timing of their introduction.

3.1 Baseline data collection, main intervention and voucher distribution

Prior to the intervention, in the summer of 2010, the University of Oxford conducted a complete census of parcels in Barafu. Households were identified using records and maps from the Kindondoni Municipality, which had created a listing of all households in the area to assist with the roll-out of residential license programme. Using this listing, parcel-owning households were identified and interviewed, resulting in detailed data on household and parcel characteristics.

Following the survey, a ward-level meeting was held by a local NGO, the Women's Advancement Trust (WAT), to explain the overall intervention and process of selection into treatment and control blocks. Using a town plan recently drawn up as a prerequisite for CRO distribution, we then divided land parcels into 20 'blocks' (contiguous groups of parcels), randomly assigning half of these into treatment and control groups. Figure 1 displays a map of Mburahati Barafu, indicating treatment and control blocks. All parcels in treatment blocks were subject to a cadastral survey and owning

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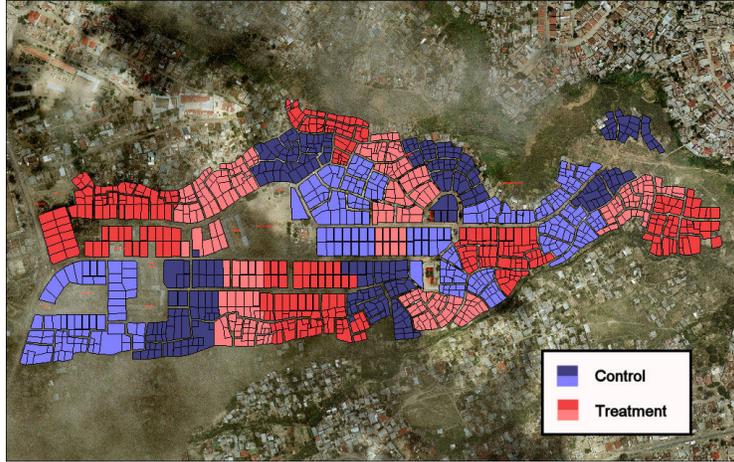
Figure 1: Treatment and control parcels in Mburahati Barafu

households were invited to participate in the repayment program to obtain a land title.

The second and third dimensions of the intervention were cross-cutting and randomized at the 'individual' parcel level. After treatment parcels were selected, residents were given two types of discounts on the price of CROs, both redeemable at WAT. The first was an unconditional voucher - a simple discount. The second was a conditional voucher, which could only be applied if one of the names registered on the CRO application form was a female household member. These conditions were carefully printed in Swahili on each type of voucher. If households elected to use a conditional voucher, names were checked at the time of application to ensure compliance. Vouchers were assigned to a parcel, rather than a particular owner, so as to remain impartial to the identity of the actual owner within the household and to prevent vouchers from traveling.

Vouchers could take on values ranging from zero to tsh 80,000, in steps of 20,000, so between zero and 80% of the total cost of a CRO could be subsidized. This variation will be key to discerning price-elasticities of demand for land titles for both unconditional and conditional discounts. Every fea-

sible[4] combination of vouchers was given equal weighting in randomization. These weights are shown in table 2. There were concerns that a top-down allocation of vouchers might be perceived as unfair by the residents and that comprehensive block-level lotteries would be impractical and difficult to ensure balance. To allay these concerns, the randomization was performed in the following manner:

1. A random distribution of voucher pairs for treated parcels was drawn 100 times.

2. Balanced was tested using a vector of observable parcel-level characteristics and the three draws that were the most balanced (defined by average t-stat values) were retained.

3. These three random draws were presented to residents attending block-level information meetings. Each attendee was made aware of the three possible distributions, each with a designated number. One of the attendees was selected by the group to draw a number out of a hat, corresponding to each draw. Whichever number was chosen became the resulting draw for that block.

Thus we were able to maintain control over the broad aspects of the randomization, while still allowing residents some perceived agency in which outcome was chosen. Table 3 shows how a select group of observable household and parcel characteristics varies across different levels of the treatment (general and conditional voucher levels, as well as net price). While the result shows some very slight unbalancedness in household assets values and average education (where vouchers were slightly progressive) and electricity connectivity, these statistically significant differences are quite small. Sufficient balance was achieved across all other characteristic, including a range of variables which might be reasonable proxies for female bargaining power.

In Fall 2010, following the identification and announcing of treatment blocks, owners of parcels within treatment blocks were invited to a meeting

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[4]The net price of a title was required to be strictly greater than zero ($p > 0$).

Table 2: Intended general and gender-specific discount distributions

General Discount	Conditional Discount					
	0	20k	40k	60k	80k	Total
0	6.7%	6.7%	6.7%	6.7%	6.7%	33.3%
20k	6.7%	6.7%	6.7%	6.7%	.	26.7%
40k	6.7%	6.7%	6.7%	.	.	20.0%
60k	6.7%	6.7%	.	.	.	13.3%
80k	6.7%	.	.	.	.	6.7%
Total	33.3%	26.7%	20.0%	13.3%	6.7%	100%

The baseline price was TSh. 100,000 for a CRO, per parcel, regardless of size or other characteristics. Each cell shows the intended bivariate distribution of assignment to each combination of general and gender-specific discounts. Blank cells were not used to avoid offering a negative net price.

held jointly by the research team and WAT. At this meeting, the details of the repayment plan were discussed, vouchers were allocated and residents were given the opportunity to sign up to the programme. The official repayment period was defined over a five month period, although some households completed payment after this date.[5]. Households which had completed payment were invited to fill out an application for a CRO, at which point we collected detailed data on the household members being included as owners in the application.

3.2 Gender outcomes at baseline

The availability of pre-experimental data allows us to examine the state of female ownership at baseline. Table 4 displays summary statistics for a range of female ownership and empowerment measures for dual-headed households in treatment blocks.

It appears that both self-reported and *de jure* female ownership is quite low: when household members were asked who the owner of the parcel was, only 13% cited a female household member as one of the owners (respon-

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[5]Our final measure of take-up is completed payment, rather than project sign up, as some households signed up with the project but then never made any subsequent payments.

Table 3: Summary statistics and balance

	Mean/SD	General	Conditional	Price
	(1)	(2)	(3)	(4)
Monthly income (tsh '000)	356.767	-.027	-.808	0.985
	(441.880)	(0.949)	(0.821)	(0.895)
Total assets (tsh '000)	4095.852	-27.424	5.790	17.542
	(6524.772)	(13.952)**	(12.128)	(13.201)
HH size	4.679	0.001	0.004	-.006
	(2.409)	(0.005)	(0.004)	(0.005)
Parcel has RL	0.401	-.0005	-.0002	0.0007
	(0.491)	(0.001)	(0.0009)	(0.001)
Avg schooling of hh	12.273	-.004	-.006	0.011
	(2.681)	(0.006)	(0.005)	(0.005)**
Muslim	0.577	0.0003	-.00004	-.0002
	(0.495)	(0.001)	(0.0009)	(0.001)
No flush toilet	0.872	-.0004	-.00007	0.0005
	(0.335)	(0.0007)	(0.0006)	(0.0007)
HH lives on parcel	0.831	0.0006	-.0003	-.0001
	(0.375)	(0.0008)	(0.0007)	(0.0008)
Inherited parcel	0.109	-.00002	-.0008	0.001
	(0.312)	(0.0007)	(0.0006)	(0.0006)
Electricity connection	0.401	0.003	-.0001	-.002
	(0.491)	(0.001)**	(0.0009)	(0.001)**
Log(parcel area)	5.098	-.001	0.0001	0.001
	(0.513)	(0.001)	(0.001)	(0.001)
Woman has rights over sale	0.625	-.0008	-.0004	0.001
	(0.563)	(0.001)	(0.001)	(0.001)
One of default owners is female	0.249	-.0006	-.0003	0.0008
	(0.433)	(0.0009)	(0.0008)	(0.0009)
Woman has business on parcel	0.051	-.0005	0.00005	0.0003
	(0.254)	(0.0005)	(0.0005)	(0.0005)
Single female-headed household	0.179	-.0001	-.0001	0.0003
	(0.384)	(0.0008)	(0.0007)	(0.0008)
Obs	414	414	414	414

Column (1) displays the mean and standard deviation for each variable. Columns (2)-(4) display the mean and standard error of β_2 from the linear regression of each variable $var = \beta_1 + \beta_2 * T$, where T is general voucher value (2), the conditional voucher value (3), and the total price (4), respectively. $^*(p < 0.10),^{**}(p < 0.05),^{***}(p < 0.01)$

dents were allowed to list multiple people). For those households who had received a residential license, a similar percentage had included a woman as one of the listed owners. It does appear that women fare slightly better when households decide to purchase a full title: nearly 25% of dual-headed households indicated at least one woman when asked who would be included as an owner of a CRO.

While female household members may be less likely to make it onto residential licenses or CROs, they fare better in *de facto* measures of control over the land. Households were asked which members must be consulted in the event of a land sale, transfer or rental, with at least one female household member being indicated 50% of the time. While we do not yet observe any of these characteristics following take up, they provide a good conceptual starting point for the subsequent analysis.

Table 4: Female bargaining power characteristics at baseline

Variable	Mean	(Std. Dev.)	N
One of default owners is female	0.13	(0.337)	238
Woman has rights over sale	0.513	(0.501)	236
Woman has rights over transfer	0.504	(0.501)	236
Woman has rights over renting	0.479	(0.501)	236
Would hypothetically include woman on title	0.248	(0.433)	234
Has woman listed as owner on RL	0.133	(0.342)	75
Female is owner of a business	0.134	(0.342)	238
Woman has sole control over own income	0.157	(0.365)	235
Has sole control over major hh purchases	0.119	(0.325)	235
Have your own assets?	0.404	(0.492)	235
Wanted to take out a loan?	0.034	(0.182)	235
Positive exp on alcohol	0.281	(0.451)	185
Positive exp on cigar	0.112	(0.317)	178
Positive exp on cosmetics	0.85	(0.358)	226
Positive exp on schoolfees	0.700	(0.459)	207
Positive exp on cclothing	0.861	(0.347)	216
Positive exp on wclothing	0.929	(0.258)	224

Sample is restricted to dual-headed households in treatment blocks.

4 Results

In this section, we present results testing the effectiveness of price incentives to encourage the titling—and co-titling—of land. We proceed in three steps. First, we show that households' decision to title their plot is highly sensitive to price incentives, and that, perhaps surprisingly, households respond equally strongly to incentives that require them to list a female household member on the title as a condition for accessing this discount. Second, we show that these conditional vouchers have a strong effect on the probability that the household lists a woman: whereas roughly 70% percent of dual-headed households who purchase a CRO list a woman on this title in the absence of any pecuniary incentive to do so, this fraction rises to approximately 95% with the smallest conditional discount in our sample.

The evident effectiveness of these incentives, while encouraging, presents a puzzle. If indeed co-titling was seen as resulting in a substantial reallocation of bargaining power within the household, one might have expected the application of conditional vouchers to meet with more resistance than is apparent here. To shed further light on this, we thirdly explore the characteristics of households who acquire CROs across conditional and unconditional price levels.

4.1 Basic demand results

To test the relationship between CRO price—with and without a co-titling requirement—and takeup, we estimate a linear probability model of the form

$$\mathrm{E}[y|v,p] = \beta_G G + \beta_C C, \tag{1}$$

where G and C are the levels of general and conditional discount vouchers (expressed in thousands of Tanzanian shillings).[6] In some specifications, we will augment equation (1) by including observed characteristics and their interactions with discount levels.

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[6]For take up estimates we will restrict the effect of voucher values to the linear case. In Appendix Table A.2, we show that the implied linear restrictions are comfortably satisfied.

Table 5: Impact of vouchers on demand for CROs

	Separate vouchers		Single price	
	(1)	(2)	(3)	(4)
General discount (tsh '000)	0.00302**	0.00402***		
	(0.00121)	(0.00135)		
Conditional discount (tsh '000)	0.00346***	0.00431***		
	(0.00102)	(0.00112)		
Gen * Single female-headed		-0.00476		
		(0.00303)		
Cond * Single female-headed		-0.00458		
		(0.00287)		
CRO price (tsh '000)			-0.00331***	-0.00422***
			(0.000966)	(0.00107)
Price * Single female-headed				0.00469*
				(0.00258)
Single female-headed		0.287*		-0.180
		(0.152)		(0.134)
Constant	0.469***	0.413***	0.799***	0.834***
	(0.0593)	(0.0666)	(0.0481)	(0.0519)
R^2	0.029	0.038	0.028	0.038
Obs	414	414	414	414
$H_1 : p$-value	0.679	0.799		
$H_2 : p$-value		0.854		

Notes: Dependent variable is indicator for purchase of CRO. Table presents p-values from test of hypothesis that coefficients on general and conditional discounts are equal (H_1), and that the total effect of each type of voucher is equal for single, female-headed households (H_2).

Table 5 displays the results of estimating equation (1). In column (1), we present reduced-form results, allowing general and conditional discounts to affect purchasing decisions distinctly. Households no receiving either type of voucher have a base take up rate of 47 percent—given the virtually nonexistent titling at baseline, this suggests that the even the base price of TShs 100,000, when combined with the financing model employed here, can substantially improve households' access to title. Both general and conditional vouchers have a positive and significant effect on take up, with a TShs 80,000 general voucher increasing the probability of take up by 23 percentage points.

Household demand for title is equally responsive to general and conditional vouchers. Table 5 reports tests for differences in the coefficient of the general voucher value, β_G, and the conditional voucher, β_C; as is also illustrated in Figure 2, the null hypothesis of equal effects is comfortably accepted. This failure to reject the null is not driven by imprecision: as these coefficients are relatively precisely estimated, the data appear to be inconsistent with an economically substantial difference in effects of the two voucher types. This result suggests conditionality can be imposed without excluding significant groups of the population.

If households were resistent to co-titling because of its bargaining-power effects, we would expect female-headed households[7] to be more responsive to conditional vouchers than dual- or male-headed households. To test this hypothesis, column (2) includes interactions between voucher values and a dummy for solely female-headed households. As in the full sample, we find no effect of conditionality for this sub-population. More broadly, it appears that female-heads are on average less responsive to price incentives, but have a higher base take up rate.

Given that we cannot reject that the impact of general and conditional vouchers are equal, columns (3) and (4) pool both voucher values to derive the net price a households faces (100,000 shillings - total value of all vouch-

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[7]More precisely, this discussion and the corresponding empirical results refer to single-headed, female-headed households. We focus on these households because of the absence of a rival to the woman's ownership claim.

Figure 2: Conditional voucher values and co-titling rates
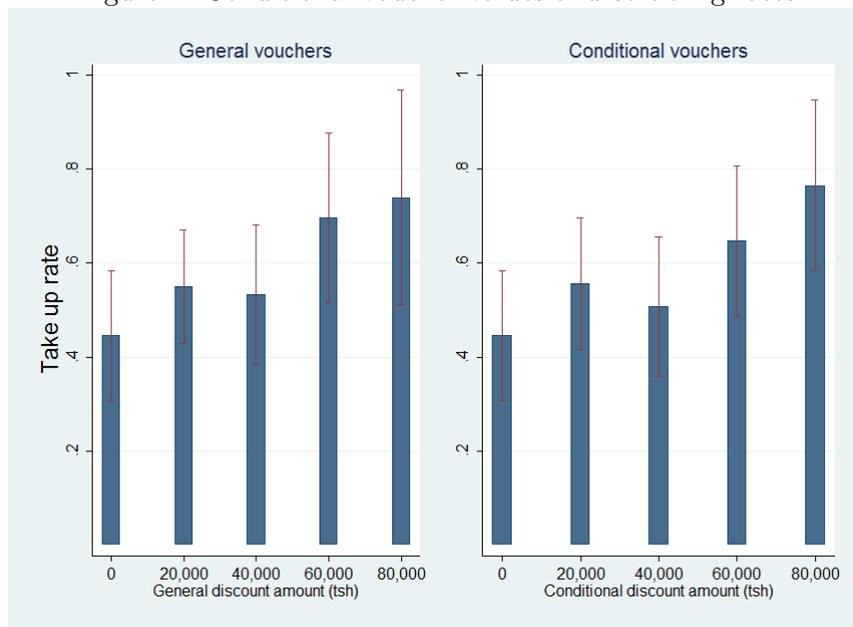
Figure shows estimates of take up probability, conditioning on general conditional voucher values. Red bars indicates 95% confidence interval.

ers). Again, we cannot reject the hypothesis that female-headed households are unresponsive to price incentives, but these households have a significantly higher take up rate when faced with the full price of a CRO.

4.2 Co-titling results

One possible explanation for the equal responsiveness of households to general and conditional discounts is that households are indifferent to listing female members as owners, or indeed that they might do so irrespective of any conditionality. Below, we show that this is not the case: the probability of a household listing at least one female member on their CRO application is strongly influenced by the offer of a conditional discount.

To do so, we analyze the decision of households to apply for a CRO with a female household member included. We again employ a specification such as that in equation (1), where the dependent variable is now an indicator for whether a female household member is included on the title.[8] Results are presented in Table 6.

In columns (1), (2), (4), and (5) of Table 6, we restrict the sample to households that have applied for a CRO. The *conditional* decision to include a female is shown to be influenced by the presence of a conditional voucher, in the full population (column 1), as well as among dual-headed households (column 2). Point estimates in column (2) imply that receipt of a TShs 20,000 conditional voucher increases the likelihood of a woman being listed on the title (conditional on an application being filed) by 7.8 percent. This result is illustrated in Figure 3, which shows conditional voucher effects on female inclusion across all voucher levels.

In columns (3), (6), and (7), we estimate the same specification without restricting the sample to CRO applicants, thereby treating both non-applicants and applicants without female household members listed as equal. Estimates in column (3) confirm that the conditional vouchers affect absolute levels of co-titling, and not just the share of titles with women listed.

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[8]General discounts are still included in the model, because their values are not independent of conditional vouchers, and we do not wish any apparent response of households to unconditional vouchers to be driven by the baseline price level that they face.

Table 6: Price incentives and co-titling outcomes

	All HHs			Dual-headed			
	(1) Applicants	(2) Applicants	(3) All	(4) Applicants	(5) Applicants	(6) All	(7) All
General discount (tsh '000)	-0.00165 (0.00156)	-0.00126 (0.00212)	0.00373** (0.00163)	-0.00106 (0.00234)	-0.00152 (0.00228)	0.00334* (0.00177)	0.00334** (0.00167)
Conditional discount (tsh '000)	0.00276** (0.00122)	0.00392** (0.00167)	0.00578*** (0.00131)	0.00422** (0.00178)	0.00394** (0.00176)	0.00562*** (0.00144)	0.00565*** (0.00135)
One of default owners is female				0.459** (0.184)		-0.0846 (0.166)	
Gen * One of default owners is female				-0.00298 (0.00459)		0.00330 (0.00458)	
Cond * One of default owners is female				-0.00708** (0.00344)		0.000742 (0.00375)	
Woman has business on parcel					0.299** (0.119)		-0.0630 (0.371)
Gen * Woman has business on parcel					0.00152 (0.00228)		0.00878* (0.00527)
Cond * Woman has business on parcel					-0.00394** (0.00176)		0.00170 (0.00622)
Constant	0.794*** (0.0783)	0.702*** (0.113)	0.129* (0.0709)	0.674*** (0.123)	0.701*** (0.119)	0.142* (0.0798)	0.136* (0.0728)
R^2	0.090	0.119	0.073	0.136	0.132	0.075	0.082
Obs	184	117	238	117	117	238	238
H_1 : p-value	0.000	0.001	0.173	0.002	0.001	0.152	0.138
H_2 : p-value				0.020	0.001	0.413	0.083

Notes: Linear probability model. Dependent variable equals one if household completes CRO application with female household member listed, or zero otherwise. Sample in columns (1) is all households, and in remaining columns is dual-headed households. Columns (1)–(2) and (4)–(5) estimate probability of cotitling conditional on application for CRO; columns (3), (6), and (7) estimate unconditional probability of co-titling outcome.

Figure 3: Conditional voucher values and co-titling rates
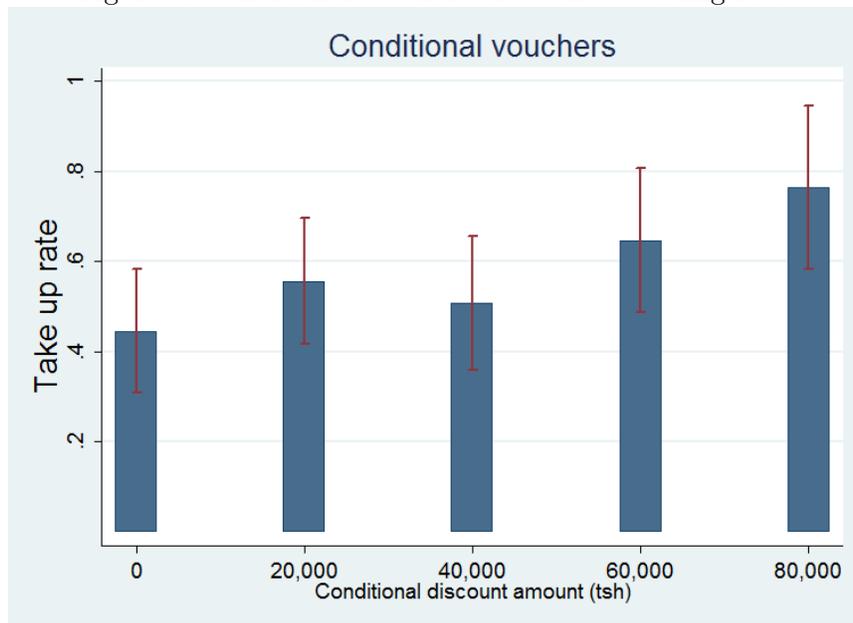
Figure shows estimates of co-titling probability, conditioning on conditional voucher values. Red bars indicates 95% confidence interval.

Since conditional vouchers are shown to be effective in inducing co-titling, it remains surprising that households appear not to treat conditional and unconditional vouchers differently in evaluating whether or not to acquire a title of any kind. One possible explanation is that the 'price of empowerment' is very small: that in the context of this intervention, even small price incentives are sufficient to overcome any resistance to cotitling on the part of men. Such a small willingness-to-pay to avoid co-titling could be a rational response on the part of men who either discount the future very heavily, or who perceive any bargaining-power losses to be small.[9]

To understand whether households act 'as if' they anticipate substantial bargaining power effects, we explore heterogeneity in the effects of the discount vouchers in columns (4)–(8) according to baseline measures of female bargaining power. In addition, this also informs a question of the incidence of any benefits from co-titling, since it can suggests whether conditional vouchers are successful at changing the profile of households that include women on the title.

In columns (4) and (5), we explore heterogeneous effects of discounts on the decision to co-title, conditional on application for a CRO. We focus on two measures of female bargaining power: whether any female in the household was considered as an owner of the parcel in the baseline survey (before any intervention), and whether any female member has a business on the parcel at baseline. In both cases, a similar pattern emerges: conditional on application, levels of female bargaining power are associated with higher rates of cotitling, and lower effects of conditional vouchers. The second of these effects appears to be a mechanical outcome of the fact that cotitling rates, conditional on application, are very high for households judged to have strong female bargaining power on these measures.

Columns (6) and (7) apply the same specifications to the unconditional decision to apply for a CRO with a female household member listed (again, treating both non-applicants and male-only applicants as the alternative

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[9]In a noncooperative household model, Rainer (2007) shows that men may even gain from increases in female bargaining power, when this change induces a sufficiently large increase in investment in the household on the part of the woman.

category). This reveals that the *level* of cotitling is no greater for households with strong bargaining power by the measures studied. The effect of neither conditional nor unconditional vouchers varies with these measures, with the exception of the general discount, which is considerably more effective when women have a business on the parcel.

We draw two lessons from these results. First, both conditional and unconditional vouchers are effective at raising levels of co-titling, with conditional vouchers, unsurprisingly, appearing in particular to shift the decision of households to include a woman, conditional on submitting a CRO application. Second, while co-titling appears to be more likely among households where initial measures of female bargaining power are strong, these results are in fact driven by the fact that CRO application rates—whether or not they include a woman—are substantially lower among households where baseline levels of female empowerment were low.

5   Conclusion

In this paper we presented results from a land titling experiment in Dar es Salaam, Tanzania, where we used subsidies to induce random variation in the price that owner households faced when purchasing a land title. In addition to this, we also varied the conditionality of these subsidies, requiring some households to include a woman as a title-holder if they wished to obtain the discount. The results strongly suggest that on average both general and conditional subsidies have identical impacts on take up, indicating that households seem to be treating them equally. Conditional on take up, receiving a gender-conditional voucher strongly predicts female-cotitling. Taken together, these results suggest that price incentives are an effective means of encouraging *de jure* empowerment of women in the implementation of property rights reforms.

It remains to be seen whether this *de jure* legal empowerment will translate into *de facto* improvements in the lives of the residents of unplanned settlements, and in the lives of women in particular. It is perhaps worrying that the 'price' of female empowerment appears to be so low. The apparent

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lack of resistance to cotitling may be explained by the belief that such *de jure* changes will not result in any changes in intra-household bargaining power, although it may also be explained by steep and/or heterogeneous discount rates (Schaner 2012), or by high returns to women's investments. Given the effectiveness of conditional discount vouchers as a means to encourage co-titling in our study, we are optimistic that this relationship between *de jure* empowerment and *de facto* outcomes will be an answerable, empirical question.

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Appendix A   Additional tables

Table A.1: Tanzania's Land Act of 1999 - provisions relating to spouses

161.-(1)	Where a spouse obtains land under a right of occupancy for the co-occupation, and use of both spouses or where there is more than one wife, there shall be a presumption that, unless a provision in the certificate of occupancy or certificate of customary occupancy clearly states that one spouse is taking the right of occupancy in his or her name only or that the spouses are taking the land as occupiers in common, the spouses will hold the land as occupiers in common and, unless the Presumption is rebutted in the manner stated in this subsection, the Registrar shall register the spouses spouses as joint occupiers accordingly.
161.-(2)	Where land held for a right of occupancy is held in the name of one spouse only but the other spouse or spouses contribute by their labour to the productivity, upkeep and improvement of the land, that spouse or those spouses shall be deemed by virtue of that labour to have acquired an interest in that land in the nature of an occupancy in common of that land with the spouse in whose name the certificate of occupancy or customary certificate of occupancy has been registered.
161.-(3)	Where a spouse who holds Act No. 5 land or a dwelling house for a right of occupancy in his or her name alone undertakes a disposition of that land or of 1971 dwelling house, then- 1. Where that disposition is a mortgage, the lender shall be under a duty to make inquiries of the borrower has or as the case may be, have consented to that mortgage accordance with the provisions of section 59 of the Law of Marriage Act, 1971 2. Where that disposition is an assignment or a transfer of land, the assignee or transferee shall be under a duty to Make inquiries of the assignor Or transferor as to whether the spouse or spouses have consented to that assignment or transfer in accordance with section 59 of the Law Of Marriage and where the aforesaid spouse undertaking the disposition deliberately misleads the lender or, as the case may be, the assignee or transferee as to the answers to the inquiries made in accordance with Paragraphs (a) and (b), the disposition shall be voidable at the option of the spouse or spouses who have not consented to the disposition.

Table A.2: Test of linearity assumption of voucher impacts

	20	40	60	80
General voucher				
20	.	.3231502	.7376661	.4800987
40	.3231502	.	.337561	.7324069
60	.7376661	.337561	.	.5441553
80	.4800987	.7324069	.5441553	.
Conditional voucher				
20	.	.3042746	.7128511	.8541609
40	.3042746	.	.2297262	.1226721
60	.7128511	.2297262	.	.6533703
80	.8541609	.1226721	.6533703	.

Results taken from regression of take up on a dummy for each general and conditional voucher value. Each cell contains the p-value from a test of linearity between two coefficients. For example, cell (20,40) displays the results from the test of $2 * \beta_{20} = \beta_{40}$

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