

CASE STUDY

WORLD BANK | DEVELOPMENT RESEARCH GROUP

MAY 5, 2015

Determinants of participation and transaction costs in Rwanda's land markets

DANIEL ALI, KLAUS DEININGER, MARKUS GOLDSTEIN, ELIANA LA FERRARA AND MARGUERITE DUPONCHEL

INTRODUCTION

Land markets play a limited role in subsistence economies with low skill-intensity of agricultural cultivation, equally distributed land endowments and little movement out of agriculture to join the non-farm economy. But, as the economy starts to diversify, the scope for efficiency-enhancing land transfers beyond immediate kin and for longer than just one season assumes significantly greater importance (Badiane *et al.* 2012). Lease markets can contribute to the diversification of the economic base in rural areas by allowing those with limited farming skills to take up non-agricultural employment or to migrate temporarily without losing their links to rural areas, and those with comparative advantage in agriculture to increase the size of the land they farm. Land sales, on the other hand, may allow households who want to move into the non-agricultural economy to mobilize the capital that will help them to exploit profitable economic opportunities.

Programs aiming to provide higher level of tenure security and better land information systems have often been justified by noting their impact on lowering transaction costs in land markets. Registered land rights make it easier to identify rightful land owners, negotiate and enforce contracts, and reduce the risk of land owners not being able to recover land that they had rented out. This could in turn increase the number of efficiency-enhancing land market transactions; facilitate credit access via the use of land as collateral; and foster structural change and transformation. At the same time, in settings where market imperfections are prevalent, reducing transaction costs in one market will not necessarily improve outcomes across the board. For example, historically, distress sales due to credit market imperfections have allowed moneylenders to amass vast land holdings that often



Fig. 1. Parcels on a Rwandan hill

limited local economic opportunities for tenants who were kept in semi-feudal relationships.

THE RWANDAN CONTEXT

With 416 inhabitants per km² (NISR, 2012), Rwanda is one of the most densely populated countries in the world and pressure on land has long been identified by the Government as a challenge to development (EDPRS1, EDPRS2). In particular, unfettered operation of land markets in the 1980s was viewed as one cause of conflict and even considered as a possible contributing factor to the 1994 Genocide by some scholars (Andre and Plateau, 1998).

To secure rights to Rwandans' most important asset and deal with other land related issues, the

Government, soon after peace was established, embarked on far-reaching legal and institutional changes. Following these changes, a program of land tenure regularization (LTR) was launched in 2010. Almost 11 million parcels were demarcated in a participatory, low cost (5 USD per parcel) process, making the Rwandan LTR program an exemplary case of land tenure regularization across Africa. The exercise was complemented by a rigorous impact evaluation that used baseline and follow-up surveys aimed at exploring early effects of land tenure regularization on, among others, transaction costs of land market participation and the potential for these to foster diversification and structural transformation.

DATA

We use data from a two-round panel survey of 3,600 rural households in 300 randomly selected villages collected for the impact evaluation of the LTR program. Before the LTR roll-out, 100 sectors nationwide (4 in each of the country's 25 districts) were randomly chosen and then half of them were randomly assigned to be among the first program areas and the other half to be among the last.¹ The baseline was collected in early 2011 before the project started in the selected villages. The second round of interviews was conducted one year later, after the implementation of the LTR in the 'early' program areas and before the start of the implementation of the LTR in the 'late' program areas, thus enabling us to observe the short term impacts of the program (in this case, demarcation and adjudication). In particular, the panel data allow us to describe how rural land sales and rental markets function, identify similarities and differences between them, and assess to what extent they have contributed to changes in agricultural production and land use.

BOTH LAND RENTAL AND SALES MARKETS ARE VERY ACTIVE

Descriptive statistics reported in Table 1 illustrate that participation in both land rental and sales market is high. Using a 12 month recall



Fig. 2. Parcel demarcation

period, the figures show that 31 percent of the sampled households leased-in, 12 percent leased-out, 9.5 percent bought land and 4 percent sold land.

Rental markets seem to help equalize land endowments, increasing the average tenant's cultivated area by 0.16 ha (from 0.44 ha of owned land). Participation in rental seems to allow younger household heads with relatively more dependent children to access cultivable land. Tenants also appear to be significantly

more educated than landlords and those households that are remaining in autarky; and are more likely to engage in off-farm wage employment and non-farm household based enterprises. Interestingly, both tenants and landlords are less credit constrained in the semi-formal sector² than households that did not participate in land rental market transactions. Once participation in land markets is accounted for, output per ha is not found to be statistically significantly different across landlord-cum-cultivator, tenant and autarkic households.

Table 1: Selected descriptive statistics by status of current season land rental market participation

Only market transactions	Rental Market					Sales Market	
	Total	Tenant	Autarky	Landlord	Buyer	Autarky	Seller
Land endowment and participation in sales and rental markets							
Owned land in hectares	0.64	0.44 ***	0.64	1.18 ***	0.8 ***	0.6	0.73
Operated land in hectares	0.71	0.65 *	0.71	0.85 ***	0.86 ***	0.69	0.71
Net purchase of land over the past year in ha.	0.01				0.14 ***	0	-0.1 ***
Net land leased-in only through market transactions	0.02	0.16 ***	0	-0.28 ***	0.01	0.02	-0.04 ***
Basic household characteristics							
Female headed household	0.3	0.21 ***	0.33	0.37 **	0.11 ***	0.32	0.31
Age of household head in years	47	41 ***	49	50 **	39 ***	48	47
Head has been displaced	0.47	0.47	0.46	0.52 ***			
Head has primary school education	0.57	0.65 ***	0.54	0.54	0.66 ***	0.57	0.57
Head has secondary school education	0.07	0.09 ***	0.06	0.08 ***	0.09 ***	0.06	0.08
Number of dependent	2.35	2.44 ***	2.3	2.32	2.62 ***	2.31	2.43
Assets and participation in off-farm activities							
Sale value of household assets in USD	86	82	80	126 ***	122 ***	82	88
Sale value of livestock in USD	158	146	155	201 ***	226 ***	150	163
Constrained in the semi-formal credit market	0.72	0.69 ***	0.75	0.68 ***	0.58 ***	0.73	0.74
Involved in off-farm wage employment	0.42	0.48 ***	0.39	0.39 **	0.36 ***	0.42	0.4
Has non-farm enterprises	0.24	0.28 ***	0.21	0.25 **	0.34 ***	0.22	0.25
Output per ha cultivated (USD/ha)	559	560	542	641	573	564	428
Farming ability	-0.00				0.14 ***	-0.02	0.00
Community characteristics							
LTR village dummy	0.5	0.54 ***	0.48	0.48	0.53	0.49	0.5
Number of observations	6980	2132	4016	832	663	6035	282

Note: Asterisks indicate the difference in significance between means for tenant and landlord groups as compared to those in autarky with *, **, and *** denoting significance at 10%; 5%; and 1%.



Fig. 3. Couple having just collected their land titles

Areas transferred in the sales markets were relatively smaller than those in the rental markets (0.14 ha bought and 0.10 ha sold vs. 0.16 ha leased-in and 0.28 ha leased-out), and parties involved complemented transactions by leasing-in or -out land. With an average of 0.8 ha of owned and 0.86 ha of operated land, buyers are more land abundant than those in autarky, suggesting that the existing pattern of land sales in the market may lead to concentration of land ownership. On average, buyers are less likely to be female headed households than those remaining in autarky. The household heads among land buyers are also younger, more educated and have larger families (in particular they have more female adults) than those in autarky. The sale values of their owned household assets and livestock are higher and these buyers are, consistent with expectation, less constrained in the semi-formal credit markets. In addition, buyers are also more involved in operating non-farm enterprises than both sellers and households who did not participate in the land sales markets. While no difference in agricultural productivity is observed among buyers, sellers and households that do not participate in the land sales market, buyers tend to have significantly higher levels of farm abilities.³

LAND/LABOR RATIOS

Comparing land-labor ratios for households before and after participation in the land rental markets (table 2) and in the land sales markets (table 3) allows us to test the input ratio equalization hypothesis. We note that, with 47 household members (or 24 adults) per ha of owned land, those leasing in land have higher labor-land ratios than those who act as landlords (with 15 and 8) or remain in autarky (with 36 and 17). Market participation allows for the reversal of this; once relevant transfers are accounted for, the number of

household members per ha of operated land is significantly lower for tenants (23 household members or 12 adults) as compared to landlords (30 and 16) or those in autarky (30 and 14).

In Table 3 we compute factor ratios for households depending of their status of participation in the land sales market. We find that buyers have more total or adult household members than sellers (31 and 15 per ha of owned land, as compared to 18 and 9 for sellers) but these ratios are much lower than those in autarky. For those able to participate, sales markets equalize labor-land ratios, but this amplifies the contrast with non-participants. Land rental markets do seem to attenuate some of this effect, and further reduces the labor-land ratio for buyers below that for sellers.

To identify determinants of participation on either side of land rental or sales markets as well as the extent to which the LTR program affected transaction costs in these markets in the short-term, we use a standard friction model (Skoufias 1995). Results for both land rental and land sales market participation are given in table 4.

LAND RENTAL MARKET DETERMINANTS

Columns 1 and 2 of table 4 show that lease markets are characterized by an endowment equalization effect whereby the coefficient on the amount of land owned is significant and positive for leasing out and negative for leased in, implying that larger land owners are more likely to lease out and smaller ones more likely to lease in. However, the extent of adjustment is far from what would be required to achieve full adjustment to the desired level of cultivated area (i.e., we reject that the absolute value of the coefficient of land owned equals one). Land rental provides access to younger producers as suggested by the fact that the head's age is positive for net land leased out and negative for net land leased in. Interestingly, the same pattern is observed for the value of household assets, implying that Rwanda's land rental markets effectively transfer land from relatively rich to relatively poor households. Positive signs on the coefficients for number of male adults and dependents (both at 10% significance level) and dummies for having a non-farm enterprise and being credit unconstrained suggest that rental markets transfer land to those with higher endowments of family labor, do not impede diversification

Table 2: Labor-Land Ratio before and after Land Rental Market Participation

Market transactions only	Total	Tenants	Autarky	Landlord
Before participation in land rental market				
Household size per hectare of owned land	36.78	46.51 ***	36.31	15.09 ***
Number of adults per hectare of owned land	18.20	23.69 ***	17.48	8.18 ***
Number of observations	6815	2045	3938	832
After participation in land rental market				
Household size per hectare of operated land	27.63	23.04 ***	29.64	29.73
Number of adults per hectare of operated land	13.82	11.70 ***	14.43	16.38
Number of observations	6950	2132	4016	802

Note: Asterisks indicate the difference in significance between means for tenant and landlord groups as compared to those in autarky with *, **, and *** denoting significance at 10%, 5%, and 1%.

Table 3: Labor-Land Ratio before and after Land Rental and Sales Markets Participation

Market transactions only						
	Total	Buyer		Autarky	Seller	
If not participated in land sales market						
Household size per hectare of owned land	36.92	30.87	**	38.51	17.53	***
Number of adults per hectare of owned land	18.34	15.30	*	19.13	8.93	***
Before participation in land rental market						
Household size per hectare of owned land	36.78	26.21	***	38.51	25.45	**
Number of adults per hectare of owned land	18.20	12.20	***	19.13	13.10	**
After participation in land rental market						
Household size per hectare of operated land	27.63	15.75	***	29.23	21.29	**
Number of adults per hectare of operated land	13.82	8.04	***	14.58	10.98	*
Number of households	6980	663		6035	282	

Asterisks indicate the difference in significance between means for buyer and seller groups as compared to those in autarky with *, **, and *** denoting significance at 10%; 5%; and 1%

of the rural non-farm economy, but are more difficult to use for credit constrained households. Female headship is estimated to increase net land leased out and decrease net land leased in. We discuss below the extent to which this may be a source of concern. Results suggest that there is no strong impact of farming ability (proxied by household fixed effects from a panel production function regression) on net leasing of land while having a non-farm enterprise is estimated to increase rather than reduce the likelihood of leasing in land.

LAND SALES MARKET DETERMINANTS

In contrast, in column 3 of table 4 the magnitude of the estimated coefficient on land owned in the net seller equation is much smaller than in the land rental market equation and the coefficient in the equation for net buying (column 4) is insignificant. This suggests that the contribution of land sales markets to equalization of endowments is marginal. Similarly to what was observed for land rental, being credit constrained reduces land sales market participation. While coefficients on relevant variables suggest that net land buyers are younger, less likely to be female headed, and have more male adults and dependents, all the estimated coefficients are rather small in magnitude compared to the estimated coefficients on assets, both household and livestock, suggesting that such markets transfer land to relatively affluent households and contribute less to poverty reduction (Deininger 2003). Finally, being engaged in off-farm wage employment is negatively correlated with net land purchased. Interestingly, there is a positive correlation with farming ability that suggests that land is transferred to the households with more agricultural skills.

IMPACTS OF SECURING LAND RIGHTS ON

LAND MARKETS PARTICIPATION

From the perspective of the Rwanda's land regularization program, the negative and significant coefficient on the interaction between dummies for the LTR program and the follow up survey (round 2) in the estimates for leasing -in suggests that LTR significantly reduced the threshold for land rental market participation (Table 4 – column 2). This is in line with the notion that LTR-induced clarification of land ownership reduced transaction cost-induced friction in land rental markets.

In the case of land sales, threshold equations point towards a significant widening of the autarky band on the purchasing side with time that is only partly compensated by a LTR-induced transaction cost reduction. At the village level, having more land with a record that unambiguously identifies the owner will reduce the transaction cost of land purchases by eliminating the need for a costly investigation into whether or not the seller is the true owner, thus making it easier to buy land. At the same time, the regression suggests that this variable will be of little relevance for the costs borne by land sellers (column 3 of table 4), a finding that may be partly related to the exclusion from our sample of households who sold land and no longer engage in agriculture.

CONCLUSION

While our results suggest that clarifying land rights had a positive impact on functioning of land rental as well as sales markets even in the very short term, they leave open a number of questions that would be worth exploring. First, it would be useful to better uncover the underlying mechanisms, in particular the extent to which clarification of land tenure and land market

participation allowed households to expand income sources and join the non-agricultural economy. Second, although female-headed households are less likely to participate in rental markets than male headed ones, welfare effects need not be negative as leasing out provides them with more resources than they could get from own cultivation. Investigation of this as well as the way in which plots to be leased out are chosen and resources received from doing so are distributed within the household will be useful. Regarding land sales, a particular area of interest will be to explore the extent to which other measures that affected the transaction cost of land sales, in particular changes in the consent clause, affected land market participation. This would allow us to assess if such a restriction had affected the incidence of certain types of land transfers as a first step to appreciate potential impacts on other outcome variables such as the protection of women's rights or the number of conflicts.

1 Areas where the regularization program had already started by the time of data collection were dropped from the frame, implying that Kirehe district in Eastern Province and Rubavu district in Western Province, as well as Kigali city were excluded.

2 Details of the construction of the "credit constrained" variable in the semi-formal sector can be found in Ali et al. (2014).

3 We use the standard method of measuring farming abilities using household fixed effects from a Cobb-Douglas production function regression. Details are available upon request from the authors.

Table 4: Determinants of Net Land Leased- and of Net Land Purchases

	Leased-out	Leased-in	Net-Seller	Net-Buyer
Owned land in hectares	0.154*** (2.729)	-0.109** (-2.404)	0.018*** (2.748)	-0.002 (-0.191)
Head has been displaced	0.028 (0.531)	-0.043 (-1.624)	0.033 (1.259)	0.009 (0.488)
Female headed household	0.090** (2.475)	-0.097*** (-2.955)	0.011 (0.461)	-0.151*** (-5.061)
Age of household head in years	0.004*** (2.946)	-0.008*** (-5.859)	-0.000 (-0.098)	-0.006*** (-6.373)
Head has primary school education	0.016 (0.410)	0.062** (2.200)	0.007 (0.317)	-0.001 (-0.049)
Head has secondary school education	0.101 (1.502)	0.053 (0.723)	0.048 (1.221)	-0.003 (-0.106)
Number of dependents	-0.013 (-1.057)	0.013* (1.675)	0.004 (0.535)	0.015** (2.198)
Number of male adults	-0.004 (-0.211)	0.030* (1.929)	0.003 (0.275)	0.023** (2.566)
Number of female adults	-0.015 (-0.643)	0.023 (1.320)	0.015 (1.256)	0.006 (0.471)
Sale value of household assets in USD1000	0.286** (2.344)	-0.128* (-1.847)	-0.095 (-1.562)	0.128** (2.362)
Sale value of livestock in USD1000	0.008 (0.070)	0.045 (0.769)	0.002 (0.046)	0.100*** (2.805)
Constrained in the semi-formal credit market	-0.040 (-1.006)	-0.061*** (-2.743)	0.003 (0.124)	-0.060*** (-3.738)
Involved in off-farm wage employment	0.044 (1.047)	0.026 (1.233)	-0.022 (-1.126)	-0.095*** (-4.327)
Has non-farm enterprises	-0.005 (-0.124)	0.113*** (3.335)	0.019 (0.710)	0.023 (1.159)
Farming ability	0.036 (1.205)	0.003 (0.110)	-0.000 (-0.023)	0.031** (2.269)
Threshold effect				
LTR village X time dummy	0.037 (0.891)	-0.067** (-2.156)	-0.028 (-1.062)	-0.057** (-2.055)
Time dummy	0.001 (0.027)	-0.066*** (-2.606)	0.013 (0.577)	0.098*** (4.033)
Sigma		0.630*** (6.346)		0.347*** (8.339)
Number of observations		6,657		6,657
Log-Likelihood		-5,522.96		-2,137.97
Wald chi2 test		44.666		16.493

Note: Robust z-statistics adjusted for clustering at the village level are in parenthesis: *** significant at 1%; ** significant at 5%; * significant at 1%. Coefficients for leasing out (except threshold effects and constant parameters) are multiplied by -1 for ease of interpretation. Results include a range of constant parameters at the village level that are not reported for presentation purposes.

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This case study was prepared by a team from the Development Economics Research Group and Africa Gender Innovation Lab of the World Bank in collaboration with the Rwanda Natural Resources Authority. The UK Department for International Development, the Bank Netherlands Partnership Program and the International Growth Centre provided generous financial support.

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