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Why is Land Productivity Lower on Land Rented Out by Female Landlords? – Theory, and Evidence from Ethiopia

By
Stein Holden[1]
Department of Economics and Resource Management
Norwegian University of Life Sciences
P.O.Box 5033, 1432 Ås, Norway
Stein.holden@umb.no
and

Mintewab Bezabih
Department of Economics
Göteborg University
Göteborg, Sweden
Mintewab.bezabih@economics.gu.se

Abstract

This paper seeks to find explanations to why land productivity is lower on land rented out by female landlord households than on land rented out by male landlord households. First it is demonstrated that this productivity differential is highly significant after controlling for land productivity using nearest neighbour and kernel plot matching methods. Then we test alternative hypotheses that possibly may explain the productivity differential. These include transaction costs in the land rental market, larger problem with Marshallian inefficiency on land rented out by female landlords, poorer ability to screen good tenants and evict bad tenant by female landlords, and larger proportion of pure landlords (with poorer monitoring capacity) among female landlords. Using GLS and controlling for sample selection we found evidence of Marshallian inefficiency in the analysis but this could not explain the gender productivity differential. Female landlords have tenants who are older, own less oxen, are more related, and under longer-term contracts. In the parametric regressions land productivity was significantly lower on plots rented out to in-law tenants and this appeared to explain the gender productivity differential. Female landlords may be forced to rent their land to their in-laws and they are unable to evict them even if they are inefficient land users. Land reforms that strengthen women's land rights may therefore be good for efficiency as well as equity. Recent land regulations restricting renting out of land to maximum half of the farm area may contribute to weaken women's land rights as a large share of the poor female landlords currently rent out more than half of their land because they lack the necessary nonland resources to farm efficiently.

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1. Introduction

There is a common view and belief that women are the ones that do the farming in Africa while the men do not work much. Yet we find a lot of variation within the continent, making such sweeping generalisations too strong. Still, there is no doubt that men in most places have more power than women within their families and communities as they in most communities are considered to be the household head and take up most local leadership positions. When looking at the agricultural production both within and across households some interesting gender-specific differences have been identified. Udry et al. found that land productivity on plots controlled by women was lower than that of plots controlled by men. Their study showed that men were more able to mobilize labour and other factors of production for their plots than women were within the family (Udry, et al., 1995). Another study by Udry found 30% lower productivity on female plots than that of male plots within households in Burkina Faso (Udry, 1996). Goldstein and Udry attributed the productivity differential to women's higher level of tenure insecurity, making them less able to invest in the land in form of fallowing because they could then risk losing the land (Goldstein and Udry, 2005).

In Ethiopia Holden et al. (2001) found systematic lower productivity on owner-operated land of female-headed households than that of male-headed households (Holden, et al., 2001). Bezabih and Holden found lower land productivity on land of female landlords than that of male landlords (Bezabih and Holden, 2006). We build on and expand from the analysis of Bezabih and Holden (2006). They used a double moral hazard model with tenure insecurity and transaction costs to explain the productivity differential. Female landlord households were assumed to be more tenure insecure and were therefore considered less able and less likely to use threat of eviction and contract renewal as an instrument to enhance productivity on rented out land. Alternatively, female landlords faced higher transaction costs in the land rental markets and therefore had larger difficulties in evicting inefficient tenants and in searching and finding more efficient tenants.

In this study we test a number of alternative models and hypotheses that possibly may explain the productivity differentials between female- and male-headed landlord households using the same data as in Bezabih and Holden (2006). First we test a simple transaction cost model for participation in the land rental market and its possible consequences for land productivity differentials. Second, we test a model with endogenous contract choice to see whether

Marshallian inefficiency due to more limited monitoring capacity can explain the productivity differential. Third, we test whether the productivity differential may be explained by screening and/or adverse selection of tenants possibly due to female-headed households' lower ability to screen and select good tenants and evict bad tenants. This could also be due to the tenure insecurity of female landlords, making them less able to use threats of eviction (Kassie and Holden 2006; Bezabih and Holden 2006). Finally, we test whether kinship contracts, involving blood-related tenants or in-laws of male and female landlords are less efficient, like found by Kassie and Holden (2006). This may be another reason for female landlords being unable to use threat of eviction as a device to enhance effciency. Such a finding may give reason to doubt that partner choice in the rental market is voluntary. Coersion may play an important part and possibly explain the productivity differential. We discuss whether this could be captured by a transaction cost model or whether a contested exchange model (Bowles and Gintis, 1988, Bowles and Gintis, 1993) may be more appropriate.

In part 2 of the paper we provide more background information about the setting where the empirical study was carried out. In part 3 we present alternative theoretical models that form the basis for our hypothesis testing and analysis. In part 4 we give an overview of econometric methods used and discuss some of the limitations. Then we go to the presentation of results and discuss the findings in relation to our hypotheses before we conclude.

2. The setting

This study uses information from the 230 landlord households in the sample of approximately 2000 households in two districts, East Gojjam and South Wollo, in the Amhara National Regional State in the northern and central highlands of Ethiopia. East Gojjam is a fertile plateau receiving good average rainfall, while South Wollo is characterized by degraded farm plots receiving lower and more erratic rainfall. An overall sample of 130 male and 100 female landlords is included as a result.

As has been noted in the previous section, households may or may not engage in the land lease market, by virtue of which they are categorized as 'autarkic', 'landlords' or 'tenants'. For those who engage in the land lease market as landlords, they might do so partially or fully i.e. by renting out all/part of the plots that belong to them. If they rent out all their land we call them 'pure landlords'.

The participation of female-headed households in the land market is restricted to the leasing-out side of the market (Deininger , et al., 2006, Deininger, et al., 2006). Based on the same data set as we used they show that 40% of the households that rent out land are female-headed (our sample for analysis) and more than 70% of female-headed households rent out land. At the same time they find no significant difference in area owned between those renting-in and renting-out land. This demonstrates the 'reverse-tenancy'-nature of the land rental market in Ethiopia, which also has been demonstrated in other studies (Holden and Ghebru, 2005, Kassie and Holden, 2006), and in other African countries (Bellemare, 2006, Tikabo, et al., Revised).

Thus, for our purpose, our analysis focuses on male and female landlords who are among the poorest of the poor in the areas of study. While there are some households who lease out their land fully, a considerable proportion of them are owner-cum landlords who cultivate a part of their land themselves. This allows us also to compare land productivity of rented-out land and owner-operated land of the same landlords. A set of land quality variables is included to control for land quality.

3. Theoretical models

We refer to the transaction cost models for land rental markets in the introduction. The first model is with fixed-rent rental contracts and transaction costs in markets for land and nonland resources. The second model is with sharecropping contracts, moral hazard and tenure insecurity.

3.1. Simple transaction costs model for the land rental market

How can this model explain gendered productivity differentials? If female-headed households possess on average less nonland resources relative to land resources than male-headed households they are more likely to rent out land than male-headed households. They are therefore more likely to choose one of the first two land strategies. The transaction costs in the land rental market cause land productivity to be higher on rented-in land (managed by tenants) than on the owner-operated land of landlords. With a high proportion of the female-headed households in the category of landlord households (land strategy 2) and a low proportion of female-headed households in the tenant category of households (land strategy 4), land productivity of female-headed households should on average be lower than that of male-headed households. In this case the productivity on the land rented out by female-headed households should not be different from that on owner-operated land of tenant households. For pure owner-operators (land strategy 3) average land productivity should fall between the average land productivity on owner-operated land of landlords and that of tenant households (rented-in as well as owner-operated land).

Furthermore, if female-headed households face higher transaction costs in the land rental market, average land productivity on owner-operated land of female landlords should be lower than that of male landlords. This should also lead to female landlord households operating with lower nonland-land factor ratios on their owner-operated land.

3.2. Model with sharecropping, transaction costs and tenant characteristics

A landlord household has land endowment $\overline{L}$ and rents out L^s of this land with $L^s \leq \overline{L}$. The characteristics $\left(\gamma^l\right)$ of the landlord household include nonland resources $\left(N^l\right)$ and sex of household head (*g*). The household expects to produce output *q* at price *p* using land and nonland resources in production. It is also assumed that sex of household head affects production in form of farm skill (non-tradable nonland resource) in a society where males traditionally are responsible for farming activities. Production is increasing in land and nonland resources use at a decreasing rate. Land and nonland resources are assumed to be complementary. Land is rented out in a sharecropping arrangement where the landlord gets α share of the expected output. This share is, for simplicity assumed to be fixed (exogenous) in the short run. Expected output on rented out land is a function of land rented out and the expected use of nonland resources by the tenant $\left(N^{t0}\right)$. The amount of nonland resources used by the tenant is expected to depend on his characteristics $\left(\gamma^t\right)$ and the sex of the head of the landlord household (*g*). We expect that $\frac{\partial N^{t0}}{\partial g} < 0$ if female landlords have lower monitoring and enforcement capacity and there is no difference in endowments of tenants of male and female landlords' tenants. We hypothesize that there is a higher risk of losing the land if it is rented out to the same tenant for more than one cropping season. This tenure insecurity (ϕ) is an increasing function of the share of the land that is rented out ($\frac{L^s}{\overline{L}}$) [2], and increasing with the number of years the land has been rented out to the same tenant (C_{-t}), and is higher for female landlords than for male landlords. In case the landlord decides to evict the tenant that was contracted last year she/he will face an eviction cost and a search problem related to finding a new tenant and an uncertainty about the characteristics of the new tenant and his productivity because tenants' characteristics are only partially observable. We assume that search efficiency $\left(S(g)\right), \frac{\partial S}{\partial g} < 0, \frac{\partial \gamma^{t1}}{\partial S} > 0$, is lower for female than for male landlords and that this affects the quality of tenants they are able to find. If female landlords face a higher eviction cost, $c^E = c^E(g), \frac{\partial c^E}{\partial g} > 0$, they may be stuck with inefficient tenants. This may be in-laws or blod-related kin that take control over their land. The landlord's choice problem is stated in equation (3) below, assuming uniform land;

$$V^l\left(y^l;\gamma^l\right) = \max \begin{Bmatrix} V^l\left(pq\left(\overline{L}-L^s, N^l(g)\right) + \alpha pq\left(L^s, N^{t0}\left(\gamma^{t0}(g), g\right)\right) - \phi\left(\frac{L^s}{\overline{L}}, C_{-t}, g\right) L^s; \gamma^l \right), \\ V^l\left(pq\left(\overline{L}-L^s, N^l(g)\right) + \alpha pq\left(L^s, N^{t1}\left(\gamma^{t1}\left(S(g)\right), g\right)\right); \gamma^l \right) - c^E(g) - c^S(g) \end{Bmatrix}$$

(3)

She/he will not renew the contract if the first term (above) inside the big paranthesis is larger than the second term (below) inside the big paranthesis.

We are particularly interested in studying the implications of the model for the difference between male and female landlords in terms of their exptected land productivity on own and rented out land. From the model we derive the following propositions, given that the productivity differential between male and female landlords persists after controlling for differences in plot quality, sample selection in relation to plots that are rented out, and other landlord characterisitcs;

[2] In the recent Ethiopian land proclamations it is stated that one may rent out up to half of the land, making it illegal to rent out more than that. Previously all land renting was prohibited and inability to cultivate one's land was an indication of too much land and this could increase the probability of losing the land in the next land redistribution.

1. Female landlords have less monitoring and enforcement capacity. They are therefore likely to experience more Marshallian inefficiency than male landlords. Contract choice therefore explains the productivity differential.
2. Screening and search cost: Female landlords are less mobile due to more commitments at home and due to cultural restrictions. They are therefore less able to search and find good tenants. The productivity differential can therefore be explained by the difference in tenant characteristics of female and male landlords.
3. Eviction cost: Female landlords are less able to evict inefficient tenants, particularly if these are blod-related kin or in-law tenants. The productivity differential is explained by the fact that female landlords have more blood-related kin and in-law tenants that are less efficient.
4. Duration of partnership: Longer duration is a sign of tenure security and is associated with higher productivity for male landlords while it may be associated with less efficient kin contracts for female landlords.
5. Pure landlords, renting out all their land, are less able to monitor and enforce contracts. Pure landlords are more likely to be female landlords and this explains the productivity differential.
6. Tenure secure landlords may use threat of eviction to enhance the efficiency of tenants. Contract renewal conditional on performance is more used by male landlords that are more tenure secure than female landlords and this explains the productivity differential.

Hypotheses 3 and 4 can be contradictory. High eviction costs may be a sign of tenure insecurity and can lead to longer duration contracts.

4. Methodology

Empirical testing of gendered productivity differentials may reveal which of these propositions are true. We do this in several steps. The structure of the data is such that we have multiple plots per household. We cannot be sure that plot quality is the same on land for male and female landlords or that land quality and productivity are the same on owner-operated and rented out land. We use matching models and selection models to control for observable and unobservable plot characteristics. First we compared nonparametrically the land productivity on owner-operated and rented-out land of male and female landlords. We used propensity score plot matching to do this comparison. The propensity score was constructed on the basis of observable plot characteristics. We tested that the common support requirement was satisfied with our data and used kernel matching and nearest neighbour matching methods (Becker and Ichino, 2002, Dehejia and Wahba, 2002).

To control for selection bias related to unobservable plot characteristics we have applied selection models where the selection equation related to wheter plots were rented out or not (trade status T_{hp} for household *h* and plot *p*.

$$T_{hp} = \begin{Bmatrix} 1 \quad \text{if} \quad \text{rented} \quad \text{out} \\ 0 \text{ if owner-operated} \end{Bmatrix} = T_{hp}\left(S_{hp}, Z_h\right) \tag{1.1}$$

For identification we used observable plot characteristics $\left(S_{hp}\right)$, including soil type, distance to plot for landlords and plot size, and landlord household resource endowments $\left(Z_h\right)$ in form of male and female labour per unit owned land, oxen and other livestock per unit of land. Many of these variables were highly significant. We considered also using household fixed effects for the selection equation but the fact that a considerable share of the landlord households rented out all their land kept us from doing it. Following Deaton (1997) we used a polynomial of the predicted probability of a plot being traded in the selection equation to control for selection bias in the second stage productivity equations on rented out land. We were unable to use household fixed effects also in the second stage, unlike Shaban (Shaban, 1987), since we are interested in comparing land productivity of male and female landlord households, a household level variable. We used bootstrapping to get corrected standard errors in the second stage GLS models.

Analytical strategy:

1. Parametric approach: GLS selection models of land productivity on rented out plots of male and female landlords against the following variables;
    a. Plot characteristics (used in the propensity score matching), to control for plot quality variation,
    b. Gender dummy for sex of head of household, to see whether differences may be explained by other landlord household characteristics or whether the gender variable has a separate effect,
    c. Contract choice in terms of pure sharecropping as this type of contract is likely to have the largest disincentive effect as compared to fixed rent and costsharing contracts. Contract choice in terms of pure sharecropping is endogenous and is predicted.

d. Nonland/land factor ratios and other characteristics of tenants, to see whether tenants' characteristics alone can explain the productivity differential (meaning that male landlords are able to get better tenants)[3].
e. Duration of partnership with the same tenant which may not be the same as contract length because it may be a result of multiple renewals of short-term contracts (test whether significance of gender dummy disappears when this variable is added, this would indicate that land productivity on land rented out by male landlords is higher because they use more long-term contracts (perhaps because they are more tenure secure))
f. Interaction of landlord gender dummy with duration of partnership. This allows us to assess whether contract renewal and duration of partnership has a different effect on land productivity for female than for male landlords.
g. Dummy for pure landlords (these are likely to be the weakest of the landlords, and are more likely to be female). They are more likely to have problems with monitoring and enforcing land use efficiency on their rented out land. This variable was used to replace the share of land rented out variable in the theoretical model. Different specifications were tried to test the hypothesis.

7. Results and discussion

We compared the land productivity of male and female landlords on all plots and on owner-operated and rented out plots separately. We may then compare this with the propositions of the theoretical models and this may help us to reject some of the propositions. The results of this comparison are as follows in Table 4.

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[3] We also do separate tests of whether there are significant differences in the tenant characteristics of male and female landlords (Table 6). Tenant characteristics are obviously endogenous so the results have to be interpreted with care.

Table 4. Propensity score matching results of gender of household head on land productivity on owner-operated and rented out plots of landlord households[1]

Variable	All plots		Owner-operated plots		Rented out plots	
	Kernel matching	Nearest neighbour	Kernel matching	Nearest neighbour	Kernel matching	Nearest neighbour
Land productivity						
Female landlords	1366.02	1366.02	1430.85	1430.85	1345.05	1345.05
Male landlords	1806.08	1952.30	1799.02	2266.90	1815.49	1753.60
Difference	-440.06	-586.28	-368.16	-836.04	-470.44	-408.55
Bootstrapped st. error	126.21	177.76	255.65	414.59	156.26	210.83
t-statistic	-3.487***	-3.298***	-1.440	-2.017**	-3.011***	-1.938**
Number of observations						
Female landlords	439	439	124	124	315	315
Male landlords	820	477	329	153	484	255

[1] The comparison is based on propensity score kernel-based matching (Dehejia and Wahba 2002, Becker and Ichino 2003). Significance levels (after correction for bias): *: 10% level, **: 5% level, ***: 1% level.

Table 4 reveals that average land productivity was significantly lower (1% level) for female landlords than for male landlords when we compare all their plots. When we compare land productivity separately for owner-operated plots, we see that this result is less robust as a significant difference is retained only when we used nearest neighbour matching. However, we find a significant difference with both matching methods on rented out plots.

So where does this leave us with respect to the explanatory power of the theoretical models? This latter result that land productivity is lower on land rented out by female landlords than on land rented out by male landlords can clearly not be explained by our first theoretical transaction-cost model. This model predicted that land productivity should be higher on rented out plots than on owner-operated plots if we have transaction costs in the land rental market. We do not find this to be true in our empirical results. The other proposition of the first model was that land productivity should be lower on owner-operated plots of female landlords if they face higher transaction costs in the land rental market than male landlords. We find evidence on this but the results are not very robust as the productivity differential was significant only with the nearest neighbour matching method. This may also be due to the relatively smaller number of owner-operated plots that were owned by female landlords.

We focus our analysis more on explaining the productivity differential on rented-out land. Does this differential mean that female landlords have more problems with Marshallian inefficiency on the rented out land while this is a less significant problem for male landlords? Table 4 does not reveal a larger gap in land productivity between owner-operated plots and rented out plots of female landlords than of male landlords that would be consistent with Marshallian inefficiency. The gap appears to be too small in both cases to be significant.

In order to test more of our propositions from the second model we ran a number of parametric models on the rented out land. We corrected for plot selection bias with a plot trade selection model that is presented in Table 5 together with the results from the three first parametric productivity models.

The first model (Landlord model 1) to explain productivity differentials on rented out plots is a village fixed effects (GLS) model with sample selection. This model does not take contract choice into account. We see from the trade selection equation in Table 5 that female landlords were more likely to rent out a specific plot. While controlling for plot, village, and other household characteristics, land productivity was still significantly lower on their rented out land. One may wonder why they rent out more land when they seem less able to enforce efficiency on their rented out land. We therefore wanted to test whether female landlords used pure sharecropping contracts more than male landlords and whether that could explain the productivity differential. Contract choice is endogenous and we predicted the probability that landlords chose pure sharecropping contracts over fixed-rent, cost-sharing and mixed contracts. The predicted variable (bpuresharp) was included in Landlord Model 2. We see from Table 5 that the variable was significant at 5% level and with a negative sign while the gender variable (hsex) still remained significant. It appears therefore that there is more to the productivity differential than Marshallian inefficiency.

Table 5. Generalised Least Squares Selection Models for Land Productivity Differentials on Rented Out Plots: With household random effects and bootstrapped standard errors

	Landlord Model 1 b/(se)	Landlord Model 2 b/(se)	Landlord Model 3 b/(se)	Trade selection Equation b/(se)
Selection variables				
tradep	-2.912	-3.427	-3.611*	
	(2.19)	(2.11)	(2.04)	
tradep2	2.745	3.326**	3.457**	
	(1.68)	(1.66)	(1.59)	
Landlord household characteristics				
madultha				0.106***
				(0.04)
fadultha				0.157**
				(0.07)
fadultha2				-0.011
				(0.01)
totalplot				0.027****
				(0.01)
extreme				0.079
				(0.36)
severe				0.289
				(0.18)
intermediate				-0.001
				(0.36)
security				-0.152***
				(0.05)
confilct				0.242**
				(0.11)
changeland				0.111
				(0.13)
hage1				-0.002
				(0.00)
heduc1				0.077
				(0.06)
plotdist				0.009****
				(0.00)
oxha				-0.084**
				(0.04)
livestockha				0.012
				(0.01)
hsex	-0.282**	-0.286**	-0.001	0.526****
	(0.14)	(0.14)	(0.28)	(0.12)
Predicted contract choice				
bpuresharp		-2.093**	-1.718*	
		(0.84)	(0.91)	
puresharfp			-0.724	
			(0.60)	
Plot characteristics				
soiltype1	0.246	0.270	0.273	-0.363***
	(0.17)	(0.19)	(0.18)	(0.14)
soiltype2	0.137	0.174	0.180	-0.297**
	(0.17)	(0.18)	(0.18)	(0.13)
slope1	-0.028	-0.070	-0.064	0.015
	(0.25)	(0.26)	(0.24)	(0.19)
slope2	0.072	0.097	0.094	0.120
	(0.25)	(0.28)	(0.26)	(0.20)
red	-0.045	-0.088	-0.098	-0.089
	(0.23)	(0.22)	(0.23)	(0.19)
black	-0.234	-0.223	-0.239	0.097
	(0.23)	(0.20)	(0.22)	(0.19)
plotarea	-4.389****	-3.763***	-3.721****	1.174****
	(1.24)	(1.20)	(1.11)	(0.34)
plotarea2	1.965	1.439	1.391	
	(1.43)	(1.37)	(1.33)	
Village dummies				
amanuel	-0.858	-1.186*	-1.158**	-1.382****
	(0.61)	(0.65)	(0.54)	(0.20)
kebi	-0.138	0.112	0.121	-0.697****
	(0.17)	(0.22)	(0.20)	(0.17)
wolekie	-0.274	-0.455*	-0.450*	-0.410**
	(0.22)	(0.26)	(0.26)	(0.19)
telima	0.029	-0.086	-0.058	-0.361*

	(0.33)	(0.37)	(0.35)	(0.19)
sekeladebir	-0.678***	-0.140	-0.159	0.071
	(0.21)	(0.29)	(0.29)	(0.20)
kete	-1.104****	-0.904****	-0.899****	-0.679****
	(0.22)	(0.22)	(0.22)	(0.17)
ambamariam	-1.088****	-0.434	-0.436	0.301
	(0.25)	(0.37)	(0.39)	(0.21)
yamed	-0.528**	0.346	0.360	-0.155
	(0.25)	(0.41)	(0.37)	(0.19)
addismender	0.106	-0.487	-0.483	-0.994****
	(0.27)	(0.33)	(0.34)	(0.24)
chorisa	-0.155			-0.462
	(0.42)			(0.30)
Constant	8.869****	9.463****	9.377****	0.071
	(0.80)	(0.80)	(0.76)	(0.52)
Prob > chi2	0.000	0.000	0.000	0.000
Number of obs.	605	591	591	1124

Significance levels: * 10%, ** 5%, *** 1%, **** 0.1%.

We wanted to go one more step on this and created an interaction variable between the predicted pure sharecropping contract variable and the gender variable (hsex=1 for female landlords, zero otherwise). This variable would test whether Marshallian inefficiency is a problem only on land rented out by female landlords possibly due to their lower ability to monitor and enforce their contracts. This new variable (bpuresharfp) was added in the Landlord Model 3. We see from Table 5 that this variable also was insignificant although it had a negative sign. It appears therefore that female landlords are not significantly less able to enforce efficiency in relation to their pure sharecropping contracts. We see that the gender variable (hsex) became insignificant in this last model. The insignificance of these variabless could be due to multicollinearity because their standard errors increased.

We now want to go further and test our hypotheses on screening and adverse selection of tenants as an explanation for the productivity differential. We had the following tenant characteristics related to each of the contracts; age of tenant, oxen ownership of tenant, whether the tenant was blod-related, and whether the tenant was in-law related to the landlord. The mean values of these variables and a test for significance of differences between male and female landlord households are presented in Table 6. The table reveals that female landlords had tenants that on average were significantly older and had fewer oxen than male landlords. This may be in line with our screening and adverse selection hypothesis, at least for the oxen variable, although it is less obvious that the age of tenants has a negative effect on land productivity. We also see from the table that female landlords were more likely to have blood-related and in-law related tenants than male landlords were. However, we cannot be sure whether this implies a negative productivity effect due to screening/adverse selection of tenants till we have tested the effects on land productivity.

The empirical evidence on how kinship contracts affect land contract efficiency are mixed (Kassie and Holden, 2006, Sadoulet , et al., 1997, Sadoulet, et al., 1997). Sadoulet et al.(1997) found that kinship contracts were more efficient while Kassie and Holden (2006) found kinship contracts to be less efficient. Since the study of Kassie and Holden was carried out in Ethiopia, it may have more relevance than that of Sadoulet et al. for our study area. They proposed that threat of eviction may be used by landlords as an instrument to enhance land productivity on sharecropped out land while this instrument may not be so efficient in kin contracts as in non-kin contracts. We have included duration of partnership (clength1) in our analysis to test whether duration of partnership with the tenant can be associated with land productivity. We refer to Bezabih and Holden (2006) for more details on the issue of contract length and contract renewal. We see from Table 6 that average contract duration was longer for female landlords than for male landlords even though land productivity was lower for female landlords. This may imply that female landlords were less able to use threat of eviction as a device to induce higher productivity and evict less efficient tenants.

Table 6. Tenant characteristics of male and female landlord households

Variable	Female landlords Mean value	Male landlords Mean value	Bonferroni test of significant difference F	Prob > F
Tanant age (tage)[1]	2.368	2.232	4.73	0.0090
Oxen owned by tenant (toxcd)	1.940	2.075	2.99	0.0041
Blod-related tenant (btenant)	.466	.365	12.81	0.0004
In-law related tenant (stenant)	.184	.102	17.58	0.0000
Contract length (clength1)	4.825	2.637	9.17	0.0000

[1]The age of tenants was grouped in three age categories; young, medium and old.

We now go ahead and test for adverse selection effects on the productivity differential using parametric selection models. The results are presented in Table 7.

Table 7. Generalised Least Squares Selection Models for Rented Out Land including Tenant Characteristics: with household random effects and bootstrapped standard errors

	Landlord-Tenant Model 1 b/se	Landlord-Tenant Model 2 b/se	Landlord-Tenant Model 3 b/se	Landlord-Tenant Model 4 b/se
Selection variables				
tradep	-3.571*	-3.632	-3.648*	-3.956
	(2.05)	(2.24)	(2.15)	(2.57)
tradep2	3.435**	3.475**	3.463**	3.645*
	(1.56)	(1.75)	(1.67)	(1.99)
Predicted contract choice				
bpuresharp	-2.101***	-2.253***	-2.253***	-2.434***
	(0.81)	(0.87)	(0.85)	(0.86)
Tenant characteristics				
hsex	-0.266*	-0.236*	-0.087	-0.004
	(0.14)	(0.14)	(0.15)	(0.24)
tage	0.009	0.015	-0.012	-0.107
	(0.11)	(0.11)	(0.11)	(0.13)
toxcd	0.018	0.024	0.043	0.057
	(0.08)	(0.07)	(0.08)	(0.09)
btenant		0.080		
		(0.12)		
stenant		-0.297		
		(0.25)		
fbtenant			-0.092	-0.041
			(0.19)	(0.24)
fstenant			-0.740**	-0.926**
			(0.37)	(0.42)
clength1				0.006
				(0.03)
fclength				-0.027
				(0.03)
Plot characteristics				
soiltype1	0.286	0.254	0.241	0.129
	(0.20)	(0.20)	(0.19)	(0.22)
soiltype2	0.185	0.169	0.135	-0.018
	(0.20)	(0.19)	(0.19)	(0.21)
slope1	-0.081	-0.084	-0.065	0.038
	(0.24)	(0.26)	(0.26)	(0.29)
slope2	0.105	0.087	0.122	0.337
	(0.25)	(0.28)	(0.26)	(0.26)
red	-0.112	-0.116	-0.075	-0.044
	(0.24)	(0.23)	(0.23)	(0.26)
black	-0.246	-0.262	-0.217	-0.143
	(0.23)	(0.23)	(0.22)	(0.25)
plotarea	-3.820****	-3.885****	-3.938****	-4.880****
	(1.14)	(1.09)	(1.06)	(1.12)
plotarea2	1.489	1.556	1.619	2.916**
	(1.34)	(1.25)	(1.26)	(1.37)
Village dummies				
amanuel	-1.283*	-1.349	-1.285	-1.267*
	(0.76)	(0.83)	(0.79)	(0.75)
kebi	0.122	0.170	0.188	0.198
	(0.22)	(0.23)	(0.21)	(0.23)
wolekie	-0.448	-0.450*	-0.382	-0.427
	(0.30)	(0.27)	(0.32)	(0.35)
telima	-0.071	-0.080	-0.003	0.050
	(0.34)	(0.35)	(0.32)	(0.37)
sekeladebir	-0.133	-0.092	-0.006	0.052
	(0.30)	(0.30)	(0.28)	(0.32)
kete	-0.914****	-0.897****	-0.843****	-0.629**
	(0.25)	(0.24)	(0.24)	(0.29)
ambamariam	-0.438	-0.383	-0.266	-0.252
	(0.40)	(0.42)	(0.41)	(0.52)
yamed	0.350	0.416	0.576	0.847*
	(0.39)	(0.42)	(0.41)	(0.48)
addismender	-0.501	-0.436	-0.262	-0.364
	(0.36)	(0.36)	(0.40)	(0.46)
Constant	9.469****	9.537****	9.486****	9.860****
	(0.84)	(0.84)	(0.85)	(0.96)
Prob > chi2	0.000	0.000	0.000	0.000
Number of obs.	577	577	577	485

Significance levels: * 10%, ** 5%, *** 1%, **** 0.1%.

We see from Table 7 in the Landlord-Tenant Model 1 that the gender variable (hsex) remained significant after we included the tenant age (tage) and tenant oxen ownership (toxcd) variables while these variables were insignificant. The tenant variables are clearly endogenous so we have to interprete them with care.

When we added the variables for blod-related tenants (btenant) and in-law related tenants (stenant) in Landlord-Tenant Model 2, these variables were also insignificant while the gender dummy variable remained significant. The size of the parameter for the gender dummy variable was reduced somewhat indicating that there may be a grain of truth in the adverse selection hypothesis, given the significant difference in these tenant characteristics between male and female landlords.

We wanted to test more specifically whether kin contracts could be associated with lower productivity for female than for male landlords. We therefore constructed interaction variables between the blod-related tenant (fbtenant) and in-law tenant (fstenant) variables and the gender dummy variable. We present the results in Landlord-Tenant Model 3. We see that the interaction variable for blod-related tenants was insignificant while it was significant at 5% level and negative for in-law tenants. The parameter for the gender dummy variable became insignificant and the absolute value was much reduced. This indicates that in-law contracts are associated with the lower land productivity of female landlords' rented out plots. In all the models the predicted contract choice (= pure sharecropping) remained significant at 1% level, showing the disincentive effect of sharecropping.

We also wanted to control for duration of partnership (clength1) and included the interaction variable for contract length and gender (fclength) as well. We see from the Landlord-Tenant Model 4 that these variables also were insignificant and their inclusion did not affect any of the other variables of interest. It appears therefore that in-law tenants are less efficient than other tenants. Such contracts appear to be of longer duration even though they are less efficient (see Table 6). This is in line with anecdotal evidence that in-laws take control over land of female landlords. The female landlords may in such cases face high eviction costs and may therefore fail to evict these tenants and cannot search for more efficient tenants. This appears to be the main form of tenure insecurity that female landlords face.

Finally, we wanted to assess whether pure landlords that are renting out all their land, were facing higher problems with inefficiency on their rented-out land, possibly because they may be more resource-poor or absent and therefore less able to monitor and enforce contracts, or because they may be more tenure insecure and therefore less able to use efficiency-enhancing devices. To test for this we included the dummy variable for pure landlords (llordpure), the predicted probability of being a pure landlord (purellp3) and an interaction variable for the predicted pure landlord variable and female dummy (purellpf). We included these variables one at the time and jointly because of possible problems with multicollinearity. We see the results in Table 8. None of the specifications made these variables significant. The signs were even positive in case of the interaction variable. Multicollinearity may therefore not be blamed for these varibles not being significant and with a negative sign. We therefore reject the hypothesis that lower productivity on rented out land from female landlords is due to their higher probability of being pure landlords.

We did some further tests to see whether the difference could be associated with crop choice. First we tested whether the results were the same if we did the analysis for plots with cereals only. We found that was the case although levels of significance were reduced due to the smaller sample size (about 63% of the cropped plots were cropped with cereals). The equivalent results of Table 7 are presented in the appendix. Alternatively we also ran the regressions with a cereal dummy. Also this did not change the key results while the cereal dummy was significant and positive in most models (with about 20% higher output value than other plots). Crop choice is largely determined by local crop rotation practices and may therefore be seen as exogenous in our analysis (Kassie and Holden 2006).

Table 8. Generalised Least Squares Selection Models for Rented Out Land including Tenant Characteristics: with household random effects and bootstrapped standard errors

	Pure landlord Model 1 b/se	Pure landlord Model 2 b/se	Pure landlord Model 3 b/se
Selection variables			
tradep	-4.035	-2.234	-2.169
	(2.46)	(2.39)	(2.61)
tradep2	3.700*	2.402	2.149
	(1.93)	(1.84)	(2.02)
Predicted contract choice			
bpuresharp	-2.369***	-2.389***	-2.611***
	(0.83)	(0.86)	(0.88)
Pure landlord variables			
llordpure	-0.050		
	(0.15)		
purellp3		-0.628	
		(0.64)	
purellpf		0.644	0.238
		(0.70)	(0.51)
Tenant characteristics			
hsex	0.011	-0.223	-0.115
	(0.24)	(0.36)	(0.32)
tage	-0.106	-0.062	-0.062
	(0.12)	(0.12)	(0.11)
toxcd	0.057	0.035	0.037
	(0.10)	(0.08)	(0.09)
fbtenant	-0.045	-0.021	-0.015
	(0.21)	(0.23)	(0.22)
fstenant	-0.927**	-0.862**	-0.874*
	(0.44)	(0.42)	(0.46)
clength1	0.006	-0.003	-0.000
	(0.03)	(0.03)	(0.03)
fclength	-0.027	-0.020	-0.024
	(0.03)	(0.03)	(0.03)
Plot characteristics			
soiltype1	0.127	0.162	0.141
	(0.22)	(0.22)	(0.21)
soiltype2	-0.024	-0.014	-0.018
	(0.22)	(0.22)	(0.23)
slope1	0.038	-0.011	-0.007
	(0.30)	(0.29)	(0.31)
slope2	0.333	0.286	0.293
	(0.32)	(0.28)	(0.32)
red	-0.040	-0.107	-0.128
	(0.29)	(0.29)	(0.31)
black	-0.136	-0.150	-0.158
	(0.28)	(0.27)	(0.30)
plotarea	-4.877****	-4.861****	-4.835****
	(1.10)	(1.19)	(1.30)
plotarea2	2.911**	2.866**	2.934*
	(1.31)	(1.38)	(1.54)
Village dummies			
amanuel	-1.292		
	(0.81)		
kebi	0.171	0.092	0.229
	(0.24)	(0.27)	(0.24)
wolekie	-0.424	-0.501	-0.513
	(0.37)	(0.34)	(0.37)
telima	0.037	-0.088	-0.016
	(0.35)	(0.40)	(0.37)
sekeladebir	0.028	-0.046	0.029
	(0.32)	(0.33)	(0.33)
kete	-0.651**	-0.761**	-0.684**
	(0.31)	(0.33)	(0.29)
ambamariam	-0.272	-0.325	-0.229
	(0.50)	(0.54)	(0.52)
yamed	0.809*	0.688	0.828*
	(0.46)	(0.50)	(0.47)
addismender	-0.375	-0.522	-0.482
	(0.49)	(0.48)	(0.53)

Constant	9.889****	9.565****	9.509****
	(0.96)	(0.94)	(1.02)
Prob > chi2	0.000	0.000	0.000
Number of obs.	485	470	470

Significance levels: * 10%, ** 5%, *** 1%, **** 0.1%.

Our theoretical model captured the issue of eviction of tenants with the eviction cost, which is like a transaction cost that may lock these female landlords into a continued contract relationship. This may also be seen as involuntary contract participation and is related to the weak property rights and weak farmer status of female-headed households. However, we think our second model capturing transaction costs related to eviction and screening and search for tenants provides an adequate theoretical framework for the problem we analyse and that it is consistent with a contested exchange model (Bowles and Gintis 1988; Bowles and Gintis 1993). The eviction costs are real and a consequence of the power structure similar to transaction costs and asymmetric information causing involuntary non-participation in other markets. While male landlords may be on what Bowles and Gintis (1998, 1993) call the short side of a non-clearing market and therefore in a powerful position that allows them to use eviction threats, it is likely that female landlords whose land is rented in by blod-related kin or in-law tenants have much less bargaining power. They may therefore not be called short-siders and are therefore also less able to capture the resource rents.

6. Conclusion

We have tested alternative models and theories to explain the productivity differential on rented out plots of female vs. male landlord households in the Ethiopian highlands. A simple transaction cost model could not explain the differential. The hypothesis of endogenous contract choice and higher Marshallian inefficiency in the case of female landlords also could not explain the whole productivity differential although the variable was highly significant. We found significantly higher level of inefficiency linked to contracts of female landlords with in-law tenants. This may be due to the high eviction costs of tenure insecure female landlords who therefore are less able to freely screen and select the better tenants. Female landlords face higher tenure insecurity and have lower bargaining power. This leads to poorer screening and selection ability, poorer quality tenants and lower resource rents.

An important policy implication of our analysis is that strengthening women's land rights may not only be good for equity but also for efficiency of land use. The new land proclamations in Ethiopia push in this direction but it may take quite some time and additional effort in terms of information dissemination and sensitisation to reduce the gender biases that are deeply rooted in the culture. Local administrations including local courts as well as NGOs have to play important roles in this process. Donor support may be important to provide sufficient resources for this.

A large share of the landlord households, and even a larger share of the female landlords in the sample violated the new regulation that only up to half of the land owned can be rented out. If this regulation is implemented strongly, it will contribute to more tenure insecurity for the poorest landlords that often are female-headed households. This regulation appears neither to contribute to enhance efficiency nor equity as it hits the poorest of the poor. It reduces the possibility of using land as a safety net.

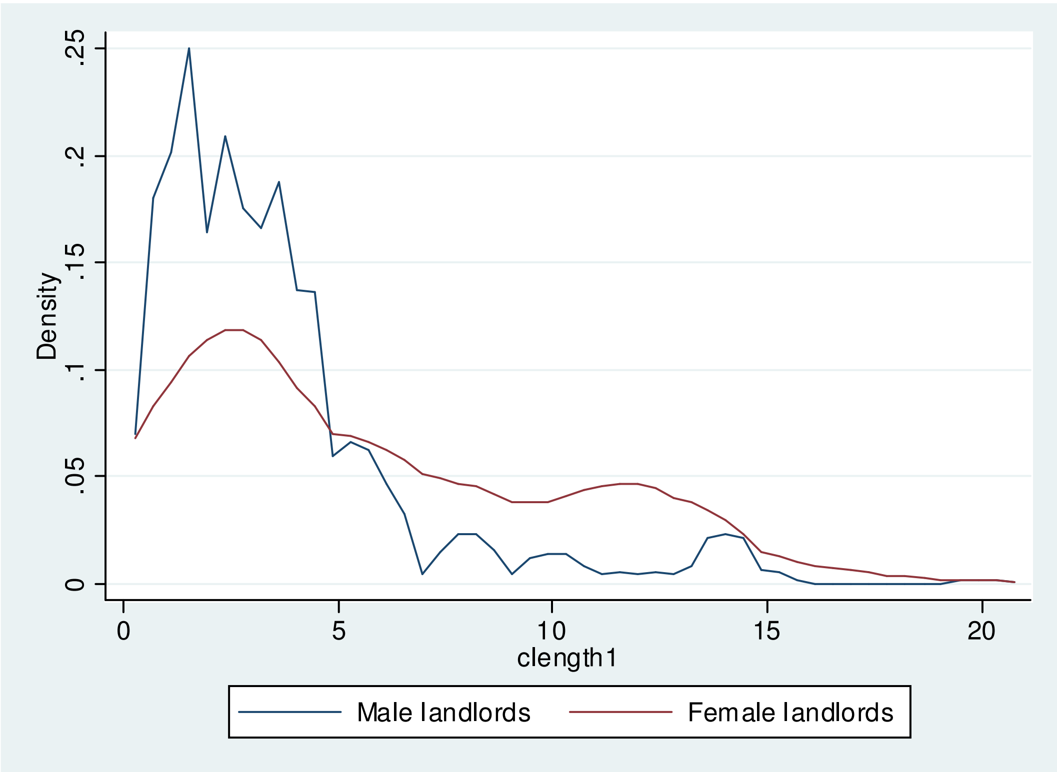

Figure 1. Duration of partnership for male and female landlord households

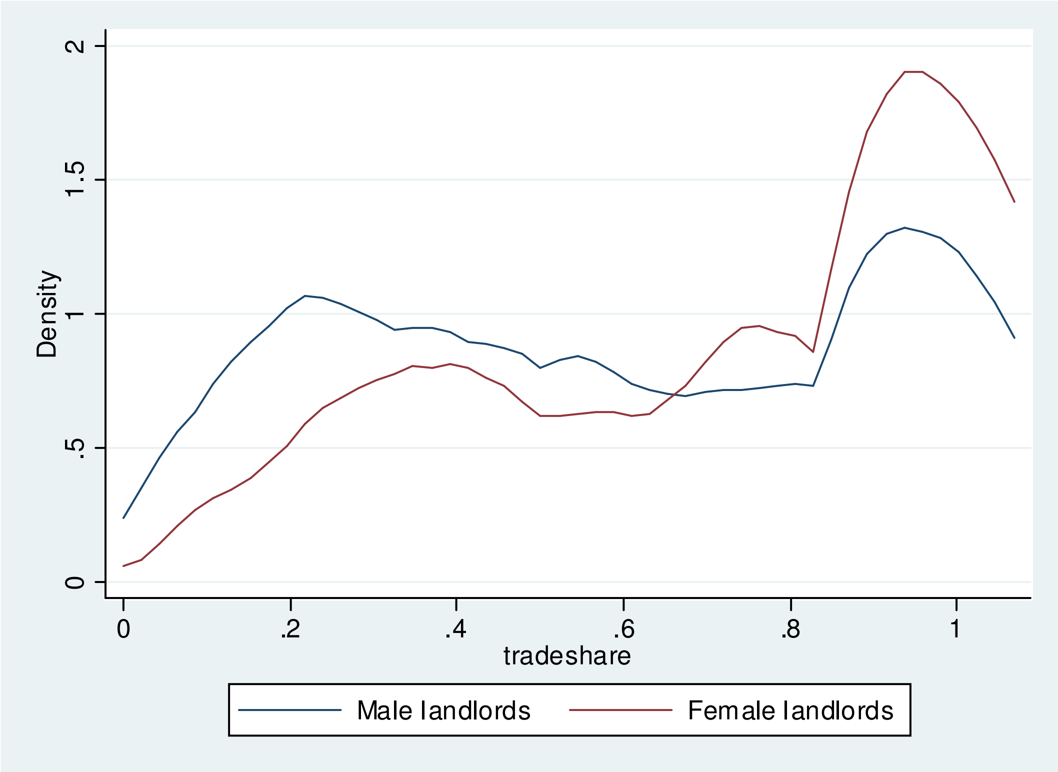

Figure 2. Share of land rented out by male and female landlord households.

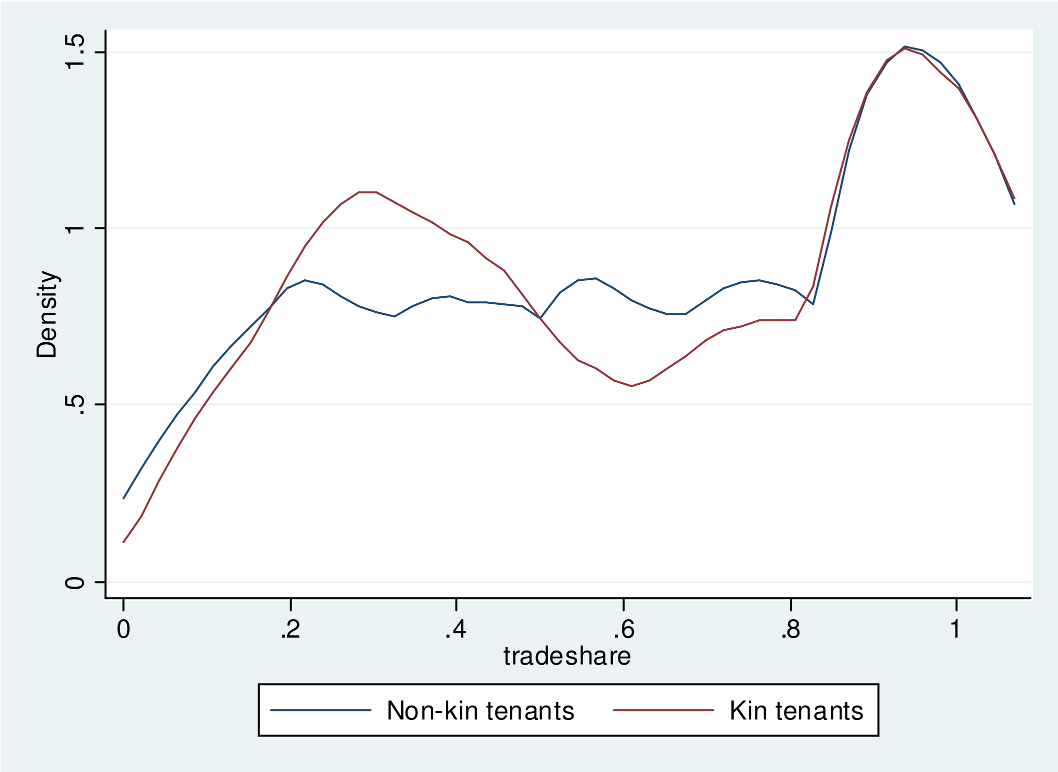

Figure 3. Share of land rented out to non-kin and to kin tenants

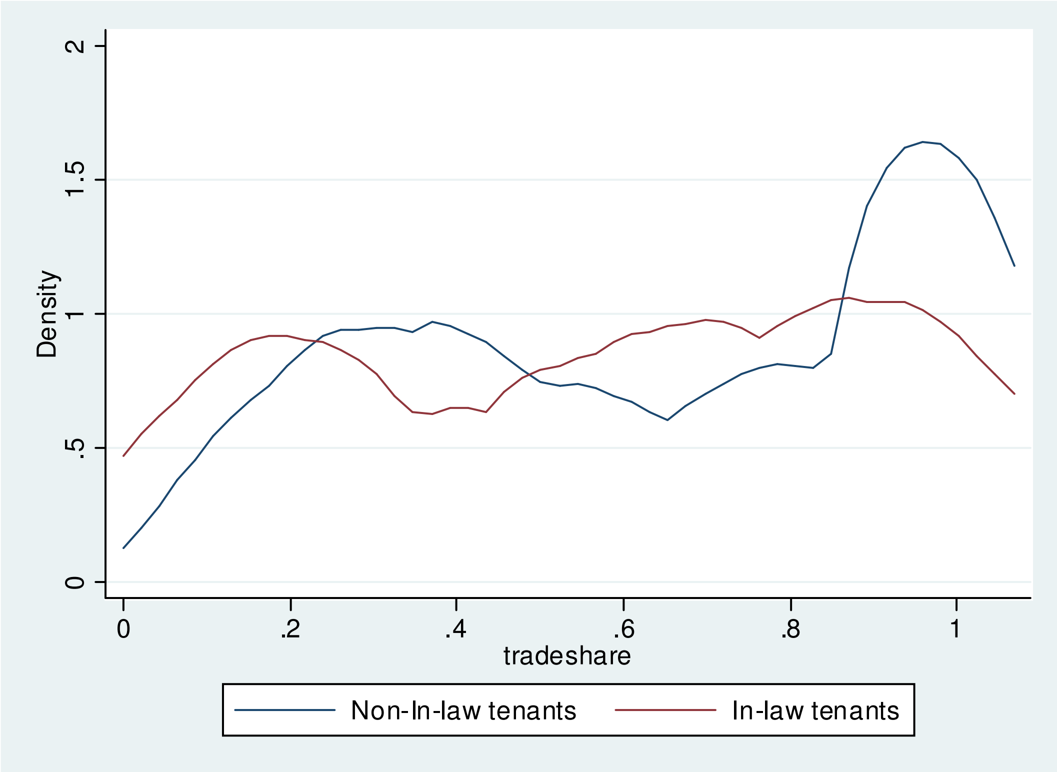

Figure 4. Share of land rented out to non-in-law and to in-law tenants

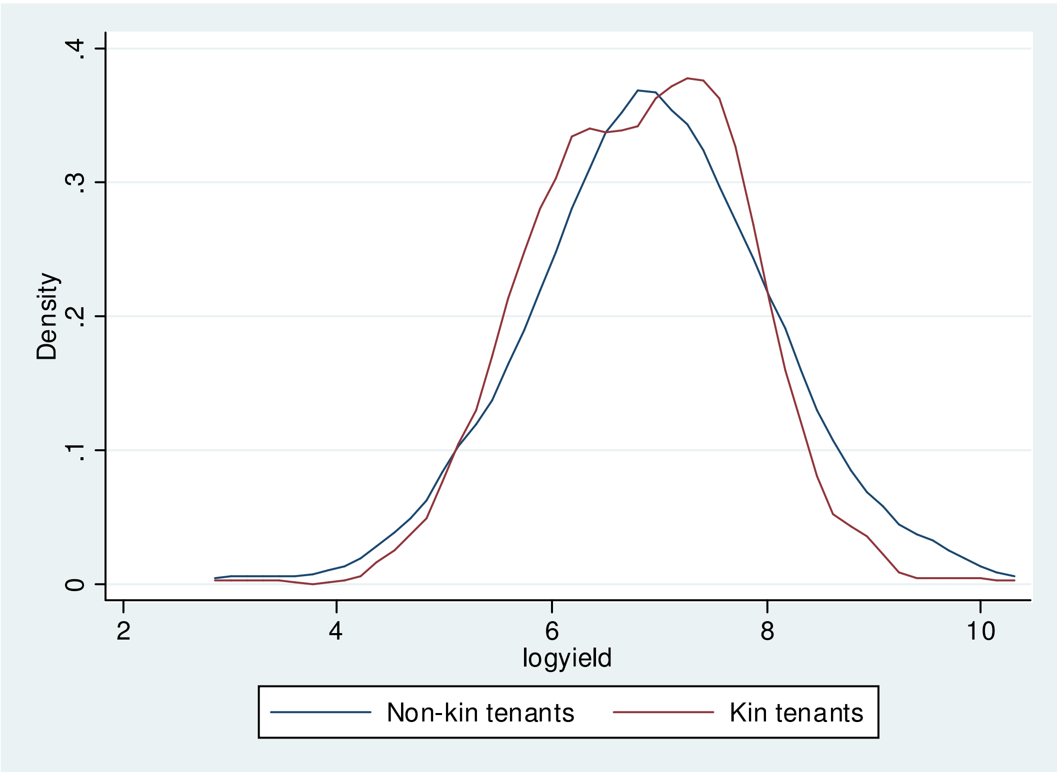

Figure 5. Land productivity distribution (log of output value) of land rented out to non-kin and to kin tenants.

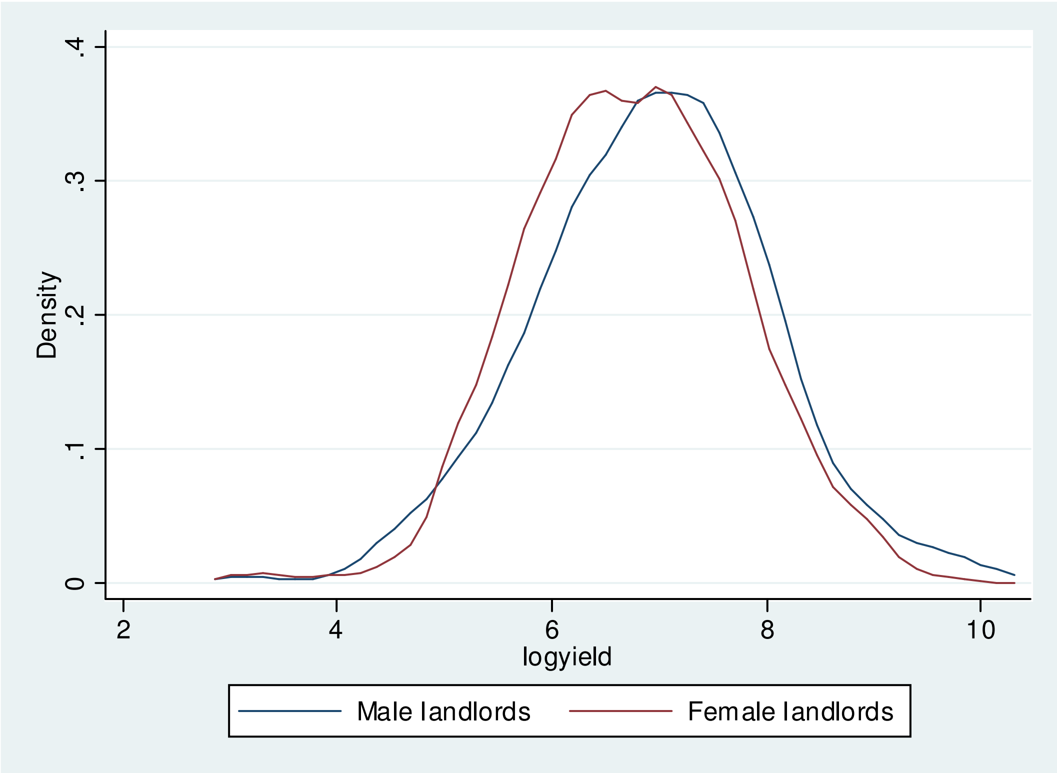

Figure 6. Land productivity distribution (log output value) of land of male and female landlord households.

Appendix.

Table A1. Generalised Least Squares Selection Models for Rented Out Land including Tenant Characteristics: With household random effects and bootstrapped standard errors

Analysis for plots with cereal crops only

	Landlord-Tenant Model 1 b/se	Landlord-Tenant Model 2 b/se	Landlord-Tenant Model 3 b/se	Landlord-Tenant Model 4 b/se
tradep	-0.740	-0.838	-0.695	-0.652
	(1.97)	(1.89)	(1.93)	(1.99)
tradep2	1.012	1.140	0.958	0.835
	(1.40)	(1.37)	(1.44)	(1.50)
hsex	-0.296*	-0.268*	-0.119	-0.019
	(0.16)	(0.15)	(0.18)	(0.27)
bpuresharp	-1.161**	-1.321***	-1.272***	-1.341***
	(0.50)	(0.46)	(0.48)	(0.52)
tage	0.052	0.072	0.026	-0.040
	(0.10)	(0.10)	(0.11)	(0.12)
toxcd	-0.025	-0.012	0.011	0.003
	(0.07)	(0.07)	(0.09)	(0.10)
soiltype1	0.245	0.198	0.188	0.011
	(0.21)	(0.21)	(0.20)	(0.22)
soiltype2	0.139	0.125	0.073	-0.095
	(0.19)	(0.20)	(0.18)	(0.21)
slope1	-0.166	-0.166	-0.161	0.048
	(0.27)	(0.25)	(0.26)	(0.37)
slope2	-0.098	-0.128	-0.086	0.141
	(0.27)	(0.25)	(0.25)	(0.36)
red	-0.221	-0.233	-0.172	-0.019
	(0.25)	(0.26)	(0.23)	(0.26)
black	-0.132	-0.168	-0.096	0.123
	(0.24)	(0.25)	(0.23)	(0.25)
plotarea	-4.099***	-4.198****	-4.316****	-5.466****
	(1.27)	(1.20)	(1.09)	(1.36)
plotarea2	1.737	1.821	1.953	3.471**
	(1.39)	(1.30)	(1.23)	(1.64)
amanuel	-0.075	-0.166	-0.060	0.009
	(0.54)	(0.58)	(0.58)	(0.58)
kebi	-0.029	-0.000	0.032	0.067
	(0.19)	(0.20)	(0.19)	(0.20)
wolekie	0.051	0.018	0.153	0.314
	(0.26)	(0.28)	(0.28)	(0.33)
telima	-0.136	-0.179	-0.084	-0.021
	(0.29)	(0.33)	(0.31)	(0.38)
sekeladebir	-0.439*	-0.431	-0.319	-0.184
	(0.25)	(0.27)	(0.26)	(0.25)
kete	-1.278****	-1.244****	-1.189****	-1.001***
	(0.24)	(0.24)	(0.26)	(0.31)
ambamariam	-1.367****	-1.348****	-1.193****	-1.163**
	(0.35)	(0.37)	(0.35)	(0.53)
yamed	-0.564	-0.513	-0.280	-0.161
	(0.37)	(0.42)	(0.40)	(0.41)
addismender	-0.450	-0.360	-0.133	-0.221
	(0.33)	(0.39)	(0.41)	(0.53)
btenant		0.191		
		(0.14)		
stenant		-0.297		
		(0.28)		
fbtenant			-0.029	-0.103
			(0.21)	(0.24)
fstenant			-0.835*	-0.947*
			(0.43)	(0.56)
clength1				0.013
				(0.02)
fclength				-0.021
				(0.04)
Constant	8.863****	8.870****	8.837****	8.867****
	(0.81)	(0.83)	(0.84)	(0.92)
Prob > chi2	0.000	0.000	0.000	0.000
Numbe..	367.000	367.000	367.000	314.000

Table A2. Generalised Least Squares Selection Models for Land Productivity Differentials on Rented Out Plots: With household random effects and bootstrapped standard errors: With crop dummy for cereals

	Trade selection Equation b/(se)	Landlord Model 1 b/(se)	Landlord Model 2 b/(se)	Landlord Model 3 b/(se)
hsex	0.526****	-0.280**	-0.278**	-0.003
	(0.12)	(0.13)	(0.13)	(0.27)
madultha	0.106***			
	(0.04)			
fadultha	0.157**			
	(0.07)			
fadultha2	-0.011			
	(0.01)			
totalplot	0.027****			
	(0.01)			
extreme	0.079			
	(0.36)			
severe	0.289			
	(0.18)			
intermediate	-0.001			
	(0.36)			
security	-0.152***			
	(0.05)			
confilct	0.242**			
	(0.11)			
changeland	0.111			
	(0.13)			
hage1	-0.002			
	(0.00)			
heduc1	0.077			
	(0.06)			
soiltype1	-0.363***	0.248	0.273	0.276
	(0.14)	(0.17)	(0.20)	(0.17)
soiltype2	-0.297**	0.138	0.178	0.183
	(0.13)	(0.16)	(0.17)	(0.17)
red	-0.089	-0.098	-0.145	-0.154
	(0.19)	(0.21)	(0.24)	(0.23)
slope1	0.015	-0.018	-0.062	-0.056
	(0.19)	(0.21)	(0.24)	(0.24)
slope2	0.120	0.069	0.092	0.089
	(0.20)	(0.23)	(0.24)	(0.25)
black	0.097	-0.282	-0.273	-0.289
	(0.19)	(0.20)	(0.23)	(0.23)
plotarea	1.174****	-4.407****	-3.796****	-3.757****
	(0.34)	(1.08)	(0.98)	(0.97)
plotdist	0.009****			
	(0.00)			
oxha	-0.084**			
	(0.04)			
livestockha	0.012			
	(0.01)			
amanuel	-1.382****	-0.806	-1.143*	-1.116*
	(0.20)	(0.55)	(0.61)	(0.58)
kebi	-0.697****	-0.151	0.110	0.119
	(0.17)	(0.18)	(0.20)	(0.20)
wolekie	-0.410**	-0.204	-0.393	-0.388
	(0.19)	(0.24)	(0.26)	(0.26)
telima	-0.361*	0.029	-0.092	-0.064
	(0.19)	(0.31)	(0.35)	(0.32)
sekeladebir	0.071	-0.672****	-0.110	-0.128
	(0.20)	(0.20)	(0.29)	(0.29)
kete	-0.679****	-1.127****	-0.922****	-0.917****
	(0.17)	(0.22)	(0.22)	(0.22)
ambamariam	0.301	-1.047****	-0.370	-0.372
	(0.21)	(0.27)	(0.36)	(0.37)
yamed	-0.155	-0.485*	0.420	0.433
	(0.19)	(0.29)	(0.38)	(0.40)
addismender	-0.994****	0.050	-0.566	-0.562*
	(0.24)	(0.25)	(0.35)	(0.33)
chorisa	-0.462	-0.204		

	(0.30)	(0.39)		
tradep		-2.970	-3.460*	-3.639*
		(1.93)	(2.07)	(2.06)
tradep2		2.772*	3.339**	3.467**
		(1.51)	(1.60)	(1.57)
cropdum		0.205**	0.204**	0.202**
		(0.09)	(0.10)	(0.10)
plotarea2		1.932	1.418	1.373
		(1.21)	(1.15)	(1.10)
bpuresharp			-2.175***	-1.813**
			(0.84)	(0.92)
puresharfp				-0.700
				(0.60)
Constant	0.071	8.799****	9.413****	9.331****
	(0.52)	(0.65)	(0.83)	(0.80)
Prob > chi2	0.000	0.000	0.000	0.000
Numbe..	1124.000	605.000	591.000	591.000

Table A3. Generalised Least Squares Selection Models for Rented Out Land including Tenant Characteristics: With household random effects and bootstrapped standard errors Analysis for plots with cereal crops only

	Landlord-Tenant Model 1 b/se	Landlord-Tenant Model 2 b/se	Landlord-Tenant Model 3 b/se	Landlord-Tenant Model 4 b/se
tradep	-3.542	-3.605	-3.599*	-3.928*
	(2.21)	(2.27)	(2.11)	(2.30)
tradep2	3.400**	3.442**	3.411**	3.616*
	(1.66)	(1.73)	(1.61)	(1.85)
hsex	-0.258*	-0.227	-0.093	-0.002
	(0.14)	(0.14)	(0.16)	(0.23)
bpuresharp	-2.178***	-2.346***	-2.350***	-2.499***
	(0.80)	(0.86)	(0.82)	(0.81)
cropdum	0.203**	0.211**	0.212**	0.208*
	(0.09)	(0.10)	(0.10)	(0.11)
tage	0.010	0.017	-0.009	-0.105
	(0.11)	(0.11)	(0.12)	(0.11)
toxcd	0.011	0.018	0.037	0.051
	(0.06)	(0.07)	(0.08)	(0.08)
soiltype1	0.290	0.256	0.242	0.119
	(0.19)	(0.19)	(0.20)	(0.19)
soiltype2	0.190	0.173	0.138	-0.027
	(0.20)	(0.18)	(0.19)	(0.19)
slope1	-0.077	-0.080	-0.062	0.035
	(0.26)	(0.26)	(0.25)	(0.30)
slope2	0.093	0.073	0.108	0.319
	(0.26)	(0.27)	(0.25)	(0.32)
red	-0.164	-0.171	-0.128	-0.066
	(0.24)	(0.24)	(0.23)	(0.27)
black	-0.292	-0.312	-0.264	-0.170
	(0.22)	(0.21)	(0.22)	(0.27)
plotarea	-3.856****	-3.923****	-3.975****	-4.911****
	(0.90)	(1.07)	(0.98)	(1.17)
plotarea2	1.472	1.538	1.601	2.901**
	(1.02)	(1.22)	(1.14)	(1.42)
amanuel	-1.225	-1.294	-1.234	-1.201
	(0.83)	(0.80)	(0.86)	(0.78)
kebi	0.118	0.167	0.183	0.197
	(0.20)	(0.22)	(0.21)	(0.21)
wolekie	-0.394	-0.398	-0.329	-0.355
	(0.30)	(0.32)	(0.29)	(0.36)
telima	-0.082	-0.095	-0.020	0.029
	(0.32)	(0.34)	(0.30)	(0.34)
sekeladebir	-0.109	-0.065	0.021	0.086
	(0.29)	(0.29)	(0.29)	(0.27)
kete	-0.935****	-0.919****	-0.859****	-0.634**
	(0.27)	(0.25)	(0.25)	(0.29)
ambamariam	-0.380	-0.320	-0.201	-0.171
	(0.38)	(0.41)	(0.41)	(0.48)
yamed	0.413	0.485	0.645	0.910**
	(0.41)	(0.40)	(0.40)	(0.43)
addismender	-0.578	-0.515	-0.342	-0.413
	(0.37)	(0.36)	(0.39)	(0.45)
btenant		0.090		

		(0.14)		
stenant		-0.308		
		(0.23)		
fbtenant			-0.056	-0.020
			(0.19)	(0.23)
fstenant			-0.746**	-0.944**
			(0.36)	(0.40)
clength1				0.005
				(0.03)
fclength				-0.026
				(0.03)
Constant	9.412****	9.480****	9.422****	9.775****
	(0.85)	(0.90)	(0.84)	(0.81)
Prob > chi2	0.000	0.000	0.000	0.000
Numbe..	577.000	577.000	577.000	485.000

Table A4. Generalised Least Squares Selection Models for Rented Out Land including Tenant Characteristics: with household random effects and bootstrapped standard errors, With crop dummy for cereals

	Pure landlord Model 1 b/se	Pure landlord Model 2 b/se	Pure landlord Model 3 b/se
tradep	-4.024*	-2.209	-2.141
	(2.32)	(2.32)	(2.51)
tradep2	3.682**	2.423	2.145
	(1.84)	(1.87)	(1.93)
hsex	0.015	-0.222	-0.101
	(0.23)	(0.34)	(0.30)
bpuresharp	-2.424***	-2.418***	-2.662***
	(0.76)	(0.83)	(0.82)
llordpure	-0.059		
	(0.17)		
cropdum	0.209**	0.171	0.166
	(0.10)	(0.11)	(0.11)
tage	-0.104	-0.061	-0.061
	(0.11)	(0.12)	(0.10)
toxcd	0.051	0.031	0.033
	(0.08)	(0.08)	(0.09)
fbtenant	-0.024	-0.004	0.002
	(0.24)	(0.20)	(0.22)
fstenant	-0.945**	-0.878**	-0.892**
	(0.45)	(0.42)	(0.41)
clength1	0.005	-0.004	-0.001
	(0.02)	(0.02)	(0.03)
fclength	-0.026	-0.019	-0.023
	(0.03)	(0.03)	(0.03)
soiltype1	0.116	0.159	0.136
	(0.23)	(0.21)	(0.20)
soiltype2	-0.035	-0.017	-0.021
	(0.21)	(0.21)	(0.21)
slope1	0.033	-0.003	0.001
	(0.29)	(0.32)	(0.31)
slope2	0.314	0.276	0.284
	(0.30)	(0.33)	(0.31)
red	-0.062	-0.123	-0.146
	(0.28)	(0.26)	(0.27)
black	-0.162	-0.175	-0.182
	(0.27)	(0.27)	(0.26)
plotarea	-4.908****	-4.927****	-4.896****
	(1.14)	(1.17)	(1.13)
plotarea2	2.894**	2.876**	2.951**
	(1.38)	(1.37)	(1.42)
amanuel	-1.231		
	(0.77)		
kebi	0.165	0.081	0.231
	(0.23)	(0.28)	(0.23)
wolekie	-0.351	-0.432	-0.447
	(0.35)	(0.34)	(0.34)
telima	0.013	-0.107	-0.027
	(0.40)	(0.38)	(0.36)
sekeladebir	0.058	-0.022	0.060
	(0.30)	(0.32)	(0.31)
kete	-0.660**	-0.770***	-0.685**

	(0.30)	(0.29)	(0.31)
ambamariam	-0.195	-0.271	-0.167
	(0.48)	(0.54)	(0.47)
yamed	0.866**	0.722	0.875**
	(0.43)	(0.45)	(0.43)
addismender	-0.427	-0.562	-0.517
	(0.47)	(0.51)	(0.49)
purellp3		-0.695	
		(0.60)	
purellpf		0.653	0.203
		(0.67)	(0.49)
Constant	9.810****	9.480****	9.421****
	(0.85)	(0.91)	(0.96)
Prob > chi2	0.000	0.000	0.000
Numbe..	485.000	470.000	470.000

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