Tenure Insecurity, Gender, Low-cost Land Certification, and Land Rental Market Participation

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Background

- This ongoing research is based on ten years of collaboration between Norwegian University of Life Sciences and Mekelle University in Tigray, Ethiopia.
- Collaboration with the World Bank on this research started in 2005.
- Panel Data Collection: Funding from Research Council of Norway, Norwegian Ministry of Foreign Affairs, NORAD, and the Norwegian Trust Fund (project with Klaus Deininger).
- Here I present one out of three joint papers on impacts of land certification in Tigray.
Introduction

• New land reforms high on the development agenda:
  – Commission on Legal Empowerment of the Poor
  – The World Bank
  – UNHABITAT (Global Land Tools Network)

• Emphasis on formalisation of land rights
• Pro-poor reforms
• Enhancing tenure security
• Enhancing allocative efficiency and investment
• Enhancing women’s land rights
• Reducing land-related disputes
Roles of land rental markets

- Reallocate land to more efficient producers when markets for non-land resources are missing or imperfect
- Provide access to land for land-poor and landless households at low financial cost
- Provide rental income or farm output for households who lack resources to farm their land efficiently themselves
- How efficient are land rental markets as compared to other factor markets as instrument to readjust factor ratios?
Transaction costs and allocative efficiency of land rental markets

• Bliss and Stern (1982) model

Rented land as a function of desired cultivate area and own land holding: Simple OLS

\[ L_j = f \left( h(\overline{N}) - \overline{L} \right) = a_0 + f' h_N \overline{N} - f' \overline{L} = a_0 + a_1 \overline{N} + a_2 \overline{L} \]

Expanded by Skoufias (1995)

tobit model approach
Weaknesses of earlier studies

- Used only cross-section data
- Could not test the dynamic response
  - Could not control for unobserved heterogeneity of households and farms
- Did not test for the functional form of transaction costs
- Did not test for selection bias and the appropriateness of the censored tobit model
Policy-related questions

• Can land rental markets compensate for imperfections in non-land factor markets?
• Can land rental markets contribute to poverty-reduction?
• Can land rental markets be a more efficient way of reallocating land resources than land redistributions?
• Can land certification enhance tenure security and indirectly enhance the efficiency of land rental markets?
• How can policies contribute to obtain the full potential of land rental markets?
Novelty of this paper

• Assesses the impacts of the low-cost certification on allocative efficiency of the land rental market
• Uses a unique household panel data set covering the situation immediately before and up to 8 years after the land reform
• Assesses dynamic adjustment and tests for state dependency using a new approach to dynamic non-linear panel data modeling due to Wooldridge (2005)
• Controls for endogeneity of certification by generating a random certificate variable that is used for impact assessment (new approach based on Holden et al. in press)
• The combination of methods controls for unobserved time-invariant heterogeneity of households, including time-invariant land quality
Land tenure in Ethiopia

• All land is owned by the state (since 1975)
  – Land used as a safety net; all residents in a community had the right to get land for free, this was ensured through local land redistributions
  – Egalitarian land distribution based on household size
    • Each household got a share of each land quality class in the village
  – Land renting and hiring of labour was illegal
  – Redistributions created tenure insecurity
• Change in government in 1991
  – More market-friendly policy
  – Land is still owned by the state
• Land rights regulated by Federal and Regional Land Proclamations and Regional Land Regulations
Active land rental markets in Ethiopia

• Dominated by sharecropping contracts
• Landlords usually poorer than tenants
• Female-headed households often rent out their land
  – Cultural taboos against women ploughing with oxen
  – No rental market for oxen ploughing
• Certificates may strengthen female-headed households’ tenure security and their bargaining power in the rental market
Land certificates in Tigray

- Simple one-page certificates
  - Name of head of hh (husband not wife usually)
  - Name of location, plotsize, land quality of plots, and names of neighbours
Theoretical models

• Landlord models
  – Capture gender-specific tenure insecurity, endowment effects, and land certification impacts
  – with transaction costs affected by earlier market participation (trust and reputation), and unobservable and observable landlord characteristics

• Tenant models
  – Access may be constrained and depend on earlier market participation (trust, reputation), land reform, observable and unobservable tenant characteristics

• Policy effects tend to be dynamic and may depend on past and initial conditions
Landlord model

- Bellman equation

\[ V(A_t) = \max_{R,L} \left\{ \begin{array}{l} p q (A - R, L, N(g)) + p (1 - \alpha) q (R) \\ -c(R, R_{t-1}) - wL \end{array} \right\} + \beta V \{ A - \xi (C, g) R \} \]

- Gender and LRM participation:

\[ R_g = \frac{1}{H} \left\{ U_Y p q_{AN} N_g - U_{YY} p q_{N} N_g (p (1 - \alpha) - p q_A - c_R - \beta (V_{A_{t+1}, A_{t+1}} R - V_{A_{t+1}}) \xi_g U_Y p q_{LL} \right\} \]

\[ \left\{ -(U_Y)^2 p^2 q_{LN} q_{AL} N_g \right\} \]

- >0 if endowment effect dominates
- <0 if tenure insecurity effect dominates
Landlord model, cont.

- Effect of certification

\[ R_C = |H^{-1} \{ \beta (V_{At+1} - V_{At+1,At+1} R) \xi_C U_Y pq_{LL} \} \]

  - Unambiguously positive if certification enhances tenure security
  - Will *ceteris paribus* be stronger for female-headed households if the tenure security effect is stronger for them
Some key hypotheses

• H1. Female-headed households are more likely to rent out land and rent out more land than male-headed households (due to their poverty in non-tradable non-land resources) vs.

• H2. Female-headed households rent out less land than male-headed households because they are more tenure insecure.

• H3. Landlords that received certificates rent out more land after the reform (due to increased tenure security).

• H4. Female landlords that received land certificates rent out more land as a response to getting land certificates compared to male landlords that received land certificates (because they initially were more tenure insecure and land certificates increased their tenure security relatively more).
Data

- Household panel data survey
  - Stratified random sample of 400 households in 16 communities
  - Stratification based on population density, market access and agroclimatic variation
    - Household and farm plot level data
    - Use households for which we have complete data (balanced panel): 303 households included in final analysis
Methods

- Test and control for attrition bias
  - Deaton’s (1997) approach

- Identification strategy for certification variable
  - Use a linear probability model with household fixed effects to clean out endogeneity bias due to observable and unobservable household and farm characteristics
  - Use the residual of this model as measure of random certification
    - A high (close to 1) value indicates a household with certificate and low probability of having one
    - A low (close to -1) value indicates a household without certificate and a high probability of having one
Methods

- Dynamic panel data models with binary (Probit) and censored (Tobit) response variables and include controls for unobserved heterogeneity
  - Random effects Probit form for the binary land rental market participation models
    - incorporated lagged dependent variables along with exogenous variables
    - unobserved heterogeneity is assumed to be additive inside the standard normal distribution function
    - unobserved effect is modelled on the initial condition and exogenous variables to get a likelihood function that does not depend on the unobserved individual effects (Wooldridge 2005)

\[
P\left( y_{it} = 1 \mid y_{i,t-1}, \ldots, y_{i0}, z_i, c_i \right) = \Phi\left( z_{it} \gamma + \rho y_{i,t-1} + c_i \right)
\]
Methods, cont.

- The dynamic corner solution model with unobserved heterogenous effects for land rented in or rented out is modelled as a random effects tobit model:

\[ y_{it} = \max \left[ 0, z_{it}, \gamma + g(y_{i,t-1})\rho + c_i + u_{it} \right] \]

\[ u_{it} \mid y_{i,t-1}, ..., y_{i0}, z_i, c_i \sim \text{Normal}(0, \sigma_u^2) \]
Methods, cont.

• Unobserved heterogeneity is modeled on the initial conditions and the exogenous variables:

\[ c_i = \alpha_0 + \alpha_1 y_{i0} + z_i \alpha_2 + \alpha_i \]

• The analysis requires balanced panel data
### Panel probit models:

**Determinants of participation in the land rental market**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Landlord 1</th>
<th>Landlord 2</th>
<th>Tenant model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landlord dummy, lagged one period</td>
<td>1.422****</td>
<td>1.421****</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.15)</td>
<td></td>
</tr>
<tr>
<td>Landlord dummy, initial year</td>
<td>0.588**</td>
<td>0.605***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(0.22)</td>
<td></td>
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<tr>
<td>Tenant dummy, lagged one period</td>
<td>1.089****</td>
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<tr>
<td></td>
<td>(0.16)</td>
<td></td>
<td></td>
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<tr>
<td>Tenant dummy, initial year</td>
<td>0.574*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.29)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random certificate, residual</td>
<td>0.047</td>
<td>0.066</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.40)</td>
<td>(0.37)</td>
<td></td>
</tr>
<tr>
<td>Years since certification</td>
<td>0.016</td>
<td>-0.002</td>
<td>0.048**</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.03)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Sex of household head</td>
<td>0.560****</td>
<td>0.566****</td>
<td>-1.045****</td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.15)</td>
<td>(0.25)</td>
</tr>
<tr>
<td>Sex of household head*Random certificate, residual</td>
<td>1.822*</td>
<td>1.687*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.95)</td>
<td>(0.93)</td>
<td></td>
</tr>
<tr>
<td>Own farm size</td>
<td>0.031**</td>
<td>0.031**</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
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</tbody>
</table>
Area rented out models with gender and certificate interaction variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Area rented out 1</th>
<th>Area rented out 2</th>
<th>Area rented out 3</th>
<th>Area rented out 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged land area rented out</td>
<td>0.231**</td>
<td>0.237**</td>
<td>0.232**</td>
<td>0.237**</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.11)</td>
<td>(0.10)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Land area rented out, initial year</td>
<td>0.542****</td>
<td>0.548****</td>
<td>0.551****</td>
<td>0.556****</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.16)</td>
<td>(0.15)</td>
<td>(0.15)</td>
</tr>
<tr>
<td>Landlord dummy, lagged one period</td>
<td>3.008****</td>
<td>3.046****</td>
<td>3.028****</td>
<td>3.060****</td>
</tr>
<tr>
<td></td>
<td>(0.34)</td>
<td>(0.36)</td>
<td>(0.36)</td>
<td>(0.33)</td>
</tr>
<tr>
<td>Landlord dummy, initial year</td>
<td>-0.008</td>
<td>-0.035</td>
<td>0.043</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(0.42)</td>
<td>(0.42)</td>
<td>(0.40)</td>
<td>(0.41)</td>
</tr>
<tr>
<td>Random certificate, residual from prediction</td>
<td>0.839</td>
<td>-0.213</td>
<td>0.913</td>
<td>-0.065</td>
</tr>
<tr>
<td></td>
<td>(0.70)</td>
<td>(0.73)</td>
<td>(0.68)</td>
<td>(0.75)</td>
</tr>
<tr>
<td>Years since certification</td>
<td>0.069**</td>
<td>0.071**</td>
<td>-0.021</td>
<td>-0.011</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.05)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Sex of household head</td>
<td>1.471****</td>
<td>1.411****</td>
<td>1.475****</td>
<td>1.414****</td>
</tr>
<tr>
<td></td>
<td>(0.26)</td>
<td>(0.26)</td>
<td>(0.24)</td>
<td>(0.24)</td>
</tr>
<tr>
<td>Sex of household head*Random certificate, residual</td>
<td>4.264**</td>
<td></td>
<td>3.874**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.71)</td>
<td></td>
<td>(1.61)</td>
<td></td>
</tr>
<tr>
<td>Predicted certificate, control for unobserved household heterogeneity</td>
<td></td>
<td>1.118****</td>
<td>1.025***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.34)</td>
<td>(0.36)</td>
<td></td>
</tr>
<tr>
<td>Own farm size</td>
<td>0.163***</td>
<td>0.160***</td>
<td>0.166****</td>
<td>0.163***</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.05)</td>
<td>(0.05)</td>
<td>(0.05)</td>
</tr>
</tbody>
</table>
### Land area rented in models

<table>
<thead>
<tr>
<th>Variables</th>
<th>Area rented in 1</th>
<th>Area rented in 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged land area rented in</td>
<td>0.302***</td>
<td>0.072</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>Initial year land area rented in</td>
<td>1.104****</td>
<td>0.118</td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.36)</td>
</tr>
<tr>
<td>Tenant dummy, lagged one period</td>
<td></td>
<td>2.346****</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.41)</td>
</tr>
<tr>
<td>Tenant dummy, initial year</td>
<td></td>
<td>1.590*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.85)</td>
</tr>
<tr>
<td>Years since certification</td>
<td>0.203****</td>
<td>0.138****</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Sex of household head</td>
<td>-3.555****</td>
<td>-3.319****</td>
</tr>
<tr>
<td></td>
<td>(0.66)</td>
<td>(0.63)</td>
</tr>
<tr>
<td>Own farm size</td>
<td>0.066</td>
<td>0.085*</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.05)</td>
</tr>
</tbody>
</table>
Conclusions

• Significant and positive effect of land certification on the amount of activity in the land rental market
  – (Potential) female landlords more willing to rent out their land
  – Easier for (potential) tenants to access land to rent in
• Significant state dependency in the land rental market
  – This may indicate non-convex transaction costs in the land rental market (entry barrier)
  – These transaction costs remain high after the reform and policies should aim to further reduce these
Conclusion: Wider perspective

- Why the Ethiopian reform with more restricted rights has been successful while land titling programs in Kenya and Madagascar did not have similar effects:
  - Collateral effect unimportant in all cases
  - Initial tenure insecurity higher in Ethiopia – created a demand for certificates
  - Low cost and rapid implementation through a participatory and transparent process
  - Local administrative capacity and motivation
  - No local elite was threatened by the reform