

Links Between Food Security and Tenure Security: Panel Data Evidence from Ethiopia

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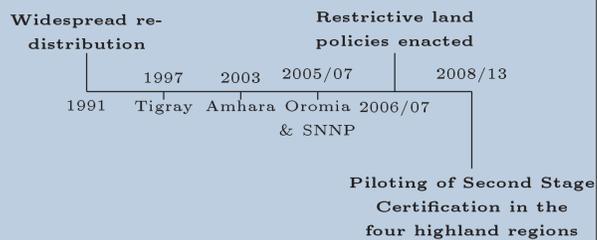
Introduction

Context: Land Rights/responsibilities in Ethiopia:

- Right to use, bequeath, inherit, rent out, invest
- Prohibits land sales/mortgage
- Responsibility for land conservation
- Restricts migration and duration of rental contracts
- Restricts proportion of land rented to only half
- Obligation to use the land

Major timelines: Land Certification Program

Certification took place in the Tigray region, and nearly ten years later, Amhara, Oromia, and SNNP. The timeline of these policies can be illustrated as follows:



Hypotheses:

- (1) Land certification has enhanced food security in the form of calorie availability for households
(1A): Land certification has in particular enhanced calorie availability through strengthened use rights and investments (*direct*)
(1B): Land certification has enhanced calorie availability through better land access via enhanced participation in land rental markets (*indirect*)
(1C): Land certification has in particular enhanced the calorie availability of female-headed households.
 (2) Land certification has enhanced the nutritional status of family members

Materials and Methods

Data: used comes from a five-wave panel data of 400 households in the Tigray region - Ethiopia interviewed in 1998, 2001, 2003, 2006, and 2010. This study is based on a balanced panel of 300 households. Respondent attrition was tested and minimal.

Food security indicators: Calorie availability per adult equivalent per day as a household-level variable. BMI for household members (only for children in 2006 and 2010)

Tenure security indicators: (i) Household perception (fear) of losing their land due to government expropriation; and (ii) Households perceptions on the impacts of land certification in reducing land-related disputes, enhancing women tenure status, and/or increasing chances of getting compensation in case of expropriation.

Estimation Strategy:

- Timing of receiving land certificates/Duration of ownership of land certificates was used as the variable to identify impacts of certification, and it is interacted with Gender to identify its gender specific impact
- Household fixed effects are used to control for other potential unobservable household and farm characteristics
- Dynamic impacts are assessed by varying the number of survey rounds
- Operational/Own farm size ratio used to identify the impact of participation in land rental market

Econometric Model:

The general specification of the estimated models is as follows for the calorie availability and the BMI models:

$$1) CA_{ht} = \beta_0 + \beta_1 A_{ht} + \beta_2 CY_{ht} + \beta_3 S_{ht} + \beta_4 CY_{ht} * S_{ht} + \beta_5 OP_{ht} / A_{ht} + \beta_6 D_t + \beta_7 \theta_h + e_{ht}$$

$$2) BMI_{iht} = \beta_0 + \beta_1 A_{ht} + \beta_2 CY_{ht} + \beta_3 S_{ht} + \beta_4 CY_{ht} * S_{ht} + \beta_5 OP_{ht} / A_{ht} + \beta_6 D_t + \beta_7 X_{iht} + \beta_8 \theta_h + u_{iht}$$

CA_{ht} is calorie availability for household h in year t

A_{ht} is farm size

CY_{ht} is duration of ownership of land certificate

S_{ht} is sex of household head

OP_{ht} / A_{ht} is operational holding over own holding size

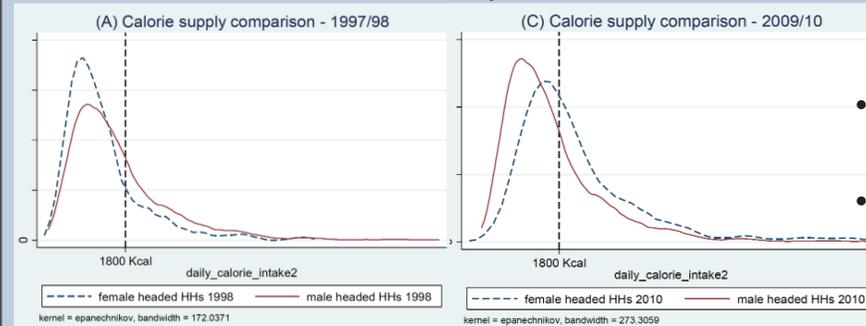
D_t are time period dummies

θ_h unobservable household and farm characteristics (time invariant)

BMI_{iht} is body mass index for child i in household h in time period t

Descriptive Results

Gender-differentiated welfare dynamics



Welfare dynamics

- The welfare improvement is stronger for female-headed households than for male-headed households.
- Contrary to the baseline year status (upper diagram), the kernel density diagrams show that female-headed households, on average, have lower food deficits (calorie gap) than male-headed households in the later years (as shown in lower diagram)

Perceived tenure insecurity at baseline (1998)

1998 Response	Response	Zone (% of respondents)				All
Baseline survey		Central	East	South	West	%
Fear of loss of land	Yes	56	45	42	61	51
Does the fear affect land management?	Yes	3	8	20	13	11
Land conflicts solved in a good way?	No	0	1	10	25	9

Tenure Insecurity

- 51 percent of the surveyed households feared future land redistributions and 11 percent indicated that this fear affected their land management.
- Land management effects of tenure insecurity is higher in relatively land abundant areas (South and Western zones) than areas with relative land scarcity (Central and Eastern zones).
- In the western and southern zones, 25 percent and 10 percent, respectively, of the households were critical of the way land conflicts were resolved.

Regression Results

Dependent var: Calorie availability per consumer unit

Variables	1997-2010	2000-10	2003-10	2006-10
Years with certificate	0.031*** (0.01)	0.035*** (0.01)	0.071*** (0.02)	0.053* (0.03)
Sex of household head Female=1, male=0	0.097 (0.06)	0.122* (0.07)	0.136 (0.08)	0.251** (0.12)
Farm size per consumer unit	0.082*** (0.01)	0.066*** (0.02)	0.050*** (0.02)	0.016 (0.02)
Sex of household head*Years with certificate	0.014* (0.01)	0.021** (0.01)	0.020* (0.01)	0.011 (0.03)
Operational holding size/Farm size, Tenants	0.076*** (0.03)	0.121*** (0.05)	0.137* (0.07)	0.182** (0.09)
Operational holding size/Farm size, Landlords	-0.027 (0.07)	-0.048 (0.08)	-0.076 (0.09)	-0.048 (0.14)
Year dummies	Yes	Yes	Yes	Yes
Constant	7.006*** (0.12)	6.933*** (0.15)	6.593*** (0.21)	6.756*** (0.33)
Prob > chi2	0.000	0.000	0.000	0.000
Number of observations	1459	1161	863	565
R-squared	0.257	0.25	0.163	0.064

Impacts of land certification on calorie availability

- Overall, the results indicate that one extra year of land certificate ownership increased the food availability. For the entire period of 1998 - 2010, one extra year of land certificate ownership increased food availability by 3.1 percent.
- **Female-headed households** appeared to have an additional 1.5 to 2 percent higher increase in food availability than male-headed households for each extra year of land certificate ownership.
- Farm size per adult equivalent also appears to be a strong determinant of calorie availability showing the reliance on farming for food security
- **Operational farm size/own farm size** is significant for **Tenants** implying that improved access to land through the land rental market also lead to significantly higher calorie availability.

Dependent var: BMI of members under the age of 15

Variables	Model 1	Model 2	Model 3	Model 4
Sex of person, 1=female	0.058	0.085	0.048	0.069
Age of person	0.150***	0.150***	0.145***	0.145***
Age of person, squared	-0.001***	-0.001***	-0.001***	-0.001***
Years with certificate	0.350**	0.277	0.311*	0.255
Operational holding size/Farm size			0.065***	0.057**
Constant	13.976*** (1.13)	13.921*** (1.12)	14.213*** (1.15)	14.138*** (1.14)
Prob > chi2	0.000	0.000	0.000	0.000
Number of observations	1578	1578	1563	1563
R-squared	0.114	0.117	0.114	0.116

Impacts of land certification on BMI

- **Years with certificate** variable is significant and positive showing households with more years with certificate had household members with significantly higher Body-Mass-Index - BMI.
- **Operational farm size/own farm size** variable is significant and with positive parameter showing accessed additional land through the land rental market improves BMI

Conclusion

- Household perception analysis indicate that tenure security has been enhanced by the land tenure reform program in Ethiopia - in the form of the issuance of the low cost land certificates.
- Using the two indicators of food security (calorie availability and BMI of children), results show that land certification appears to have contributed to enhanced food security, and more so for female-headed households.
- Results show that the positive food security effects of the land certification program were both via:
 - Direct Effects:** increased investment and productivity on owner-operated land; and
 - Indirect Effects:** increased land access through participation in the land rental market participation.
- Recent restrictive land law reforms (durations and size restriction on land rental activities) may therefore erode the tenure security and land rental market effects of land certification program