What's hers isn't mine: Gender-differentiated tenure security, agricultural investments and productivity in sub-Saharan Africa

Martin Limbikani Mwale (Stellenbosch University) & Jacob Ricker-Gilbert (Purdue University)

Stellenbosch
UNIVERSITY
IYUNIVESITHI
UNIVERSITEIT

Presentation for the World Bank Land Conference, May 13 – 16, 2024, Washington D.C.

Motivation: land is a key factor of production that affects rural household welfare in SSA

- SSA historically considered a land abundant region
- However recent population growth and climate change has reduced the amount of arable land for cultivation (Holden, Otsuka and Place 2009)
- Raised the need for sustainable intensification practices
  - intercropping, erosion control, organic manure, etc.
- Most land cultivated under traditional tenure arrangement. User rights guaranteed by local chiefs (Berge et al. 2014)

- Increased commodity prices, market linkages, and urbanization have led to land commodification and rising land prices.
  - raises questions about how well customary system can guarantee security (Jayne et al. 2014; Wineman and Jayne 2018)

Tenure security and investment

- Expect people to invest more in land with secure tenure (Besley 1995)
- Land investment has implications for productivity, food security and poverty reduction in SSA.
- In the region we focus on (southern-eastern Africa) Malawi in particular, tenure security may be affected by gender differentiated inheritance patterns.
- Matrilineal inheritance: land is passed through women, men marry into wives family and move to her village. Only access land through wife and her family.
  - Doesn't mean wife is in charge (ownership is not necessarily control)
  - Extended family/clan leader (eg: wife's uncle) makes decisions
  - In case of divorce, husband leaves with nothing.
- Patrilineal inheritance: land is passed through men, women move to husband's village.
  - **How do these patterns affect decisions at the household and plot level?**

Inheritance patterns relative to the gender productivity gap are important to consider

- Men are generally the head of households so make many decisions that affect the family (farming, non-farm, social).
  - Men and women tend to farm separate plots but may also have plots in common.
- Large productivity gap between men and women in the developing world. (Doss, 2014; Kilic et al., 2015; Palacios-López and López, 2015; Udry, 1996; Hill and Vigneri, 2014).
- Malawi specifically the gender productivity gap has been found to be 25% for land and 44% for labor. (Kilic et al., 2015; Palacios-López and López 2015).
  - Due to men growing tobacco and different access to inputs.

- **However to our knowledge no study had considered how this gap may differ between men and women across matrilineal and patrilineal inheritance practices.**
  - Patrilineal men vs. Patrilineal women vs. Matrilineal men vs Matrilineal women?

We estimate these issues using 2018/19 LSMS-IHS data in Malawi

- **Research questions**
- #1: how do yields and self-assessed land values at the plot level differ by gender of manager and gender-differentiated inheritance practices?
- #2: how do intensification practices at the plot level differ by gender of manager and gender-differentiated inheritance practices?
  - 2018/19 data asked about inheritance practices at the household level and community level. Earlier rounds only asked about it at the community level.
- **Contributions**
- To the literature on tenure security and investment
- To the literature on gender-differentiated empowerment and yield gaps.

Conceptual framework

$$Y = f(I(G), G, X) \quad (1)$$

Outcomes Y (yields, land value, investment) affected by gendered inheritance patterns I, and gender of the plot manager G, and other factors X.

$$Y_{ij} = \beta(I_j(G_{ij})) + \alpha G_{ij} \quad (2)$$

We expect men to have an advantage in production given gender productivity gap α

and men to have an advantage in patrilineal inheritance systems β

But women to have an advantage in matrilineal inheritance systems. (men don't own/control land so don't invest)

So for Patrilineal men $\alpha > 0$ & $\beta > 0$

Patrilineal women $\alpha < 0$ & $\beta < 0$ clear we expect men to do better.

Matrilineal men $\alpha > 0$ & $\beta < 0$

Matrilineal women $\alpha < 0$ & $\beta > 0$ who does better?

Empirical Specification: 1

$$Y_{ijr} = \beta Matrilineal_{jr} + \alpha Male_{ijr} + \boldsymbol{\lambda}' \boldsymbol{x}_{jr} + \mu_j + \varepsilon_{ijr} \quad (3)$$

Matrilineal effect = β
Male effect = α

Other controls (household, plot, climatic), individual and plot-level errors.

Empirical Specification: 2

$$Y_{ijr} = \beta Matrilineal_{jr} + \alpha Male_{ijr} + \gamma Male_{ijr} \times Matrilineal_{jr} + \boldsymbol{\lambda}' \boldsymbol{x}_{ijr} + \vartheta_j + \varsigma_{ijr} \quad (4)$$

Matrilineal female effect = β
Patrilineal male effect = α
Matrilineal male effect = γ
Vs Patrilineal female effect

Also β = α = γ

Identification Strategy – people may engage in different inheritance patterns for unobservable reasons?

- Matrilineality and the Livingstoina Mission
- Traditionally Malawi was matrilineal
- Scottish missionaries set up Christian mission in late 1800's on shores of lake Malawi to avoid malaria.
- Preached patrilineal values that spread from north to south.
- Clear in the map of Matrilineality today
- **Distance to Livingstonia mission is strong IV**
  - Correlated with women's education and off-farm work today (Kudo 2017)
- Argue that that the IV: distance is exogenous as it is uncorrelated with productivity-affecting factors today.
  - Control for rainfall and agro-ecological zone.

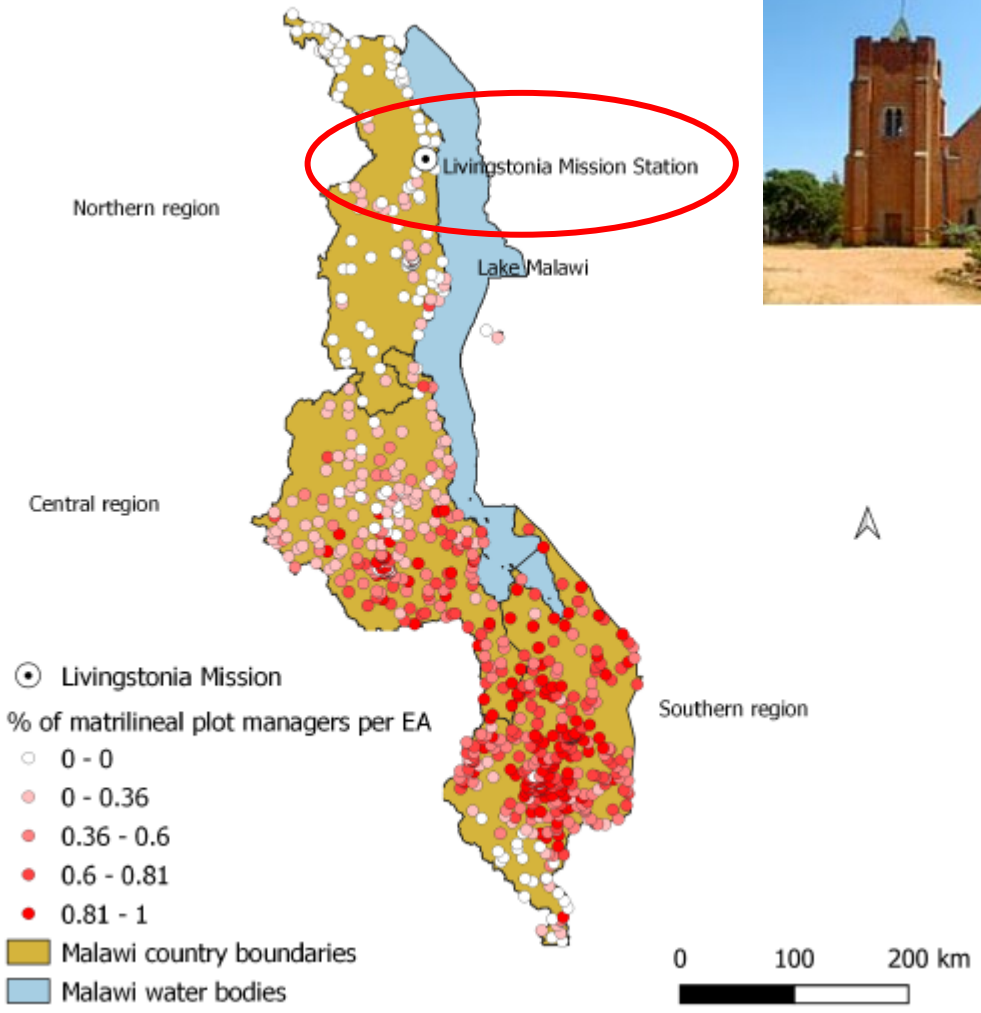

Table: The first stage effects of Livingstonia mission on matrilineal customs

	(1) Matrilineal	(2) $Matrilineal \times Male$
Distance to Livingstonia mission	0.002***	0.001***
	(0.000)	(0.000)
Male	-0.080***	0.113***
	(0.015)	(0.019)
Distance to Livingstonia mission × Male		0.001***
		(0.000)
Constant	-9.373***	-7.139***
	(0.841)	(0.754)
Observations	8770	8770

NOTES: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Matrilineal is discreet indicating whether the plot manager married under the matrilineal marriage custom, captured by 1), and 0) if the manager married under the patrilineal custom. Distance to livingstonia mission is continuous in kilometres. Household probability weights and robust standard errors are employed in the analysis. The analysis included all control variables namely: Male household head; Plot manager's age; Whether the plot manager is a permanent resident in their village; Whether the plot manager benefited from the government subsidized ferlilizer programme (FISP); Household size; Plot size; Soil type; Soil quality; Quantity of seeds planted on the plot; Rain season cultivation; Rainfall; and Agro-ecological zones.

Source: Own calculations from IHPS 5 data

Column 1: 100 kilometers from the mission increase probability of being matrilineal by 20 pp on average

Data

- Malawi's Fifth Intergated Household Survey (IHS-V)
- Collected by Malawi National Statistical Office

Table: Means of plot level attributes

	(1)	(2)	(3)	(4)
	Means			
	Matrilineal		Patrilineal	
	Male	Female	Male	Female
Outcomes				
Maize Productivity (kg/ha)	2,570	3,102	4,160	1,922
Land price (kwacha/ha)	2,420,375	3,359,514	9,618,999	3,387,147
Erosion control	0.461	0.468	0.405	0.315
Applied manure	0.328	0.298	0.256	0.236
Used inorganic fertilizer	0.684	0.662	0.678	0.620
Number of complete weedings	1.958	1.932	1.862	1.921
Applied herbicides	0.054	0.056	0.053	0.033
Inter cropped with legumes	0.233	0.237	0.217	0.208
Instrumental Variable				
Distance from Livingstonia mission (km)	485	520	343	381
Observations	2,845	1,411	3,579	905

Results

Table: The effects of individual's customs on productivity and land prices

	(1)	(2)
	Un-interacted treatment	
	Productivity	Land price
Matrilineal	-0.989***	-0.568***
	(0.112)	(0.106)
Male	-0.011	-0.078*
	(0.055)	(0.042)
Matrilineal × Male		
Constant	0.250	0.600
	(2.059)	(1.774)
Observations	8770	7752
First stage statistic	872.516	773.596
$Matri - Matri \times Male = 0$		
$Male - Matri \times Male = 0$		
P3=$Matri + Male + Matri \times Male = 0$		

NOTES: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Own calculations from IHPS 5 data

Matrilineal males seem to be doing worse than other groups. (their wives, patrilineal males, and even patrilineal females)

Results

Table: The effects of individual's customs on productivity and land prices

	(1)	(2)	(3)	(4)
	Un-interacted treatment		Interacted treatment	
	Productivity	Land price	Productivity	Land price
Matrilineal	-0.989***	-0.568***	-0.217	-0.478***
	(0.112)	(0.106)	(0.172)	(0.162)
Male	-0.011	-0.078*	0.585***	-0.007
	(0.055)	(0.042)	(0.125)	(0.121)
Matrilineal × Male			-1.021***	-0.119
			(0.212)	(0.196)
Constant	0.250	0.600	-0.121	0.561
	(2.059)	(1.774)	(2.071)	(1.770)
Observations	8770	7752	8770	7752
First stage statistic	872.516	773.596	371.209	336.637
$Matri - Matri \times Male = 0$			0.804**	-0.359
$Male - Matri \times Male = 0$			1.606***	0.112
P3=$Matri + Male + Matri \times Male = 0$			-0.653***	-0.604***

NOTES: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Own calculations from IHPS 5 data

Matrilineal males seem to be doing worse than other groups. (their wives, patrilineal males, and even patrilineal females)

Results

Table: Estimates of the effects of individual's customs on land investment

	(1)	(2)	(3)	(4)	(5)	(6)
			Interacted treatment			
	Strategy	Manure	Fertilizer	Weeding	Herbicides	Intercrop
Matrilineal	0.287***	0.118**	0.156***	-0.131	0.080***	0.136**
	(0.065)	(0.055)	(0.060)	(0.141)	(0.025)	(0.057)
Male	0.053	0.058	0.159***	-0.228*	0.049***	-0.001
	(0.049)	(0.041)	(0.044)	(0.136)	(0.017)	(0.043)
Matrilineal × male	-0.003	-0.025	-0.230***	0.409	-0.063**	-0.003
	(0.078)	(0.067)	(0.070)	(0.255)	(0.030)	(0.068)
Constant	4.498***	1.443**	-2.786***	2.571***	1.363***	-0.620
	(0.655)	(0.575)	(0.664)	(0.969)	(0.333)	(0.576)
Observations	8770	8770	8770	8506	8770	8770
Reference group means	0.342	0.236	0.658	1.874	0.058	0.287
First stage statistic	371.209	371.209	371.209	371.546	371.209	371.209
$Matri - Matri \times Male = 0$	0.290**	0.142	0.387***	-0.540	0.142***	0.139
$Male - Matri \times Male = 0$	0.056	0.082	0.390***	-0.637	0.112**	0.002
$Matri + Male + Matri \times Male = 0$	0.336***	0.151***	0.085*	0.050	0.066***	0.131***

Strategy =1 if erosion control or water harvesting on plot

Matrilineal males seem to be doing worse than their wives, patrilineal males, but better on investments than patrilineal females (doing more and getting lower yields, from previous slide).

Conclusions

- Matrilineal males got lower yields and lower land values than all of their counterparts.
  - Invested less than all others besides patrilineal females (whom we might expect to be the most disadvantaged group).
  - Matrilineal males having lower yields and investing less in their land than their wives makes sense given their tenure insecurity,
  - It offsets their gendered productivity advantage for males found elsewhere in the literature.
- Added to the literature on tenure security and gender-differentiated ag impacts

Implications for policy

1. Ag development/extension programs that promote sustainable intensification practices and increase input use may fail if they do not recognize land inheritance patterns and incentives that exist there.
   - No differential impact on fertilizer subsidy receipt by gender-differentiated inheritance patterns

2. Formal titling programs may not spur investment if local communities do not respect titles.
   - This may be especially important with husbands obtaining titles in matrilineal areas.
   - Will the wife's family respect that title?

Thank you for your time!

Questions/comments

- martinresearch4@gmail.com
- jrickerg@purdue.edu

	Means			
	Matrilineal		Patrilineal	
	Male	Female	Male	Female
Outcomes				
Maize Productivity (kg/ha)	2,570	3,102	4,160	1,922
Land price (kwacha/ha)	2,420,375	3,359,514	9,618,999	3,387,147
Erosion control	0.461	0.468	0.405	0.315
Applied manure	0.328	0.298	0.256	0.236
Used inorganic fertilizer	0.684	0.662	0.678	0.620
Number of complete weedings	1.958	1.932	1.862	1.921
Applied herbicides	0.054	0.056	0.053	0.033
Inter cropped with legumes	0.233	0.237	0.217	0.208
Covariates				
Male headed household	0.976	0.663	0.990	0.667
Plot manager's age	44.240	39.369	43.084	39.432
Plot manager is a permanent resident	0.631	0.816	0.820	0.671
Household size	5.103	4.957	5.044	5.115
Plot size (ha)	0.315	0.284	0.343	0.309
Sandy (Mchenga) soil	0.234	0.230	0.183	0.199
Between sandy & clay soil	0.512	0.518	0.586	0.537
Clay (Katondo) soil	0.211	0.221	0.189	0.192
Other soil types	0.044	0.030	0.043	0.072
Good soil quality	0.557	0.513	0.571	0.593
Fair soil quality	0.315	0.334	0.317	0.323
Poor soil quality	0.129	0.153	0.113	0.084
Seed quantity (kg)	8.232	7.905	8.300	8.312
Rain season cultivation	0.953	0.966	0.929	0.919
Rainfall (mm)	812	810	865	856
Tropic-warm or semiarid zone	0.504	0.439	0.407	0.403
Tropic-warm or subhumid zone	0.373	0.502	0.288	0.357
Tropic-cool or semiarid zone	0.112	0.048	0.143	0.106
Tropic-cool or subhumid zone	0.011	0.011	0.162	0.134
Plot manager received subsidy (FISP)	0.086	0.149	0.096	0.097
Instrumental Variable				
Distance from Livingstonia mission (km)	485	520	343	381
Observations	2,845	1,411	3,579	905

The table reports means for plot attributes in the sample. Productivity, land price, plot hectares, seed quantity, household size, rainfall, and number of weedings are continuous while the rest of the variables are categorical. The land prices are quoted in Malawi Kwacha (MWK). The average

Results

Table: Estimates of the effects of community's customs on land investment

	(1)	(2)	(3)	(4)	(5)	(6)
			Interacted treatment			
	Strategy	Manure	Fertilizer	Weeding	Herbicides	Intercrop
Community Matrilineal	0.313***	0.123**	0.111*	-0.064	0.085***	0.159***
	(0.064)	(0.056)	(0.058)	(0.123)	(0.024)	(0.056)
Male	0.086*	0.072*	0.132***	-0.180	0.057***	0.029
	(0.047)	(0.040)	(0.041)	(0.120)	(0.015)	(0.041)
Community matrilineal × Male	-0.098	-0.054	-0.164***	0.271	-0.072***	-0.062
	(0.066)	(0.056)	(0.058)	(0.193)	(0.025)	(0.057)
Constant	3.901***	1.204*	-2.651***	2.326**	1.306***	-0.901
	(0.699)	(0.620)	(0.701)	(1.015)	(0.348)	(0.617)
Observations	8703	8703	8703	8439	8703	8703
Reference group means	0.341	0.237	0.656	1.873	0.059	0.289
First stage statistic	485.118	485.118	485.118	518.132	485.118	485.118
$Matri - Matri \times Male = 0$	0.411***	0.177*	0.276**	-0.334	0.157***	0.221**
$Male - Matri \times Male = 0$	0.184*	0.125	0.296***	-0.450	0.129***	0.091
$Matri + Male + Matri \times Male = 0$	0.302***	0.141***	0.079*	0.027	0.070***	0.125***

Strategy =1 if erosion control or water harvesting on plot

Matrilineal males seem to be doing worse than their wives, patrilineal males, but better on investments than patrilineal females (doing more and getting less). – noisier with community inheritance variables.

Results

Table: The effects of community's customs on productivity and land prices

	(1)	(2)	(3)	(4)
	Un-interacted treatment		Interacted treatment	
	Productivity	Land price	Productivity	Land price
Community Matrilineal	-0.833***	-0.487***	-0.428**	-0.628***
	(0.095)	(0.088)	(0.174)	(0.160)
Male	0.085	-0.028	0.414***	-0.144
	(0.054)	(0.040)	(0.121)	(0.114)
Community matrilineal × Male			-0.504***	0.175
			(0.179)	(0.162)
Constant	2.315	2.138	1.748	2.347
	(2.227)	(1.888)	(2.244)	(1.901)
Observations	8703	7691	8703	7691
Reference group means	1323	1014380	1323	1014380
First stage statistic	1321.068	1134.775	485.118	482.775
$Matri - Matri \times Male = 0$			0.075	-0.803***
$Male - Matri \times Male = 0$			0.917***	-0.320
$Matri + Male + Matri \times Male = 0$			-0.518***	-0.597***

Matrilineal males seem to be doing worse than other groups. (their wives, patrilineal males, and even patrilineal females) – consistent but noisier evidence with community inheritance variables.