Efficiency and Equity of Customary Land Tenure Systems and their Implications for Well-being

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Introduction

- Land property rights govern various land-related activities – acquired through sales and rental markets or customary tenure systems
- Sales and rental markets – more efficient due to the flexible transfer of land rights governed by legal systems (Feder & Feeny, 1991; Alchian & Demsetz, 1973)
- Customary Land Tenure Systems (CLTSs) – valued for their reliance on local knowledge and traditions (Roth & McCarthy, 2013; Ostrom, 1990; De Soto, 2002)
- Extensive research on sales and rental markets (Deininger & Jin, 2008; Han et al., 2021; Jin & Deininger 2009; Holden et al., 2010; Kijima & Tabetando, 2020; Chamberlin & Ricker-Gilbert, 2016)
- Limited literature on efficiency, equity, and well-being in CLTSs

- CLTSs – over 78% of land holding in Sub-Saharan Africa (Byamugisha & Dubosse, 2023) and about 69% for Malawi (Tsutomu, 2008)

- Therefore this paper aims to empirically assess;

  1. The efficiency and equity hypothesis under CLTSs
  2. The differential well-being effects between CLTSs and land tenure through sales and rental markets

- Utilizes the screening model based on self-selection through contractual choices to evaluate the efficiency hypothesis.

- Self-selection serves as a signal in contexts with asymmetric information.

- Study classifies customary land tenure systems into inherited farmland and farmland allocated by chiefs.

Key findings

1. **Efficiency:**
   - Farming ability does not affect efficiency in production.

     $\longrightarrow$ Inherited and rented/borrowed farmland – positive farming ability

     $\longrightarrow$ Farmland allocated by chiefs or purchased – negative farming ability

2. **Equitable farmland distribution:**
   - Inherited and rented/borrowed farmland promote equitable farmland distribution.
   - Farmland allocated by chiefs or purchased does not promote equitable farmland distribution

3. **Welfare effects**:
   - No significant differential welfare impact between CLTSs and tenure through sales and rental markets.

Significance of the study

- Sheds light on the efficiency and equity of CLTSs and their impact on household welfare.

- Provides empirical evidence for alternative policies to ensure Land Tenure Property Rights (LTPR) in Sub-Saharan African countries.

- Underscores the importance of considering local contexts and traditional practices in land tenure policies.

  $\rightarrow$ to ensure equitable resource distribution and sustainable development.

Background

- Land in Malawi is categorized into public, private, and customary forms (GoM, 2002; Kishindo, 2004; Tsutomu, 2008).
- Government owns public land, including national parks and reserves.
- Private land includes freehold and leasehold titles, obtained through colonial governors.
- Customary land governed by traditions, constitutes 69% of total land area (Tsutomu, 2008).
- Chiefs allocate customary land, rights remain with households in permanent villages.
- Malawi National Land Policy (2002) allows registration and protection of customary land
- New land reforms (2016) aim to ensure tenure security, reduce land conflicts, and increase government revenue (NPC, 2021; Msukwa et al., 2021)

Study Design

Data

- Data Source: Integrated Household Panel Surveys (IHPSs) – conducted alongside Integrated Household Survey (IHS) program
- Aims to track trends in poverty, socio-economic, and agricultural characteristics
- First IHPS conducted in 2010 alongside IHS-3 with 3,104 households
- Follow-up surveys conducted in 2013 and 2016 (2013: 4,000 households; 2016: 1,989 households (budget constraints))
- Last wave in 2019 combined previous sample with split-off individuals (3,104 households)

Summary statistics

Variable	N	Mean	SD	p25	p50	p75	Min	Max
Crop production value (Malawi Kwacha)	3804	53534.459	651513.262	4000	15000	39000	0	30240000
Plot area (acres)	3804	1.41	16.481	.41	.75	1.22	0	685.35
Crop sales value (Malawi Kwacha)	3804	25750.364	900964.63	0	0	2800	0	55500000
Plot soil type	3804	1.972	0.768	2	2	2	0	3
Plot soil quality	3804	1.26	0.672	1	1	2	0	2
Extent of plot soil erosion	3804	1.562	0.856	1	1	2	1	4
Total inorganic fertilizer applied (kgs)	3804	37.415	66.103	0	0	50	0	1100
Inherited farmland	3804	.599	0.490	0	1	1	0	1
Chief/employer allocated farmland	3804	.256	0.437	0	0	1	0	1
Rented/borrowed farmland	3804	.096	0.295	0	0	0	0	1
Purchased farmland	3804	.047	0.211	0	0	0	0	1
Distance to agricultural market (kms)	3804	25.979	14.349	15	27	36	0	67
Distance to the paved road (kms)	3804	16.582	6.306	2	6.615	14	0	36
Plot distance from the household (kms)	3804	1.37	5.715	.1	.5	1.1	0	248.6
Annual total rainfall (mm) – last season	3804	877.285	140.665	779	836	952	615	1386
Annual total rainfall (mm) – current season	3804	767.452	57.326	657	742	828	529	1131
Annual average temperature ($0^{C} * 10$)	3804	214.796	18.005	202	213	225	193	263
Annual precipitation (mm)	3804	1010.714	188.661	892	941	1148	795	1843
Credit or loan access (=1)	3804	.2	0.400	0	0	0	0	1
Adult equivalents	3804	3.925	1.599	2.86	3.701	4.845	.76	12.755
Number of crops planted (/season)	3804	1.35	0.572	1	1	2	1	4
Household head age (years)	3804	44.792	15.766	32	42	55	16	106
Household head education (years)	3804	1.283	0.800	1	1	1	0	7
Male Household head (=1)	3804	.749	0.433	0	1	1	0	1

Identification strategy & estimation equations

1. **Farming Efficiency Estimation:**
   - Employs a fixed-effects stochastic frontier model.

$$ln(Q_{ijt}) = \alpha_0 + \sum_{i=1}^{N} \beta ln(Z_{ijt}) + \beta_q \chi'_{ijt} + \upsilon_{ijt} - \mu_{ijt} \tag{1}$$

2. **Household Participation Analysis:**
   - Utilizes Ordinary Least Squares (OLS) estimation.

$$LT_{ijt} = \theta_1 \hat{\mu}_{ijt} + \theta_2 ln(PA_{ijt}) + \chi'_{ijt} + \epsilon_{ijt} \tag{2}$$

3. **Welfare Effects Assessment:**
   - Employs household-plot fixed-effect models to analyze differential welfare effects between customary land tenure systems and sales/rental markets.

$$ln(Y_{ijt}) = \pi_1 IT_{ijt} + \pi_2 CET_{ijt} + \pi^* \chi'_{ijt} + \nu_{jt} + \tau_t + \epsilon_{ijt} \tag{3}$$

Threats to identification

- Other confounding factors

  $\Rightarrow$ included soil quality and soil type of the plot, crop diversification and the occurrence of an adult household member's death and migration.

- Persistence of individual characteristics and dynamic decision making of households over time

  $\Rightarrow$ use lag of farming ability to test for persistence and past experiences/resources

Results

Estimation of farming efficiency/ability

Table: Fixed-effects Cobb-Douglas stochastic frontier model

VARIABLES	Log crop production value	P-value
Log plot area (acres)	0.6167***	(0.0001)
Log total inorganic fertilizer (kgs)	0.1013***	(0.0016)
Log adult equivalent	0.5647*	(0.0623)
Log annual rainfall (mm)- previous season[1]	-1.7035**	(0.0151)
Log population density	-0.4331	(0.4653)
Log annual temperature ($0^c * 10$)	0.3747	(0.9636)
Household head age (years)	0.0123*	(0.0936)
Household head education (years)	0.0739	(0.4688)
Male household head (=1)	0.0397	(0.8625)
Year & Regional fixed effects	YES	
U-sigma Constant	5.8577***	(0.0000)
V-sigma Constant	0.8925***	(0.0000)
N	3804	

*Standard errors in parentheses clustered at household level. * p < 0.10, ** p < 0.05, *** p < 0.01.*

- Farming ability score mean of 0.08 (0 – 0.83) against maximum feasible output of 1

[1]https://climateknowledgeportal.worldbank.org/country/malawi/vulnerability

Determinants of household participation in customary land tenure systems

Table: Determinants of household participation in customary land tenure (OLS)

VARIABLES	(1) Inherited farmland. (=1)	(2) Chief/employer farmland. (=1)	(3) Rented/borrowed farmland. (=1)	(4) Purchased farmland. (=1)
Predicted farming ability	**0.0117**	**-0.0211**	**-0.00318**	**0.0171**
	(0.0429)	**(0.0381)**	**(0.0300)**	**(0.0248)**
Log plot area (acres)	**-0.0348***	**0.0384****	**-0.0375*****	**0.0350****
	(0.0206)	**(0.0176)**	**(0.0124)**	**(0.0155)**
Number of crops planted (/season)	0.0773***	-0.0196*	-0.0419***	-0.0151**
	(0.0138)	(0.0114)	(0.00955)	(0.00649)
Log annual total rainfall (mm) - Last season	-0.180**	0.193**	-0.0239	-0.0139
	(0.0903)	(0.0866)	(0.0512)	(0.0442)
Household head age (years)	0.00112	-0.000628	-0.00137**	0.000811**
	(0.000971)	(0.000910)	(0.000625)	(0.000398)
Household head education (years)	-0.0352***	-0.00683	0.0256***	0.0136*
	(0.00999)	(0.00719)	(0.00825)	(0.00697)
Male household head (=1)	-0.0182	-0.0154	0.0307***	0.00259
	(0.0178)	(0.0154)	(0.0110)	(0.00869)
Credit or loan access (=1)	-0.0176	-0.0150	0.0256*	0.00831
	(0.0183)	(0.0146)	(0.0136)	(0.00969)
Observations	3,804	3,804	3,804	3,804

Bootstrap standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Other control variables: Household member migration; adult member death; soil type & quality; extent of plot soil erosion; distance to paved road; annual temperature; population density; adults equivalent; year &regional fixed effects; MC devices.

Household welfare effects analysis

Table: Welfare effects analysis - customary vs. sales and rental markets (FE)

VARIABLES	(1) Log crop production value (Malawi kwacha)	(2) Log crop sales value (Malawi kwacha)
Inherited farmland (=1)	**-0.211**	**-0.268**
	(0.265)	**(0.297)**
Chief or employer allocated farmland (=1)	**-0.485**	**-0.249**
	(0.313)	**(0.335)**
Log plot area (acres)	0.780***	0.612**
	(0.197)	(0.246)
Log adult equivalent	0.896**	0.314
	(0.382)	(0.412)
Log total inorganic fertilizer applied (kgs)	-0.507***	0.231***
	(0.0702)	(0.0716)
Log total inorganic fertilizer * Fertilizer crops	0.785***	-0.199***
	(0.0686)	(0.0723)
Log plot distance from household (kms)	0.453***	0.172
	(0.129)	(0.165)
Household head age (years)	0.0125	-0.0178*
	(0.00942)	(0.00954)
Male Household head (=1)	0.143	0.567**
	(0.280)	(0.272)
Observations	3,804	3,804

Standard errors in parentheses clustered at household-plot level *** p<0.01, ** p<0.05, * p<0.1.

Other control variables: Credit or loan access; total annual rainfall (mm); Household head education; Soil type and quality; extent of plot soil erosion; year & regional fixed effects.

Recommendations for policy and future research

Based on these findings, the paper recommends:

- Promote community engagement in policy development.
- Empower local chiefs and leaders in land allocation management.
- Develop or revise legal frameworks to recognize customary land tenure systems.
- Future studies:

  → utilize yearly panel data to observe seasonal dynamics

  → include acquisition time to account for the time lag between land tenure acquisition and survey data.

Conclusion

- Primary focus of this paper:

  $\Rightarrow$ identify factors influencing decision-making regarding their participation in customary land tenure systems;

  $\Rightarrow$ the subsequent impact on household welfare outcomes compared to land tenure through sales and rental markets.

- Approximately 78% of population in sub-Saharan Africa still adheres to CLTSs due to the underdevelopment of land sales and rental markets.

- Contrary to some existing literature (Chamberlin et al., 2016; Jin et al., 2009), not all customary land tenures are inefficient in allocating farmland.

- Inherited farmland tenure allocates farmland fairly efficient and equitably, particularly to those with high farming ability and land-poor households.

THANK YOU!

https://sites.google.com/view/timothy-mtumbuka

Appendix

Lagged farming ability/efficiency

Table: Determinants of household participation in farmland tenure systems (OLS – lag farming ability)

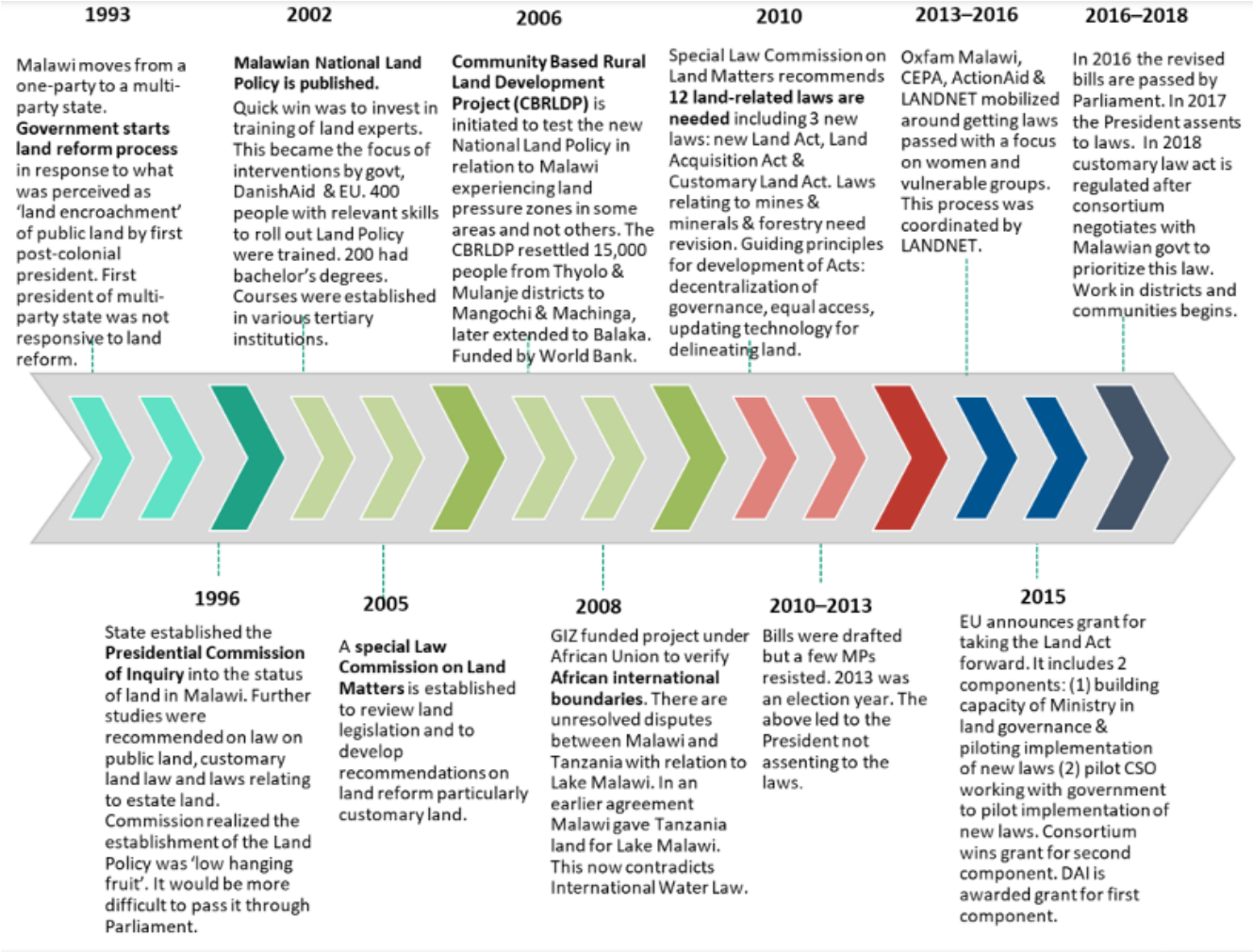
VARIABLES	(1) Inherited farmland. (=1)	(2) Chief/employer farmland. (=1)	(3) Rented/borrowed farmland. (=1)	(4) Purchased farmland. (=1)
Lag predicted farming ability (-1)	0.00849	-0.00483	-8.62e-05	-0.000435
	(0.0471)	(0.0452)	(0.0303)	(0.0232)
Log plot area (acres)	-0.0242	0.0233	-0.0322*	0.0338*
	(0.0252)	(0.0232)	(0.0177)	(0.0174)
Number of crops planted (/season)	0.0813***	-0.0220	-0.0354***	-0.0224***
	(0.0161)	(0.0150)	(0.0109)	(0.00744)
Log annual total rainfall (mm) - Last season	-0.0954	-0.0575	0.0689	0.0802
	(0.123)	(0.114)	(0.0820)	(0.0575)
Household head age (years)	0.00217**	-0.000821	-0.00253***	0.00111**
	(0.00101)	(0.00113)	(0.000781)	(0.000496)
Household head education (years)	-0.0320***	-0.00631	0.0204**	0.0152*
	(0.0110)	(0.00922)	(0.00863)	(0.00783)
Male household head (=1)	-0.0222	-0.0161	0.0443***	-0.00695
	(0.0205)	(0.0190)	(0.0131)	(0.0107)
Log adult equivalent	0.0342	0.0143	-0.0471	-0.000751
	(0.0544)	(0.0519)	(0.0392)	(0.0305)
Credit or loan access (=1)	0.00177	-0.0155	0.00700	0.00649
	(0.0204)	(0.0187)	(0.0146)	(0.0106)
Log population density	0.0229	-0.0336	-0.0215	0.0326
	(0.0593)	(0.0695)	(0.0721)	(0.0403)
Log distance to paved road (kms)	0.0484	-0.0482	-0.0159	0.0153
	(0.0731)	(0.0763)	(0.0820)	(0.0330)
Log annual total temperature (0c)	0.994	0.110	-1.254	0.151
	(1.634)	(1.615)	(2.150)	(0.377)
Observations	2,536	2,536	2,536	2,536
R-squared	0.326	0.332	0.040	0.028

Logistic regression analysis results

Table: Determinants of household participation in farmland tenure systems (Logit)

VARIABLES	(1) Inherited farmland. (=1)	(2) Chief/employer farmland. (=1)	(3) Rented/borrowed farmland. (=1)	(4) Purchased farmland. (=1)
Predicted farming ability	0.286	-0.465	0.254	-0.174
	(0.249)	(0.328)	(0.415)	(0.584)
Log plot area (acres)	-0.214	0.270*	-0.486*	0.650**
	(0.159)	(0.154)	(0.256)	(0.259)
Number of crops planted (/season)	0.512***	-0.152	-0.549***	-0.524**
	(0.105)	(0.0960)	(0.155)	(0.224)
Log annual total rainfall (mm) - Last season	-0.386	-0.327	0.942	2.079
	(0.927)	(0.857)	(1.089)	(1.678)
Household head age (years)	0.00215	0.00598	-0.0317***	0.0367**
	(0.00653)	(0.00719)	(0.0108)	(0.0150)
Household head education (years)	-0.218***	-0.0215	0.166*	0.249*
	(0.0689)	(0.0812)	(0.0905)	(0.129)
Male household head (=1)	-0.184	-0.0110	0.549***	-0.272
	(0.135)	(0.154)	(0.196)	(0.245)
Log adult equivalent	0.210	-0.0724	-0.130	-0.0522
	(0.322)	(0.356)	(0.444)	(0.691)
Credit or loan access (=1)	-0.0775	-0.0399	0.180	0.110
	(0.132)	(0.144)	(0.175)	(0.269)
Log population density	-0.168	0.127	0.0184	0.633
	(0.318)	(0.332)	(0.732)	(0.903)
Log distance to paved road (kms)	-0.259	0.0182	0.429	-0.0960
	(0.453)	(0.471)	(0.714)	(0.797)
Log annual total temperature ($0^C * 10$)	16.23	-3.223	-16.80	4.056
	(13.19)	(13.84)	(22.95)	(11.95)
Observations	3,804	3,804	3,804	3,804
Number of newid	1,268	1,268	1,268	1,268

Figure: Land reform process since multiparty state in 1993)



Adopted from NPC (2021): "A Cost-Benefit Note: Implementing the National Land Policy in Malawi - Technical Report, Malawi Priorities, National Planning Commission(NPC)," Copenhagen Consensus Center (USA) African Institute for Development Policy (Malawi).