

Land rights and risk sharing in rural West Africa

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Property Rights & Economic Growth

Voluminous literature on the benefits of *individual property rights* on *economic growth*.

1. Assurance effect
2. Realizability effect
3. Collateralization effect

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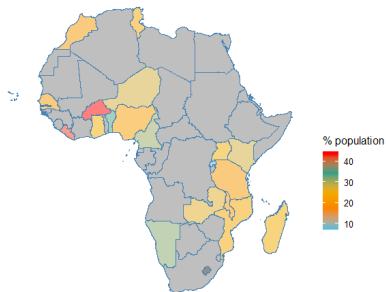
Hernando de Soto:

What the poor lack is easy access to the property mechanism that could legally fix the economic potential of their assets so that they could be used to produce, secure or guarantee greater value in the expanded market. (de Soto, 2001)

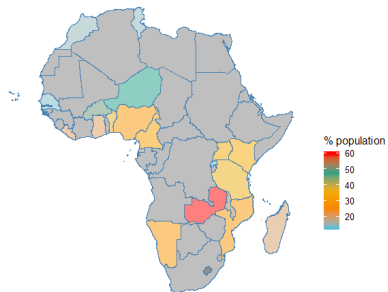
Property Rights in Africa

PR-Index 2019

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Tenure Insecurity



Absence of Ownership Documents

Land Reform in Burkina Faso

Land Reform 2009 - Burkina Faso

Status Quo

- | Introduction of an **inclusive** and **innovative** rural land tenure legislation in 2009.

Loi 034/2009

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- | Introduction of an **inclusive** and **innovative** rural land tenure legislation in 2009.
- | Reconciliation between **statutory land management**, based on national laws, and **customary land tenure**, based on local norms.
- | Possibility of issuing Rural Land Certificate of Possession (**APFR**).
 1. **Official** formal **recognition** of land ownership from the **state**.
 2. **Local communities** were highly engaged.

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Loi 034/2009

Results:

Reasons

Indicators	Target (2009)	Actually Achieved (2014)	(%)
Number of HHs receiving APFRs	3000	403	13.4%

Millenium Challenge Corporation's Report (2015)

Land Reform in Burkina Faso

USAID (2017):

*Although the 2009 Rural Land Law and the 2012 RAF provide the **mandate** and **mechanisms** to formalize and secure a variety of tenure types in rural Burkina Faso, **most rural land** continues to be governed according to **customary, informal rules**.*

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Puzzle: People are given the opportunity to register their land, and either they are not allowed to, or they do not opt in for this option.

Question: Why land reforms aiming at establishing strong individual property rights, **underperform** in rural Burkina Faso?

land registration rates are low.

Prelude of research paper

Claim: Statutory land reforms and informal risk sharing in a communal level are highly antagonistic mechanisms.

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I combine two strands of literature:

1. **Property Rights / Land Reforms:** Besley (1995), Besley and Ghatak (2010), Montero (2018), Adamopoulos and Restuccia (2019)
2. **Risk Sharing:** Thomas and Worrall (1988), Townsend (1994), Udry (1994), Attanasio and Rios-Rull (2000), Cooley et al. (2004), Ábrahám and Laczó (2017), Morten (2019)

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I study the effects of land reform in a dynamic contract context.

1. dynamic contract / informal risk sharing
2. trace the effects of a land reform on the functioning of the contract.

Model

Two customary characteristics (Ouédraogo and Millogo (2007)):

1. **Land Chief** (chef de terre):

- | a religious figure with legal power
- | **full control** over **land** on behalf of the community

Graph

Model

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2. **Periodic land redistribution:**

- | one of the main duties of the land chief
- | **land re-allocation** among the members of the same community/village

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Based on this, I build a dynamic contract between a **land chief** and an **agricultural household**

pooling of all households' **outputs** in the hands of the land chief.

allocation of **consumption** back to the households.

allocation of **land** to the households.

incentives problem → **limited commitment**

Model - Household

receives a stochastic **idiosyncratic productivity** each period.

$$\{z_t\}_{t=0}^T$$
$$z_t \stackrel{iid}{\sim} \text{Prob}(z_t = z_s) = \Pi_s, \quad \text{where } s \in \{1, 2, \dots, S\}$$

produces **agricultural output** (non-storable).

$$y_t = z_t f(\kappa_t \bar{l})$$

where: $\bar{l} = 1$: village land, $\kappa_t \in (0, 1)$: fraction of cultivated land, $f'(\cdot) > 0$, $f''(\cdot) < 0$, Inada conditions

budget constraint.

$$c_t = y_t + \tau_t \quad \forall t$$

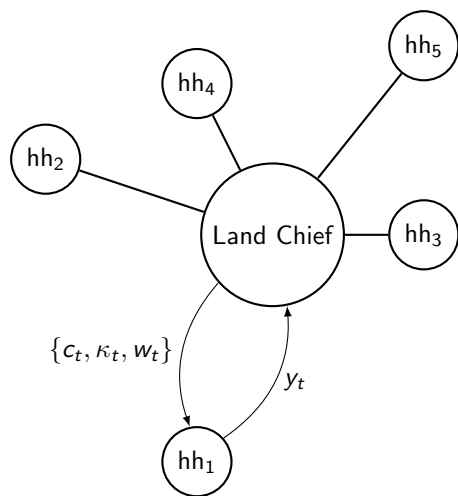
where: τ_t transfers from(to) the community.

derives **utility** from consumption:

$$u(c_t)$$

where: $u'(\cdot) > 0$, $u''(\cdot) < 0$

Dynamic Contract - Mechanism



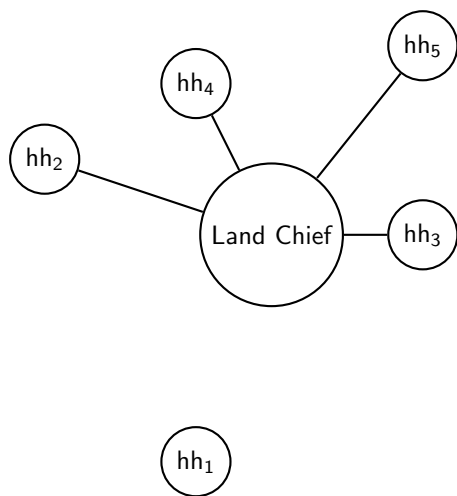
Under Contract:

$$\kappa_t > 0$$

$$y_t = z_t f(\kappa_t \bar{l})$$

$$C_t = y_t + \tau_t$$

Dynamic Contract - Mechanism



Under Autarky:

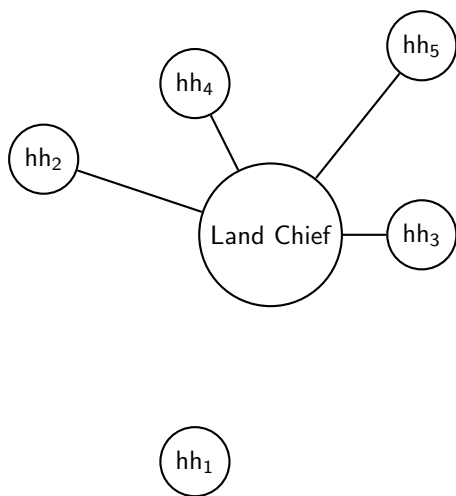
$$\kappa_t = 0$$

$$y_t = 0$$

$$c_t = 0$$

Dynamic Contract - Mechanism

Land Reform: *Under autarky the farmer permanently owns the fraction of land lastly decided within the contract.*



Under Autarky:
(Post-Land Reform)

$$\kappa_t > 0$$

$$y_t = z_t f(\kappa_t \bar{l})$$

$$c_t = y_t$$

Model - Contract in a Recursive Form

Land chief maximizes stream of profits:

$$P(v) = \max_{f, c_s, \kappa_s, w_s, g} \sum_{s=1}^S \Pi_s \left[(z_s f(\kappa_s) - c_s) + \beta P(w_s) \right]$$

where

v : utility **previously** promised to the farmer.

w_s : **future** promised utility to the farmer.

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where

v : utility **previously** promised to the farmer.

w_s : **future** promised utility to the farmer.

Promise Keeping Constraint: Land chief honours her promises

$$\sum_{s=1}^S \Pi_s \{u(c_s) + \beta w_s\} \geq v$$

Model - Land Reform and Limited Commitment

a **land reform** offers the opportunity to the farmer to **register** land as privately owned.

*Once the farmer deviates from the contract, she **permanently owns the fraction of land lastly decided within the contract.***

$$v_{\text{aut}}(\kappa_s) = \sum_{t=0}^1 \beta^t \sum_{r=1}^S \Pi_r u(z_r f(\kappa_s))$$

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the effect of the land reform materializes through the **outside option** of the farmer.

Participation Constraint: the contract needs to be **sustainable**.

$$u(c_s) + \beta w_s \geq u(z_s f(\kappa_s)) + \beta v_{\text{aut}}(\kappa_s) \quad \forall s$$

Model

$$P(v) = \max_{f_{c_s, \kappa_s, w_s} g} \sum_{s=1}^S \pi_s \left[(z_s f(\kappa_s) - c_s) + \beta P(w_s) \right]$$

$$\sum_{s=1}^S \pi_s \{ u(c_s) + \beta w_s \} \geq v \quad \text{[PKC]} \quad : (\theta)$$

$$u(c_s) + \beta w_s \geq u(z_s f(\kappa_s)) + \beta v_{\text{aut}}(\kappa_s) \quad \text{[PC]} \quad \forall s \quad : (\pi_s \phi_s)$$

$$\kappa_s \in (0, 1) = \begin{cases} \kappa_s > 0 & : (\pi_s \nu_{1s}) \\ 1 - \kappa_s > 0 & : (\pi_s \nu_{2s}) \end{cases}$$

$$\sum_{s=1}^S \pi_s \kappa_s \leq 1 \quad : (\nu_3)$$

$$w_s \in [v_{\text{aut}}, \bar{v}]$$

Model

$$P(v) = \max_{f_{c_s, \kappa_s, w_s} g} \sum_{s=1}^S \Pi_s \left[(z_s f(\kappa_s) - c_s) + \beta P(w_s) \right]$$

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$$w_s \in [v_{\text{aut}}, \bar{v}]$$

Trade-off: κ_s affects size of the pie positively but also increases the incentives of the villager to deviate from the contract.

Model - Allocation of land

First Best allocation (full commitment):

$$\kappa_s^{fb} = \left(\frac{(1-\gamma)}{\gamma} \right)^{\frac{1}{\gamma}} \underbrace{\frac{z_s^{\frac{1}{\gamma}}}{\sum_s z_s^{\frac{1}{\gamma}}}}_{\text{relative idiosyncratic productivity}}$$

Allocation of land is **increasing** in **relative idiosyncratic productivity**.

Constrained Optimal allocation (limited commitment):

$$\underbrace{v_3 + z_s f'(\kappa_s)}_{\text{Marginal Increase in Land Chief's Revenues}} = \underbrace{u'(z_s f(\kappa_s)) z_s f'(\kappa_s) \phi_s}_{\text{Farmer's Marginal Benefit from deviation}} + \underbrace{\phi_s \beta \frac{\partial v_{aut}(\kappa_s)}{\partial \kappa_s}}_{\text{Land Reform's Intertemporal effect}}$$

Customary Land Regime

Proposition:

There exists threshold z_s which determines the nature of the land regime under the contract when the participation constraint binds.

Land Regime		z_s
Productive	$\frac{\partial \kappa_s}{\partial z_s} > 0$	$z_t < z_s = [(1 - \alpha)\phi_s]^{\frac{1}{\alpha}} \kappa_s^{(1 - \gamma)}$
Rigid	$\frac{\partial \kappa_s}{\partial z_s} = 0$	$z_t = z_s = [(1 - \alpha)\phi_s]^{\frac{1}{\alpha}} \kappa_s^{(1 - \gamma)}$
Counter Productive	$\frac{\partial \kappa_s}{\partial z_s} < 0$	$z_t > z_s = [(1 - \alpha)\phi_s]^{\frac{1}{\alpha}} \kappa_s^{(1 - \gamma)}$

$$z_s^* \text{ was calculated for } u(c) = \frac{c^{(1-\alpha)}}{1-\alpha} \text{ and } z_s f(\kappa_s) = z_s \kappa_s^{(1-\gamma)}$$

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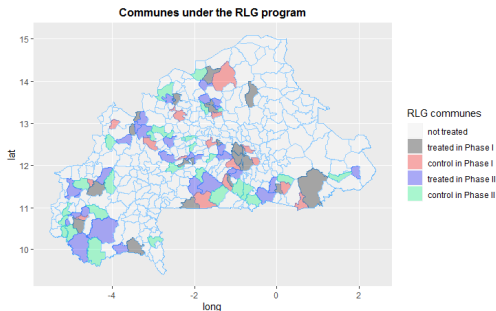
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- Non monotonic relation of land to productivity.
- When threat of deviation becomes credible, allocation of land adjusts to preserve the contract and not to increase the amount of risk-sharing.

Additional Analysis (1): Empirical



Rural Land Governance:

BF + Millenium Challenge Corporation.

5-year plan (2009-2014)

Evaluator: IMPAQ

Data:

34 communes (17: treated, 17: control)

Treatment: Dissemination of land reform's merits + APFRs (early stages)

Land & Crop production data
3,352 hh, > 6,000 land plots

Additional Analysis (2): Normative

What if the reform was extended to allow pledging of land as collateral (**collateralization effect**)?

Collateralization of land could grant the affected areas with **access to credit**.

) **race** between **mutual** and **self insurance**.

Collateralization option **was weakly defined** in the 2009 land reform in Burkina Faso, depending on banks' requirements (Hughes, 2014).

Results

Model result:

-) Trade-off between amount of risk-sharing and output efficiency
-) Non monotonic relation of land to productivity ! inefficient customary allocation of land.

Empirical result:

-) In treated villages, farmers exhibiting higher productivity than the median, are allocated less land compared to less productive farmers.

Normative result:

-) For certain level of self-insurance, risk-averse agents strictly prefer self to mutual insurance.

However,

3 critical reasons led to a new paper:

1. Burkina Faso → clear-cut example of a land reform.
 - | focused on “assurance effect”.
 - | transition from communal land management to individual ownership.
 - | **not** always the case in Western African countries / land rights operate under:
 - | Dual - institutional framework.
 - | (i) incomplete land markets, (ii) strong inheritance rules (cultural), (iii) ill-defined formal land rights.
2. Limited data on Burkina Faso.
3. Principal agent model → other households enter indirectly.

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⇒ **“Mutual Insurance and land security in Rural Ghana”**

with Karol Mazur (University of Oxford)

- | *Ghana Socioeconomic Panel Survey (Yale - EGC and ISSER)* - Panel data (waves 2009/2014 - 5,000 hhs)
- | Quantitative model of voluntary participation w/ 2-sided limited commitment.

More

Concluding Remarks

The present work:

1. Studies **land rights** in environments with:
 - | **communal** land management.
 - | voluntary participation to **informal risk-sharing mechanisms**.
2. Speaks to the **policy design** of land reforms on customary rules accommodating
 - | powerful figures with **full control over land**.
 - | **strong inheritance rules**

World Bank's view on land policy in Africa

It could potentially provide the **theoretical justification** for the development of the **rationale of the World Bank**.

In the mid-1970's the World Bank held the following position:

land policy [..] was focused on the desirability of providing secure individual title to smallholder farmers. (*World Bank, 1975*)

while in the early 1990's, World Bank switched to the following:

'indigenous land tenure systems appear to be adapting efficiently to changes in relative factor scarcities and this evidence undermines the conventional view that land rights are a constraint on productivity' (*Udry, 2011*)

Thank you

Intro & Research Question

Customary norms on land are widespread in Ghana

- | 80% of Ghana's land under customary land laws Fenrich et al. (2011).

Strong inheritance rules → Ghanaian land can be either **Stool** or **Skin**

- | Stool (South Ghana), Skin (North Ghana): symbols of chieftanship
- | Stool land ! patrilineal
- | Skin land ! matrilineal

Research Question: How does land formalization affect mutual insurance and land reallocations in environments w/ strong inheritance rules?

Empirical Analysis - Risk-sharing & selling rights

Two indicators of mutual insurance:

1. risk-sharing ratio:

$$RS_{v,t} = \frac{\text{Var}(c_{h,v,t})}{\text{Var}(y_{h,v,t})}$$

2. elasticity of consumption over idiosyncratic income shocks:

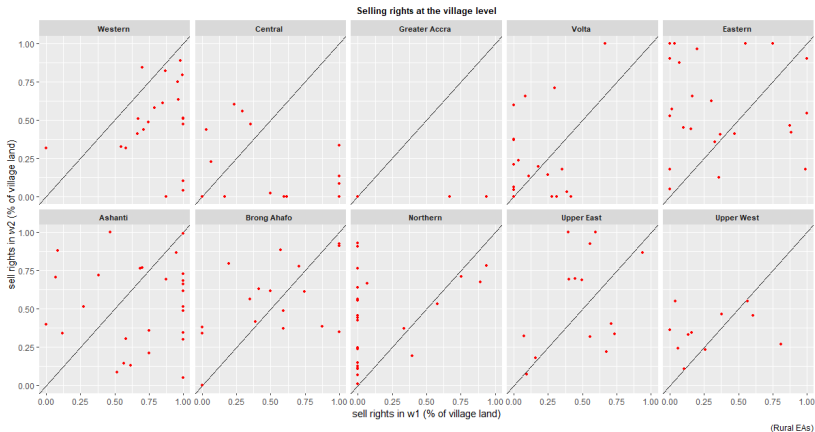
$$\frac{\partial c/c}{\partial y/y}$$

Main explanatory variable:

$$\text{sell-rights}_{v,t} = \sum_{p \in v} \left(\text{sell-rights}_{p,t} \frac{\kappa_{p,t}}{\sum_{p \in v} \kappa_{p,t}} \right)$$

- where p : plot in village v and $\kappa_{p,t}$: size of p at time t
- $\text{sell-rights}_{p,t} \in \{0, 1\}$

Empirical Analysis - Variation in village selling rights



Village selling rights waves 1 & 2

Empirical Analysis - Risk-sharing & selling rights

$$RS_{v,t} = \alpha + \beta_1 \cdot \text{sell-rights}_{v,t} + \beta_2 \cdot X_{v,t} + \epsilon_{v,t}$$

		<i>Dependent variable:</i>	
		<i>ihS(RS_{v,t})</i>	
<i>sell-rights_{v,t}</i>		-1.386	(0.432)
mean village cons pc		0.0001	(0.0002)
Village FE		Yes	
Village Land Controls		Yes	
Regions Clustered se		Yes	
Observations		334	
R ²		0.110	
F Statistic	2.717	(df = 6; 132)	
<i>Note:</i>		p<0.1;	p<0.05; p<0.01

Empirical Analysis - Risk-sharing & selling rights

$$\begin{aligned}
 ihs(c_{h,v,t}) = & \alpha + \beta_1 \cdot ihs(y_{h,v,t}) + \beta_2 \cdot ihs(y_{h,v,t}) \cdot sell-rights_{v,t} + \\
 & \beta_3 \cdot sell-rights_{v,t} + \beta_4 \cdot X_{h,v,t} + \epsilon_{h,v,t}
 \end{aligned}$$

<i>Dependent variable:</i>	
	<i>ihs(c_{h,v,t})</i>
<i>ihs(y_{h,v,t})</i>	0.036 (0.007)
<i>sell-rights_{v,t}</i>	0.363 (0.145)
<i>ihs(y_{h,v,t}) * sell-rights_{v,t}</i>	-0.062 (0.030)
<i>ihs(mean village cons)</i>	0.972 (0.021)
Village + Land controls	Yes
HH Fixed effects	Yes
Village Clustered se	Yes
Observations	4,723
R ²	0.587
F Statistic	331.827 (df = 8; 1864)
<i>Note:</i>	p<0.1; p<0.05; p<0.01

Quantitative village economy

Two ex-ante homogeneous and risk averse households.

Time is discrete and households are infinitely lived.

Crop output in each period: $y_{i,t} = \phi_t \cdot \theta_{i,t} \cdot z_{i,t}^\alpha$

- | Idiosyncratic and aggregate productivity Markov-shocks θ and ϕ .
- | Fixed land supply in every period: $z_1 + z_2 = 1$.
- | Land in t chosen for $t + 1$ production.
- | *Inherent* land allocation at $t = 0$: $z_{1,0} = z_{2,0} = 0.5$.

Limited commitment:

- | in every period and weather-productivity state realization, require that for every farmer: Value of coop Value of non-coop.

Land and risk sharing allocation with limited commitment

The village chief solves:

$$V_t^{LRS}(x_t) = \max_{f_{c_{i,t}, z_{i,t+1}g}} \sum_{i=1}^2 \lambda_{i,0}^{LRS} \left(u(c_{i,t}) + \beta E_{\theta} V_{i,t+1}^{LRS}(x_{t+1}|x^t) \right)$$
$$s.t. \quad \sum_i c_{i,t} \leq \sum_i \phi_t \theta_{i,t} z_{i,t}^{\alpha}$$
$$E_t \left[\sum_{t'=t}^1 \beta^{t'} {}^{t'} u(c_{i,t'}) \right] \geq V_{i,t}^{out} \left(\tilde{x} = \underbrace{(\psi \cdot 0.5 + (1 - \psi) \cdot z_{i,t})}_{z_{i,t}^{out}}, \theta_{i,t} \right) \quad \forall i, x^t$$
$$z_{1,t+1} + z_{2,t+1} = 1$$
$$z_{i,t+1} \in [0, 1]$$

Outside option

Outside the contract:

farmers make individual decisions about consumption, land transactions and associated production.

farmers do not share their output with others in the village (self-insurance).

$$V_{i,t_{dev}}^{out}(x_{i,t_{dev}}; \psi) = \max_{f_{i,t_{dev}}^{out}, z_{i,t_{dev}+1}^{out}} u(c_{i,t_{dev}}^{out}) + \beta E_{\theta} V_{i,t_{dev}+1}^{out}(x_{i,t_{dev}+1} | x_{i,t_{dev}}^{i,t_{dev}})$$

subject to:

$$t = t_{dev} : c_{i,t}^{out} + q_{z,t} z_{i,t+1}^{out} \leq \phi_t \theta_{i,t} (z_{i,t}^{out})^{\alpha} + q_{z,t} z_{i,t}^{out}$$

$$t > t_{dev} : c_{i,t}^{out} + q_{z,t} z_{i,t+1}^{out} \leq \phi_t \theta_{i,t} (z_{i,t}^{out})^{\alpha} + q_{z,t} z_{i,t}^{out}$$

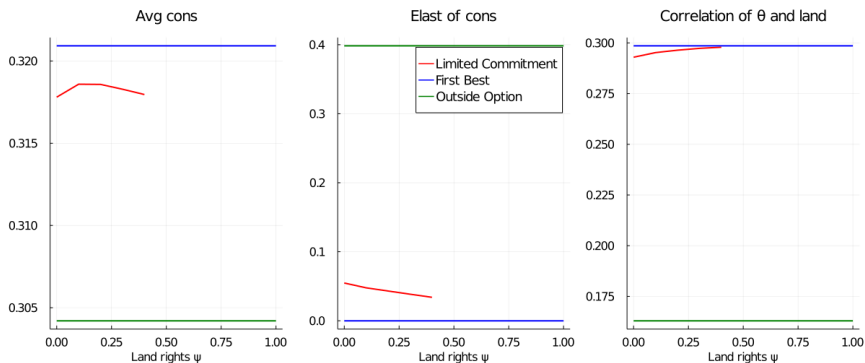
where $z_{i,t_{dev}}^{out} = \psi z_{i,0} + (1 - \psi) z_{i,t}^{LRS}$ and land price $q_{z,t}$ is s.t. market clearing $z_{1,t+1} + z_{2,t+1} = 1$ holds in eqm.

Numerical example: non-linear effects of land rights

Increase in ψ affects heterogeneous farmers differently:

As $\psi \uparrow$, θ_H 's incentives to deviate decrease since $z_{H,t}^{in} > 0.5$.

As $\psi \uparrow$, θ_L 's incentives to deviate increase since $z_{L,t}^{in} < 0.5$



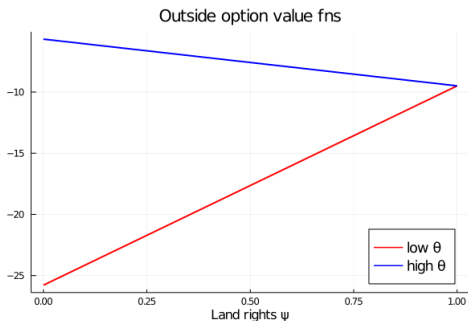
Numerical example results

Numerical example: co-operation break-down

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As $\psi \uparrow$, θ_L 's incentives to deviate increase since $z_{L,t}^{in} < 0.5$



Changes in value of outside option

Research plan - IV strategy

Empirical findings: non-causal.

Potential endogeneity of *sell-rights* to many village, land and ethnic characteristics.

Exploit the distance to commercial centres under the British rule to instrument for *sell-rights*.

Assumption: Areas directly under the British control would be more likely to have adopted a land tenure regime closer to the western rule than the customary one.

Research plan - IV strategy

British presence in the Gold Coast starts in 1821 ends in 1956.

Concentrated in the coast due to commercial interests.

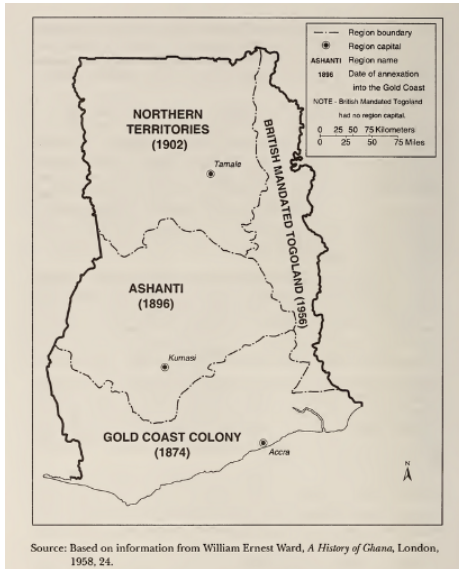
Bond of 1844: Special treaty between British and coastal states.

- | Offering protection against Ashanti.
- | Constituting the legal foundation for British colonization.

“MacLean’s interest with the Bond was not territorial expansion rather the expansion of justice that we now call British Justice”

(J. B. Danquash, 1957)

Research plan - IV strategy



Timing of British rule's expansion

Concluding Remarks

The present work:

1. Studies **land rights** in environments with:
 - | **communal** land management.
 - | voluntary participation to **informal risk-sharing mechanisms**.
2. Speaks to the **policy design** of land reforms on customary rules accommodating
 - | powerful figures with **full control over land**.
 - | **strong inheritance rules**

World Bank's view on land policy in Africa

It could potentially provide the **theoretical justification** for the development of the **rationale of the World Bank**.

In the mid-1970's the World Bank held the following position:

land policy [..] was focused on the desirability of providing secure individual title to smallholder farmers. (*World Bank, 1975*)

while in the early 1990's, World Bank switched to the following:

'indigenous land tenure systems appear to be adapting efficiently to changes in relative factor scarcities and this evidence undermines the conventional view that land rights are a constraint on productivity' (*Udry, 2011*)

Thank you

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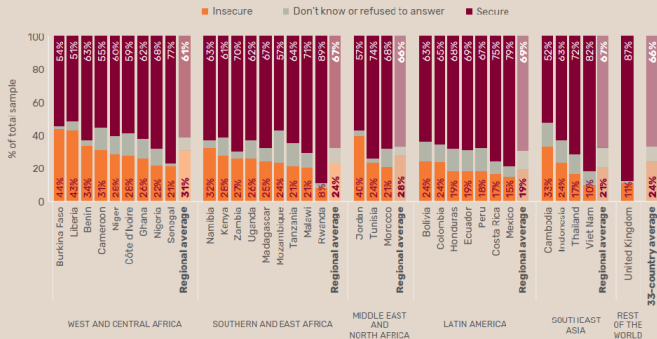
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Tables from PR-Index

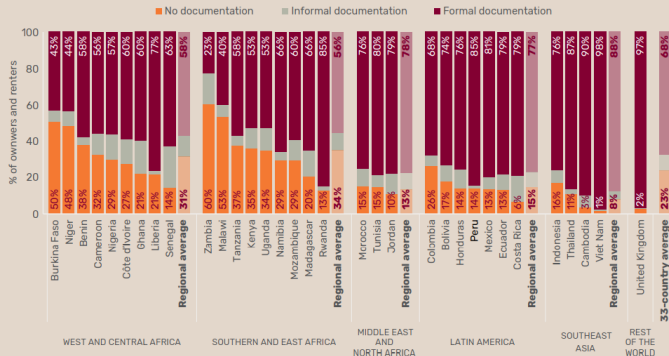
FIGURE 1: PERCEIVED TENURE INSECURITY AND SECURITY BY COUNTRY AND REGION



Source: authors using Prindex data.

Comparative Report, PR-Index, March 2019

FIGURE 3: PROPORTION OF OWNERS AND RENTERS WITH FORMAL, INFORMAL OR NO DOCUMENTATION BY COUNTRY AND REGION



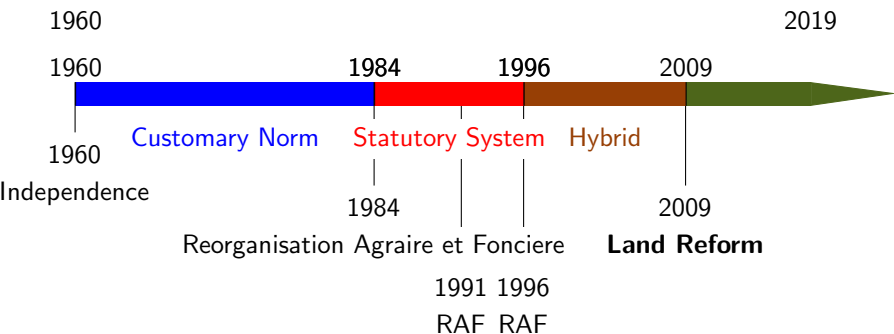
Note: The methodology for reporting type of tenure has been adapted since the wave 1 comparative report. This is the reason for minor changes in results for some countries.

Source: authors using Prindex data.

Land Regimes' Timeline

[Back](#)

Land Management in Burkina Faso:



Application locus: rural Burkina Faso.

Targets:

1. equitable access to land
2. enhance productivity
3. sustainable land management
4. social peace

APFR (Attestation de Possession Fonciere Rurale)

1. either individual or collective
2. issuing period 75 days
3. community needs to approve it

Rights from APFR

1. productive and profitable use of land is allowed
2. transfer of it to family members is allowed
3. access to bank loans (depending on the bank's requirement) is allowed
4. sale of parcel to a third party **not** allowed

1. **Dissemination of information**

- ! The first activity of the MCC plan was "Communication & Outreach"

2. **Time-consuming process of APFR issuance**

- ! Issuing period: 75 days, within which any objections should be raised.

3. **People do not apply - or community does not approve?**

- ! Impossible to disentangle without data.
- ! Model predicts that if the community does not approve, it can induce no application.

Rural Land Governance Project			
Activities	Title	Description	Phases
Activity No 1	Legal and Procedural Change and Communication	<ol style="list-style-type: none"> 1. Support government's efforts to develop and implement improved rural land legislation and to develop, revise and implement other legal and procedural frameworks. 2. Significant public outreach program to inform people about the new legislations and its expected benefits 	Phase I (2009-2012) (national level)
Activity No 2	Institutional Development and Capacity Building	<ol style="list-style-type: none"> 1. Improve institutional capacity to deliver land services in rural areas. 2. Funding of series of land registration, mapping and decentralization services. 	Phase I (2009-2012) (17 communes) Phase II (2012-2014) (additional 30 communes)
Activity No 3	Site-Specific Land Tenure Interventions	<ol style="list-style-type: none"> 1. Site specific land rights formalization sub-activities 2. Provision of APFR certificates 3. Preparation of land titles and leases in selected project areas. 	Phase I (2009-2012) (17 communes) Phase II (2012-2014) (additional 30 communes)

Table 3: Burkina Faso Rural Land Governance Project Impact Evaluation (IMPAQ, 2015)

Observation No 1: Transfers

Intensive Margin:

Non Agricultural Income			<i>Trans. % Inc.</i>	<i>%Tot.Sample</i>
	Baseline	Followup		
Salary	45.8	47.2	10-50	22%
Trade	1.65	2.25	51-100	18%
Transfers	55.6	56.7	100-200	16%
Pensions	5.2	5.8	200-300	10%
Breeding	2.6	2.1	300-400	10%

Non- Agricultural Income (in mil.
FCFA)

Transfers as % of Agr. Income

Extensive margin: 14.6% (13.5%) of the individuals have received a transfer in the past 12 months in the baseline (interim) survey.

Observation No 1: Transfers

[Back](#)

However,

81.6% of the villages - (where maximum 8 hhs are surveyed) include at least one person receiving transfers.

The sample consists of individuals that belong to the same household. It is more likely that transfers target the head of the household and from there it is distributed to the members.

Land Size

[Back](#)

60.4% have a parcel ranging from 0.1 to 1 hectare.

20.4% from 1 to 2 hectares.

12.3% from 2 to 3 hectares.

Number of plots and transfers

[Back](#)

Variables	(1) Received Transfers (Baseline Survey)	(2) Received Transfers (Follow-up Survey)
Number of Plots	-0.024*** (0.00403)	-0.039*** (0.00336)
Constant	1.867*** (0.00411)	0.117*** (0.00446)
Observations	10,361	10,277
R-squared	0.003	0.008

Standard errors in parentheses

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

Dependent variable: Probability of receiving a transfer

Land Size and Risk-sharing

[Back](#)

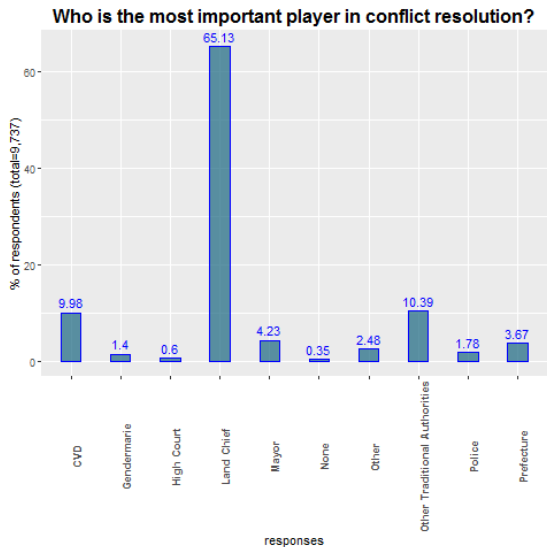
Observation No 4: Land size matters for receiving a transfer.

$$\Pr(\text{Transf}_i = 1) = \beta_1 \text{Sex}_i + \beta_2 \text{CdM}_i + \beta_3 \text{Age}_i + \beta_4 \text{LandSize}_i + \epsilon_i$$

Variables	(1) Model 1		(2) Model 2	
	Baseline	Interim	Baseline	Interim
<i>sex</i> (1=Male, 0: Female)	-0.0384*** (0.00972)	-0.0483*** (0.00921)	-0.0774*** (0.0273)	-0.0348 (0.0217)
<i>chef de menage</i> (1: True, 0:False)	0.0369*** (0.0111)	0.0286*** (0.0109)	0.0373 (0.0291)	0.00692 (0.0232)
<i>Age</i>	0.00252*** (0.000230)	0.00317*** (0.000231)	0.00301*** (0.000538)	0.00379*** (0.000439)
<i>Land Size</i>			-0.00458 (0.00474)	-0.00862** (0.00346)
<i>Constant</i>	0.0635*** (0.0105)	0.0302*** (0.0106)	0.0528** (0.0241)	0.0131 (0.0201)
Observations	10,361	10,234	2,018	3,138
R-squared	0.019	0.028	0.024	0.030

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1



Derivations for the IFT

Back

$$H(z_s, \kappa_s) = z_s - \phi_s \left[u^0(z_s f(\kappa_s)) z_s + \frac{1}{1-\beta} \underbrace{E_r \left[u^0(z_r f(\kappa_s)) z_r \right]}_{\omega(z_r, \kappa_s)} \right]$$

then:

$$\frac{\partial \mathcal{H}(z_s, \kappa_s)}{\partial \kappa_s} = 0 - \phi_s \left[u^{00}(z_s f(\kappa_s)) z_s f^0(\kappa_s) + \frac{1}{1-\beta} \Pi_r u^{00}(z_r f(\kappa_s)) z_r^2 f^0(\kappa_s) \right] > 0$$

but

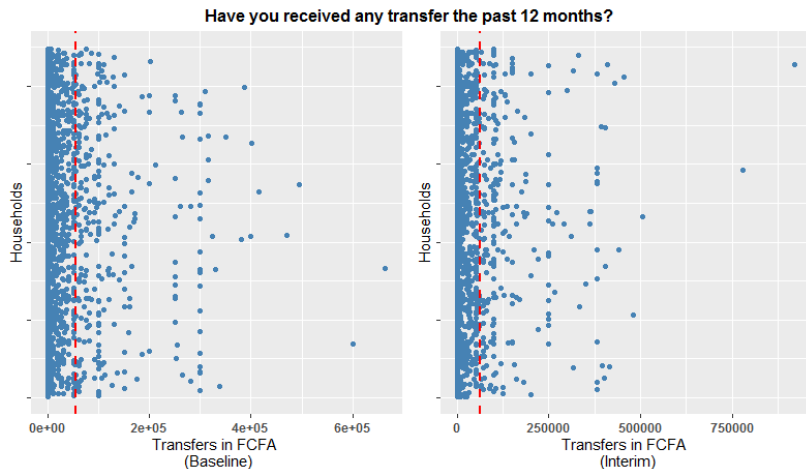
$$\frac{\partial \mathcal{H}}{\partial z_s} = 1 - \phi_s \left[\underbrace{u^{00}(z_s f(\kappa_s)) f(\kappa_s) z_s}_{<0} + \underbrace{u^0(z_s f(\kappa_s))}_{>0} \right]$$

<>=?

Since the $\frac{\partial \mathcal{H}}{\partial \kappa_s} > 0$, then the sign of the ift expression depends on the partial derivative of \mathcal{H} over idiosyncratic productivity (z_s)

Transfers among households

Observation No 1: Transfers among households are non-negligible both in the intensive and the extensive margin.

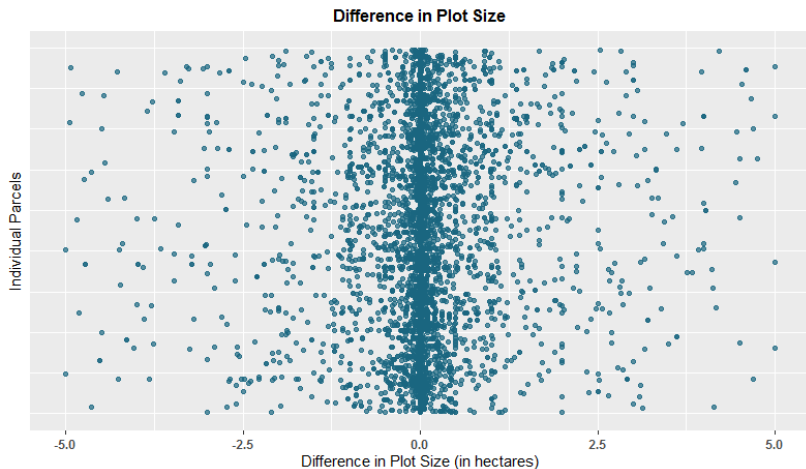


WB data

Back

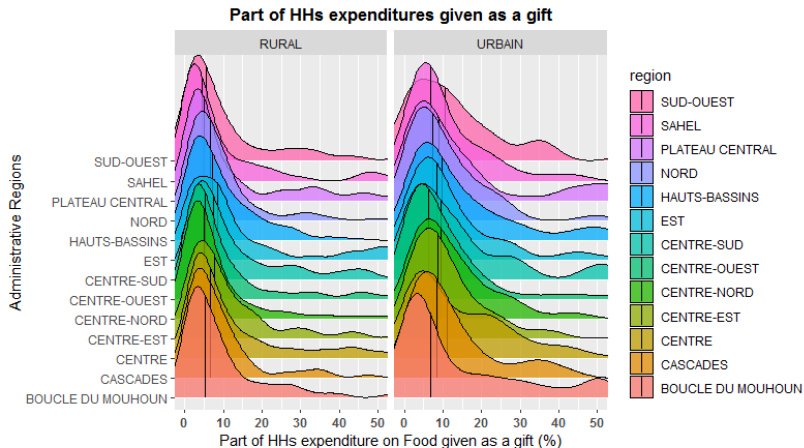
Plot Size

Observation No 2: Plot size variation is widely observed.



- 76% of the farmers reported different plot size between the two survey waves.
- 37% of the farmers reported a difference larger than 20%.

Gift giving in World Bank Data



Source: Consommation Du Menage des 7 Dernieres Jours (Passage 3) | World Bank LSMS-ISA