

Who wants property rights? Land values and formal titles in 22 African countries

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MOTIVATION

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Figure 1: "Attention land predators! No parcel from this site is meant for sale!"

MOTIVATION

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Key results:

- Contrary to prevailing expectations, land values by themselves are not associated with higher rates of land titling.
- The potential returns to investing in land—particularly for investing in tree crops—are associated with higher rates of land titling.
- However, the relationship between the relationship between returns to investment and titling is moderated by strong customary institutions: households with strong institutions title less.

CONTRIBUTION

- Existing research focuses on when states and other elites **supply** formal property rights (Albertus 2020; Boone 2014; Herbst 2014; Honig 2022; Onoma 2010).
- This project highlights when households **demand** formal property rights (Ellickson 1991; Honig 2017).
- This research advances a growing literature on the political economy of informality: informality as a resource rather than as a constraint (Balan et al. 2023; Baldwin and Ricart-Huguet 2023; Bates 1983; Ferree et al. 2023; Nathan 2022).
- Brings the politics back into the political economy of property rights.

EXISTING THEORY

RESEARCH QUESTION

What explains variation in the prevalence of formal land titles?

ENDOGENOUS PROPERTY RIGHTS

Within political economy, theories of **endogenous institutions** posit that property rights emerge when the individual benefits to organizing such a system become equal to the individual costs (Besley and Ghatak 2010; North 1990).

Shifts in the value of property can then shock prevailing equilibria and drive institutional change (Libecap 1989).

COSTS

Households weight costs and benefits when deciding whether to pursue formalization.

Land titling is not a 1:1 mapping of existing use onto paper—there will be winners and losers, and households run a risk of losing land (boone_shifting_2018; colin_identifier_2009; Delville and Moalic 2019).

Households also pay a fee to title. In Senegal, this is 5,000 CFA (about USD 8).

BENEFITS

On the other hand, land titles reduce the risk of losing land, which allows households to invest more in their parcels

(goldstein_profits_2008; North and Weingast 1989).

*Many subsistence agriculturalists have taken to the growing of plantation crops, with the result that **land which was formerly the collective property of the group has now become the private property of some members of the group**, with new rights of transfer and new rules of inheritance (Meek 1939: 3).*

ENDOGENOUS PROPERTY RIGHTS

If you feel more confident that you will receive the returns to an investment, you'll be more likely to make the investment (North and Weingast 1989).

- Existing research largely centers land values.
- However: the quantity of interest here isn't land values per se, but rather the returns to potential investments.

ENDOGENOUS PROPERTY RIGHTS

Strong customary institutions can decrease the marginal increase in security provided by formal titles:

- Historically, the absence of the state has left chiefs as arbiters of disputes (Herbst 2014; Nathan 2022).
- Chiefs may be jealous of this power because households who bring disputes to the chief implicitly recognize the chief's authority to resolve conflicts.
- Households may also prefer informal sources of conflict resolution (Winters and Conroy-Krutz 2021).

HYPOTHESES

- H1. Households in areas with higher land values will be more likely to possess a formal land title.
- H2. Households in areas with higher returns to investment in agricultural parcels will be more likely to possess a formal land title.
- H3. The relationship between land values/returns to investment will be weaker in areas with strong customary institutions.

RESEARCH DESIGN

Two new data sources permit me to understand the conditions under which households seek land titles in response to land values:

- **Outcome variable:** LSMS and DHS survey, aggregated from 60 different survey waves across 22 countries. Specific variable is a binary indicator for whether a household has at least one land title.
- **Explanatory variable:** new approach to measuring land values, combining geospatial data on attainable yields and global commodity price data.

And we'll use Murdock data to see how these relationships operate with and without strong customary institutions.

EXISTING EXPLANATIONS

I combine two large scale data collection efforts: the Demographic and Health Surveys (DHS) and the Living Standards Measurement Surveys (LSMS).

- 22 countries;
- 60 country-survey wave dyads;
- 389,529 survey observations;
- 167,479 observations with non-missing observations of land titling.

Outcome variable: whether a household has at least one formal land title.

COMBINED SURVEY DATA

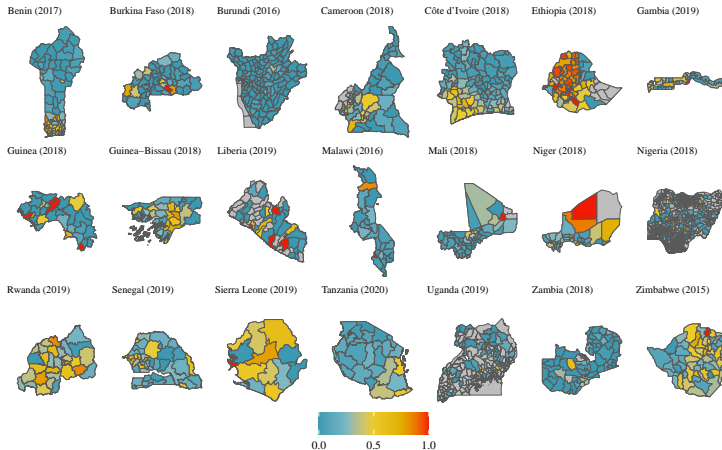


Figure 2: Fraction of landholding households with at least one formal land title

Data sources Titling over time Zoom-in

DATA SOURCES

How to measure land values in areas without well-documented land markets?

- Crop-wise total attainable yield per hectare from the Food and Agricultural Organization (FAO)'s Global Agro-Ecological Zones (GAEZ) dataset. [Data details](#)
- Historic commodity price details from the IMF's Primary Commodity Price System. [Data details](#)

For each crop and grid cell, I multiply the maximum attainable yield (MT/ha) by the commodity prices in a given year (USD/MT) to obtain the attainable price (USD/ha). I then take the maximum of this vector. [Formal definition](#)

RETURNS TO INVESTMENT

In addition to the maximum attainable value, I can adjust the underlying parameters of the model to obtain two estimates of the returns to investing in the land:

- The difference in attainable value with and without fertilizer (i.e. the returns to fertilization)
- The difference in attainable value planting tree crops and other crops (i.e. the returns to planting trees)

Côte d'Ivoire example

OTHER MEASURES

I interact these land value data with a measure of hierarchy in precolonial institutions from Murdock's ethnographic atlas.

This is a metric for the **strength of customary institutions**.

Distribution by country

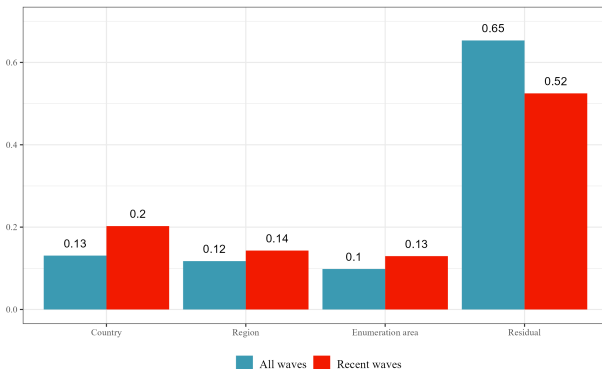
SUMMARY

- **Outcome variable:** Binary indicator for whether a household has at least one land title.
- **Explanatory variables:** Attainable value per hectare, returns to agricultural investment.
- **Moderating variable:** Strength of customary institutions.

RESULTS

RESULTS: 2ND LEVEL ADMINISTRATIVE DIVISIONS

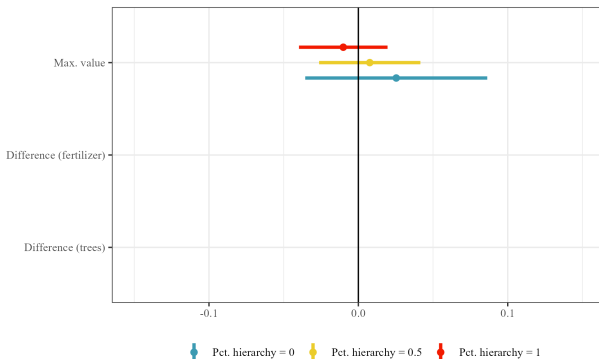
Figure 3: Geographic variables do not capture all variance in land titling rates



This figure decomposes the variance of the outcome variable (binary indicator of having a land title) for the merged survey data. Each bar shows the marginal R^2 from adding the additional geographic specificity.

RESULTS: 2ND LEVEL ADMINISTRATIVE DIVISIONS

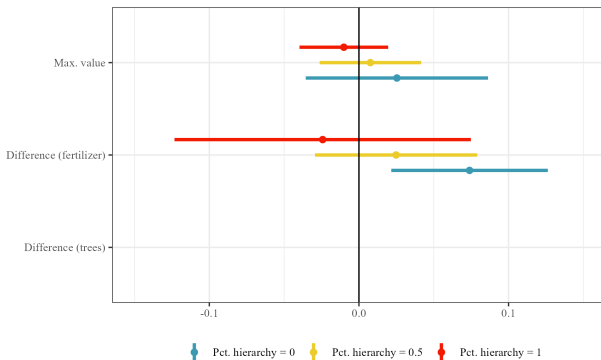
Figure 4: Strong customary institutions moderate the relationship between land values and titling



Points represent the marginal effect of an increase of one standard deviation in attainable yield, returns to fertilization, and returns to tree crops; bars show 95% confidence intervals. Results are from OLS models with country-wave fixed effects. Standard errors are clustered by country and survey wave. [Regression table](#)

RESULTS: 2ND LEVEL ADMINISTRATIVE DIVISIONS

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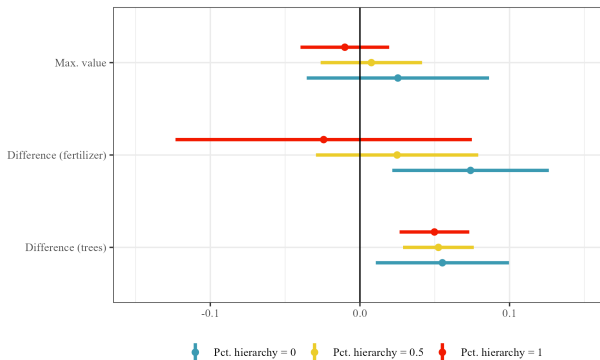
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Marginal effects (fertilizer)

Marginal effects (trees)

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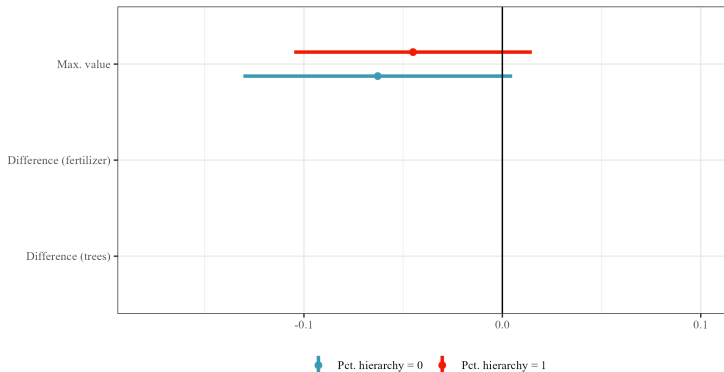
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RESULTS: EA CENTER POINTS

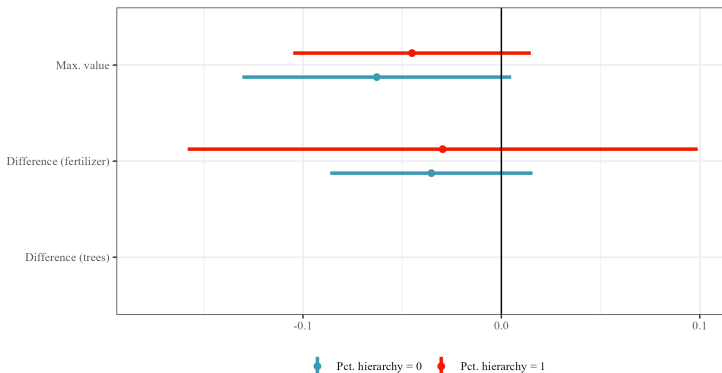
Figure 5: Strong customary institutions inconsistently moderate the relationship between land value and land titles at the EA level



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RESULTS: EA CENTER POINTS

Figure 5: Strong customary institutions inconsistently moderate the relationship between land value and land titles at the EA level



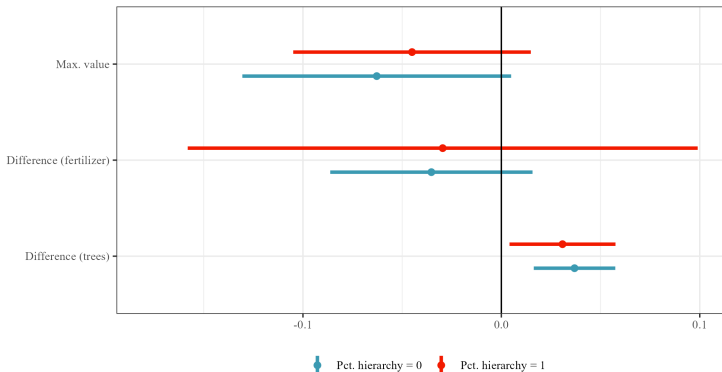
Points represent the marginal effect of an increase of one standard deviation in attainable yield, returns to fertilization, and returns to tree crops; bars show 95% confidence intervals. Results are from OLS models with country-wave fixed effects. Standard errors are clustered by country and survey wave. [Regression table](#)

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Marginal effects (fertilizer)

Marginal effects (trees)

NEXT STEPS

DISCUSSION

Households do not pursue formal land titles, despite availability and documented benefits, when they have strong customary institutions.

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Households do not pursue formal land titles, despite availability and documented benefits, when they have strong customary institutions.

Conventional economic explanations don't seem to explain variation in household demand for land titles. The relationship between the relationship between returns to investment and titling is moderated by strong customary institutions: households with strong institutions title less.

DISCUSSION

Households do not pursue formal land titles, despite availability and documented benefits, when they have strong customary institutions.

Conventional economic explanations don't seem to explain variation in household demand for land titles. The relationship between the relationship between returns to investment and titling is moderated by strong customary institutions: households with strong institutions title less.

Who wants property rights?

OTHER EMPIRICAL CHAPTERS

I explore this question through two additional empirical chapters in my book-style dissertation:

- A natural experiment in Cote d'Ivoire: **Research design**
 - Chiefs receive a plausibly exogenous shock to their political legitimacy immediately before land formalization through a village mapping process.
- A field conjoint experiment in Senegal. **Research design** **Results**
 - Households who distrust their local governments place less weight on formal land title when adjudicating hypothetical land disputes.

CONTRIBUTION

- The majority of African households continue to work in the agricultural sector, which means that land tenure is the form of property rights which impact the greatest number of lives across the continent (German and Braga 2021; Meinzen-Dick and Mwangi 2009).
- Beyond their role in economic development, formal property rights drive legibility, underly statebuilding, and condition a variety of political behaviors (Albertus 2020; 2023; Ferree et al. 2023; Herbst 2014; Scott 1998).
- This research advances a growing literature on the political economy of land, development, and informality (Balan et al. 2023; Baldwin and Ricart-Huguet 2023; Bates 1983; Ferree et al. 2023; Honig 2022; Nathan 2022).



Thank you for listening!

APPENDIX

SOURCES FOR OUTCOME DATA

Data are from the most recent round of the Demographic and Health (DHS) or Living Standards Measurement Survey (LSMS). All averages use provided survey weights.

Data for Benin, Burundi, Cameroon, Gambia, Guinea, Liberia, Mali, Nigeria, Rwanda, Senegal, Sierra Leone, Zambia, and Zimbabwe are from the DHS.

Data for Burkina Faso, Cote d'Ivoire, Ethiopia, Guinea-Bissau, Malawi, Niger, Tanzania, and Uganda and from the LSMS.

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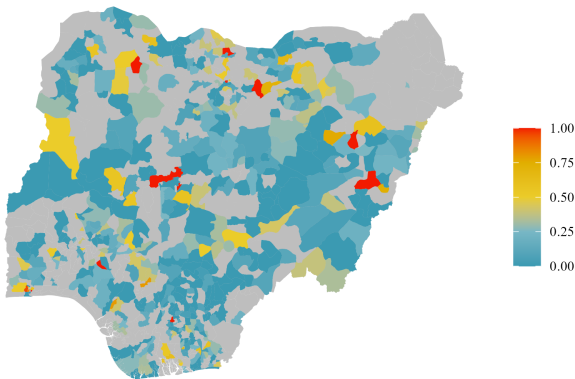


Figure 6: Fraction of landholding households in Nigeria with at least one formal land title

[Data sources](#)[Titling over time](#)[Back](#)

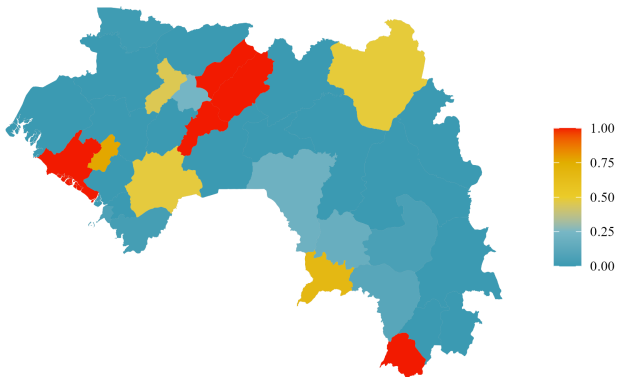


Figure 6: Fraction of landholding households in Guinea with at least one formal land title [Data sources](#) [Titling over time](#) [Back](#)



Figure 6: Fraction of landholding households in Senegal with at least one formal land title [Data sources](#) [Titling over time](#) [Back](#)

TITLING RATES OVER TIME



Figure 7: Fraction of landholding households with at least one formal land title per country over time [Back](#)

FORMAL DEFINITION

More formally, the value π_g of grid cell g in year y is defined as:

$$\pi_{g,y} = \max_c(p_{c,y} \cdot s_{c,y,g})$$

where p indicates crop price, s indicates the attainable yield, and observations are indexed by g for grid cell, y for year, and c for crop.

These data will measure the maximum attainable value in dollars per hectare for a given 10km by 10km grid cell on a yearly basis.

DETAILS: FAO CROP SUITABILITY

The model takes into account climate data (from a variety of potential models), soil and terrain data, as well as observed phenology and crop calendars. The attainable yield I use in these analyses are expressed in kilograms per hectare.

Attainable yield here differs from “agro-climactic suitability” because the latter do not take into account soil suitability and terrain factors. These data are averaged over the entire grid cell: potential total production is divided by total grid cell area. Each grid cell is a 10km by 10km square.

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DETAILS: IMF PRICING

Prices come from the IMF's Primary Commodity Price System. The majority of prices are listed as USD per metric ton; I apply an appropriate correction for other prices.

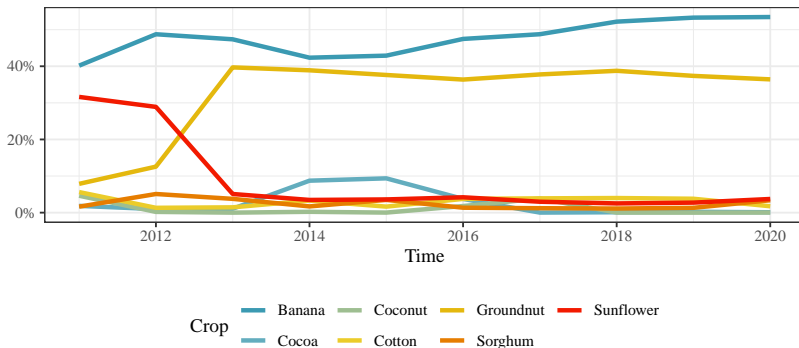
The commodities included in these data are: bananas, barley, chickpeas, cocoa, coffee, coconuts, cotton, groundnuts, corn, oats, palm oil, rice, canola oil, rubber, sunflower oil, soybeans, sorghum, sugar, tea, and wheat. I exclude tomatoes because the commodity price is calculated differently.

All prices are in constant 2011 USD.

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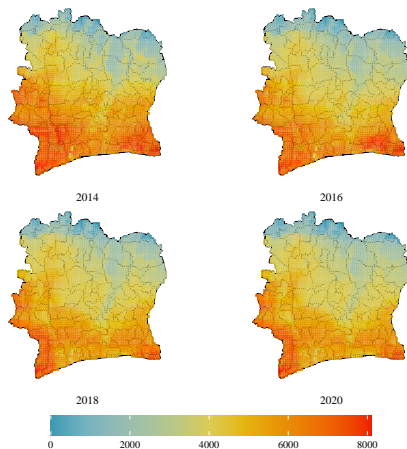
PERCENTAGE OF CELLS PER CROP

Figure 8: Percentage of grid cells where each crop is most valuable



This figure excludes crops which are the most valuable in less than one percent of grid cells. Data are from the FAO's Global Agro Ecological Zone model and the IMF's Primary Commodity Price System. [Back](#)

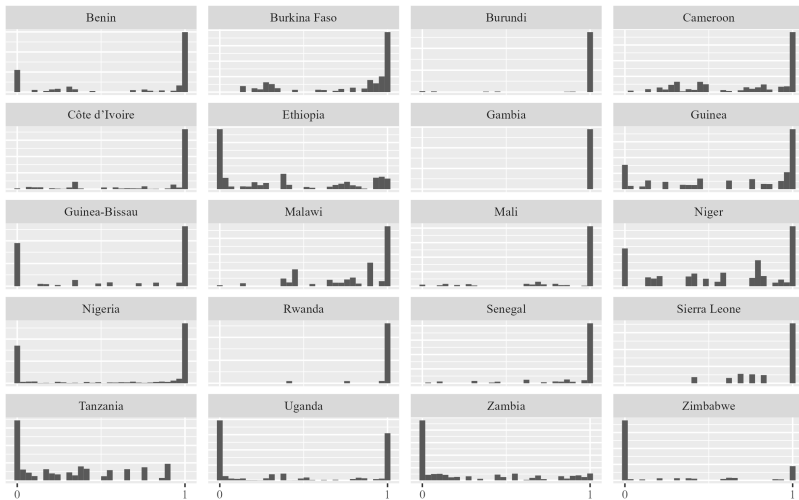
CÔTE D'IVOIRE EXAMPLE (RETURNS TO TREE CROPS)



Data are from the FAO's Global Agro Ecological Zone model and the IMF's Primary Commodity Price System.

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Figure 9: Distribution of hierarchy variables by country



Data are from the Murdock ethnographic atlas.

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FULL REGRESSION TABLE: ADMINISTRATIVE DIVISIONS

Table 1: Potential value of output and the likelihood of a household formalizing

	(1)	(2)	(3)	(4)	(5)	(6)
Max value	0.015 (0.028)	0.016 (0.029)	-0.010 (0.012)	-0.034 (0.033)	-0.001 (0.030)	-0.006 (0.030)
Difference (trees)			0.103*** (0.016)	0.098*** (0.018)		
Difference (fertilizer)					0.343 (0.579)	0.442 (0.565)
Land grabs	-0.004 (0.005)	-0.003 (0.006)	-0.003 (0.005)	-0.002 (0.006)	-0.004 (0.005)	-0.004 (0.006)
Country/Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls		X		X		X
Geographic Controls		X		X		X
Num.Obs.	166 012	152 909	166 012	152 909	166 012	152 909
R2	0.232	0.237	0.238	0.243	0.232	0.237

Note: The dependent variable of this model is a binary indicator for whether the household possesses a title. The unit of analysis is the household. Land value data vary at the second level administrative division, with the exception of Cote d'Ivoire (third level) and Malawi (first level). Data are from the DHS and LSMS projects. Country and year two-way clustered standard errors are displayed in parentheses.

FULL REGRESSION TABLE: ADMINISTRATIVE DIVISIONS

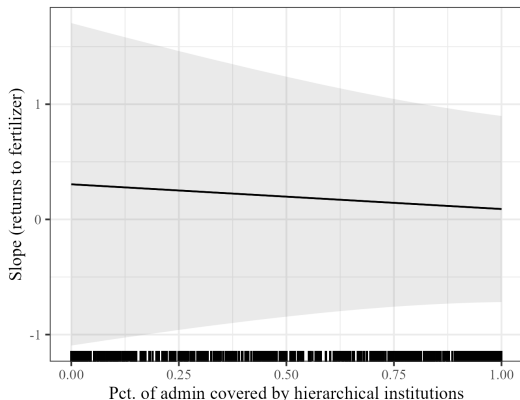
Table 2: Potential value of output, hierarchical pre-colonial institutions, and the likelihood of possessing a land title

	(1)	(2)	(3)	(4)	(5)	(6)
Max value	0.019 (0.023)	0.019 (0.024)	0.006 (0.026)	0.006 (0.028)	-0.034* (0.014)	-0.040** (0.015)
Max value * Hierarchy	-0.026 (0.025)	-0.028 (0.026)	-0.025 (0.024)	-0.027 (0.025)	0.044 (0.044)	0.049 (0.046)
Difference (trees)			0.110* (0.045)	0.103* (0.043)		
Difference (trees)* Hierarchy			-0.011 (0.054)	-0.011 (0.054)		
Difference (fert.)					1.505** (0.543)	1.694*** (0.398)
Difference (fert.)* Hierarchy					-1.999 (1.199)	-2.192 (1.181)
Land grabs	-0.021** (0.008)	-0.021** (0.008)	-0.017* (0.007)	-0.016* (0.007)	-0.024*** (0.006)	-0.025*** (0.006)
Land grabs * Hierarchy	0.031 (0.022)	0.032 (0.022)	0.023 (0.020)	0.023 (0.022)	0.037* (0.018)	0.039* (0.018)
Country/Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls		X		X		X
Geographic Controls		X		X		X
Num.Obs.	166 012	152 909	166 012	152 909	166 012	152 909
R2	0.233	0.238	0.240	0.244	0.234	0.240

Note: The dependent variable of this model is a binary indicator for whether the household possesses a title. The unit of analysis is the household. Land value data vary at the second level administrative division, with the exception of Cote d'Ivoire (third level) and Malawi (first level). Data are from the DHS and LSMS projects. Country and year two-way clustered standard errors are displayed in parentheses.

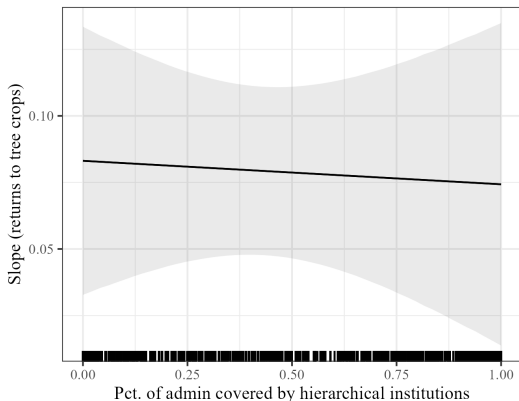
MARGINAL EFFECTS

Figure 10: Marginal effects for returns to using fertilizer (2nd level admin divisions)



MARGINAL EFFECTS

Figure 11: Marginal effects for returns to tree crops (2nd level admin divisions)



FULL REGRESSION TABLE: EAS

Table 3: Potential value of output and the likelihood of a household formalizing (EA-level)

	(1)	(2)	(3)	(4)	(5)	(6)
Max value	-0.042 (0.039)	-0.038 (0.039)			-0.020 (0.037)	-0.016 (0.038)
Difference (trees)			0.026* (0.011)	0.022 (0.010)		
Difference (fertilizer)					-0.603 (1.076)	-0.599 (1.149)
Land grabs	-0.004 (0.006)	0.000 (0.006)	-0.003 (0.006)	0.001 (0.006)		0.000 (0.006)
Country/Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls		X		X		X
Geographic Controls		X		X		X
Num.Obs.	83 488	74 659	83 488	74 659	83 488	74 659
R2	0.274	0.273	0.277	0.274	0.274	0.273

Note: The dependent variable of this model is a binary indicator for whether the household possesses a title. The unit of analysis is the household. Land values are calculated as the average of a 20 kilometer circle around the enumeration area. Data are from the DHS and LSMS projects. Region and year two-way clustered standard errors are displayed in parentheses.

FULL REGRESSION TABLE: EAS

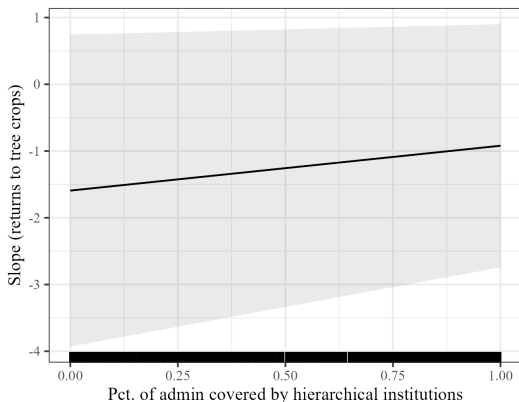
Table 4: Potential value of output, hierarchical pre-colonial institutions, and the likelihood of possessing a land title (EA-level)

	(1)	(2)	(3)	(4)	(5)	(6)
Max value	-0.054 (0.037)	-0.052 (0.036)	-0.031 (0.033)	-0.030 (0.034)	-0.032 (0.031)	-0.037 (0.028)
Max value * Hierarchy	0.016 (0.016)	0.017 (0.016)	0.013 (0.015)	0.009 (0.014)	0.015 (0.053)	0.022 (0.050)
Difference (trees)			0.027* (0.011)	0.029* (0.011)		
Difference (trees)* Hierarchy			-0.002 (0.010)	-0.011 (0.009)		
Difference (fert.)					-0.573 (0.502)	-0.394 (0.551)
Difference (fert.)* Hierarchy					0.022 (1.265)	-0.181 (1.272)
Land grabs	0.000 (0.012)	0.001 (0.012)	0.002 (0.012)	0.003 (0.012)	-0.001 (0.010)	0.001 (0.011)
Land grabs * Hierarchy	-0.005 (0.016)	-0.001 (0.018)	-0.006 (0.015)	-0.002 (0.017)	-0.004 (0.012)	0.001 (0.014)
Country/Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls		X		X		X
Geographic Controls		X		X		X
Num.Obs.	83 476	74 647	83 476	74 647	83 476	74 647
R2	0.277	0.276	0.279	0.278	0.277	0.277

Note: The dependent variable of this model is a binary indicator for whether the household possesses a title. The unit of analysis is the household. Land values and exposure to precolonial hierarchy are calculated as the average of a 20 kilometer circle around the enumeration area. Data are from the DHS and LSMS projects. Region and year two-way clustered standard errors are displayed in parentheses.

MARGINAL EFFECTS

Figure 12: Marginal effects for returns to using fertilizer (Enumeration areas)

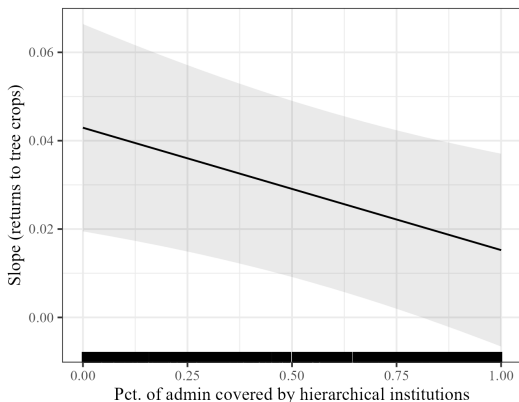


Data from the FAO's Global Agro Ecological Zone model and the IMF's Primary Commodity Price System.

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MARGINAL EFFECTS

Figure 13: Marginal effects for returns to tree crops (Enumeration areas)

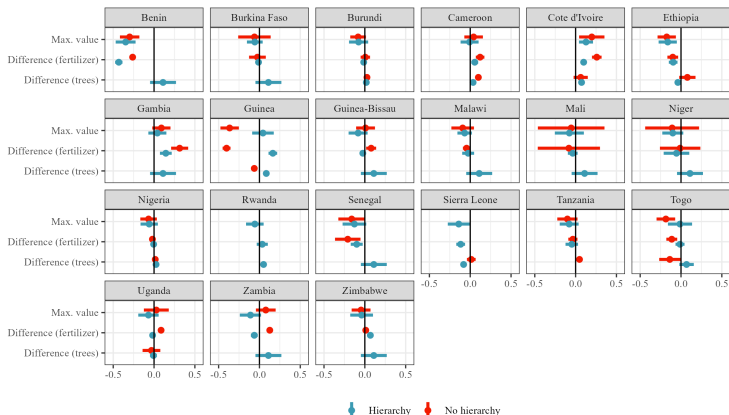


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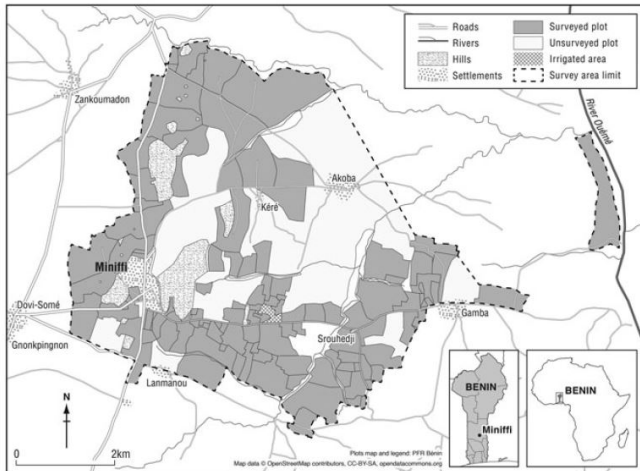
RESULTS: COUNTRY-LEVEL

Figure 14: Country-level effects for land values (administrative divisions)



Points represent the marginal effect of an increase of one standard deviation in attainable yield, returns to fertilization, and returns to tree crops. This model adds country-level interactions with the explanatory variables. Bars show 95% confidence intervals. Results are from OLS models with country-wave fixed effects. Standard errors are clustered by country and survey wave.

Figure 15: Customary elites can lead to irregularly formalized boundaries, example from the Département des Collines in Benin



Example of how customary elites can interfere with land formalization. Figure from Delville and Moalic (2019).

CÔTE D'IVOIRE DESIGN

To isolate the role of customary elites in land titling, I will exploit a natural experiment in Côte d'Ivoire.

- A village delimitation process precedes land titling: some villages are elevated to administrative status and some are downgraded.
- Bureaucratic discretion and political pressures make this process exogenous to local conditions.



Figure 16: Map of early delimitation project areas (from Boone 2018)

RESEARCH DESIGN

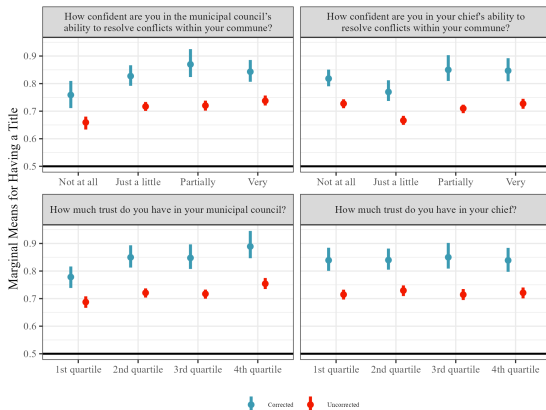
I use a mixed method strategy to show how confidence in institutions and social proximity to chiefs affects the perceived utility of land titles in resolving disputes.

- A forced-choice paired conjoint design administered to 1,164 respondents in Senegal via an in-person field experiment.
- A structural topic model on free response answers to "what would happen in this dispute."
- Qualitative interviews with village chiefs, farmers, and government officials.

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RESULTS

Figure 17: Confidence in municipal councils increases the weight respondents place on formal land titles



Bars represent 95 percent confidence intervals, calculated using a block bootstrap. For the "how much trust do you have in" questions, I subtract the average of all other "trust" questions, then take the quartiles. [Back](#)