

# Land, power, and property rights: the political economy of land titling in West Africa

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## Abstract

The majority of African households are employed by the agricultural sector, but the uptake of formal land titles remains slow and uneven. This paper argues that local politics in the form of customary institutions interact with the country's overall land regime to moderate the relationship between land values and land titling. I combine 170,216 household-level observations of titling with a novel geospatial measure of both land values and the returns to agricultural investment. Households in areas with high returns to potential agricultural investment are more likely to title. However, in countries with centralized land tenure regimes, strong customary institutions attenuate this relationship; in countries with decentralized land regimes, strong customary institutions reinforce this relationship. I then use an in-depth case study of Côte d'Ivoire, including an original survey of 801 households in the central cocoa belt, to trace how village chiefs leverage devolved land titling institutions to discriminate against relative newcomers and reinforce their own authority. This paper speaks to the broader literature on the emergence of property rights by centering household demand for land titles, rather than whether the state supplies them. It also advances understanding of the circumstances under which informal institutions act as compliments or substitutes to the state.

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The agricultural sector in sub-Saharan Africa employs 52 percent of workers, but insecure land tenure constricts agricultural investments and reduces productivity.<sup>1</sup> To alleviate these concerns, African governments and international donors devote sizable resources to land tenure formalization programs. Land titles are available on-demand to many African farmers as part of ‘piecemeal’ titling programs, but the illegibility and complexity of local land use creates space for informal elites to act as development intermediaries (Deininger and Goyal 2024; Honig 2022a). The uptake of these programs, and rate of formal land titling, varies dramatically across Africa. In Ethiopia, 79 percent of households possess such a title; in Burkina Faso, Burundi, and Malawi, that statistic is only three percent. Titling rates differ across regions, even within countries at high and low levels of land titling. What explains the uneven uptake of formal property rights?<sup>2</sup>

This paper demonstrates that local politics and national land regimes structure household decisions to acquire a formal land title, and therefore titling rates. In addition to administrative fees, mapping complex land use onto straightforward titles creates risk for households. As a result, households formalize their landholdings only when the value of their property or the potential returns to agricultural investments enabled by titles increases to the point that the benefits justify the costs. In countries where responsibilities for land tenure security are devolved to local government, customary chiefs facilitate land titling, because they can capture the process and maintain their authority. In countries with more centralized land regimes, land titling comes at the cost of chiefly authority, and so stronger customary chiefs impede land titling.

Using survey data from the Demographic and Health Surveys (DHS) and Living Standards Measurement Surveys (LSMS) across 22 African countries, I show that both the value of land

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<sup>1</sup>This figure comes from the World Bank’s ‘Employment in agriculture’ statistics for sub-Saharan Africa in 2022.

<sup>2</sup>I define ‘land titles’ here very broadly to mean some kind of state-issued written documentation of a claim over a parcel of land. May such rights lack some portion of the ‘bundle of rights’ associated with property deeds in a Western context. Some titles, such as a Senegalese *délégation foncière*, are long-term use rights which lack the right of alienability. The key term is defensibility: “the ability to defend property rights by calling on and retrieving clear property rights information, and by appealing to the state for rights enforcement” (Albertus 2020: 13). I use titling and formalization interchangeably.

and the parcel-level returns to agricultural investment are associated with higher rates of land titling at the household level. I use a novel, geospatial measure of land values and the returns to agricultural investments to sidestep measurement problems associated with informal and illegible property markets. These cross-national data provide broad evidence that interaction between country-level land regimes and the strength of customary institutions moderate the relationship between the value of land and the uptake of land titles. In devolved land regimes, strong customary authorities strengthen the relationship between increased land values and land tenure formalization; in centralized land regimes, strong customary authorities weaken the relationship between land values and land tenure formalization. These results are both substantively and statistically significant: the returns to agricultural investment drives land titling, but institutions matter.

To trace the role that customary authorities play in land titling, I use an in-depth case study of Côte d'Ivoire. The history of migration in Côte d'Ivoire, combined with shifting policies towards land titling different political regimes, created a unique patchwork of shifting customary authority. I leverage this natural experiment through an original field survey of 801 household heads across the Ivoirian cocoa belt. This case study illustrates how powerful chiefs use their authority to discriminate against relative newcomers (*allochthones*) in the land titling process and to maintain their relative authority.

These results add to a voluminous literature in both political science and political economy which seeks to explain the presence or absence of strong property rights. Much of this research centers how states and elites manipulate property rights for political and economic advantages: it asks why and when states supply property rights (Albertus 2020; Boone 2014; Nathan 2023). I nuance these theories by incorporating the households who make decisions to title their property into these models. By marshalling LSMS and DHS data from 22 different countries across 66 distinct survey waves, I show that household demand for formal property rights varies significantly even

within regions and districts. Local politics, in the form of strong or weak customary authorities, interact with national land regimes to attenuate or reinforce the relationships between economic circumstance and the decision to title. While much of the existing body of work treats property rights or institutions in abstract terms (Acemoglu and Robinson 2012; Libecap 1989; North and Weingast 1989), I open the “black box” of property rights by showing how households interact with concrete, tangible land titles.

Informal institutions who influence politics are hardly unique to Africa (Acemoglu et al. 2020; Díaz-Cayeros, Magaloni, and Ruiz-Euler 2014). Informal institutions sometimes compliment the state and sometimes substitute for it (Balán et al. 2022; Baldwin, Kao, and Lust 2023; Henn 2023). Such subnational pluralism can create the conditions for forum shopping (Lust 2022), empower clientelist governance (Baldwin 2016; Gottlieb 2024; Nathan 2023), and drive legibility (Scott 1998). This research advances the study of informal governance by illustrating the conditions under which informal elites in Africa support or impede statebuilding in the form of property rights.

This paper proceeds in seven parts. The first section provides additional context on land formalization efforts in sub-Saharan Africa. The second section delves into this paper’s demand-driven theory of land formalization. The fourth section outlines the data sources I marshal to test these arguments. The fifth section presents the quantitative results showing how the interaction between strong customary institutions and land regimes moderate the uptake of land titling. The sixth section shows how powerful chiefs in Côte d’Ivoire maintain authority in a devolved land regime to discriminate against outsiders. The seventh section concludes the paper.

## I Formal and informal land tenure in sub-Saharan Africa

The majority of land in sub-Saharan Africa is held via informal, or customary land tenure regimes. Across the most recent waves of the Demographic and Health Surveys (DHS) and Living Stan-

dards Measurement Surveys (LSMS), 15.2 percent of landholding households possess at least one title for one of their agricultural parcels. The remainder hold their land through customary or informal rights, which are not registered and are rarely written. Customary land rights may be recognized by the state on a case-by-case basis, but are generally managed by customary authorities, such as village chiefs. Customary authorities influence politics throughout sub-Saharan Africa (Baldwin 2016).<sup>3</sup> They often derive a considerable portion of their political authority through their role as development brokers and through their powers over land usage (Acemoglu, Reed, and Robinson 2014; Baldwin and Ricart-Huguet 2023). In contrast, formal land rights, or land titles, are registered with state institutions, generally in the form of a written land title. Titles document a claim to the land (ownership, use rights, alienability, etc.) and they carry legal weight.

A wide-ranging body of evidence supports the claim that formal property rights provide greater security than informal property rights (Deininger and Goyal 2024; Higgins et al. 2018; Lawry et al. 2017). Secure property rights are a necessity for economic development. Acemoglu, Johnson, and Robinson (2001) famously show that countries with better institutions—defined as those with a smaller risk of one’s property being expropriated—are richer than countries with worse institutions.<sup>4</sup> Secure property rights incentivize investment, because one is more likely to receive the returns to one’s investment when the threat of expropriation is lower (North and Weingast 1989). Secure land tenure permits households to reallocate the unproductive labor they expended guarding their property into more productive uses (Besley and Ghatak 2010).

Empirical research illustrates the linkages between land tenure security and agricultural in-

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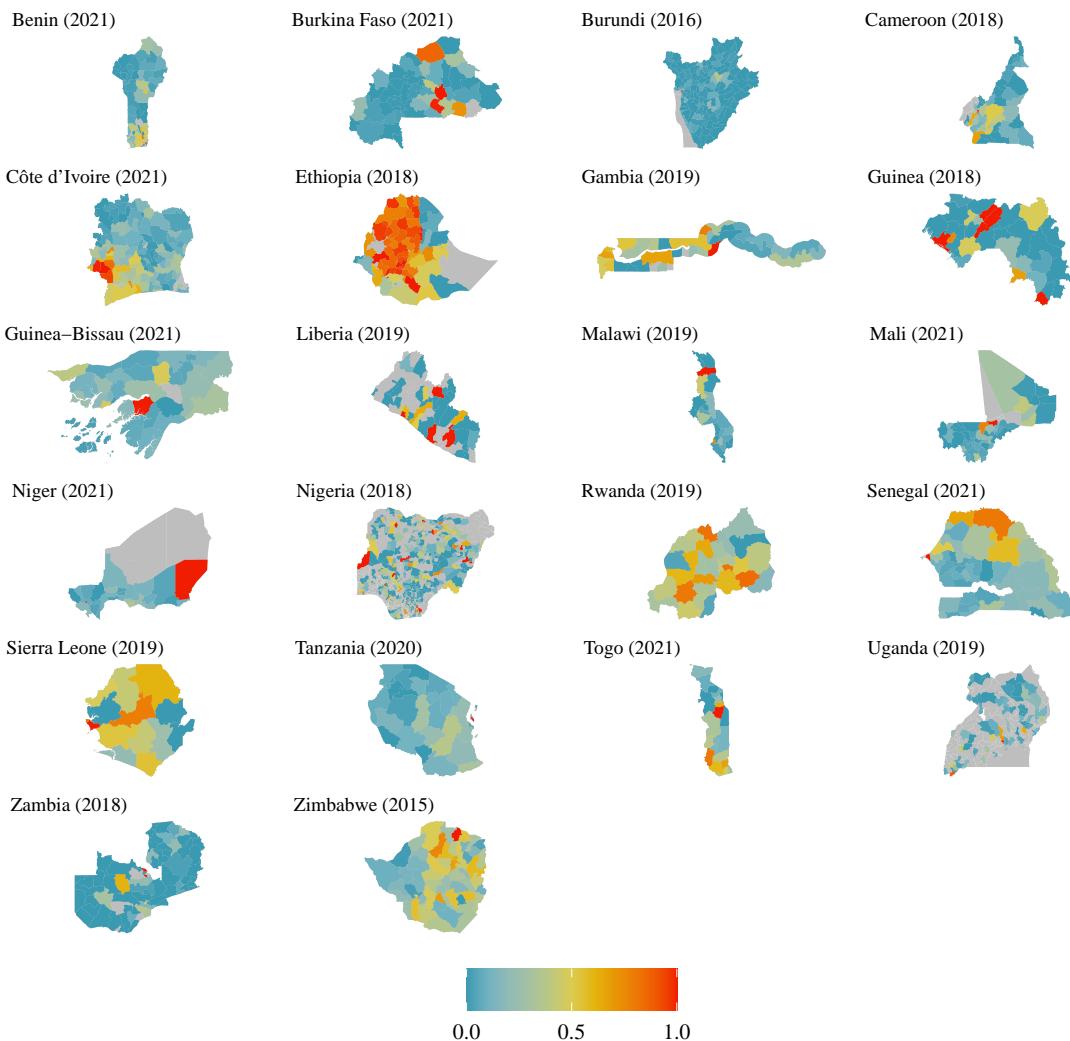
<sup>3</sup>The word “customary” need not imply these institutions are rooted in longstanding tradition. Many contemporary institutions have their roots in the colonial period, where European leaders installed local intermediaries. Where colonial interlocutors did exist in the precolonial period, they often leverages their status to claim additional powers (Mamdani 1996; Nathan 2023).

<sup>4</sup>De Soto (2000) argued that secure property rights would lead to economic growth by allowing rural households to mortgage their land. Empirical evidence does not support this claim (Lawry et al. 2017): titles which lack alienability cannot be used as collateral for a mortgage, and the supply of credit is limited across much of rural Africa.

vestment. In Ghana, officers of local customary institutions feel more secure in leaving their plots fallow, and as a result have higher level of soil fertility and agricultural profits, compared to non office-holders (Goldstein and Udry 2008). In a randomized control trial in Benin, even land demarcation sans additional titling procedures led households to shift cultivation to crops which required a longer-term investment (Goldstein et al. 2018). Dillon and Voena (2018) show that households in Zambian villages where widows are unable to inherit land invest less in land quality. These effects are unique neither to Africa nor to developing countries. In India, households in areas with historically stronger landlords and weaker property rights have lower agricultural investments and productivity, even after independence (Banerjee and Iyer 2005). In the United States, uncertain title of railroads' land grants delayed the development or irrigation in frontier Montana and reduced land values by up to 21 percent.

Women are often among the most affected by the consequences of land tenure insecurity, which means formalization has strong potential for empowering women in agriculture (Meinzen-Dick et al. 2019). For example, a land titling program in Rwanda improved land access for married women, who also saw the greatest impact on agricultural investment and soil quality (Ali, Deininger, and Goldstein 2014). Land titling also matters for climate resilience. Many climate adaptations, such as windbreaks or demi-lunes, are long term investments incentivized by secure property rights. Secure property rights have also been linked to investment in reduced deforestation (Deininger and Goyal 2024: 184–8).

**Figure 1.** Subnational variation in land titling across 22 African countries



This figure shows the fraction of landholding households with at least one formal title for their parcels at the district (2nd level administration division) level. Data are from the most recent round of the DHS and LSMS surveys. All calculations use the provided survey weights.

The policies of African governments reflect the importance of land tenure security. Since the 2000s, 41 African countries have established piecemeal, or on-demand land titling procedures (Honig 2022a: 2). In contrast to top-down land formalization programs, demand-driven programs

allow households to opt-in to land tenure formalization. Land titles are available, but households are not obligated to seek them.<sup>5</sup> The existence of a legal pathway to titling does not imply that titles are easy to acquire. The result of piecemeal titling programs is often a state of institutional pluralism, where different systems of land tenure prevail in the same village (Lund 2008).

International donors also focus on land tenure security. The Land Portal Foundation, a consortium of international donor organizations, tracks 3,871 projects around the world in its database. USAID alone has implemented land tenure projects in 23 separate countries.<sup>6</sup> Land tenure and property rights appear or have appeared in 22 different compacts implemented by the Millennium Challenge Corporation. Land tenure issues are a major focus of the World Bank as well.

Titling remains rare across sub-Saharan Africa despite these efforts. However, the overall scarcity of land titles is highly variable. Figure 1 shows the spatial distribution of formal land titles, as of the most recent wave of DHS or LSMS data collection. Land titles are not universally clustered around national capitals, or in resource producing areas. For example, there is a large concentration of formal land titles in the Fouta Djallon region of Guinea, a bastion of strong customary authority among the Peulh (Fulani) ethnicity. Both Benin and Togo have clusters of land titling in the central forested belt, well outside the national capitals in the far south of the countries. Mali's highest rate of titling is in the fertile Mopti region, but several communes within the arid region around Gao also have high rates of titling.

These facts pose a puzzle. Rural households benefit from land titles. Many African states have made land titles available. Nevertheless, land titles remain rare, although high levels of spatial variation exist even within regions. What explains this limited uptake of land tenure

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<sup>5</sup>Rwanda and Ethiopia are important exceptions: both mandated top-down, comprehensive titling drives. In 2019, 69.4 percent of Rwandan households possessed at least one formal land title; in 2018, 79.4 percent of Ethiopian households possess at least one formal land title.

<sup>6</sup>Kapstein (2017) demonstrates that land reform was a major component of US foreign aid policy during the Cold War. American policymakers believed it would reduce grievance-based political instability.

formalization? In the following section, I introduce a new theory of land tenure formalization to show how both customary authorities and households make decisions which explains this variation in the spread of formal property rights.

## **2 Towards a demand-driven theory of land titling**

The confluence of local politics, national land regimes, and economic circumstance structure variation of the prevalence of land titles. Chiefs have an incentive to impede titling, because displacing their role in customary land administration removes a long-term reservoir of political authority. On the other hand, when land administration is devolved, chiefs continue to play a greater role in local land administration regardless of titling. In these contexts, chiefs facilitate land titling, to be seen as bringing development goods to the village. However, ultimately it is the households themselves who make titling decisions. Pursuing a land title is costly: households who title pay an administrative fee, but also incur a variety of risks when they title. As a result, they only title when the benefits outweigh the costs. These benefits are increasing in the value of land and the returns to potential agricultural investments.

### **2.1 Chiefs and the state**

States have a variety of incentives to supply or withhold land tenure from households. Without formal land tenure, households depend more on the state to supply agricultural inputs such as seeds or fertilizer which could otherwise be purchase via credit. Albertus (2020: 169) points out that farmers who are "fixed geographically and lack property rights while facing obstacles to acquiring necessary agricultural inputs and credits are the stuff of clientelist party fantasy." Leaders themselves may also face incentives to withhold or support strong property rights. Many African leaders are also large-scale landowners. If such leaders depend on the kind of productive exploitation of land which benefits from secure property rights, such as plantation-style cultivation

of cash crops, they have an incentive to promote strong property rights institutions (Onoma 2010). Elsewhere, the cost of creating such institutions may not be worth the cost to politicians.

Land administration is a difficult task for African states: by definition, land often exists in the hinterlands where state capacity is comparatively limited (Herbst 2014)<sup>7</sup>. Boone (2014: 24–5) distinguishes between *statistic* and *neoclassical* land regimes. In statist regimes, "governments administer the allocation and holding of rural property directly;" in the latter, land is governed indirectly, by way of customary institutions.<sup>8</sup>

However, chiefs can play a role in both neocustomary and statist land regimes. Local land tenure arrangements are complex, heterogeneous, and often illegible to the state (Scott 1998). As a result, chiefs tend to play a large role in adjudicating land claims even when land administration is officially in the hands of the state. In Sénégal, municipal councils issue the rural land certificates (*délégations foncières*). There is no formal role for the chief. However, in practice chiefs matter quite a bit. Chiefs guide the subcommittee of the municipal council which is deputized to investigate land claims, and often resolve land disputes.<sup>9</sup> In Côte d'Ivoire, village land management committees (*comités villageois de gestion foncière rurale*—CVGFR) investigate land claims, although *certificats fonciers* are formally distributed by the national land bureau. Village chiefs have no official position in CVGFRs, but chiefs almost always head the committee. Both of these contexts are "statist" land regimes, but chiefs nevertheless pervade the process.

In contrast, it is much more difficult for chiefs to capture the land titling process in areas where land formalization is centralized. In such contexts, decisions around land tenure formalization are made at the national level—which is more distant to customary elites. For example,

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<sup>7</sup>This paper specifically considers agricultural land. Urban land tenure has different constraints, and so I consider it outside of my scope conditions.

<sup>8</sup>She specifically refers to these institutions as *neocustomary* to emphasize their often limited resemblance to historical precolonial institutions.

<sup>9</sup>Ribar (2023) asked 1,164 households across rural Sénégal which steps would be necessary for a household to acquire a *délégation foncière*. 92 percent of households said it would be necessary to inform the chief, 47 percent said it would be necessary for the chief to investigate your claim, and 18 percent said it would be necessary to pay the chief.

the Liberian Land Authority presents itself as a "one-stop shop" for land tenure formalization. Land administration and titling occurs in Monrovia—far from customary institutions. Another strong example is Rwanda, where the country's comprehensive land tenure formalization drive was managed entirely by the state. Rwanda selected areas in which to title, household claims were mapped, and then the central land registry office published the information (Ali, Deininger, and Goldstein 2014).

Why do some African states devolve land tenure? Centralized land tenure administration was the default condition across colonial Africa, particularly in polities under French control. Centralized administration was necessary to alienate productive land from African populations (Hailey 1938: 1649). Starting in the 1990s, the World Bank promoted a number of decentralization proposals across the developing world (Deininger 2003). A number of Millennium Challenge Corporation compacts also promoted decentralization reforms. These reforms are largely donor-driven, rather than reflective of domestic polities. Decentralization programs are also a bad candidate for clientilistic or targeted policies, because by nature they affect entire countries.<sup>10</sup>

Customary authorities, most often chiefs, are important political actors across sub-Saharan Africa. Chiefs can use their control of land to emphasize their power in other domains. Where property rights are insecure, chiefs can use control over land to sanction households who go against the chiefs in other ways (Acemoglu, Reed, and Robinson 2014). Beyond chiefs' ability to sanction, the role chiefs play in land claims and land disputes enhances their perceived authority to regulate conflicts. Chiefs are often the first step to resolve land disputes. When households bring their disputes to the chief, they implicitly recognize the chiefs' right to arbitrate such disputes. Lund (2008: 10) summarizes this point, that "[r]ecognition of property rights by an institution simultaneously constitutes a process of recognizing the legitimacy of the institution." So

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<sup>10</sup>This does not mean that access to land titles is equal across countries—some states may in fact create local land bureaus unevenly. This question is outside the scope of the present paper, but I address the consequences of uneven state capacity elsewhere in my dissertation project.

by keeping land rights in the customary regime, chiefs maintain a long-term reservoir of political legitimacy. Baldwin and Ricart-Huguet (2023) illustrate the result of this dynamic: households across sub-Saharan Africa perceive their chiefs to be more authoritative where land values are higher, as a result of increased competition over land.

Land is not the only way chiefs can enhance their political authority. Chiefs also act as crucial development intermediaries. Baldwin (2016) notes that much of chiefs legitimacy as political actors comes from their performance on the job: constituents prefer a chief that delivers development goods, such as roads or clinics. Of course, the practical role of chiefs depends on the extent to which chiefs are formally recognized. Where chiefs are formally integrated into the state, strong chiefs can complement the state. Elsewhere, chiefs can undermine it, or substitute for it (Henn 2023). Where land tenure administration is centralized, this kind of credit-claiming becomes more difficult, creating a second rationale for chiefs to impede titling under centralized land regimes and facilitate titling under devolved land regimes.

In summary, land help in the customary system enhances the power of chiefs. When households title land, it exits the customary system. Where the administration of land tenure is devolved, chief can retain some control over land tenure through their involvement in local land institutions, and so titling land does not eliminate the chiefs authority. Chiefs also receive some credit for acting as a development broker within devolved regimes. Where land tenure formalization is centralized, chiefs completely lose access to this reservoir of political authority. In summary, where land tenure administration is devolved, chiefs have an incentive to facilitate formalization; where land administration is centralized, chiefs have an incentive to oppose titling. However, the incentive to impede or facilitate titling does not confer the ability. Through the empirical sections of this paper, I show that the strength of chiefs conditions whether they act on these incentives.

## 2.2 Household incentives to title

The above section shows how chiefs have an incentive to either impede or facilitate land titles. However, within on-demand land regimes, chiefs cannot actually provide or prevent titles. Households who make the decision to seek formal land titles. Titling benefits households because it reduces the risk that they lose land, allowing them to invest on parcels. However, titling is surprisingly messy and costly process. Households balance these costs with the benefits, the latter increasing in both the value of land and the returns to agricultural investments.

Land titling is costly. The first set of costs are administrative. Generally households pay some kind of fee to title. In Côte d'Ivoire, Bassett (2020: 144) enumerates "over 20 steps to obtain a land certificate and another dozen to obtain a land title." Many of these administrative steps involve a fee, but the largest cost comes from the requirement to hire an official surveyor to map the parcel. These steps involve multiple levels of government: the CVGFRs, the sous-prefectures, and the Agence Foncier Rurale (AFOR) in the capital, Abidjan. Côte d'Ivoire is an extreme case, but such processes are common across the continent.<sup>11</sup>

However, the costs to titling go beyond monetary fees or time spent in the sous-prefect's office. Land tenure formalization is not a one-to-one mapping of existing land use onto paper; it creates winners and losers. In much of sub-Saharan Africa, agricultural parcels are subject to overlapping ownerships, which exist in a state of strategic ambiguity. One person may have the right to farm in the dry season, another in the rainy season. A third person may have the right to graze their animals on the parcel. A fourth person may be the descendent of the original inhabitants of the area, who collects customary (but debateably ceremonial) rents. Which of these four owns the parcel? Land titling forces the issue of hierarchy between these partial owners. Formalization may carry a particular risk for "groups such as women, pastoralists, hunter-gatherers, casted people,

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<sup>11</sup>Similarly, in Liberia, though tribal certificates (the prevailing type of land registration) are issued by local communities, they must be submitted to the Liberia Land Authority in Monrovia and published in both the official gazette and three other newspapers of national coverage.

former slaves and, and serfs, who have traditionally enjoyed subsidiary or derived (usufruct) rights to land" (Platteau 1996: 40).

Land arrangements often require both chiefs and households to regularly negotiate and contest to maintain holdings (Berry 2001). Where land is governed by such pluralistic systems, titling could add a layer of complexity rather than simplify holdings (Lund 2008). Titling also adds a potential for forum shopping (Lust 2022). For households who are particularly well-situated within the customary institutions which govern land, the marginal increase in land tenure security from this additional layer of complexity could be minimal (Honig 2022a). Together, these dynamics suggest that land tenure formalization in sub-Saharan Africa comes with costs beyond the administrative. By forcing issues of ownership and hierarchy, titling carries a non-zero risk of losing access to one's land.

If titling is risky and expensive, why do households pursue it? Land conflicts are an unfortunately common occurrence in much of Africa. In Côte d'Ivoire for example, settlement patterns by Burkinabé and Baoulé migrants led to large scale uprisings with as many as 4,000 casualties in the 1970s (Boone 2003: 220). In parts of Northern Ghana, the dispossession of historical elites led to conflicts between the village chiefs and the dispossessed earthpriests (Lund 2008). The fact that individuals who are more highly placed within customary institutions feel more secure in fallowing land likewise highlights the risk of expropriation (Goldstein and Udry 2008). Similarly, Collin (2020) documents an increase in demand for formal land rights after a non-coethnic moves into one's neighborhood. Concern over an inability to sanction non-coethnics without juridical support highlights a concern over potential conflicts.

Formal property rights can help alleviate such concerns. Titling one's land reduces the risk of losing it.<sup>12</sup> Keeping one's property is useful by itself—you don't need to spend labor guarding it which could otherwise be dedicated to productive uses (Besley and Ghatak 2010). An increase

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<sup>12</sup>The legibility itself inherent in formal property rights can enhance the perceived security of holdings, regardless of the actual utility of titles (Ferree et al. 2023; Honig 2022b)

in the value of land—regardless of any further increases in the returns to investment—would increase household incentive to protect the land. Households will be willing to spend more to protect a more valuable asset.

The biggest transformative potential to more secure land is that households are able to invest with comparatively greater surety that they will receive the returns to these investments. These investment incentives can be short term—such as fallowing one's land, or investing in fertilizer—or long term, such as planting tree crops which can take four to five years to produce crops. The potential returns to investment in the parcel drive titling by incentivizing households to protect their future investments in the land. The returns to investment in a parcel are also likely to be "priced in" to the value of land. These two variables—the value of land and the returns to potential agricultural investment—are distinct, but the end result is an increase in titling rates regardless.

However, land tenure insecurity is not always the binding constraint to investing in one's agricultural parcels. Much land is simply not worthwhile for investments. Much land in sub-Saharan is arid, or infertile ([\(Herbst 2014\)](#)). Historically, this lack of fertility across much of Africa manifested in low population densities, complicating the task of projecting state power over arid and distant hinterlands. Many seemingly lush tropical areas also suffer from poor soil. In such cases, the benefits to households from seeking a formal land title will be lesser—more secure land title will not unlock investment where the potential returns to such investments fail to justify their costs.

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 ([\(North 1990\)](#)). Shifts in relative prices can shock prevailing equilibria and drive institutional change ([\(Libecap 1989\)](#)). In the context of land formalization, a shift in the value of land or poten-

tial returns to investment could drive rural households to seek formal titles for their parcels.<sup>13</sup>

Rosenthal (1992: 21) illustrates this dynamic clearly in Revolution-era France, where "it was not worthwhile to define property rights to unimproved land clearly, for enforcing such rights would have required monitoring unwarranted by the low value of the land." While the revolution created the possibility for new property rights institutions, these changes were only worth the expense in areas of high potential to return that investment. Another example comes from the American West, where mineral rights were unclear as miners staked claims during various gold rushes. Most claims were worthless. Where miners discovered gold deposits, they organically created camp administrations to arbitrate disputes, delimit boundaries, and document claims (Libecap 1989). In other words, property rights became more formalized as the value of the property increased. After the discovery of the Comstock lode, the subsequent demand for formal property right helped drive the formation of the Nevada Territorial Government—and later statehood.

The perception that households will seek to title as their land becomes more valuable pervaded much of the World Bank-supported reform efforts to reform land regimes (Vendryes 2014). The relationship between land value and land titling has been made particularly explicit in Côte d'Ivoire. In 1962, president Houphouët-Boigny announced that "the land belongs to those cultivate it" in reference to a group of Burkinabè migrants who had established cocoa and coffee plantations in the center of the country. From this period until the following 1998 Ivoirian land law, these planters were the major drivers of formal property rights across the country (Colin, Le Meur, and Leonard 2009). Firmin-Sellers (1995) shows that a land-rush in Ghana led to a rebirth of customary institutions to enforce private property rights.

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<sup>13</sup>As part of his survey of the British colonies, Lord Hailey (1938: 830) wrote that "we are beginning to see new varieties of custom created by the growth of more intensive systems of cultivation, and by the fact that, in some areas at least, land is beginning to acquire a commercial value."

## **2.3 Hypotheses**

Households decide whether to pursue property rights. However, land titles are costly. It is only worthwhile to title when either the value of land or the returns to investment in the agricultural parcels is relatively high. Chiefs may also try to impede titling—however, they will only do so where they are excluded from the titling process. Where land formalization is devolved, chiefs will instead facilitate households in titling. In order to test this demand-driven explanation for variation in the uptake of land titles, we can distill the following hypotheses.

- H.1 Households in areas where the value of land is higher will be more likely to possess a title.
- H.2 Households in areas where the returns to agricultural investment are higher will be more likely to possess a title.
- H.3 Strong customary institutions will weaken the relationship between land values/returns to titling in countries where land tenure formalization is centralized.
- H.4 Strong customary institutions will strengthen the relationship between land values/returns to titling in countries where land tenure formalization is devolved.

## **3 Data sources**

This section overviews the four key sources of data I use in the remainder of the paper. For my outcome variable, I combine 66 waves of DHS and LSMS data across 22 African countries to extract 170,216 household-level observations of land titling.<sup>14</sup> Next, I combine geospatial measures of agricultural suitability with historical commodity pricing to measure both the value of agricultural land and the returns to agricultural investment. Third, I introduce my measure of the strength of customary institutions, for which I use Murdock’s ethnographic atlas. Finally, I introduce my original coding of country land regimes.

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<sup>14</sup>There are 425,663 observations across the merged survey data; the difference (251,466) are dropped because they are either urban, or they do not have access to land.

### **3.1 Outcome variable: household titling**

The lack of accessible administrative data on land titling has hampered the ability of scholars to study the subject. Datasets are often private or difficult to access. Importantly, they are also not comparable across countries—what is included in one country may not be included in another country. The result is a literature which largely studies the emergence of formal property rights through case studies of individual countries. I sidestep this problem using survey data.

Specifically, I combine data from two large scale data collection efforts. The first is the United States Agency for International Development (USAID)'s DHS project. The DHS project collects comparable data on developing countries around the world. While the project is largely health focused, DHS also asks about households' participation in agriculture and their landholdings. Among other questions, the DHS asks "do you have a title deed or other government recognized document for any land you own?" Importantly DHS only asks this question in a random subsample of men within surveyed households.

The second large scale data collection effort is the World Bank's LSMS. Like the DHS, this survey is a large scale effort to collect comparable data across the developing world. Unlike the DHS, the LSMS has a greater focus on agriculture and economic conditions than on health. The LSMS contains a parcel-level roster of agricultural land and asks "[d]oes your household currently have a title or ownership document for this parcel."<sup>15</sup>

The main outcome variable for this paper is a binary indicator for whether a household possesses a title for at least one parcel of agricultural land. Importantly, both sets of surveys include similar questions for whether a household possesses a title for their dwelling. This latter variable can serve as an important placebo if we think that agricultural land values will not affect demand

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<sup>15</sup>While the DHS uses one standardized protocol across different countries, the LSMS protocols differ substantially across countries. Variable names, values of outcomes, etc. all differ across countries. These differences make merging LSMS waves a sizeable undertaking which can be carried out. The exception is the *Enquête Harmonisée sur le Conditions de Vie des Ménages* (EHCVM) implemented in the Economic Community of West Africa, which I explore further in the appendices.

for titling houses.<sup>16</sup>

### 3.2 Land values and returns to investment

Land markets in most of Africa are largely informal and illegible, which prevents researchers from directly measuring land sales. Because this research focuses on agricultural land, I conceptualize the value of land as a function of the potential agricultural production of the parcel.<sup>17</sup> To overcome these issues, I implement a novel measurement of ‘attainable value’: the value for which the maximum attainable yield (per hectare) could sell for on the international commodity market. I combine crop suitability data with global commodity prices to obtain these land values at a 10km by 10km grid cell level. Adjusting the underlying parameters of the suitability models allows me to calculate the returns to fertilization based on prevailing crop values.

I use version 4 of the Food and Agriculture Organization (FAO’s) Global Agro Ecological Zone (GAEZ) model to obtain data the ‘attainable yield’ of different crop types. 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.<sup>18</sup> Attainable yield here differs from “agro-climactic suitability” because the latter do not take into account soil suitability and terrain factors. Potential total production is divided by total grid cell area.<sup>19</sup> Prices come from the IMF’s Primary Commodity Price System.<sup>20</sup>

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<sup>16</sup>An important note is that the outcome variables are not identical across the two surveys—while the LSMS protocol asks if any parcel owned by a household is titled, the DHS protocol asks if any man has a title for their land. While the overwhelming majority of parcels are owned by men, these answers could give slightly different numbers. This difference is absorbed by fixed effects in all models.

<sup>17</sup>Differences in future discounting which could also feed into latent land values, but these cannot be addressed with current data.

<sup>18</sup>Some crops use other measures (for example, "alfalfa, miscanthus, napier grass, reed canary grass, pasture legumes and grasses the yields are in 10kg dry weight per hectare") but I apply appropriate conversion factors where necessary (Fischer et al. 2021: 129).

<sup>19</sup>These data are based on the RCP4.5 climate projection.

<sup>20</sup>The FAO’s producer price database provides more granular estimates of crop prices, but it has too many missing data points to be useful. For example, in our target period it is missing data for cocoa and coffee prices in Côte d’Ivoire—the country’s two primary export commodities.

The majority of prices are listed as USD per metric ton; I apply an appropriate correction for other prices and set prices to constant 2011 USD. The commodities included in these data are: bananas, barley, chickpeas, canola oil, cocoa, coconuts, coffee, cotton, corn, groundnuts, oats, palm oil, rice, rubber, sunflower oil, soybeans, sorghum, sugar, tea, and wheat.<sup>21</sup>

For each crop and grid cell, I multiply the maximum attainable yield (metric tons per hectare) by the commodity prices in a given year (USD per metric ton) to obtain the attainable price (USD per hectare). I then take the maximum of this vector. More formally, the maximum attainable value  $\pi_{g,y}$  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 measure the maximum attainable value in dollars per hectare for a given 10km by 10km grid cell on a yearly basis.

From this baseline measure, I two measures of the potential return to agricultural investment. Specifically, I calculate the returns to household decisions to fertilize their parcels as a short-term agricultural investment, as well as increases to potential attainable value from planting tree crops over perennial crops as a long-term investment. My primary land value measure assumes that households do not fertilize their household. By re-calculating the GAEZ attainable yield models assuming a high level of fertilizer use, I can take the difference to identify the returns to fertilization. Important, fertilizer is not a consistent multiplier for yields. In some locations and for some crops, greatly increases yields. Elsewhere, the returns are minimal.

I also calculate the returns to planting tree crops over perennial crops. Tree crops require a high up-front investment Households must purchase saplings or in waiting for trees to become

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<sup>21</sup>I exclude tomatoes because the IMF commodity price is calculated as the consumer price per kilo in metropolitan France, rather than the price per kilo on the international commodity market.

productive. Coffee trees, for example, take five to seven years to become commercially viable. As a result, tree crops represent a longer-term investment than purchasing fertilizer for the remaining year. Of the 20 crops for which I have price data, I classify bananas, coconuts, cocoa, coffee, rubber, and tea as tree crops. I calculate the maximum attainable value for these crops, and subtract the maximum attainable value for other crops. Where this difference is negative, I reset it to zero.

Farmers do not receive the global commodity prices. However, the validity of this measurement requires only that the prices farmers receive are positively correlated with global commodity pricing. In appendix B, I probe this requirement using a subset of data for which households' planting decisions are available. I show that households respond to this measure of attainable value by changing their planting patterns. A one percent increase in the average attainable value per hectare of a crop is associated with a 0.13 to 0.159 percentage increase in the amount of land that farmers dedicate to that crop. Similarly, an increase of one percent in the fraction of an administrative area in which a crop is the most profitable is associated with a 0.076-0.080 percent increase in the fraction of land that farmers dedicate to that crop. In other words, the elasticity of crop planting with regards to the crop's attainable value is positive, which supports this land value measure capturing the underlying phenomenon.

This metric superficially resembles a Bartik, or shift-share instrumental variables (SSIV), design. A plethora of literature in recent years has enumerated the assumptions through which shift-share instrumental variables identify effects and placed limits on their applicability (Borusyak, Hull, and Jaravel 2022; Goldsmith-Pinkham, Sorkin, and Swift 2020). However, the weighted exposure to common shocks approach I adopt differs from a SSIV in two key ways. First, my measure is not an instrument—attainable yield operationalizes the latent land values directly. Second, the SSIV designs use the weighted exposure to shocks across sectors; the canonical design weights sector-level exposure to Chinese import competition by industry concentration in a

given area. In this paper, the land values metric takes the maximum of a series of values (i.e. the highest multiplicative product of crop yield and commodity price) rather than a weighted mean.

### 3.3 The strength of customary institutions

To measure the strength of customary institutions, I use geo-referenced data from the Murdock Ethnographic Atlas (Moscona, Nunn, and Robinson 2020; Murdock 1967). The Murdock Ethnographic Atlas is a common reference for differences among pre-colonial institutions. The Murdock dataset includes 89 variables on 802 different ethnic groups around the world, of which 239 are located in sub-Saharan Africa.

These data are meant to operationalize the extent to which customary institutions are able to enforce property rights in the absence of formal documentation. If your village chief is able to protect property rights, the marginal returns to titling are likely to be lower. The specific variable from the Murdock dataset through which I operationalize the strength of customary institutions is the society's level of hierarchy:

the number of levels up to and including the local community... a measure of political complexity, ranging from 0 for stateless societies, through 1 or 2 for petty and larger paramount chiefdoms or their equivalent, to 3 or 4 for large states (Murdock 1967: 160).

In other words, this variable represents the number of administrative levels in pre-colonial societies. Acephalous societies, such as the independent villages of northern Ghana, would rank at the lowest level (Nathan 2023). Highly structured societies, with multiple layers of hierarchical institutions, would score higher. In Senegal, for example, the Imamate of Fouta Toto possessed a ruling council, regional chiefs, and village chiefs. Such a precolonial kingdom ranks at a four (the highest level) on the Murdock scale.

Importantly, these data rank precolonial institutions—not the strength of current customary institutions. However, a variety of literature explores the legacies and persistence of precolonial

institutions with regards to contemporary outcomes. Honig (2022a: ii), for example, notes that

Customary institutions with hierarchical legacies trace their roots to powerful pre-colonial states with hierarchical authority structures that withstood the colonial conquest. These institutions had a distinctly high organizational capacity at the end of the nineteenth century... the diverse origins of these institutions set them on different trajectories, producing variation in the contemporary strength of customary institutions within each country.

Similarly, Wilfahrt (2018) notes how the overlap of precolonial institutions and contemporary state organs affects local redistributive politics in Senegal.

While the enforcement of property rights is not the same thing as institutional hierarchy, two factors suggest that more hierarchical institutions would be better able to enforce property rights.<sup>22</sup> First, customary elites who are situated within these hierarchical institutions are more empowered to enforce their decrees. Within weakly hierarchical society, customary elites may not have the political capital to enforce judgements (Boone 2003). Second, the nature of hierarchical institutions increases the accountability of customary elites. In an acephalous village, an unfair ruling by the chief could go unchallenged; where there are customary elites above the village chief, there is a chance for appeal. This accountability may prevent chiefs from making decisions based on favoritism or their own interests (Honig 2022a). Nathan (2023) likewise shows that in the absence of precolonial hierarchies, chiefs are more likely to extract rents from their constituents, with the distribution of public goods suffering.

There is undoubtably noise in the relationship between precolonial hierarchy and contemporary institutions.<sup>23</sup> However, the above literature all suggest that, on average, contemporary political institutions are stronger in areas where precolonial institutions were more hierarchical.

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<sup>22</sup> Alternatively, customary institutions with multiple loci of control may provide for greater security of property rights. In some African societies, village chiefs co-exist with customary elites with a land-specific mandate (Lund 2008). Called earthpriests in Ghana, or chefs de terre more generally, these customary elites may lead to better governance through the seperation of powers. I intend to explore this connection in future research.

<sup>23</sup>An alternative approach would be to use Afrobarometer data. While these samples are randomly selected, and thus provide an unbiased average result, the overlap is just too small for statistical analysis—any correlations are as likely to be noise as they are to be signal.

Moreover, I do not expect this error would be correlated with the independent or dependent variables, so this source of error would attenuate my results towards zero. Ultimately, the hierarchy of precolonial institutions is an indirect measure of the strength of contemporary customary institutions. However, it has one crucial advantage: it is comprehensive. This measures covers the universe of precolonial polities in Africa. These data are geospatial, so they produce variation at the district level, where my other data sources vary. Appendix D provides additional evidence of the correlation between these murdock data and the strength of current precolonial institutions.

### 3.4 Devolved and centralized land regimes

Finally, I code a variable for whether land regimes in a given country are centralized or devolved. I classify a land regime as devolved if decisions about whether a household can title a given parcel are made at the national level (centralized) or another level (devolved). I specifically code this variable based on where the decision is made, rather than the location at which land titles are certified or recorded. For example, in Sénégal, *délégations foncières* are adjudicated, issued, and recorded by municipal councils, a third level administrative devision. Côte d'Ivoire is a more complicated case. Village-level CVGFRs decide who can obtain a *certificat foncier*, the sous-prefect verifies that correct procedures were followed, and the national land agency ultimately certifies the title. While administrative procedures take place at all three levels, this is a devolved land regime because villages make the decisions. In contrast, the National Land Agency of Rwanda maps parcels, adjudicates titling, and issues certificates—a centralized land regime.

Benin, Burkina Faso, Burundi, Côte d'Ivoire, Ethiopia, Guinea, Guinea-Bissau, Kenya, Mali, Niger, Nigeria, Senegal, and Zambia have decentralized land regimes. Cameroon, Gambia, Lesotho, Liberia, Malawi, Rwanda, Sierra Leone, Tanzania, Togo, Uganda, and Zimbabwe have centralized land regimes.

## 4 Results

Previous theory suggests that both the value of land and the returns to agricultural investment should be positively associated with titling rates ( $H_1$  and  $H_2$ ). In countries with centralized land tenure regimes, strong customary institutions—measured by the hierarchy of precolonial institutions—will attenuate this relationship ( $H_3$ ). In countries with devolved land tenure regimes, strong customary institutions will strengthen it ( $H_4$ ). This section shows the results of a series of regressions using these variables.

I analyze these variables using a series of linear probability models (i.e. OLS). All regressions are estimated using ordinary least squares with fixed effects at the country-wave level (i.e. each survey wave has its own intercept). I also include a set of demographic controls, including the household head's education level, sex, age, marital status, and whether the household is urban or rural. My geographic controls are measured at the second-level administrative division, and include geographic area and population density of the district, an interaction of area and population density, average terrain ruggedness (Carter, Shaver, and Wright 2019), and caloric yield (Galor and Özak 2016).

I model the moderating effects of land regime and informal institutions on the relationship between land values and titling through a series of triple interaction models. These regressions take the form:

$$y_{idnw} = \beta_1 V_d + \beta_2 H_d + \beta_3 V_d \cdot H_d + \beta_4 H_d \cdot C_n + \beta_5 V_d \cdot H_d \cdot C_n + X_i + Z_d + \psi_{nw}$$

Where  $V$  indicates the land value variable (I estimate separate equations for each of three land value/agricultural investment variables),  $H$  represents the fraction of the district covered by hierarchical precolonial institutions, and  $C$  is a binary indicator for whether the country devolved its land administration.  $X$  and  $Z$  are vectors of household-level and district level controls (respec-

tively),  $i$  indexes observations by individual,  $d$  by district,  $n$  by country, and  $w$  by survey wave.<sup>24</sup> Because triple interactions can be difficult to interpret, I also include marginal effects plots for all three land value variables. Tables 1, 2, and 3 all include these control variables; appendix tables A2, A4, and A3 replicate these analyses without controls, with qualitatively similar results.

The primary variables of interest on the right hand side of the equation relate to land values and the returns to investment. As I describe above, I measure land values by interacting the attainable yield per hectare for a variety of different agricultural products with their commodity prices on the global market and taking the maximum. We can think of this estimation strategy as a form of weighted exposure to external shocks: the crop prices are the shocks, and the total attainable yields per hectare are the weights. One potential threat to inference in this case is that observations' weights (i.e. their crop suitabilities) are likely not entirely exogenous to land titling. Soil quality may have other causal pathways to land titling rates; for example, Baldwin and Ricart-Huguet (2023) show that land quality affects the power of traditional leaders. In such cases, a non-random exposure to common shocks research design can lead to omitted variable bias (Borusyak and Hull 2020). When not otherwise controlled for by fixed effects, I include the average shock across all years for observation  $i$  to control for this bias.<sup>25</sup>

Table 1 shows the results of regressing the household titling indicator on the maximum attainable value per hectare (in the previous year), in various combinations with the percent of the administrative division covered by a hierarchical pre-colonial institution and an indicator for whether the country has devolved its land regime. This table shows relatively consistent results. The maximum attainable yield per hectare has a qualitatively similar magnitude across specifications, though it only reaches conventional statistical significance in columns 5 and 6. In these specifications, a one standard deviation increase in the maximum attainable value per hectare

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<sup>24</sup>I do not include the devolved indicator outside of interactions because it is absorbed by country-wave fixed effects

<sup>25</sup>Borusyak and Hull (2020) note that the distribution of shocks must be stationary over time for a time-invariant counterfactual shock to eliminate this source of omitted variable bias. After controlling for inflation, the distribution of maximum possible values per observation is indeed stationary.

**Table 1.** Strong customary institutions moderate the relationship between land value and land titles

	(1)	(2)	(3)	(4)	(5)	(6)
Land value	0.033 (0.025)		0.033 (0.024)	0.037 (0.023)	0.043** (0.014)	0.066** (0.026)
Hierarchy		0.000 (0.030)	0.001 (0.030)	-0.076* (0.037)	0.002 (0.029)	0.043 (0.072)
Hierarchy * Devolved				0.115** (0.043)		-0.052 (0.087)
Land value * Hierarchy						-0.031 (0.025)
Land value * Devolved					-0.013 (0.024)	-0.043 (0.034)
Land value * Hierarchy * Devolved						0.049 (0.030)
Country-Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls	X	X	X	X	X	X
Geographic Controls	X	X	X	X	X	X
Num.Obs.	156 822	156 822	156 822	156 822	156 822	156 822
R <sub>2</sub>	0.251	0.250	0.251	0.253	0.251	0.254

*Note:* The dependent variable of this model is a binary indicator for whether a household possesses a land title. The independent variables are the maximum attainable value; the fraction of an administrative unit that is covered by a hierarchical pre-colonial institution; and whether the country has devolved its land regime to local authorities. 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). Demographic controls include the age, sex, and education of the household head; geographic controls include area, population density, an urban/rural indicator, and terrain ruggedness. Data are from the DHS and LSMS projects. All regressions use OLS with survey weights and country-wave fixed effects. Standard errors are clustered at the country-wave level.

(0.37) is associated with a 1.7 to 2.0 percentage increase in the likelihood of a household possessing a formal land title, which translated to a 10.2 to 12.1 percent increase over the baseline probability of possessing a land title of 0.168. This table shows support for H<sub>1</sub>, but does not support H<sub>3</sub> or H<sub>4</sub>: households title in response to higher land values, but the effect of the interaction between land regime and strong customary institutions is unclear.

Table 2 repeats these analyses, but using the returns to fertilizing the parcel, which measures the potential for short-term investment in a parcel. The directionality of these results is identical, but they are consistently statistically significant. Across different specifications, a one standard deviation increase in the returns to using fertilizer (0.046) is associated with a 0.036 to 0.039 point marginal effect on the likelihood of possessing a title, which translates to a 21.4 to 23.4

**Table 2.** Strong customary institutions moderate the relationship between returns to fertilizer and land titles

	(1)	(2)	(3)	(4)	(5)	(6)
Difference (fertilizer)	0.811*** (0.244)		0.813*** (0.227)	0.879*** (0.234)	1.058*** (0.247)	1.627*** (0.382)
Hierarchy		0.000 (0.030)	0.002 (0.029)	-0.077* (0.032)	0.002 (0.028)	0.062 (0.051)
Hierarchy * Devolved				0.117** (0.040)		-0.060 (0.065)
Difference (fertilizer) * Hierarchy						-1.129* (0.490)
Difference (fertilizer) * Devolved					-0.453 (0.539)	-1.436 (0.778)
Difference (fertilizer) * Hierarchy * Devolved						1.669* (0.693)
Country-Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls	X	X	X	X	X	X
Geographic Controls	X	X	X	X	X	X
Num.Obs.	156 822	156 822	156 822	156 822	156 822	156 822
R <sub>2</sub>	0.251	0.250	0.251	0.253	0.252	0.255

*Note:* The dependent variable of this model is a binary indicator for whether a household possesses a land title. The independent variables are the increase in maximum attainable value from fertilizer; the fraction of an administrative unit that is covered by a hierarchical pre-colonial institution; and whether the country has devolved its land regime to local authorities. 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). Demographic controls include the age, sex, and education of the household head; geographic controls include area, population density, an urban/rural indicator, and terrain ruggedness. Data are from the DHS and LSMS projects. All regressions use OLS with survey weights and country-wave fixed effects. Standard errors are clustered at the country-wave level.

percent increase over the baseline of 0.168. These effects are both substantively and statistically significant—households who could make more money by using fertilizer are more likely to have a land title. Table 2 shows strong support for hypotheses H<sub>2</sub>, H<sub>3</sub>, and H<sub>4</sub>.

Finally, table 3 repeats these analyses using the returns to long-term investment in a parcel.<sup>26</sup> This measure captures the marginal increase in maximum attainable value from planting tree crops rather than non-tree crops (and is equal to zero if that difference is negative). These results are strongly significant, and in line with H<sub>2</sub>, H<sub>3</sub>, and H<sub>4</sub>. Across models, a one standard deviation increase in the returns to planting tree crops is associated with a 0.039 to 0.040 point increase in the likelihood of a household possessing a land title, an increase of 23.3 to 24.0 percent increase

<sup>26</sup>The returns to fertilizer are comparatively smaller than the returns to planting tree crops. The means of these variables are 0.076 and 0.177 respectively, both in 2011 USD.

**Table 3.** Strong customary institutions moderate the relationship between returns to planting tree crops and land titles

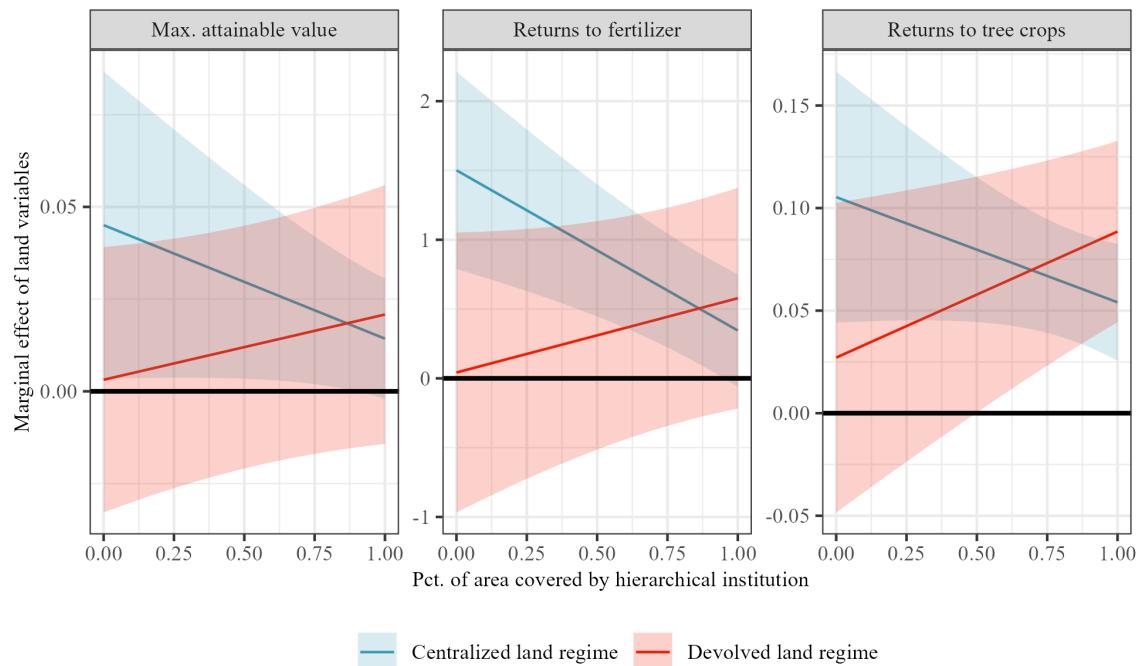
	(1)	(2)	(3)	(4)	(5)	(6)
Difference (trees)	0.078*** (0.012)		0.079*** (0.013)	0.077*** (0.016)	0.093*** (0.023)	0.107*** (0.030)
Hierarchy		0.000 (0.030)	0.005 (0.029)	-0.068* (0.034)	0.006 (0.028)	-0.051 (0.035)
Hierarchy * Devolved				0.108** (0.039)		0.079 (0.042)
Difference (trees) * Hierarchy						-0.051** (0.019)
Difference (trees) * Devolved					-0.018 (0.029)	-0.078* (0.032)
Difference (trees) * Hierarchy * Devolved						0.113*** (0.031)
Country-Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls	X	X	X	X	X	X
Geographic Controls	X	X	X	X	X	X
Num.Obs.	156 822	156 822	156 822	156 822	156 822	156 822
R <sub>2</sub>	0.254	0.250	0.254	0.256	0.254	0.257

*Note:* The dependent variable of this model is a binary indicator for whether a household possesses a land title. The independent variables are the difference in maximum attainable value between planting tree crops and planting other crops; the fraction of an administrative unit that is covered by a hierarchical pre-colonial institution; and whether the country has devolved its land regime to local authorities. 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). Demographic controls include the age, sex, and education of the household head; geographic controls include area, population density, an urban/rural indicator, and terrain ruggedness. Data are from the DHS and LSMS projects. All regressions use OLS with survey weights and country-wave fixed effects. Standard errors are clustered at the country-wave level.

over the baseline likelihood of possessing a land title (0.168).

These tables suggest that the potential returns to agricultural investment are a stronger predictor of titling than land values. However, the directionality is broadly consistent across these different models. Coverage by a hierarchical pre-colonial institution does not have strong associations with titling rates by itself. However, in a centralized land regime, moving from a district which is zero percent covered by a hierarchical pre-colonial institution to one that is entirely covered by a hierarchical pre-colonial institution diminishes the relationship between returns to investment and land titling. Simply being in a devolved land regime attenuates the relationship between returns to investment and land values. However, the triple-interaction coefficient reveals a crucial point: devolved land regimes invert the relationship between strong pre-colonial

**Figure 2.** The marginal effect of land variables by the presence of precolonial institutions depends on the prevailing land regime



This figure shows the marginal effects of three land variables on the probability a household has a title, broken out by the percent of the administrative division covered by a title and whether the country has a devolved or centralized land regime. All equations are estimated separately using OLS, with country-wave fixed effects.

institutions and land values.

To make sense of these triple interaction models, figure 2 shows the marginal effect of the different measurement strategies for land value on titling rates by the strength of pre-colonial institutions, across both types of land regime. The vertical axes show the marginal effect of land value/returns to investment; the horizontal axes show the percentage of the district covered by hierarchical pre-colonial institutions. In other words, the vertical axis shows the magnitude of the relationship between land values/returns to investment and land titling rates, once all other variables have been taken into account. For example, a value of 0.10 on the vertical axis for a given level of pre-colonial strength and a given land regime implies that within this subgroup, a one unit

increase in the land value variable is associated with a 0.10 point increase in the probability of land titling.

Figure 2 shows that the effect of the land value variables is consistent in direction. Across all specifications, the marginal effect of land values on land titling is weakly positive. Regardless of the country's land regime or the presence of hierarchical institutions, the relationship between land values and land titling is never negative—only statistically indistinguishable from zero or positive. However, the magnitude of the relationship between land values and titling varies dramatically.

In countries with devolved land regimes, the relationship between land values and titling is weakly increasing in a district's coverage by hierarchical precolonial institutions. Within devolved regimes, a one unit increase in the returns to tree crops is associated with a (statistically insignificant) 0.027 increase in titling rates at the lowest rates of hierarchy, and a statistically significant increase of 0.085 points at the highest levels of hierarchy. The slope of the marginal effects is similar for the maximum attainable value and the returns to fertilization, but at no point do they cross the threshhold for statistical significance. In summary, within devolved land regimes, the presence of hierarchical customary institutions *increases* the strength of the relationship between land values and land titles.

Centralized land regimes tell a different story. Within these countries, the relationship between land values and titling is positive and significant at all but the highest levels of pre-colonial hierarchy. However, a one unit increase in the marginal returns to planting tree crops within centralized land regimes is associated with a 0.105 point increase in the likelihood of having a title among households at the lowest levels of hierarchy. Among households at the highest level of hierarchy, a one unit increase in the returns to tree crops is associated with only a 0.054 increase int he likelihood of having a land title. The magnitude and significance of these results is similar for the maximum attainable value of a parcel and the marginal returns to fertilization. Strong

pre-colonial institutions *weaken* the relationship between land values and titling and centralized land regimes.

These results paint a nuanced portrait of the relationship between the value of land and the uptake of formal land titles. Across the board, households with more valuable land—as well as those with higher returns to agricultural investment—are more likely to have a formal title for at least one of their parcels. However, local politics, in the form of strong customary institutions, a country’s land regime moderate these relationships. In countries where land administration is centralized, households title less when chiefs are strong. Chiefs impede titling. Households in countries where land regimes are devolved, meaning that the authority of chiefs pervades the titling process, households title more when their chief is strong.

These results provide show that broad, cross-national trends in land titling are consistent with the overarching theory. Households make a cost-benefit trade-off to decide whether to title, but sufficiently powerful customary chiefs can capture this program. In the following section, I use an original field survey in Côte d’Ivoire to better elucidate these mechanisms.

## 5 Côte d’Ivoire: customary elites in action

Côte d’Ivoire is a useful case in which to trace the role of customary elites in land titling because two factors provide empirical leverage through which to trace the broader theory in action. First, Côte d’Ivoire moved from a centralized to devolved land tenure system in the wake of its 1998 land law, the heterogenous effects of which are well documented (Boone 2018; Boone et al. 2021). Second, the history of migration and land use in the Côte d’Ivoire led to very high levels of variation in the perceived authority of chiefs.<sup>27</sup> Côte d’Ivoire is also a useful case because it

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<sup>27</sup>Village chiefs are the relevant customary authority in Côte d’Ivoire. Many villages have both a village chief—selected by the village elders as the strongest representative of the village—and a customary authority, such as a land chief (*chef de terre*) or earthpriest. Such authorities may play a role within the villages, but village chiefs serve as interlocutors to the state and who manage the village land committees.

is roughly average in terms of both overall titling rates and the perceived authority of chiefs in titling.<sup>28</sup> Côte d'Ivoire is an "on-the-line" case, which makes it ideal as a nested case for testing the broader theory of land titling outlined above (Lieberman 2005).

The Ivoirian case illustrates several key intermediate steps in the broader theory.<sup>29</sup> Chiefs largely opposed state efforts to administer land during the pre-1998 period of centralized land administration of Côte d'Ivoire. Since 1998, chiefs effectively took control of the land titling process to exclude autochthones, or relative newcomers, and make allochthones feel their titles will be less useful.<sup>30</sup> Titling rates are higher in villages with stronger chiefs—though not for the out-group. Unexpectedly, autochthones who believe the chiefs could prevent them from titling see chiefs as less authoritative. This nested, within-country case study approach complements the broader cross-national work: the cross-national research reveals broad patterns, but the Ivoirian case specifically traces the intermediate steps of my theory.

I unpack this case study through an original field survey of 801 household heads in the Haut-Sassandra and Indénié-Djuablin regions of Côte d'Ivoire. Figure 3 shows these areas.<sup>31</sup> The survey took place in the spring of 2024, and covered 80 administrative villages in these regions. Within each village, I surveyed five households within the village itself, and another five in a randomly elected hamlet or campement. In fifty percent of villages, I surveyed an additional randomly selected hamlet or campement. Within each location, I also surveyed the village chief/headman or their representative.

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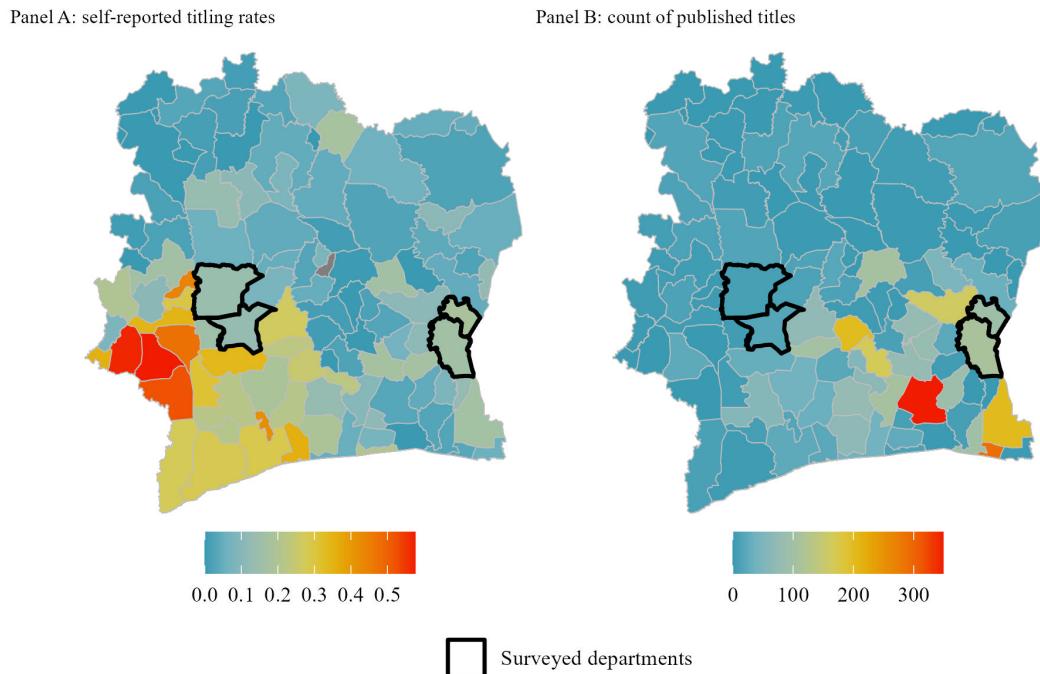
<sup>28</sup>Figure C2 shows these figures in comparative perspective and further discusses the case selection.

<sup>29</sup>I do not explicitly adopt a process tracing framework here, but I nevertheless set out the set of facts which would be necessary to "trace" the different mechanisms of my theory at work.

<sup>30</sup>Throughout this section, I will use the term *certificat foncier* and title interchangeable. Côte d'Ivoire also has higher level *titres fonciers* but these are rare, and largely concentrated in cities.

<sup>31</sup>Both regions are in the country's central forest belt, where coffee, cocoa, rubber, and oil palms are commonly grown as cash crops. With both land values and the prevailing land regime as constants, this context isolates the relationship between chiefly authority and the uptake of formal property rights.

**Figure 3.** Spatial distribution of land titles across Côte d'Ivoire



The left panel shows the average self reported titling rates by department from the 2021 *Enquête Harmonisée sur les Conditions de Vie des Ménages*, which follows the LSMS template. All averages use household weights. The right panel shows the count of land published in the Ivoirian national gazette (*Journal Officiel de la République de Côte d'Ivoire*) as of November 7, 2022.

### 5.1 Natives and strangers in the Ivoirian cocoa belt

Migration in Côte d'Ivoire created a dense patchwork of different ethnicities. Most areas have an autochthonous group or lineage, who are the descendants of the first inhabitants to ‘clear the bush.’ Later arrivals are called ‘allochthones,’ or simply ‘strangers.’ These relative newcomers often give symbolic gifts to acknowledge the precedence of the autochthones. Burkinabè families are particularly prominent among the allochthones, because the long-serving first president Félix Houphouët-Boigny recruited wealthy planters from Burkina Faso to increase Ivoirian cocoa and coffee production (Zolberg 1964). Autochthony is orthogonal to ethnicity; one ethnicity would

be autochthonous in their homeland and allochthonous elsewhere.

Arriving families often established their fields and households at some distance from the original village. Over time, these settlements grew into hamlets and ‘campements.’ These hamlets often rival the original village in population and economic prominence; in Daloa for example, allochthones now outnumber autochthones and hold most of the area’s land (Boone et al. 2021). The high number of ethnicities and these quilt-like settlement patterns mean that autochthone versus allochthone is the important cleavage for land disputes in Côte d’Ivoire, not ethnicity.

The Ivoirian land regime has alternated between two conceptions of land rights: use-based and customary (Boone 2018; Colin, Le Meur, and Leonard 2009). Use-based land regimes favor allochthones who currently farm parcels of land. Often these allochthones have more capital than the autochthones—many of the cocoa and coffee plantations in the central forested regions of the country are maintained by Burkinabè and Baoulé migrants.<sup>32</sup> Use-based rights are exemplified by the long-serving Ivoirian president Houphouët-Boigny’s famous statement: “the land belongs to whoever develops it.” Importantly, the wealthy allochthonous planters were important supporters of Houphouët-Boigny, so a use-based land regime was a political necessity (Zolberg 1964).

After a lengthy power-struggle in the 1990s following Houphouët-Boigny’s death, Côte d’Ivoire passed the 1998 land law (Law 98-750), signaling a new, land regime which favored customary rights. The law “contained an array of potentially or inherently conflicting provisions for assigning land ownership rights on the basis of autochthony” (Boone 2018: 191). In other words, this law recognized the rights of those who inherited a customary claim to the land from their ancestors: the autochthones. Laurent Gbagbo, the opposition leader, was the major proponent of this policy as it benefited his largely autochthonous political supporters. His support for customary land rights continued after he gained power in 2000, as part of a broader agenda of decentraliza-

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<sup>32</sup>The Burkinabè element means there is also an element of nationalism (*Ivoirité*) in Ivoirian debates over land policy. Between 2014 and November 2022, 95 percent of certificats fonciers gazetted in the *Journal Officiel de la République de Côte d’Ivoire* belong to Ivoirian nationals.

tion and support for village chiefs. Land-based grievances metastasized into violence during the 2010-2011 civil war and prevented broader implementation of land titling at the start of Alassane Ouattara's administration. Under Ouattara, the use of rural land administration as a crutch for autochthonous land rights was largely abandoned; the administration used land administration instead as a tool of state-building (Boone 2018; Chauveau 2009).

Village land management committees (*comités villageois de gestion foncière rurale*—CVGFRs) oversee land titling in Côte d'Ivoire. CVGFRs investigate land claims (Bassett 2020) and issue dossiers for potential *certificats fonciers* (CFs). The national land bureau (*Agence Foncier Rurale*—AFOR) ultimately records CFs and issues the forms themselves, but important decisions are made locally. Chiefs often control the CVGFRs, which means they are gatekeepers to, and facilitators of, land titling. Therefore, in line with the broader theory, we would expect titling rates to be higher in villages with stronger chiefs.

## 5.2 Chiefly opposition before 1998

Before the 1998 land law, land administration in Côte d'Ivoire was centralized, and so my broader theory predicts that chiefs would oppose it. In the colonial period, the African population of Côte d'Ivoire was "effectively reduced to the status of tenants at will" (Zolberg 1964: 57). After independence, Houphuët-Boigny prioritized an expansion of cocoa and coffee production. Chiefs represented the autochthonous groups, into whose land the incoming planter class expanded, and so chiefs in the central cocoa belt were largely suppressed (Boone 2003). Chaveau (2009: 138 notes that much of this internal colonization was not documented in formal laws, but in certificates of occupation given to migrants by sous-prefects over the heads of village chiefs.

The power of these chiefs was almost entirely destroyed in what Boone (2003: 213) calls a "near-perfect model of direct rule." As a result, village chiefs do not exert a meaningful effect on rural politics before the 1998 land reforms. In summary, analyses of this period in Ivoirian

history rarely mention overt chiefly resistance to land titling or land administration. However, the overall sense of chiefly resentment pervades the period. Chiefs and their autochthonous constituents opposed Houphouët-Boigny's development initiatives, so he sidelined them. Chiefly resistance to these efforts can be read between the lines—chiefs did not support the perceived theft of their land.<sup>33</sup>

### 5.3 Strong chiefs lead to more titles

I measure chiefly authority using an index of seven survey questions: "[f]or each of these activities [that chiefs in Côte d'Ivoire sometimes mandate], I would like you to tell me how much of the village you think would do what the chief asked them to do." The seven activities were: (1) Participate in village cleanup day; (2) Give up a piece of land for a school; (3) Give up a piece of land for a mosque; (4) Spend a day repairing a road; (5) Spend a day planting trees; (6) Come to participate in a traditional dance; and (7) Give money to support a traditional ceremony. For each of these activities, respondents answered: nobody, very few people, some people, most people, or everybody.

I then use principal component analysis to create two indices. The first principal component is evenly weighted across the seven questions; I think of this principal component as the overall authority of the chief. The coefficient of correlation between a simple sum of these questions and the first principal component is 0.99. The second principal component has strong negative weights on giving up land for a mosque, participating in a traditional dance, and giving money to a traditional ceremony, but strong positive weights on other items. As a result, I think of the second principal component as measuring the extent to which a chief's power is secular, rather than customary. The extent to which a chief is perceived as secular is also a measure of

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<sup>33</sup>One exception to the latent character of chiefly opposition is chief's outward push against a 1962 reform of the country's land law, facilitating land claims by allochthones. Chiefly opposition sufficed to prevent the law from being promulgated (Chauveau 2009: 117).

**Table 4.** Chief's legitimacy is positively associated with titling, but only for autochthones

	(1)	(2)	(3)	(4)	(5)	(6)
Overall authority	0.008 (0.010)	0.015 (0.011)	0.015 (0.012)	0.026+ (0.014)	0.031+ (0.018)	0.030 (0.018)
Chief is secular	0.072* (0.034)	0.069** (0.026)	0.068** (0.026)	0.145*** (0.030)	0.133*** (0.025)	0.133*** (0.025)
Allochthonous	0.188** (0.071)	0.189+ (0.109)	0.185+ (0.106)	0.209** (0.071)	0.241* (0.107)	0.237* (0.104)
Overall authority * Allochthonous				-0.045+ (0.026)	-0.034 (0.025)	-0.032 (0.025)
Chief is secular * Allochthonous				-0.186*** (0.042)	-0.172*** (0.038)	-0.174*** (0.039)
Hamlet/camp	-0.105 (0.085)	-0.076 (0.077)	-0.078 (0.075)	-0.089 (0.073)	-0.075 (0.071)	-0.074 (0.070)
Department FEs	X	X	X	X	X	X
Demographic controls		X	X		X	X
Geographic controls			X			X
Num.Obs.	787	785	785	787	785	785
R <sup>2</sup>	0.101	0.263	0.270	0.155	0.301	0.308

*Note:* The dependent variable is whether a respondent has a formal land title. The independent variables are indices of responses to: [f]or each of these activities [that chiefs in Côte d'Ivoire sometimes mandate], I would like you to tell me how much of the village you think would do what the chief asked them to do. Demographic controls include education, sex, age, ethnicity, the respondent's relationship to the household head, and wealth. Geographic controls include an indicator for PAMOFOR, distance to department capital, cocoa suitability, coffee suitability, and terrain ruggedness. All regressions use OLS with inverse sampling probability weights. Standard errors are clustered at the administrative village level.

their authority. Being able to muster support for traditional authorities is very much a minimum expectation for chiefs—it is the stronger chiefs who can organize other activities. Table C3 further breaks down this index.

Table 4 shows the relationship between these chiefly authority indices and household titling. The outcome variable is a binary indicator for whether a household possesses a formal land title for at least one of their parcels. The independent variables are the two indices of chiefly authority: their overall authority, and the extent to which the chief is secular. Columns 1 to 3 reinforce the principal conclusion: in Côte d'Ivoire, which has a devolved land regime, stronger chiefs lead to more titles. More specifically, a one standard deviation increase in the extent to which households perceive their chief as secular (as opposed to customary) is associated with a 0.083 point increase

in the likelihood of a household having a title, an increase of 19.6 percent over the baseline mean of 0.42.

Columns 4-6 show that these results are highly heterogenous by whether the respondent is an allochthone. Across the 801 observations, 443 were allochthones and 355 were autochthones.<sup>34</sup> Allochthones are overall more likely to have a title—likely reflecting the state’s influence in the earliest periods of titling, when CVGFRs were directly overseen by AFOR. Among autochthones, stronger chiefs have a dramatic influence on titling. A one standard deviation increase in the extent to which the chief is perceived as secular among autochthones is associated with a marginal increase of 0.15 point increase in the likelihood of possessing a land title—an increase of 40.4 percent over the baseline titling rate of 0.38 among autochthones. These results are both substantively and significantly significant. However, the interaction effect between allochthony and chief’s authority nullifies these effects. Among allochthones, a one standard deviation increase in the perception of the chief as secular is associated with a statistically insignificant decrease of 0.05 points, a decrease of 9.7 percent over the baseline titling rate of 0.48. The effects and interactions for the overall chiefly authority are similar in direction, but is not statistically significant.

These results paint a clear picture. In this devolved setting, where land values are relatively high due to the cocoa and coffee plantations, strong chiefs lead to more titles. However, this effect only holds for autochthones—the in-group for Ivoirian chiefs. The Ivoirian state and AFOR are agnostic to allochthony, but chiefs are able to capture the process and selectively distribute titles.

#### 5.4 Chiefs exclude allochthones

How do chiefs exclude allochthones? I asked the chiefs of each village (1) whether the village was mostly autochthones or allochthones, and (2) whether the CVGFR was mostly autochthones or allochtones. Among the 36 autochthonous villages, 33 CVGFRs were entirely or mostly au-

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<sup>34</sup>The remaining three refused to answer the question.

**Table 5.** Chiefs in allochthonous villages think titles are less useful

	More likely to keep		Are better off	
	(1)	(2)	(3)	(4)
Allochthonous village	-0.357*	-0.362*	-0.385**	-0.368**
	(0.154)	(0.162)	(0.131)	(0.132)
Autochthonous village	0.056	0.057	0.011	0.055
	(0.149)	(0.147)	(0.139)	(0.146)
Department FEs	X	X	X	X
Geographic controls		X		X
Num.Obs.	192	192	192	192
R <sub>2</sub>	0.052	0.055	0.075	0.096

*Note:* Dependent variables of these models are responses to “[t]o what extent do you agree or disagree with the following statements? (1) Households who formalize their landholdings are less likely to lose access to their land than other households; (2) Households who formalize their landholdings are better off than when before they formalize their land?” Respondents are village chiefs and headmen. Regressions use OLS with inverse sampling probability survey weights. Standard errors are clustered at the village level. Geographic controls include an indicator for PAMOFOR, distance to department capital, cocoa suitability, coffee suitability, and terrain ruggedness.

tochthones, with one being equally split, and 3 being mostly allochthonous. Among the 39 equally split villages, 22 CVGFRs were entirely or mostly autochthonous, 15 were equally split, and one was mostly allochthonous. Even among the five allochthonous villages, three had CVGFRs that were entirely or mostly autochthonous. Zero villages reported an entirely allochthonous CVGFR. While allochthonous and split villages had greater levels of allochthonous representation, the breakdown nevertheless illustrates that chiefs exclude allochthonous from the local land management body.

Chiefs may also selectively enforce certificates fonciers, leading to lower uptake among allochthonous. Table 5 shows that chiefs/headmen of allochthonous locations<sup>35</sup> perceive titles to be less useful. The reference category is chiefs/headmen of locations which are evenly split between autochthonous and allochthonous. Columns 1 and 2 show that chiefs/headmen of locations which

<sup>35</sup>I use the word location to mean villages, hamlets, and camps; I use the word village only to refer to administrative villages.

are mostly allochthonous are less likely to agree that "[h]ouseholds who formalize their landholdings are less likely to lose access to their land than other households." Columns 3 and 4 show that chiefs/headmen of locations which are mostly allochthonous are less likely to agree that "households who formalize their landholdings are better off than before they formalize their land." For both questions, moving from an evenly split location to an allochthonic location is associated with a decrease of about a third of a level—moving from between "strongly agree" and "agree" to simply "agree."

Table 6 shows similar results, but at the household level. Specifically, it shows whether respondents agree that: (1) having a title helps you **keep your land** if the government wants to take it; (2) having a title helps you **be compensated** if the government does take your land, and (3) having a title is useful in case of a **dispute** against your peers. Across all three categories, autochthones think titles are less helpful. These results are strongest for keeping land if the government wants to take it: allochthones have approximately half a standard deviation less confidence that titles will be useful to help them keep their land in the face of government expropriation. Responses to the other categories are similar in magnitude, but inconsistently significant.

Both autochthones and allochthones think that titles are more useful to keep land and to win disputes against neighbors when the chief is more secular. A one standard deviation increase in the 'chief is secular' index is associated with a 0.18 standard deviation in the belief that titles are helpful against the state among autochthones and a 0.32 standard deviation increase among allochthones. A one standard deviation increase in the 'chief is secular index' is associated with an approximately 0.20 increase standard deviation increase in the belief that titles are helpful in disputes with one's peers for both groups. However, allochthones perceive titles to be less useful when the overall authority of the chief goes up. A one standard deviation increase in perceived overall authority is associated with an approximately one third of a standard deviation decrease in the perceived utility of titles across all categories. Together, these results suggest that

**Table 6.** Autochthones, but not allochthones, think strong chiefs make titles more useful

	Keep land		Be compensated		Win dispute	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall authority	0.004 (0.014)	0.007 (0.017)	0.081 (0.043)	0.087** (0.029)	0.004 (0.019)	0.003 (0.016)
Chief is secular	0.109*** (0.028)	0.107*** (0.030)	0.064 (0.076)	0.105 (0.074)	0.150*** (0.044)	0.165*** (0.036)
Allochthon	-0.319** (0.108)	-0.323* (0.144)	-0.264** (0.090)	-0.183 (0.195)	-0.350** (0.105)	-0.311 (0.159)
Overall authority * Allochthon	-0.120*** (0.035)	-0.131*** (0.037)	-0.159*** (0.045)	-0.168*** (0.038)	-0.121** (0.044)	-0.128** (0.040)
Chief is secular * Allochthon	0.087* (0.043)	0.108 (0.063)	-0.023 (0.083)	-0.047 (0.090)	0.048 (0.054)	0.040 (0.078)
Hamlet/camp	0.095 (0.081)	0.007 (0.118)	0.114 (0.069)	0.144 (0.125)	0.108 (0.069)	0.053 (0.095)
Department FEs	X	X	X	X	X	X
Demographic controls		X		X		X
Geographic controls		X		X		X
Num.Obs.	798	796	798	796	798	796
R <sub>2</sub>	0.236	0.307	0.176	0.305	0.243	0.329

*Note:* Dependent variables are answers to 'd[o] you think somebody with a certificat foncier would be (1-2) more likely to keep their land if the government attempted to take it; (3-4) compensated fairly for the land, were it taken' and (5-6) more likely to succeed in a land dispute? All answers use a five-point likert scale. Demographic controls include education, sex, age, ethnicity, the respondent's relationship to the household head, and wealth. Geographic controls include an indicator for PAMOFOR, distance to department capital, cocoa suitability, coffee suitability, and terrain ruggedness. All regressions use OLS with inverse sampling probability weights. Standard errors are clustered at the administrative village level.

one mechanism by which chiefs discriminate against allochthones is the uneven enforcement of *certificats fonciers*. In areas where chiefs are stronger, allochthones perceive their titles to be less useful.

## 5.5 Capturing the process increases their authority

The final portion of this theory is that the chiefs' role in the titling process maintains their political authority. This leg of the theory is difficult to measure because the data suggest that chiefs pervade the titling process, so it is unclear how much variation to expect on the independent variable. However, I measure the chief's capture of the process by asking "If a village chief opposed a household's attempt to formalize their landholding, how likely is it that the village chief would

**Table 7.** Chiefs who can oppose titling are less secular, but only for autochthones

	Overall authority			Chief is secular		
	(1)	(2)	(3)	(4)	(5)	(6)
Chief could oppose	-0.145 (0.149)	-0.113 (0.109)	-0.118 (0.116)	-0.211*** (0.057)	-0.194*** (0.054)	-0.189** (0.058)
Allochthonous	0.205 (0.633)	-0.179 (0.579)	-0.212 (0.571)	-0.638** (0.230)	-0.845*** (0.188)	-0.750*** (0.202)
Chief could oppose * Allochthonous	-0.107 (0.164)	-0.125 (0.146)	-0.117 (0.143)	0.156* (0.066)	0.144* (0.059)	0.124* (0.059)
Department FEs	X	X	X	X	X	X
Demographic controls		X	X		X	X
Geographic controls			X			X
Num.Obs.	798	796	796	798	796	796
R <sup>2</sup>	0.046	0.223	0.228	0.134	0.248	0.271

*Note:* The dependent variables are the first two principal components of a series of questions which ask “[f]or each of these activities, I would like you to tell me how much of the village you think would do what the chief asked them to do.” The independent variable is the response to ‘If a village chief opposed a household’s attempt to formalize their landholding, how likely is it that the village chief would be able to prevent it?’ Demographic controls include education, sex, age, ethnicity, the respondent’s relationship to the household head, and wealth. Geographic controls include an indicator for PAMOFOR, distance to department capital, cocoa suitability, coffee suitability, and terrain ruggedness. All regressions use OLS with inverse sampling probability weights. Standard errors are clustered at the administrative village level.

be able to prevent it?"

Table 7 shows no relationship between the perception that a chief could stop you from titling and the overall authority of the chief. There is a strong relationship between the perception that chiefs can oppose titling and the ‘chief is secular’ index. Among autochthones, a one standard deviation increase in the belief that the chief could oppose land titling is associated with a 0.25 standard deviation *decrease* in the “chief is secular” index. Allochthones think that the chief is less secular regardless, but the interaction term between perception the chief could oppose and the respondent being an allochthonous negates the relationship. In other words, allochthones always think chiefs are less secular, but belief the chief could oppose a land title makes no difference. These results contradict the broader theory—if chiefs intervene in the titling process, it ought to enhance their legitimacy rather than reduce it.

Together, this nested case study of Côte d’Ivoire sheds light into the mechanisms at play in

this broader theory. Before land tenure was devolved by the 1998 land law, chiefs were largely opposed to titling. In a 2024 survey, strong chiefs facilitate titling within their village. However, strong chiefs discriminate: they only facilitate titling among autochthones, the chiefs' in-group. Strong chiefs have no effect on titling for allochthones. Moreover, allochthones perceive titles to be less useful, suggesting that enforcement of land titles may be unequal. Surprisingly however, households who think their chief could intervene in the titling process think their chiefs are less authoritative. This case illustrates that the mechanisms on which the broader theory is predicated do, in fact, play out in Côte d'Ivoire. This case study complements the cross-national analyses by showing the individual components of the theory in action.

## 6 Conclusion

Strong and secure property rights are a necessary condition for economic development. Across sub-Saharan Africa, secure tenure over agricultural land is the form of property rights most relevant to the high percentage of households which remain employed by the agricultural sector. Land titles benefit households: they reduce the risk of households losing their land, and they make households feel more secure making profitable investments. These land titles are available on-demand in many African countries. So why are African farmers leaving these economic gains on the table?

Across 170,216 survey observations, the average titling rates across countries is 16.8 percent (15.2 percent in only the most recent waves). Households with higher potential returns to agricultural investment on their lands are more likely to possess a title. However, the strength of customary institutions and the country's land regime moderate this relationship. Where land tenure administration is devolved, an increase of USD1,000 in the returns to long-term agricultural investment is associated with a (statistically insignificant) 18 percent increase in titling rates where customary institutions are weakest, and a statistically significant increase of 57 percent

where customary institutions are weakest. Where land tenure administration remains centralized at the national level, the same increase in the returns to long-term investment is associated with a 70 percent increase in the likelihood of having a title among households with the weakest customary institutions, and an increase of only 36 percent among households with the strongest customary institutions.

These results make two broad contributions to the existing literature. Much of the existing literature uses states and elites to explain the supply of property rights (Albertus 2020; Boone 2014). However, the prevalence of land titling varies within states and within regions, suggesting that households play an important role. This research centers household demand for property rights, and shows how states and elites moderate this demand. Second, this paper advances the literature on informal institutions in developing countries, by showing how their cooperation with the state depends on their ability to maintain control over local processes. This finding helps explain existing contradictory results on when the informal elites compliment or substitute for the state (Henn 2023; Lust 2022).

This paper combines two chapters from my book-style dissertation project. The broader dissertation deploys the cross-national data I display here both to evidence the broader theory and to descriptively test various other theories for why property rights emerge. Another empirical chapter combines the original field survey with administrative data and external survey data to explore the Ivoirian case in more depth. A third empirical chapter uses a field conjoint experiment of 1,164 households across rural Sénegal to show how the perceived utility of land titles depends on trust in local government. By theorizing "who wants property rights," this dissertation aims to answer an empirical puzzle: why do formal property rights remain so rare across sub-Saharan Africa? In so doing, it reconciles disparate findings on the uptake of written land titles. By showing how both local politics and state decisions affect household decisions, I aim to bring the politics back into the political economy of property rights.

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# Appendices

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## A Regression details

### A.1 Controls and weights

All regressions in this paper use the household-level sampling weights provided in the original DHS or LSMS data files. Both DHS and LSMS data use a complex, multi-level sampling strategy rather than a pure random sample. As a result, these surveys include sampling weights to account for both idiosyncrasies of sampling strategy and differential non-response. I make two modifications to these survey weights.

First, I winsorize all survey weights on a country-by-country basis. Weights above the 95th percentile for country  $i$  are set to the 95th percentile value; weights below the 5th percentile for country  $i$  are set to the 5th percentile value. The purpose of this procedure is to render the estimates less sensitive to extreme outliers, and to reduce the variance of estimates.

Second, I rescale all survey weights so that the country  $i$ 's fraction of total survey weight is equal to the fraction of total observations which belong to country  $i$ . For example, of the 425,663 total observations in the combined DHS/LSMS dataset, 28,991 observations come from Mali, or about 6.8 percent. After rescaling, the fraction of total survey weight which comes from observations in Mali is also 6.8 percent. This procedure ensures that results are not dominated by a single country due to different weighting procedures at the country level.

I include two sets of control variables for all regressions. The demographic set of controls include variables calculated from the LSMS/DHS survey themselves. These data are necessarily constrained by the availability of data within the underlying survey. These controls are: the education of the household head (don't know, no education, preschool, primary education, or secondary education/higher), the sex of the household head, and the household head's age. Ethnicity questions were not included in approximately half of all DHS/LSMS surveys, so I do not include it as a control. Household wealth questions were also administered inconsistently across

**Table A2.** Strong customary institutions moderate the relationship between land value and land titles (no controls)

	(1)	(2)	(3)	(4)	(5)	(6)
Land value	0.041 (0.040)		0.041 (0.040)	0.044 (0.039)	0.064* (0.032)	0.087* (0.035)
Hierarchy		-0.002 (0.033)	-0.002 (0.033)	-0.082 (0.044)	0.000 (0.031)	0.065 (0.063)
Hierarchy * Devolved				0.117* (0.054)		-0.085 (0.082)
Land value * Hierarchy						-0.037 (0.023)
Land value * Devolved					-0.030 (0.018)	-0.064* (0.029)
Land value * Hierarchy * Devolved						0.059* (0.029)
Country-Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls						
Geographic Controls						
Num.Obs.	170 216	170 216	170 216	170 216	170 216	170 216
R <sub>2</sub>	0.240	0.239	0.240	0.242	0.241	0.244

*Note:* The dependent variable of this model is a binary indicator for whether a household possesses a land title. The independent variables are the maximum attainable value; the fraction of an administrative unit that is covered by a hierarchical pre-colonial institution; and whether the country has devolved its land regime to local authorities. 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. All regressions use OLS with survey weights and country-wave fixed effects. Standard errors are clustered at the country-wave level.

countries, which limits their utility.

The second set of controls are geographic. They include the district area, population density (CIESIN 2017), the interaction between district area and population density, average terrain density (Carter, Shaver, and Wright 2019), the distance between the district centroid and the country's capital, and caloric suitability (Galor and Özak 2016). With the exception of population density, these data do not change over time. As alluded earlier, all regressions also include the average land value "shock" across all periods (Borusyak and Hull 2020).

Tables A2 and A3 repeat the regressions from section 4 regressions without these control variables. All estimates are qualitatively similar in magnitude.

**Table A3.** Strong customary institutions moderate the relationship between returns to planting tree crops and land titles (without controls)

	(1)	(2)	(3)	(4)	(5)	(6)
Difference (trees)	0.093*** (0.006)		0.094*** (0.008)	0.092*** (0.011)	0.120*** (0.016)	0.134*** (0.027)
Hierarchy		-0.002 (0.033)	0.009 (0.033)	-0.067 (0.040)	0.010 (0.032)	-0.051 (0.041)
Hierarchy * Devolved				0.110* (0.048)		0.079 (0.053)
Difference (trees) * Hierarchy						-0.051* (0.021)
Difference (trees) * Devolved					-0.033 (0.021)	-0.097*** (0.024)
Difference (trees) * Hierarchy * Devolved						0.120** (0.045)
Country-Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls						
Geographic Controls						
Num.Obs.	170 216	170 216	170 216	170 216	170 216	170 216
R <sub>2</sub>	0.247	0.239	0.247	0.249	0.247	0.250

*Note:* The dependent variable of this model is a binary indicator for whether a household possesses a land title. The independent variables are the difference in maximum attainable value between planting tree crops and planting other crops; the fraction of an administrative unit that is covered by a hierarchical pre-colonial institution; and whether the country has devolved its land regime to local authorities. 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). Demographic controls include the age, sex, and education of the household head; geographic controls include area, population density, an urban/rural indicator, and terrain ruggedness. Data are from the DHS and LSMS projects. All regressions use OLS with survey weights and country-wave fixed effects. Standard errors are clustered at the country-wave level.

## A.2 Alternative measures of land regimes

In countries where registering property is easiest, strong chiefs weaken the relationship between land values and land titling—they impede titling. In countries where titling is harder, chiefs facilitate titling. According to these World Bank metrics, centralized regimes charge a smaller percentage of the property's fee to register, but have many more steps. Overall, it is harder to formalize in devolved regimes. This means that the results from using the World Bank's registering property score mirror those using the devolution indicator.

**Table A4.** Strong customary institutions moderate the relationship between returns to fertilizer and land titles (without controls)

	(1)	(2)	(3)	(4)	(5)	(6)
Difference (fertilizer)	0.716 (0.384)		0.715 (0.380)	0.806* (0.347)	1.172*** (0.326)	1.776*** (0.454)
Hierarchy		-0.002 (0.033)	-0.001 (0.033)	-0.084* (0.040)	-0.001 (0.031)	0.067 (0.049)
Hierarchy * Devolved				0.120* (0.050)		-0.078 (0.063)
Difference (fertilizer) * Hierarchy						-1.217* (0.505)
Difference (fertilizer) * Devolved					-0.781 (0.488)	-1.877** (0.727)
Difference (fertilizer) * Hierarchy * Devolved						1.890** (0.702)
Country-Wave Fixed Effects	X	X	X	X	X	X
Demographic Controls						
Geographic Controls						
Num.Obs.	170 216	170 216	170 216	170 216	170 216	170 216
R <sup>2</sup>	0.240	0.239	0.240	0.243	0.241	0.245

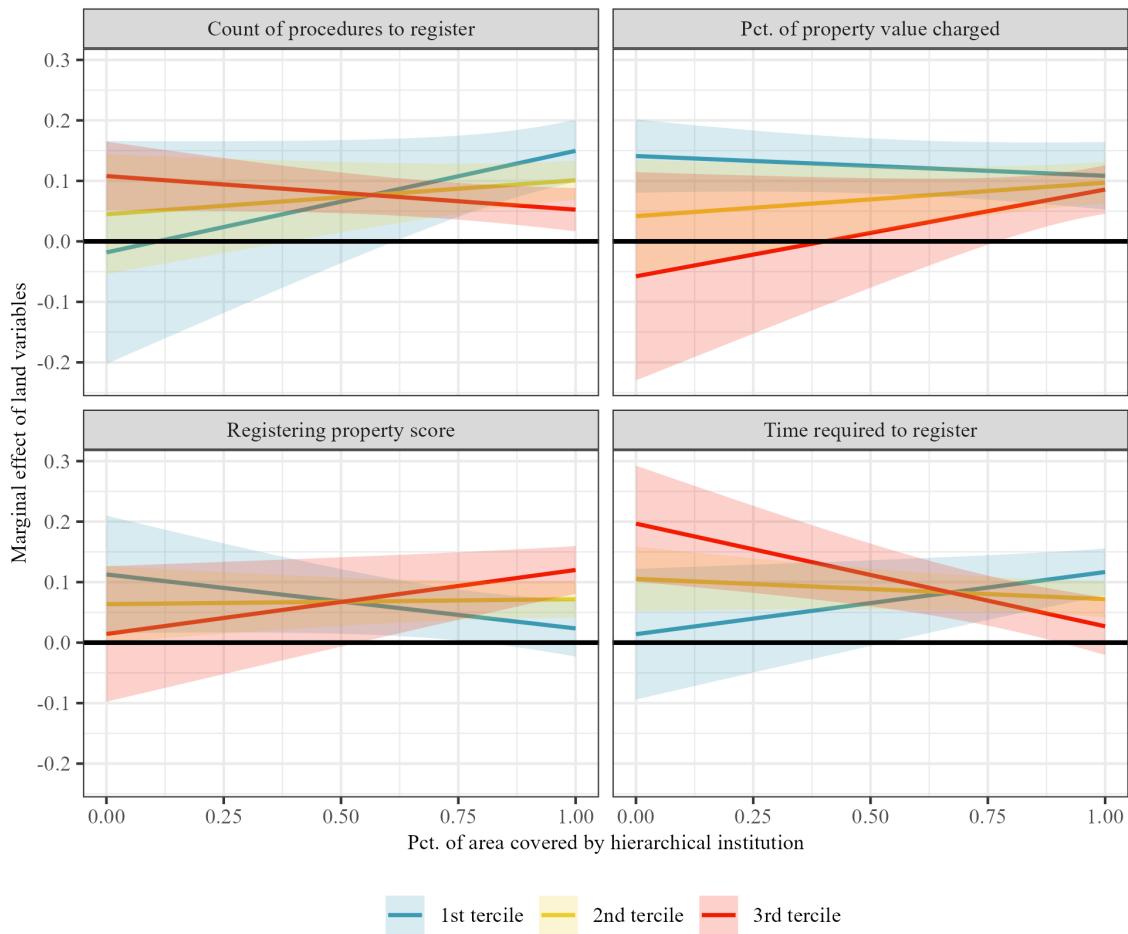
*Note:* The dependent variable of this model is a binary indicator for whether a household possesses a land title. The independent variables are the increase in maximum attainable value from fertilizer; the fraction of an administrative unit that is covered by a hierarchical pre-colonial institution; and whether the country has devolved its land regime to local authorities. 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). Demographic controls include the age, sex, and education of the household head; geographic controls include area, population density, an urban/rural indicator, and terrain ruggedness. Data are from the DHS and LSMS projects. All regressions use OLS with survey weights and country-wave fixed effects. Standard errors are clustered at the country-wave level.

**Table A5.** World Bank Doing Business Indicators by whether a country has devolved land administration

	Devolved land regime		Centralized land regime		
	Mean	Std.Dev.	Mean	Std.Dev.	T-score
Registering score	50.07	9.30	56.32	14.15	-2.01
Pct. of property value charged	8.98	3.33	4.16	3.14	5.86
Count of procedures to register	5.50	1.94	7.57	2.62	-3.47
Time required to register	56.04	29.14	66.36	46.26	-0.81

*Note:* This table shows country-wave level descriptive statistics for the World Bank's Doing Business reports. 34 country-waves have devolved land regimes; 28 have centralized land regimes. The 'registering score' variable is an index of the other variables, and is only calculated from 2016 to 2021.

**Figure A2.** The marginal effect of land variables by the presence of precolonial institutions depends on the prevailing land regime



This figure shows the marginal effects of three land variables on the probability a household has a title, broken out by the percent of the administrative division covered by a title and whether the country has a devolved or centralized land regime. All equations are estimated separately using OLS, with country-wave fixed effects.

## B Crop price elasticity

The primary contribution of this paper is to show that land titling in sub-Saharan Africa is not responsive to land values alone. For the land value to be valid, the value needs to affect other economic behaviors that one would suppose to be associated with land values. In this section, I specifically examine whether farmers in areas where crop  $a$  has a higher attainable value actually plant more of crop  $a$ . In other words, I calculate the elasticity of crop plantings with regards to the attainable value of the crop. For this strategy to measure land values to be reasonable, I would expect a positive association: farmers plant more of crop  $i$  where it is more profitable to do so.

I calculate these numbers using a subset of the LSMS data. This set of surveys, called the *Enquêtes Harmonisé sur les Conditions de Vie des Ménages*, was sponsored by ECOWAS, the Economic Community of West African States. These surveys took place in Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo in both 2018 and 2021. This subset specifically is useful because the harmonized surveys use identical variable coding, which allows cross-national analysis beyond the level of simple variables such as whether a household possesses a title.<sup>36</sup> Importantly, these data cover a variety of state capacities, land regimes, and climactic zones.

For each household in this sample, I first calculate the household's overall landholdings. I then calculate the fraction of those landholdings dedicated to a crop. The resulting data uses the household-crop as its unit of observation. For example, one observation would be the fraction of household  $i$ 's land on which cocoa is grown, another observation would be the fraction of household  $i$ 's land on which sorghum is grown, and so on. To avoid inflating my sample size

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<sup>36</sup>More specifically, because LSMS surveys (apart from the EHCVM) are collected by national statistics agencies, variable definitions change. There is no equivalent to the DHS recode files, in which large amounts of variables can be easily combined across countries. Using the EHCVM data removes this challenge and renders data analysis more feasible.

**Table B2.** Households grow more of a crop when its attainable value per hectare is higher

	(1)	(2)	(3)	(4)
Total value of crop	0.044*** (0.006)	0.047*** (0.006)		
log(Total value of crop)			0.130*** (0.017)	0.159*** (0.020)
Country/Crop Fixed Effects	X	X	X	X
Demographic Controls		X		X
Num.Obs.	392 786	368 394	392 786	368 394
R <sub>2</sub>	0.348	0.346	0.365	0.369

*Note:* The dependent variable in these models is the fraction of a household's agricultural land where a crop is the principal planting. The independent variable measures the total attainable value for this crop. Observations are at the household-crop level; the data include all crops which are grown in the respondent's country at least once. All regressions include country-crop fixed effects; standard errors are clustered at the second-level administrative division.

without meaningful variation, I only include crops which are grown in the given country. For instance, I do not include cotton in Côte d'Ivoire, where it is rarely grown, but do include it in Mali and Niger, where it is a major cash crop.

Table B2 shows the relationship between the attainable value per hectare of a given crop (calculated across the 2nd level administrative division) and the fraction of households' landholdings planted with that crop. Columns 1 and 2 are untransformed; because this relationship can be thought of as an elasticity, I also include columns 3 and 4, which log-transform both the explanatory and outcome variables. The results are strong and statistically significant. For the elasticity regressions in particular, a one percent increase in the attainable value of a crop leads to a 0.130–0.159 percent increase in the fraction of land farmers dedicate to that crop.

Table B3 shows similar results, but with a different explanatory value. Using my land value measure, I back out the percentage of grid cells in a given administrative area where crop  $i$  is the most potentially valuable. This strategy provides an alternative measure: if crop  $i$  increases in value, it may still not be the most profitable crop, and so changes to the price of crop  $i$  may not be picked up in this paper's primary regressions. In contrast, the percentage of an area where crop  $i$  is most profitable is invariant to shifts in prices of other crops, unless that price moves above the

**Table B3.** Households grow more of a crop in areas where it is the most valuable potential crop

	(1)	(2)	(3)	(4)
Total value of crop	0.030* (0.013)	0.033* (0.014)		
log(Total value of crop)			0.080*** (0.021)	0.076*** (0.020)
Country/Crop Fixed Effects	X	X	X	X
Demographic Controls		X		X
Num.Obs.	392 786	368 394	392 786	368 394
R <sub>2</sub>	0.339	0.336	0.358	0.361

*Note:* The dependent variable in these models is the fraction of a household's agricultural land where a crop is the principal planting. The independent variable measures the fraction of grid cells within the second level administrative division where a given crop is most profitable. Observations are at the household-crop level; the data include all crops which are grown in the respondent's country at least once. All regressions include country-crop fixed effects; standard errors are clustered at the second-level administrative division.

threshold to where it has a higher attainable value than crop  $i$ .

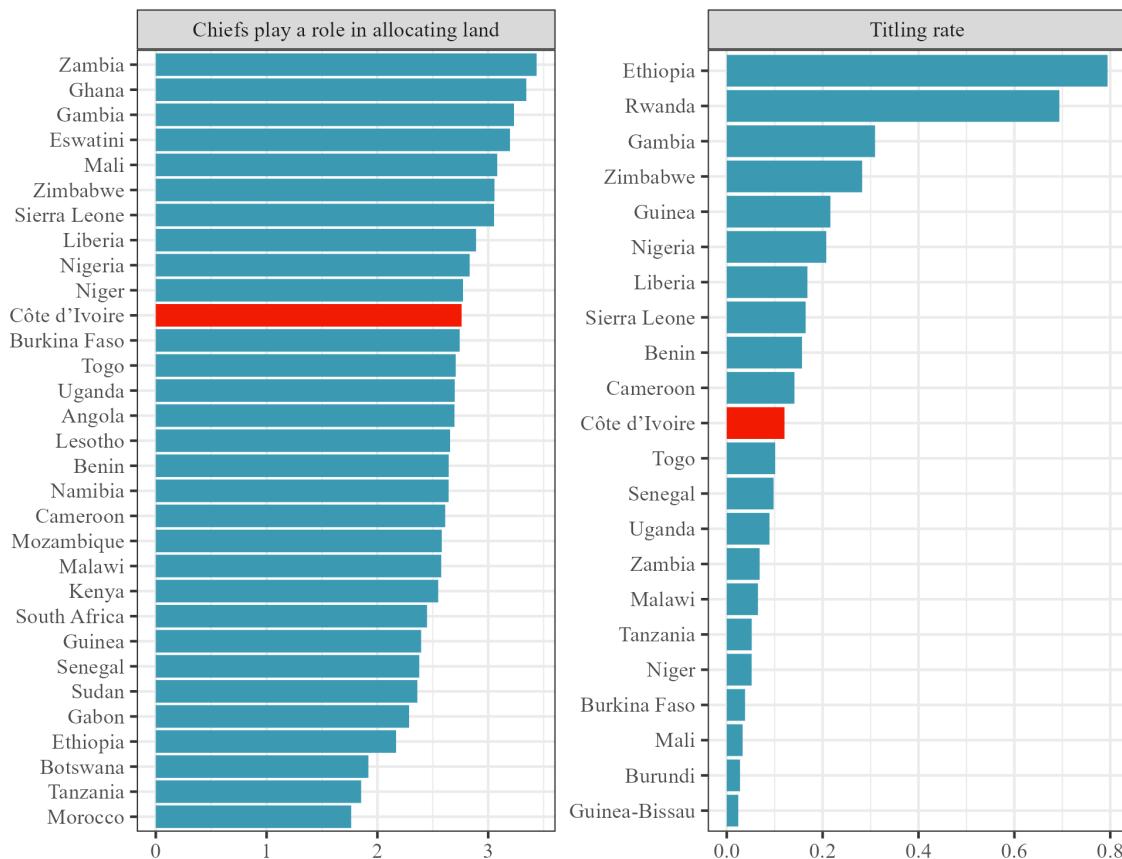
In Table B3, the results are similar to those of Table B2. For a one percent increase in the fraction of an administrative region where crop  $i$  has the highest attainable value, the fraction of households' land on which they grow crop  $i$  increases by 0.076-0.080.

Taken together, these results suggest that my measure of land values is indeed capturing the underlying agricultural conditions which could drive land titling. Farmers make planting decisions in ways consistent with the measure of land values. Where the attainable value of that crop is higher, farmers are more likely to plant it.

## C Côte d'Ivoire survey details

### C.1 Why Côte d'Ivoire?

**Figure C2.** Côte d'Ivoire is roughly average in terms of land titling and chief's influence on land allocation



The lefthand panel shows answers on a four point likert scale (1=None, 2=A small amount, 3=Some, 4=A lot) to the question "How much influence do traditional leaders currently have in each of the following areas: allocating land?" Data are from round 8 of Afrobarometer and use within-country survey weights. The righthand panel shows country averages of titling rate from the most recent round of DHS or LSMS data collection.

This figure shows Côte d'Ivoire's relative position on two key dimensions of the broader theory of this paper. The lefthand panel shows results from round 8 of Afrobarometer for the

question "How much influence do traditional leaders currently have in each of the following areas: allocating land?" Côte d'Ivoire is ranked 11th out of 31 countries in which the question was asked. The righthand panel shows country-level averages from the DHS and LSMS data that I use for the main analyses. Côte d'Ivoire is ranked 11th out of 22. These data support the choice of Côte d'Ivoire as a case study—it is roughly typical on both of these important dimensions.

## C.2 Sampling strategy

My sampling strategy for this survey was meant to maximize variation on my key explanatory outcome: chiefs' political authority.<sup>37</sup> To do this, I leverage a process called village delimitation, which unfurled differently depending on the period of time in which a village was delimited.

Arriving families often established their fields and households at some distance from the original village. Over time, these settlements grew into hamlets and 'campements.' These hamlets often rival the original village in population and economic prominence. The high number of ethnicities and these quilt-like settlement patterns mean that the important cleavage for land disputes in Côte d'Ivoire is autochthonous versus allochthonous, not ethnicity per se. This also means that before delimitation, any given area in Côte d'Ivoire will have a diverse set of autochthonous villages, allochthonous villages, camps, hamlets, and other populated clusters. Delimitation forces the issue of the hierarchy between these settlements.

Delimitation also forces the issue of hierarchy between customary elites. Each village, hamlet, etc., has its own customary headman or chief. When villages are delimited, some villages and chiefs will see their status merely confirmed; others will see their relative position increased or decreased. For example, the headman of a campements could suddenly find himself an independent chief of an administrative village. A formerly independent chief could find himself chief of an 'attached' village. This process creates the potential for village delimitation to create a sudden

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<sup>37</sup>The text for this section is largely taken from the registered pre-analysis plan, available at the [Open Science Foundation Registry](#).

shock to a chief's perceived authority or legitimacy.

The political value of this process has not gone unrecognized by Ivoirian elites. The Ivoirian land regime has alternated between two conceptions of land rights: use-based and customary (Boone 2018). Use-based land regimes favor allochthones who currently farm parcels of land. Often these allochthones are better capitalized than the autochthones—many of the cocoa and coffee plantations in the central forested regions of the country are maintained by Burkinabè and Baoulé migrants.<sup>38</sup> Use-based rights are exemplified by the long-serving Ivoirian president Houphouët-Boigny's famous statement: "the land belongs to whoever develops it." Importantly, the wealthy autochthonous planters were important supporters of Houphouët-Boigny, so a use-based land regime was a political necessity (Zolberg 1964).

After a length political power-struggle in the 1990s following Houphouët Boigny's death, the country passed the 1998 land law (Law 98-750), signalling a new, customary land regime. The law "contained an array of potentially or inherently conflicting provisions for assigning land ownership rights on the basis of autochthony" (Boone 2018: 191). In other words, this law recognized the rights of those who inherited a customary claim to the land from their ancestors, generally those who first settled the area. Laurent Gbagbo, the opposition leader, was the major proponent of this policy as it benefitted his largely autochthonous political supporters. His support for customary land rights continued after he gained power in 2000. This land agenda was the centerpiece of a broader effort towards decentralization and the elevation of customary elites, such as village chiefs.

In 2010, Alassane Ouattara was elected president; Laurent Gbagbo refused to accept these results. By 2011, pro-Ouattara forces (and their French allies) arrested Gbagbo, and Ouattara was firmly ensconced in power. Importantly, the use of village delimitation as a crutch for au-

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<sup>38</sup>The Burkinabé element means there is also an element of nationalism (*Ivoirité*) in Ivoirian debates over land policy, which is not strictly relevant to this natural experiment. Between 2014 and November 2022, 95 percent of certificats fonciers gazetted in the *Journal Officiel de la République de Côte d'Ivoire* belong to Ivoirien nationals.

**Table C2.** The history of delimitation in Côte d'Ivoire creates three treatment groups

		After delimitation	
		Attached	Independent
Before delimitation	Attached	No change (control)	Upwards shock (treatment)
	Independent	Downwards shock (treatment)	No change (control)

tochthonous land rights was also abandoned. Rather, village delimitation was used as a tool of state-building (Boone 2018).

To summarize, there are three periods of village delimitation in Côte d'Ivoire. The first period, until 1998, emphasized use-based land rights and favored allochthones. From 1998 to 2010, the 1998 land law promoted use-based rights and favored autochthones. Finally, after Ouattara took power in 2011 village delimitation has been neutral with regards to autochthony. These shifts are independent of local circumstances—the actual timing of village delimitation has largely been determined by donor considerations.<sup>39</sup> I will conduct the survey in three sets of villages: villages which did not see a change in status (control villages), villages where the village was downgraded (chiefs received a negative shock to their legitimacy) and villages where the status was upgraded (chiefs received a positive shock to their legitimacy). Table C2 summarizes these different villages.

Delimitation has primarily taken place through a series of externally funded programs. These programs are:

- The Plan Foncier Rurale (PFR) (1989-1997), sponsored by the World Bank. This program took place across five pilot zones in Abengourou, Béoumi, Daloa, Korhogo, and Soubéré.
- The Rural Land Management and Community Infrastructure Project (1997–2010), also known as the Projet National de Gestion des Terroirs et d'Équipement Rural (PNGTER). This program was primarily funded primarily by the World Bank, with contributions from

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<sup>39</sup>I am in the process of accessing World Bank archives to verify the process through which villages were selected into the program.

the Ivoirian government and the Agence Française de Développement (AFD). It was meant to expand the PFR across Côte d'Ivoire, but only formalized 171 villages (Bassett 2020: 152).

- The Village Lands Delimitation Pilot Operation, between 2000 and 2001, was funded by the AFD, which failed to delimit additional villages.
- The National Land Tenure Security Program from 2007 to 2012 (Programme National de Sécurisation du Foncier Rural [PNSFR]) also made extremely limited advances in village delimitation.
- The Support Project for the Revival of the Agricultural Sector (Projet d'Appui à la Relance des Filières Agricoles de Côte d'Ivoire [PARFACI]) from 2012 to 2020 built on PNSFR, and delimited 639 villages (AFOR, n.d.).
- The World Bank is currently supporting the Project for the Improvement and Implementation of the Rural Land Policy of Côte d'Ivoire (Projet d'Amélioration et de Mise en Oeuvre de la Politique Foncière Rurale [PAMOFOR]), which started in 2018. The project targets 665 villages across 19 departments; as of 2023, it delivered 41,032 land certificates, making PAMOFOR a dramatic step-up in the pace of land titling and village delimitation.

Between these programs and independent efforts, approximately two thirds of Côte d'Ivoire's 8,533 have been delimited.<sup>40</sup> Both Ivoirian and World Bank officials have noted that the pace of both land titling and village delimitation has massively scaled up since the establishment of AFOR in 2016. This trend is also visible in the publication of *certificats fonciers* in the Ivoirian national gazette (*Journal Officiel de la République de Côte d'Ivoire*).

The survey took place in the rural Indénié-Djuablin and Haut-Sassandra regions. I selected these regions for two reasons. First, they both experienced limited delimitation efforts as part

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<sup>40</sup>The two thirds figure comes from a series of conversations with Ivoirian officials. The 8,533 figure comes from the 2014 repertoires des localités.

of the World Bank’s Rural Land Management and Community Infrastructure Development Project (PNGTER) project.<sup>41</sup> Second, these areas are both squarely located in the country’s middle forested region, where cocoa and coffee are commonly grown. These areas were the loci of Burkinabè and Baoulé migration during the Houphouët-Boigny regime. As a result, these areas have the patchwork of autochthonous and allochthonous settlements on which this experiment is predicated. Within these two regions, I sampled within the Daloa and Vavoua departments in Indénié-Djuablin region, and the Abengorou and Agnebilekrou departments in Haut-Sassandra region. As with the region-level selection, this choice is driven by the program areas of the PNGTER intervention.

My sampling frame is the list of villages from the 2014 census of locations (*répertoire des localités*). I will randomly sample villages across three strata, each strata corresponding to a period in which villages were delimited. One strata will comprise villages delimited before 1998 (as part of the original PFR program); another strata will comprise villages delimited between 1998 and 2010; and the third strata will comprise the remainder of villages.

I used a variety of secondary literature to identify which villages were delimited when. First, the impact evaluation of the PFR program has extensive appendices; I sorted all villages which were mentioned at least once in this report into the first strata. The second strata was mostly villages delimited as part of the PNGTER program, thanks to records generously shared by Catherine Boone.<sup>42</sup> This strategy assumes that villages which were not formalized as part of the PNGTER or PFR program were not delimited through another program, but a review of existing evidence suggests that this is the case (Bassett 2020). Regardless, the purpose of stratifying is not to ensure that sampled villages were delimited on a precise time frame, but to ensure that there is variation over the period of time in which villages were delimited.

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<sup>41</sup>In French, the Projet National de Gestion des Terroirs et d’Equipement Rural. This program formalized 162 villages across Côte d’Ivoire between 1992 and 2006.

<sup>42</sup>I am in the process of accessing internal World Bank records to identify the complete list of early delimited villages.

Within villages, I sampled both the administrative village and either one or two outlying hamlets/settlements. In each settlement/village, I will first administer a brief survey to the village's chief or headman.<sup>43</sup> This survey confirms the village's history and experience with delimitation. From this survey, I hope to glean the treatment category to which the village belongs.

Finally, in each village/settlement, I administered a survey to heads of households. Households were chosen via a random walk. I will aim to administer the survey to 10-15 households per administrative village: five in the administrative village, and five in at most two hamlets/campements/attached villages. We randomly decided the village in which we would sample one versus two outlying hamlets; the choice to sample on average 1.5 was made for budgetary reasons. I will surveyed 80 administrative villages, giving a total sample of 192 chiefs/headmen (one per administrative village, plus one or two per hamlet, depending on the number of existing outlying settlements) and 801 household heads.

### C.3 Survey methodology

This section outlines additional details surrounding the field survey in Côte d'Ivoire. Specifically, table C3 shows how the two indices of chiefly authority on which I rely—overall authority and the extent to which the chief is secular—are constructed from the underlying questions.

The original questions are : "Now I am going to read you a list of activities that chiefs in Côte d'Ivoire sometimes mandate. For each of these activities, I would like you to tell me how much of the village you think would do what the chief asked them to do." The seven activities were: (1) Participate in village cleanup day; (2) Give up a piece of land for a school; (3) Give up a piece of land for a mosque; (4) Spend a day repairing a road; (5) Spend a day planting trees; (6) Come to participate in a traditional dance; and (7) Give money to support a traditional ceremony. For each of these activities, respondents answered: 1 = nobody, 2 = very few people, 3 = some people,

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<sup>43</sup>If the chief was unavailable, I spoke with a member of the village land management committee, the CVGFR.

**Table C3.** Principal component loadings on individual chiefly authority items

Activity	Principal components			
	1st	2nd	3rd	4th
<b>Secular</b>				
Participate in village cleanup day	0.30	0.15	0.01	0.45
Spend a day repairing a road	0.39	0.45	0.06	0.14
Spend a day planting trees	0.44	0.56	0.10	-0.45
Give up a piece of land for a school	0.37	-0.11	-0.24	0.64
<b>Customary</b>				
Give up a piece of land for a mosque	0.39	-0.32	-0.76	-0.36
Participate in a traditional dance	0.39	-0.33	0.36	-0.15
Give money for a traditional ceremony	0.36	-0.49	0.48	-0.07

*Note:* Data from a 2024 household survey in the Haut-Sassandra and Indénié-Djuablin regions of Côte d'Ivoire. This table shows the first four of seven principal components, ranked in order of the fraction of explained variance.

4 = most people, or 5 = everybody.

I then used principal component analysis (PCA) to isolate the axes on which these responses vary. The principal component for observation  $i$  would be the dot product of the vector of weights and the vector of responses for observation  $i$ . The first principal component (overall chief's authority) explains approximately 29 percent of total variation. Table C3 shows that it is relatively evenly weighted across the different questions. As a result, I refer to the first principal component as the chief's overall authority. The first principal component also has a correlation coefficient of 0.99 with the simple sum of these responses.

The second index captures the extent to which a chief is perceived as secular. I divide these activities into ones more reflective of a chief's administrative roles, and ones that are more reflective of their role as a traditional leader—such as participating in a traditional dance or giving money to a traditional ceremony. This index is positively weighted on the secular activities (except for giving a piece of land for a school) and negatively weighted on the customary activities. For example, a respondent who thinks their chief has a very strong ceremonial role but wouldn't

**Table C4.** Allochthones and autochthones have different opinions about land titling

	Autochthones		Allochthones		Difference
	Mean	Std.Err.	Mean	Std.Err.	T-score
<b>Chief's authority</b>					
Overall chief's authority	-0.25	2.19	-0.09	2.03	-1.07
Chief is secular	0.27	1.21	0.12	1.11	1.88
Trust in chiefs	0.43	0.77	0.12	0.78	5.56
Trust in land committee	0.46	0.63	0.15	0.85	5.71
<b>Cost of titling</b>					
N. actors you pay to formalize	2.60	1.60	2.92	1.79	-2.67
N. customary actors you pay to formalize	3.82	2.15	3.81	2.04	0.05
N. steps to title	9.77	6.27	9.45	6.05	0.72
<b>Titles are helpful to:</b>					
Succede in a land dispute	4.80	0.56	4.50	0.83	5.95
Keep their land if govt. tries to take it	4.56	0.91	4.37	0.76	3.23
Be compensated fairly for taken land	4.82	0.52	4.56	0.77	5.72
<b>Other titling opinions</b>					
Chief could prevent you from titling	2.41	1.51	2.85	1.44	-4.21
Likely to lose land while titling	0.50	0.83	0.51	0.77	-0.18
There is enough land in the village	0.78	0.86	0.99	0.84	-3.62
Likely to still have access to land in a year	4.21	1.18	3.98	1.17	2.78

*Note:* Data from a 2024 household survey in the Haut-Sassandra and Indénié-Djuablin regions of Côte d'Ivoire. 355 respondents are autochthones; 443 respondents are allochthones. All calculations use inverse sampling-probability survey weights.

listen to the chief on more practical matters such as repairing a road would rank negatively on this index.

#### C.4 Additional analyses

## **D Precolonial hierarchy and contemporary customary institutions**

Another measurement strategy could be to adapt Afrobarometer data, which includes a variety of measures of confidence and reliance on customary institutions. However, I do not use Afrobarometer for two reasons. First, the Afrobarometer data are not available at a sufficiently granular level: the available data include only the respondent's first administrative division. In contrast, my outcome data on uptake of formal property rights are available at the second level administrative division, and my primary measure of land values is available at a 10km by 10km grid across sub-Saharan Africa. More importantly, however, even within the first level administrative regions, the sample size is relatively small. For example, the Saint-Louis region of Senegal encompasses both the old colonial capital of French West Africa and much of the fertile rice-growing Senegal River Valley. According to Senegal's 2023 census, its population is 1.2 million. Afrobarometer sampled 80 respondents from this area for its eight wave; the 2019 round of DHS data collected 336 responses.

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