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## No taxation without property rights: Formalization of property rights on land and tax revenues from individuals in sub-Saharan Africa

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WIDER Working Paper 2021/175

## **No taxation without property rights**

Formalization of property rights on land and tax revenues from individuals in sub-Saharan Africa

Marina Nistotskaya<sup>1</sup> and Michelle D’Arcy<sup>2</sup>

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**Abstract:** The arguments that property rights and taxation positively affect development are well established in separate literatures, but the link between property rights and taxation is understudied. To address this gap, we theorize that formalization of individual property rights facilitates economic exchange at scale, providing a viable opportunity for individuals to improve their economic standing, in exchange for which property owners assent to pay taxes. We illustrate the argument by comparing the historical evolution of tax states in early modern Europe and colonial Africa. Empirically, we examine the links in sub-Saharan Africa between (1) the ease of access to state-recorded information on land ownership and assent to paying taxes using individual-level data from Afrobarometer, and (2) the formalization of individual property rights on land, measured through novel data on the extent of cadastral records, and government revenue from taxes on individuals at the cross-country level.

**Key words:** property rights, cadastre, taxation, sub-Saharan Africa, Afrobarometer

**JEL classification:** H24, O55, P14

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**Note:** online appendix available [here](https://www.wider.unu.edu/publication/no-taxation-without-property-rights) (<https://www.wider.unu.edu/publication/no-taxation-without-property-rights>)

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## 1 Introduction

Tax systems that can raise revenue from a broad tax base are strongly linked with higher levels of human development through various channels, ranging from public goods provision to redistributive social policies and higher quality of government (Besley and Persson 2009, 2013; Moore 2004; Moore et al. 2018; Ricciuti et al. 2019). However, it is less clear how effective tax states emerge and what explains cross-country differences. While the institutional sources of variation in tax outcomes have been studied in a large literature, limited attention has been given to the role of the foundational political economy institution—property rights. We address this gap in the literature theoretically by bringing formalization of individual property rights into the framework of fiscal contract theory and empirically by examining the link between formalization of rights on land and citizens’ assent to paying taxes (on the individual level) and the share of taxes on individuals in GDP (on the cross-country level) with data from sub-Saharan Africa (SSA).

The fiscal weakness of African states has been a focus of scholarly and policy attention (Moore et al. 2018). Direct taxes lie at the heart of this weakness, as most African countries struggle to emulate ‘the hallmark of 20th-century Western taxation: a strong personal income tax’ (Genschel and Seelkopf 2016: 316). The average share of taxes from individuals, measured in GDP, of sub-Saharan countries in 1980–2017 was half of that of Western European countries: 2 versus 7.6 per cent respectively.<sup>1</sup>

We argue that one of the factors that may explain this puzzle is the role of property-rights-defining state institutions. We suggest that formalization of individual property rights by the state underpins the fiscal contract between the state and individuals, as it facilitates economic exchange at scale, providing a viable opportunity for individuals to improve their economic standing, and in exchange for this opportunity property owners assent to pay taxes. In other words, ‘No taxation without property rights!’. This implies that the strength of the state property-rights-defining state institutions<sup>2</sup> impacts individuals’ willingness to pay taxes and ultimately the amount of direct tax revenue. Where the level of formalization of individual property rights by the state is low—as for example in many African countries, where chiefs and elders remain the most relevant authority with regard to property rights on the key economic assets (land)—individuals are less likely to meet the state’s tax demands. This is because: (1) such individuals do not enjoy a viable opportunity provided by the state to improve their economic standing through formalization of property rights, and, therefore, lack incentives to pay tax to the state; (2) such individuals are only in an indirect relationship with the tax-demanding authority, which prevents the development of a meaningful fiscal contract. We test this conjecture using individual- and country-level data, focusing on state-led (or public-order) formalization of individual property rights on land. Our findings support our argument that stronger public-order property-rights-defining institutions are associated with higher levels of consent to paying tax and higher revenue from taxes on individuals.

Our research contributes to the literature in several ways. First, to the literature on taxation and fiscal contract theory in particular, we add an emphasis on an overlooked private good—property rights or, more specifically, the formal acknowledgement by the state of the rights of individuals over their economic resources, which is central to people’s calculations about whether to pay tax to the state or not. Second, we test the effect of state-led formalization of individual property rights

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<sup>1</sup> Calculated by the authors from ICTD/UNU-WIDER (2019).

<sup>2</sup> Or, in the terminology of Besley and Persson (2009, 2011), the extent of the state’s legal capacity/infrastructure.

using novel data on the extent of state-administered cadastral records in SSA, which is an empirical contribution. Third, our work emphasizes the complementarity between fiscal and legal capacities outlined by Besley and Persson (2009, 2011). However, unlike Besley and Persson, who focused on public-order enforcement-based institutions (such as contract enforcement and property rights protection), we focus on public-order information-based institutions (property-rights-defining institutions).<sup>3</sup> Fourth, we contribute to the ongoing debate on the pros and cons of the formalization of land rights for the poor in SSA and elsewhere (Boone 2019; de Soto 2000) by theorizing and empirically testing the link between state-led formalization of rights and tax outcomes. Finally, in the broad debate about the relationship between institutions and development, we nuance the property rights–development link by highlighting the role of taxation in the context of SSA. In contrast to Acemoglu et al. (2001), whose well-known argument that Europeans established extractive rather than property-rights-protecting institutions in areas where they could not settle due to high mortality, we emphasize that African polities did experience settlement and the emergence of sound property rights institutions, created specifically for the purpose of tax extraction. However, the formalization of individual property rights was afforded only to a small group of people, leading to deleterious effects on tax and broader development outcomes.

The paper is organized as follows: after reviewing the existing literature, we present our theoretical account, illustrating it with evidence from early modern Europe and colonial and post-colonial SSA, and deriving two testable propositions regarding the extent of state-led formalization of rights on land in SSA and citizen assent to paying taxes (H1) and actual levels of taxes on individuals (H2). In the empirical section, we test these hypotheses using individual-level data from Afrobarometer for H1 and novel data on the extent of state-led formalization of property rights for H2.

## **2 Literature review: the institutional underpinnings of tax states**

The existing literature has considered a broad range of factors that may facilitate the emergence of the effective tax state. First, there are structural economic factors, such as the overall GDP per capita (Besley and Persson 2014), the structure of the economy,<sup>4</sup> and population size (Genschel and Seelkopf 2016), as well as macroeconomic policies, such as liberalization of trade (Swank 2016), and fiscal policies, such as the introduction of value-added tax (Ahlerup et al. 2015), that affect the level of tax revenue and its composition and stability.

Beyond the economic variables, the literature has emphasized the centrality of political institutions, including such aspects as state capacity and regime type. State capacity, particularly tax administration, has taken a more central focus in the literature on tax outcomes in developing countries compared with that in the advanced economies. Extracting tax from largely agrarian societies with a limited economic surplus and a large informal sector is a huge administrative challenge. Corruption (Bird et al. 2008; Jahnke and Weisser 2019), inefficiency (Lewis 2006), and technological deficits (Bird and Zolt 2008) have been noted as constraints and challenges. In the African context, neopatrimonialism has undermined state capacity by allowing for political

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<sup>3</sup> For discussion on differences between enforcement- and information-based institutions, see Coase (1960) and Dixit (2009).

<sup>4</sup> The structure of the economy includes, but is not limited to, the share of industry/agriculture in GDP (Ahlerup et al. 2015), natural resource dependency (Crivelli and Gupta 2014; Jensen 2011), and the size of the informal sector (Besley and Persson 2014).

interference in revenue collection and the appointment of unqualified personnel (Gebrekidan and Onishi 2018; von Soest 2007). It was hoped that reform of tax bureaucracies in Africa into autonomous revenue authorities since the 1990s would address the administrative deficiencies and thus increase revenue (Fjeldstad and Moore 2009; Moore 2014). However, research to date suggests that this has not translated into sustained revenue increases (Dom 2019). Besley and Persson (2009, 2011) considered the complementarity of fiscal (extractive) and legal capacities, where the latter were operationalized as institutional infrastructure to enforce contracts and protect property rights. They found the two to be robustly positively associated, but refrained from committing themselves on the direction of causality from one type of capacity to another, instead focusing on their joint positive impact on public goods production.

In relation to regime type, the revenue impact of democracy remains unclear (Cheibub 1998; Garcia and von Haldenwang 2016; Profeta et al. 2013; Ross 2004). Particular institutions of democracy that have been important in Global North contexts, such as executive constraints (Besley and Persson 2014), have improved the transparency of fiscal institutions in developing countries but not the effectiveness of revenue extraction (Ricciuti et al. 2019). Similarly, competitive elections were found to decrease tax revenue by incentivizing incumbents to reduce the tax burden prior to elections (Ehrhart 2013) and emboldening electorates to engage in non-compliance (Prichard et al. 2018). However, party institutionalization in low-capacity states seems to increase the share of revenue from personal income tax, as it signals credible commitment to the fiscal contract agreed between politicians and economic agents (von Schiller 2018).

While much of the literature discussed above has focused on contemporary political institutions, there has been a growing interest in the long-term impact on developmental outcomes of historical institutions (Acemoglu et al. 2001; Banerjee and Iyer 2005; Dell and Olken 2020; Lange 2009; Nunn and Puga 2012; Yoo and Steckel 2016), including taxation (Ali et al. 2019; D'Arcy and Nistotskaya 2018; Frankema 2010; Kjær 2009). Following Joseph Schumpeter's intuition that 'Where a country ends up in terms of both tax level and tax structure depends in large part on where it begins' (Zolt and Bird 2005: 24), we have shown (D'Arcy and Nistotskaya 2018) that fiscal capacity built by European states during the early modern period affects tax revenue today.

In the context of African states, the colonial legacy has been central to the debate on long-term institutional legacy. Mkandawire (2010) has argued that the different ways in which colonial African states were economically engineered to produce a surplus for extraction had long-term consequences for the size and structure of the tax state. Similarly, Ali et al. (2019) found systematically different levels of tax enforcement in areas with French and British colonial legacies. However, the colonial legacy is contested. While Acemoglu et al. (2001: 1375) consider high rates of colonial taxation as an attribute of low-quality institutions, others claim that high-revenue extraction was associated with better-governed (settler) colonies in the past (Frankema 2010) and remains associated with higher quality of government today (Broms 2017). Further literature has traced contemporary fiscal outcomes to pre-colonial institutions (Bolt and Gardner 2015; Kjær 2009), while others have looked at the impact of historical institutions on outcomes relevant to taxation, such as financial systems (Emenalo et al. 2018).

While this literature has acknowledged the impact of historical institutions on long-term outcomes, it has lacked mechanism-focused analysis linking macrostructural historical factors to contemporary behaviour and outcomes. In particular, the mechanisms that might link historically constructed property rights and tenurial regimes to contemporary tax states are under-explored, which is surprising given the ways in which the construction of the colonial African tax states depended on changes to underlying tenurial regimes. Moreover, evidence from contemporary Global South countries shows that formalization of property rights is at the heart of tax bargaining (Sánchez-Talanquer 2020) and that higher levels of formalization of land rights are associated with

higher levels of tax revenue (Ch et al. 2018). In the next section we address this gap in the literature by (1) bringing property rights into the fiscal contract literature and arguing for a link between consent to taxation and formalization of property rights and (2), given this argument, analysing the ways in which the historical construction of colonial tenurial regimes may have had long-term impacts on both assent to taxation and outcomes.

### 3 Theoretical framework

#### 3.1 Formalization of property rights by the state and fiscal contract

Taxation fundamentally involves rulers appropriating a portion of the wealth of their subjects and, since purely coercion-based taxation is unsustainable, bargaining with them over the terms of this fiscal relationship (Levi 1988; Moore 2008). How much wealth the ruler appropriates, what types of taxes are imposed, and what taxpayers gain in return are foundational to the nature of the fiscal state. The dominant arguments in the fiscal contract literature postulate that the possibility of political representation (Moore 2008; Prichard 2015) and the benefits of public goods production (Ali et al. 2014; Bodea and Le Bas 2016; D’Arcy 2011; Nistotskaya and D’Arcy 2018; Ross 2004; Timmons 2005) are at the heart of the subjects’ consent to taxation.

Without opposing the core of these arguments, we highlight the formalization of individual property rights by the state—a private good—as foundational to a sound fiscal contract. Our point of departure is the observation that taxation is a relationship between the holders of political power and those who own economic resources. Following fiscal contract theory, a ruler seeking stable revenue must accommodate taxpayers’ key interests in order to secure their quasi-voluntary compliance (Levi 1988). We argue that the formalization of individual rights over economic resources by a public authority is one of the key interests of resource owners, which motivates them to assent to pay taxes. To further our argument we draw on a distinction between possession—‘a relation between a person and a thing’—and property—‘a relationship between people involving rights with regard to tangible or intangible assets’ (Hodgson 2015: 688).<sup>5</sup> While without formal recognition by a public authority economic resources are merely possession, formal recognition makes an economic resource property. In other words, property rights recognized by a public authority provide for resource owners an opportunity to improve their economic standing, as now they can take advantage of economic exchange (relationships between people) more fully: for example, by trading outside their immediate social circles. While the state is not the only public authority that can formalize property rights (community-based authority is an example of non-state public authority), it is the political authority of the first order and therefore the one that enables the broadest network of economic exchange, as the number of people under the purview of the state is larger than that under any community-based authority. Individuals are, therefore, prepared to pay to support the state, as it enables a genuine opportunity to improve their economic standing. From this point of view, formalization of property rights by the state is a more obvious and immediate value than the benefits of public goods, which are deferred and, therefore, a leap of faith (Steinmo 2018). In other words, it is not only public goods that are at the centre of fiscal exchange, but also, crucially, property rights, a private good.

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<sup>5</sup> There is an ongoing debate concerning the definition of property rights either as ‘legally sanctioned rights’ or as ‘economic rights’ (which stands for mere possession or physical control). For the most recent instalment of the debate, see *Journal of Institutional Economics*, 11(4), 2015. For a discussion of the complexity of land ownership and use rights within informal institutions in Africa, see Colin (2008).

The history of the fiscal state in early modern Europe supports this perspective. In a seminal account of the Glorious Revolution of 1688 in England, North and Weingast (1989) argued that a lack of property rights was the main issue of the conflict of property owners with the Stuart kings, who practised non-consensual taxation, ‘forced loans’, and outright property seizures to raise revenue. While a standard interpretation of the fiscal contract that emerged from this political struggle focuses on the security of property rights and improved political representation of taxpayers, the 1688 settlement also marked the beginning of a large-scale process of formalization of property rights. The empowerment of parliament not only curtailed confiscatory powers of the Crown, but enabled parliament to formalize rights and obligations associated with land, which were practised but not formally acknowledged by the state. This formalization enabled improvements, exchange, lease, sale, or mortgage of land, which were previously constrained by inheritance rules, such as primogeniture, and other legacy restrictions (Bogart and Richardson 2011; Dimitruk 2018; Hodgson 2017). This formalization enabled economic agents ‘to exploit economic opportunities that could not be accommodated by the inflexible rights regime inherited from the past’ (Bogart and Richardson 2011: 241) and benefit from the economic exchange at scale (national rather than local or regional markets), which in turn led to well-documented economic growth and hence higher tax revenues. In other words, the strengthening of property-rights-defining institutions led to higher tax revenues through increased output and, arguably, higher consent to support (through taxes) the public authority that provided economic agents with an opportunity for wealth creation.

In other European tax states, even those with radically different social and economic structures than England, taxation was also linked to the rise of property-defining institutions. In Sweden, where the state and a free peasantry emerged as parties to the fiscal contract, the peasantry paid taxes and the king formally acknowledged their property rights (Nistotskaya and D’Arcy 2018; Schön 2010), and the royal bureaucracy gradually wrested the authority in matters of the adjudication of such rights away from the local peasant elites (Hallenberg 2016). As Schön (2010: 183) notes: ‘Taxes were a financial obligation to the state, but also tokens of land proprietorship for the free peasantry’.

Thus, the historical experience of early modern Europe suggests that strong fiscal states followed the emergence of strong property-rights-defining institutions. While it is problematic to directly extrapolate from this historical experience to contemporary Global South countries, evidence suggests that the recognition of property rights is also at the heart of the fiscal contract in at least some contemporary settings (Sánchez-Talanquer 2020). We contribute to this literature by testing these ideas in the African context.

### **3.2 Bifurcated tenurial system and tax outcomes in sub-Saharan Africa**

If the formalization of individual property rights by the state is at the heart of the fiscal contract, this suggests that the overall nature of the tenurial regime may be linked to the character of the tax state, with the strength of public-order property-defining institutions affecting tax outcomes through a number of channels, including its effect on consent. Where such institutions are weak, property rights are not fully formalized and the state is not the authority underpinning property relations. This may have a constraining effect on tax revenues through a number of channels, including the erosion of consent.

In the African context, the weakness of property-rights-defining state institutions on land is well-known issue (Boone 2003, 2014; Peters 2013; Alden Wily 2006) and has links to the evolution of



the colonial tax state.<sup>6</sup> Colonial powers confronted a system of property rights that was radically different to those that had existed in Europe (Boone 2003; Zouache 2018). The dominant economic activity was non-sedentary agriculture, undertaken in a mixture of centralized and decentralized political units with multitudes of property rights underpinned by traditional authorities (Bates 1983; Berry 1993; Boone 2003, 2014). Rights to land were relational and negotiated and, therefore, ‘illegible’ to colonizers. Colonial officials could neither ‘see’ them—having limited ability to understand practices embedded in local circumstances, they could perceive them only through intermediaries—nor ‘read’ them, because relational property rights are anathema to the principles of rule-based bureaucracy.

Under these conditions, tax extraction, even in minimal amounts, proved to be extremely challenging and required the construction of a parallel property rights regime to produce a legible economic surplus (Andersson and Lazuka 2019; Frankema 2011; Frankema and Booth 2020; Gardner 2012). While debate continues about the exact motivations of the colonial powers (Amin 1972; Boone 2019; Burbank and Cooper 2010; Hobson 1965 [1902]; Hopkins 1968), it is clear that they deliberately encouraged the growth of export-driven cash crop production (that had emerged decades before the European ‘Scramble for Africa’; Austin 2009), by controlling and marshalling the factors of production, especially land and labour. Cheap labour was supplied through a variety of methods: indentured labour, head and hut taxes that pushed non-monetized populations into wage labour, and migration and settlement schemes that moved members of particular ethnic groups to export production zones (Boone 2003, 2014). Within the zones of intensive commercial crop production, property rights were formalized through Torrens title—a system of land rights registration and transfer presided over by the colonial state (Dickerman 1989; Simpson 1976). This system provided a surplus that was taxable predominantly through trade taxes.

While property rights were formalized and underpinned by the colonial state in zones of export-crop production,<sup>7</sup> the great majority of land was under the so-called neo-customary property rights regime whereby the colonial state recognized corporate ownership by ethnic groups, but rights to land remained relational and under the authority of traditional chiefs and elders (Boone 2003, 2014). This ‘gave the customary authorities the carrots and sticks threat they used to govern their rural subjects’ (Boone 2014: 28). This included the collection of direct taxes: chiefs had the power to seize the land of people who did not pay taxes or fulfil their corvée requirements (Boone 2014). Authority over land underpinned the power of ‘decentralized despots’ who constituted the main means by which colonial states governed the majority of the population (Mamdani 1996). Most people were thus in an indirect fiscal relationship with the state, mediated by chiefs. After independence, as hut taxes were removed, traditional authorities were no longer tax agents, but they retained authority over land rights.

In most African countries a bifurcated tenurial system—in which property rights underpinned by the state coexist with a neo-customary system with a diversity of property rights practices, underpinned by traditional, local authority—has persisted to date.<sup>8</sup> While the former system involves the full set of rights (including the right to buy and sell), the latter is less than full property

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<sup>6</sup> We focus on property rights on land since land was the main factor of production in the colonial Africa (Bates 1983) and remains as such today, with agriculture being SSA’s largest economic sector, employing more than half of the region’s population (ILO 2021) and representing about 15 per cent of its total GDP (World Bank n.d.).

<sup>7</sup> Represented by larger farms, usually owned by Europeans, but also by small holdings, owned by African peasantries, as in much of the coastal belt of West Africa (Boone 2019).

<sup>8</sup> Presently over 90 per cent of the rural population in Africa have access to land through customary mechanisms (Alden Wily 2006: 2).

rights (Peters 2013), as customary land interests are universally denied the attributes of private property ownership (Alden Wily 2006: 6). Consequently, individuals with customary land interests are denied a meaningful opportunity to improve their economic standing by participating in economic exchange at scale, while individuals with full property rights on land enjoy such an opportunity and, hence, have incentives to support the authority that provides them with it. Furthermore, where property-rights-defining institutions are underpinned by the state, the state and property owners are in a direct fiscal relationship or, as de Soto argued (2000: 59), formalization of property rights ‘equips ordinary citizens to form ties with ... the government’. This is, however, not the case where land is under neo-customary rights, as they lock large sections of the population out of direct contact with the state, thereby preventing the very emergence of incentives to support the state through tax contributions. If, as we argued above, property rights are people’s key concern, then people are unlikely to assent to pay taxes demanded by the state where the relevant public authority to address their key concerns is chiefs and elders, not the state.

Based on the above discussion, we hypothesize that:

**H1:** where the extent of state-centred formalization of property rights on land is greater, citizens more readily assent to pay taxes to government.

**H2:** countries with a greater extent of state-centred formalization of property rights on land have, on average, higher revenue from taxes on individuals.

## 4 Analysis

### 4.1 Individual-level analysis

#### *Data and method*

To evaluate H1 empirically, we employ individual-level data from the seventh round of the Afrobarometer surveys (Afrobarometer 2019). These are representative surveys of 34 African countries conducted in 2019. Given the scope conditions of our theoretical framework, we focused on individuals from 32 sub-Saharan African countries.<sup>9</sup> Our primary variable of interest is the availability and ease of obtaining information on land ownership from the government. Such information may be available only where the state is engaged in formal recognition of property rights and keeps records of land ownership (such as cadastres). The Afrobarometer question we employed (Q18b from the merged dataset) asks how likely it is that if the respondent went to the country’s government office to find out who owns a piece of land in their community, they could get this information. There are four substantive answers, ranging from ‘not at all likely’ to ‘very likely’. This question captures the perceived strength of state property-defining institutions on land in the respondent’s area.<sup>10</sup> Although the question does not specify that the ownership information they seek is held under formal rather than customary tenure, we see the question’s reference to the land government office as implying this (see Table A1 of the online appendix). Figure 1 presents the spatial distribution of the values of the variable across SSA. Our outcome variable of interest is citizen assent to paying taxes to government. We capture this with the standard question (Q38c)

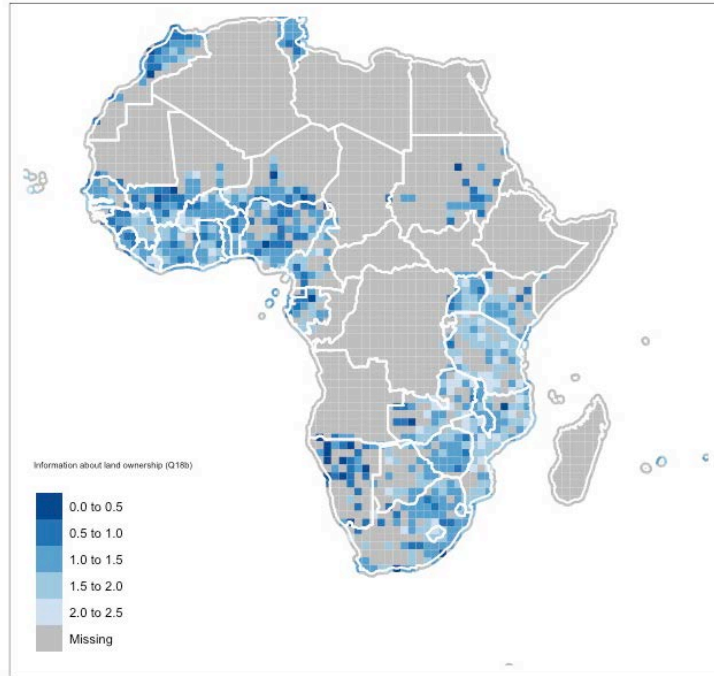
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<sup>9</sup> Morocco and Tunisia were excluded, but their inclusion does not change the results of the analysis.

<sup>10</sup> Following the fiscal contract literature, we test the effect of the respondent’s perception of government performance in the area of the public good rather than their direct experience (Ali et al. 2014; Bodea and Le Bas 2016; D’Arcy 2011).

used in the literature on tax compliance (D’Arcy 2011)—asking whether people must pay taxes. The variable is measured on a 5-point Likert scale. The precise wording of all underlying questions and answer options is reported in Table C1, Appendix C. Table C2 reports summary statistics.

Figure 1: Distribution of values for the ‘information on land ownership’ variable in SSA



Note: Q18b from the merged dataset of Afrobarometer Round 7 (2019), ‘How likely is it that you could get the following information from government or other public institutions, or haven’t you heard enough to say? If you went to the country government office to find out who owns a piece of land in your community’; answer options [0, 3]: not at all likely, not very likely, somewhat likely, very likely, don’t know/haven’t heard (dropped); the values are plotted by 150 km polygons for all 34 countries. Lighter colours stand for higher levels of state-led formalization of property rights on land. We thank

Source: authors’ illustration based on Afrobarometer (2019). We thank Magnus Åsblad for his help with drawing the map

Following the literature on the causes of tax compliance in the African context (Ali et al. 2014; D’Arcy 2011), we control for satisfaction with services provided by the state, comparative treatment by the state, trust in political institutions, and a set of personal socioeconomic characteristics (age and its square term, gender, place of residence (urban/rural), education, employment status, and wealth). As there is a mix of individual and customary land tenure in certain countries within the sample (e.g. Tanzania), we would ideally include a control for the prevailing tenurial regime. This information is not available in the dataset, so to proxy for it we use a question that asks respondents how often they have contacted traditional leaders, assuming that this will be higher in areas where customary land institutions are stronger. We also control for country fixed effects. To examine whether availability of information on land ownership affects citizen assent to paying taxes, we estimate the following equation for each individual  $i$  and country  $j$ :

$$Assent\ to\ taxation_{ij} = \alpha + \beta_1 Land_{ij} + \beta_3 Controls_{ij} + Country_j + \varepsilon_i \quad (1)$$

We measure satisfaction with state-provided services by constructing an equally weighted index of satisfaction with five services: basic healthcare, education, water and sanitation, electricity supply, and roads and bridges (Cronbach’s alpha = 0.80). Comparative treatment by the state is measured through the respondent’s view of how fairly their ethnic group is treated by the state. Trust in

political institutions is measured through an equally weighted index of trust in seven political institutions: president, national parliament, national electoral commission, subnational parliament, police, army, courts (Cronbach's alpha = 0.88). The strength of traditional authority is measured through the frequency of contacting traditional leaders. Among the vector of socioeconomic characteristics of respondents, *female*, *urban*, and *working* are dichotomous variables, *education* and *wealth* are categorical variables, and *age* and *age*<sup>2</sup> are continuous variables. *Wealth* is a composite measure (equally weighted index) of individual possession of six items: radio, TV, car/motorcycle, computer, bank account, and mobile phone (Cronbach's alpha = 0.73).

In the main specification, we use ordered probit regression (with standard errors clustered at the country level) to estimate the impact of land registration on citizen assent to paying taxes to government.<sup>11</sup> In the robustness checks we dichotomize the outcome variable and perform logistic regression analysis, which produces results substantively similar to the probit analysis.

### *Results*

Table 1 reports the results of the ordered probit regression. Models 1–5 report regression coefficients and Model 6 reports marginal effects for statistically significant variables in Model 5. The coefficient for the primary variable of interest—*land*—is statistically significant (at the 99 per cent confidence level) across all models and positively signed, suggesting that where individuals are more likely to find information from the government about land ownership in their communities, they are also more likely to agree with the statement that the government has the right to make people pay taxes.

The variable capturing the fiscal exchange theory (satisfaction with services) enters statistically significant, suggesting that people who are satisfied with the services provided by the state are more likely to agree to pay taxes to government. Similar results are obtained for *trust in political institutions*: individuals with the highest level of trust in major political institutions are more likely to assent to taxation. The coefficient for *partiality* enters statistically significant and negatively signed, suggesting that those who believe that their ethnic group is treated unfairly exhibit less acceptance of government demands for taxation. The result also holds for the category of citizens who believe that their ethnic group is often treated unfairly by the government. All variables, apart from two capturing the socioeconomic status of respondents, are statistically significant across all model specifications. While *gender*, *education*, and *wealth* are within the accepted threshold for statistical significance, *age* and its squared term, *employment status*, and *place of residence (urban/rural)* fall below the threshold. *Resort to traditional authority* enters not statistically significant.

To gauge the quantitative significance of the estimates, we calculate marginal effects for all statistically significant variables, based on the regression in Model 5. The calculated marginal effects suggest that the ease of finding information on land ownership increases the probability of strongly agreeing that authorities have a right to collect tax by 5.7 per cent, with a margin of error of 2.2 per cent. This effect is stronger than those related to satisfaction with services, trust in political institutions, and partiality. Only education has a stronger effect than our proxy for individual land rights formalization: 8 per cent  $\pm$  2.7 per cent for complete school education, rising to 9.8 per cent  $\pm$  3.1 per cent for university education.

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<sup>11</sup> Although ordinary least squares (OLS) regression estimations continue to be widely used with the Afrobarometer data measured on the Likert scale (Bateson 2012; Morrison and Rockmore 2021), the assumption of each of the four intervals being of equal length is difficult to defend in this case. Nevertheless, the results are robust to the OLS estimator (not reported).

Table 1: Information on land ownership and citizen assent to paying taxes: probit regression estimates

	<i>Dependent variable: assent to pay taxes</i>					
	1	2	3	4	5	6
Land	0.21*** (0.03)	0.19*** (0.03)	0.19*** (0.04)	0.17*** (0.03)	0.15*** (0.03)	0.057***
Satisfaction with services		0.11*** (0.02)	0.09*** (0.02)	0.04** (0.02)	0.04** (0.02)	0.014**
Partiality			-0.13*** (0.05)	-0.10** (0.04)	-0.10** (0.04)	-0.032**
Trust in political institutions				0.07*** (0.01)	.007*** (0.01)	0.07***
Resort to traditional authority					.006 (0.05)	-
Female (d)	-0.03** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.03** (0.01)	-0.03* (0.02)	-0.01**
Age	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-
Age <sup>2</sup>	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-
Education	0.18*** (0.04)	0.19*** (0.04)	0.20*** (0.04)	0.24*** (0.04)	0.24*** (0.04)	0.08***
Working (d)	0.01 (0.02)	0.01 (0.02)	0.02 (0.02)	0.01 (0.02)	0.01 (0.02)	-
Urban (d)	-0.03 (0.02)	-0.02 (0.02)	-0.03 (0.03)	-0.06** (0.03)	-0.07** (0.03)	-
Wealth	0.12*** (0.02)	0.12*** (0.02)	0.10** (0.02)	0.13*** (0.02)	0.14*** (0.02)	0.018***
Country fixed effects	yes	yes	yes	yes	yes	
Pseudo R <sup>2</sup>	0.0429	0.0450	0.0454	0.0510	0.0510	-
Observations (n)	35,146	33,176	29,043	26,553	26,553	26,554
Countries (n)	32	32	32	32	32	32

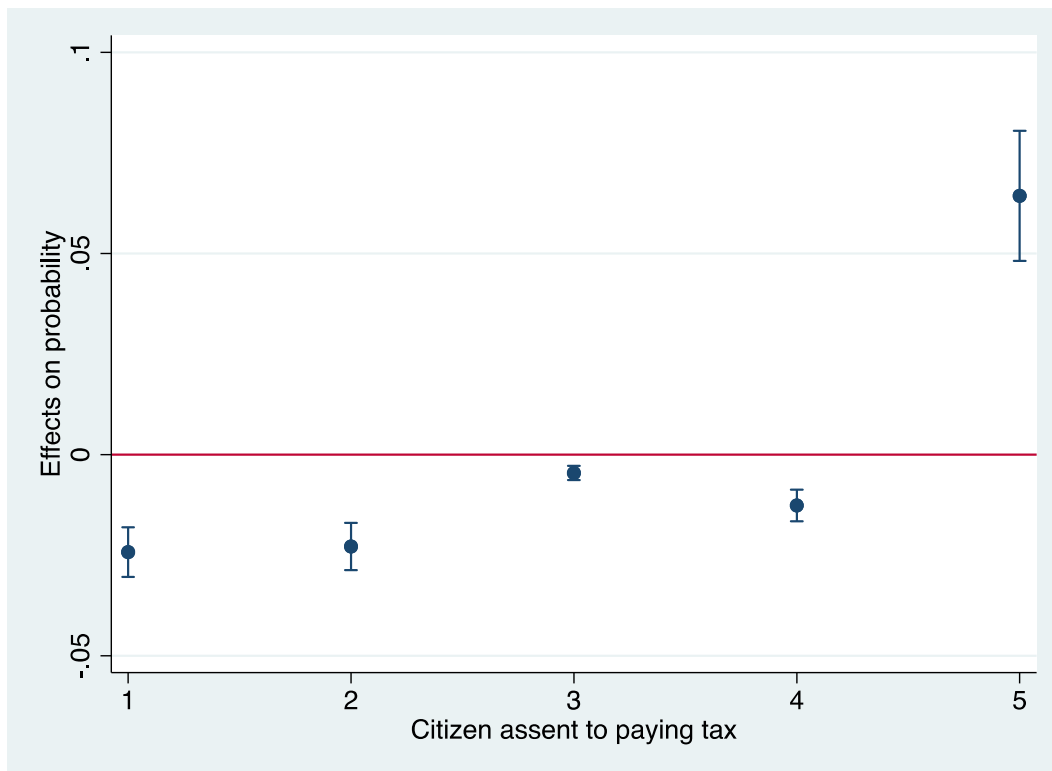
Note: coefficients are as follows: for *land*, 'very likely' (reference category 'not at all likely'); for *partiality*, 'always' (reference category 'never'); for *education*, 'secondary/high school completed' (reference category 'no formal education'); for *traditional leader*, 'often' (reference category 'never'); robust standard errors are in parentheses, standard errors clustered at country level; 'd' = dummy/dichotomous variable; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: authors' construction based on Afrobarometer (2019).

Figure 2 presents marginal effects of the dichotomized land variable ('very likely' = 1 and the rest = 0) on citizen assent to paying taxes. The marginal effects suggest that easy access to information on land ownership increases the probability of strongly agreeing that authorities have

a right to collect tax by 6.5 per cent, with a margin for error of 1.6 per cent (99 per cent confidence interval).

Figure 2: Average marginal effects of *land* (dummy) on citizen assent to paying tax



Note: *land* (dummy) = 1 if Q18b = ‘very likely’, 0 otherwise; marginal effects are calculated for *land* (dummy) = 1; citizen assent to paying tax: 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly agree.

Source: authors’ illustration based on Afrobarometer (2019).

To ascertain the robustness of these results, we re-run the analysis using additional control variables and different measures for the same underlying concepts. Additional control variables capture (1) the horizontal dimension of the fiscal contract theory—an argument that the existence of a broad national political community is conducive to high levels of tax compliance (for a review, see D’Arcy 2011); (2) corruption in both tax and land administrations; and (3) satisfaction with democracy. We measure the concept of *national political community* with the question on the strength of respondents’ national rather than ethnic identification (Q85b), *corruption* with two relevant questions (Q48d and Q48f), and *satisfaction with democracy* with a corresponding question from the survey (Q36).

The alternative measures are:

- An index of *satisfaction with state-provided services*, which includes three additional items on security (government success in prevention of crime, violent conflict, and armed extremism). The new index is built with the help of principal component analysis (PCA), which reveals three underlying dimensions of satisfaction: services, infrastructure, and safety. The resulting index is an equally weighted index of first components from three PCA scores (Cronbach’s alpha = 0.77)

- Since not all countries have subnational legislatures, the alternative measure for *trust in political institutions* is a composite measure of six political institutions, excluding subnational elected bodies.
- We also use an alternative measure for *wealth*—an index of lived poverty, provided by Afrobarometer.

Table A3 of Appendix A reports the results of this analysis, which employs an ordered probit regression estimator. Models 1–8 report regression coefficients and Model 9 reports average marginal effects for statistically significant variables in Model 4. Similarly to the main analysis, the coefficient for *land* is statistically significant (at the 99 per cent confidence level) across all models and positively signed. The quantitative impact of this factor is also stable: those who find it very likely that they will find proof of land ownership from the government are 5.7 per cent  $\pm$  2.2 per cent more likely to strongly agree that authorities have a right to make people pay tax. This is larger than the average marginal effect of *satisfaction with services* (1 per cent) and *partiality* (–3 per cent) and on a par with the effect of *trust in political institutions* (5 per cent  $\pm$  0.9 per cent).

Of the additional control variables, only *satisfaction with democracy* enters statistically significant, but at the 90 per cent confidence level, contributing to a large margin of error for the marginal effect (2.4 per cent  $\pm$  2.6 per cent). Variables capturing the strength of the *national political community* and *corruption* on land and tax administrations are not statistically significant.

The socioeconomic characteristics of respondents (not reported for brevity purposes) behave as in the main analysis in terms of both direction and the magnitude of their effects. The only difference is that *urban* is consistently statistically significant (and negatively signed). Model 8 in Table A3, Appendix A, reports the results of probit estimates on a sample of respondents in employment,<sup>12</sup> controlling for the sector of employment (formal or informal), with the results substantively the same as reported in the main and robustness analyses with the full sample.

We re-run the analysis using the logistic maximum likelihood estimator after dichotomizing the outcome variable as follows: 1 = ‘strongly agree’ and ‘agree’ on Q38c (people must pay taxes) and 0 = otherwise. Table A4, Appendix A, reports the results of the logistic analysis, which are substantively similar to the results from the probit analysis. Specifically, the coefficient for *land* enters statistically significant (at the 99 per cent confidence level) across all the models and is signed positively as expected. Those individuals who find it very likely that they will find information on land ownership from government are 3.5 per cent more likely to agree that authorities have a right to make people pay tax compared with those who find access to land information most difficult (Model 4, Table A4 and Figure A1). The average marginal effects for other factors are –3.7 per cent for *partiality*, 2 per cent for *trust in political institutions*, and 1 per cent for *satisfaction with government-provided services*. *Education* remains the strongest predictor of all, with the average marginal effect of 4 per cent for the category of ‘complete school education’ (compared with the reference category ‘no formal education’).

Based on these results, we conclude that the data provide strong support for our hypothesis that where the formalization of property rights on land by government is greater, citizens more readily assent to pay taxes to government. In the next section we examine our second hypothesis on the link between the extent of formalization and tax outcomes at the cross-country level.

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<sup>12</sup> The sample excludes respondents who have never worked, students, and homemakers.

## 4.2 Country-level analysis

### *Data and method*

To test our second hypothesis, we leverage the data on the extent of formalization of individual property rights on land on revenues from direct taxes on individuals in multivariate panel data analysis of SSA countries. As Lieberman (2002) points out, there are many considerations to take into account when selecting revenue indicators that are appropriate for a particular research question. We focus on direct taxes because, first of all, they are the most direct and visible taxes for the taxpayer and therefore most immediately reflect our theoretical concern with the fiscal contract between individuals and the state. Second, formalization of individual property rights on land may have an effect on other forms of capital—from human capital through to increased investment in, for example, education (Galiani and Shargrotsky 2010) or financial capital through to better access to credit (de Soto 2000)—which in turn provides viable opportunities for individuals to improve their economic standing through better employment and self-employment opportunities, and makes them more likely to pay taxes in exchange for these opportunities. Third, property taxes would have been an apposite tax indicator if the system of property taxation was better developed in SSA. Property taxes, however, are arguably the least-developed fiscal instrument in the region.<sup>13</sup> Effective property taxation requires not only an efficient cadastral system<sup>14</sup> and an up-to-date register of rights on land but also efficient property valuation (D’Arcy and Nistotskaya 2021b). However, ‘valuation rolls across most of Africa are incomplete and severely out-of-date’ (Zebong et al. 2017: 1), making property taxes a poor indicator for the empirical examination of the research question at hand. For our dependent variable we employ *total income, capital gains, and profit taxes on individuals*, which predominantly captures income taxes on individuals,<sup>15</sup> as a share of GDP, available for the period 1980–2017 from the Government Revenue Dataset (ICTD/UNU-WIDER 2019).

The data on formalization of individual property rights come from our original dataset on the extent of state-administered cadastral records. Cadastrification is central to the process of formalization of rights to land. A cadastre record is an administrative document containing a description of both a land asset and interests associated with the asset (such as rights, restrictions, and obligations). One part of a cadastral record contains information that uniquely identifies land parcels—their location, dimensions, and features—obtained through external observation, such as a survey of the land. This information is most often recorded in the form of cadastral maps, but there could also be narrative descriptions of land parcels.<sup>16</sup> Another part contains formal record of rights and obligations with regard to the land asset, and identifies the holders of these rights, be they individuals or other entities (communities, businesses, state or non-governmental organizations, etc.). Such registers are often, but not always, linked to the land descriptions (usually cadastral maps), but cadastral maps sometimes exist without registers of rights. Only when the land rights register is supported by a cadastral map can the system be called a cadastral record (‘cadastre’ hereafter).

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<sup>13</sup> In our sample, 70 per cent of observations have values of less than 0.1 on property taxes as a share of GDP. In other words, most countries across most time periods collected only a negligible amount of tax revenues from property taxes.

<sup>14</sup> See discussion below.

<sup>15</sup> For discussion, see the variable description in Appendix C1.

<sup>16</sup> This part in itself is not a record of rights.



The suitability of cadastres as a measure of formalization of property rights on land has been recognized in the literature (Libecap and Lueck 2011; Yoo and Steckel 2016), but the scarcity of cross-country data on cadastres is a long-standing issue (D’Arcy et al. 2019) that has precluded its utilization in empirical research. We address this gap in the multidisciplinary literature by creating the *cadastre* indicator, capturing the extent of formalization by the state of individual property rights on land. The coding principles, the quality of the underlying sources, and the validity of the resulting measure were peer-reviewed by the international community of professional surveyors (D’Arcy et al. 2019). A full description of the construction of the *cadastre* indicator can be found in Appendix B. Since we are interested in individual property rights, cadastrified state and customary land was excluded from the score.<sup>17</sup>

Table C1 in Appendix C provides a full description of the variables used in the analyses that follow, along with their sources. Summary statistics are reported in Table C2 of the same appendix. Our data are unbalanced panel data for 37 SSA countries across 35 years (1980–2015). Due to missing data for both *cadastre* and tax, there are 796 country-level observations for the focal relations, constituting on average 21 years of observations per country (min. = 5, max. = 35).

Defining a model to estimate the effect of cadastre on individual tax poses a number of challenges. First, countries with more-developed cadastral systems differ from those with undeveloped cadastres on a number of characteristics, some of which may have an impact on both cadastre and tax revenue. Consequently, the selection of covariates is very important. However, defining a model to estimate the effects of institutions is particularly challenging given the competing biases: the omitted variable bias and post-treatment bias (Acharya et al. 2016). The danger of omitted variable bias requires the inclusion of sound confounders, but some of them may be affected by the treatment variable (hence post-treatment bias). Although the level of economic development most certainly affects both land property rights and revenues from taxes on individuals, it is also a classic post-treatment covariate (Pain 2016). In our case, it is reasonable to assume not only that GDP per capita affects cadastre reform and revenue, but also that the expansion of cadastre affects GDP per capita (D’Arcy et al. 2021), and, thereby, cadastre indirectly influences tax via GDP per capita. Furthermore, as our dependent variable is expressed as a share of GDP, the presence of the same data in both parts of the equation presents a risk of biased estimates. We, therefore, exclude GDP per capita from our main analysis, restricting it to three covariates—*population size*, *level of democracy*, and *state capacity*—since each might have an effect on both the formalization of private property rights and larger tax revenues from individuals.<sup>18</sup> The measure for population comes from the World Bank’s Development Indicators. We use the *v2clrspct* variable (*impartial public administration*) generated by the V-Dem Institute as a measure of impartial public administration.<sup>19</sup> To avoid a common-source bias, we chose not to use the V-Dem’s measure of democracy, instead employing Polity’s indicator. Table C1 of the Appendix describes all variables in detail, including data sources.

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17 For example, Mauritius has a fully developed cadastral system but 22 per cent of the land is state owned (Truth and Justice Commission 2011: 31). Therefore, we score Mauritius across the period as 0.78.

18 We recognize that state capacity could be a consequence of formalization and systematization of property rights (or a post-treatment effect of cadastre) and therefore treat the results with caution.

19 Although impartiality does not cleanly capture the notion of state capacity (for discussion see D’Arcy and Nistotskaya 2021a), it seems like a suitable proxy for Besley and Persson’s (2011) enforcement-based legal capacity. Furthermore, the available alternative indicators suffer from serious problems. First, most commonly used measures of state capacity (such as the International Country Risk Guide’s bureaucratic quality) are not available for many SSA countries. Second, some measures are only suitable for cross-sectional analysis (such as the State Antiquity Index). Third, Hanson and Sigman’s (2021) indicator is inclusive of tax revenue, making it unsuitable for the investigation of tax outcomes.

In addition to these controls, all models in the panel data analysis include two-way fixed effects to account for time-invariant factors<sup>20</sup> and unobserved time-specific confounders in administration of cadastre (e.g. technological change, such as the adoption of GPS-based surveying and the switch to computerized records) and common trends (e.g. trade liberalization) and shocks (e.g. surges in commodity prices) that relate to revenues.

Second, there is a concern about reverse causality: individual property rights on land may raise taxation, but taxation may provide an incentive to invest in legal capacity and greater formalization of property rights. With the observational data at hand, we address this concern with instrumental variable regression analysis on cross-sectional data and also panel data analysis. The latter poses additional challenges, as there is no agreement on the most suitable estimation procedures, the lag structure, or the number of time periods or clusters that would address the perennial endogeneity concerns and produce unbiased estimates (D’Arcy et al. 2021; Esarey and Menger 2019; Nickell 1981). We approach these challenges by employing several estimating procedures for panel data (first-difference, two-way fixed effects, and dynamic models) and by employing both yearly and five-year data.

### *Results*

We begin with the examination of the relationship between the variables of interest with cross-sectional data: mean values of explanatory variables for 1980–99 and mean values of the outcome variable in 2000–15 (log-transformed). A scatter plot (Figure 3) of the corresponding mean values of *cadastre* and tax suggests that on average there is a positive and linear association between the two (Pearson’s  $r = 0.55$ ),<sup>21</sup> providing rationale for further interrogation of these cross-section averages with the help of OLS and instrumental variable regression analyses to account for potential reverse causality. We estimate the following equation:

$$\text{Income tax on individuals}_i = c + \alpha \text{Cadaster}_i + \delta x_j + \varepsilon_i \quad (2)$$

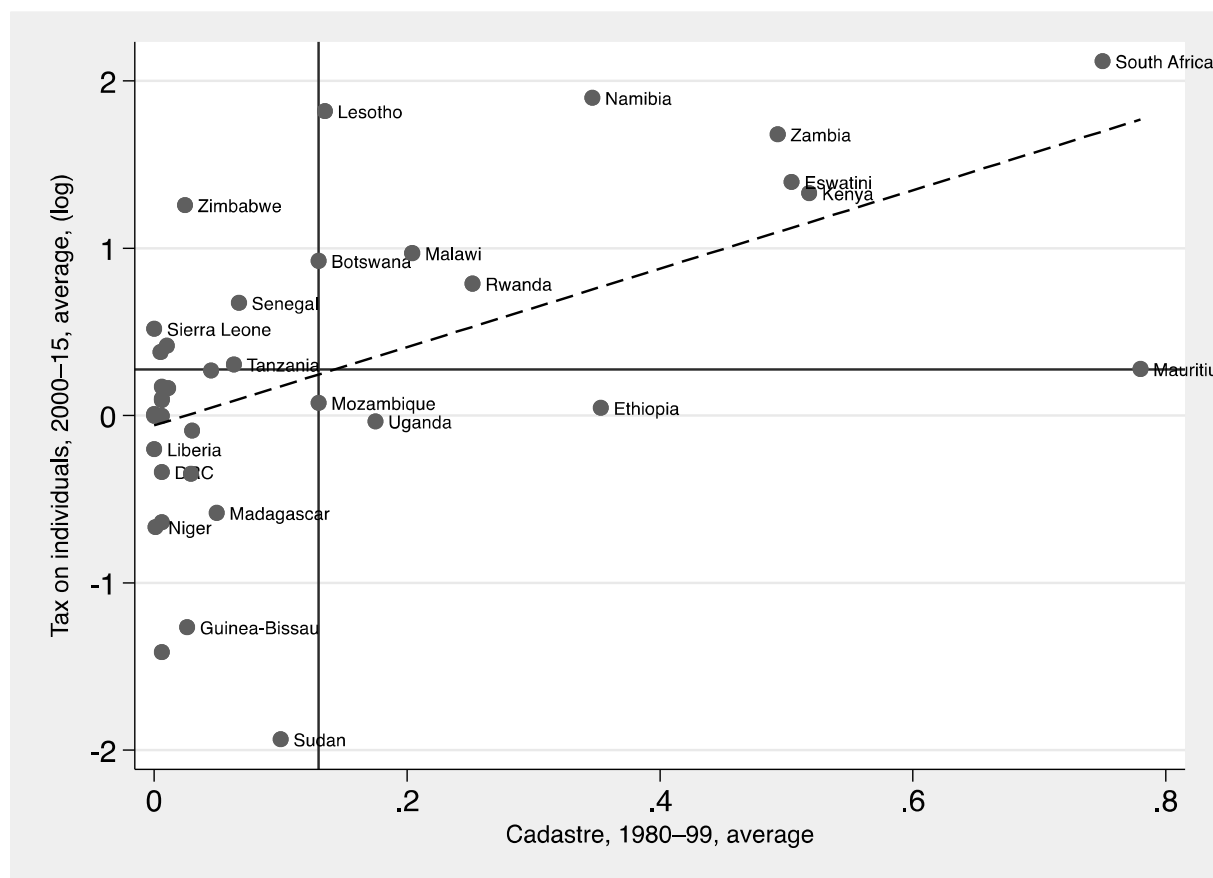
where *cadastre* is the main explanatory variable, the vector  $x$  consists of three control variables (population size, state capacity, and level of democracy), and  $\varepsilon$  is the error term.

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<sup>20</sup> Factors such as geography, the length of the colonial period, and who the colonizers were are plausible confounders of the cadastre–personal taxation link.

<sup>21</sup> Yet a few countries (Botswana, Lesotho, Malawi, Rwanda, and Senegal) with low average values of *cadastre* in 1980–99 exhibit above-average tax performance in 2000–15, pointing to the relevance of panel data analysis.

Figure 3: Cadastre and tax on individuals in SSA



Note:  $r = 0.55$ ;  $R^2 = 0$ ;  $n = 37$

Source: authors' illustration based on D'Arcy et al. (2019); ICTD/UNU-WIDER (2019).

In the instrumental variable analysis, we instrument *cadastre* with a measure of terrain ruggedness<sup>22</sup> and share of inhabitants of European descent in the population (Nunn and Puga 2012). An instrument has to be strongly correlated with the endogenous variable in the first-stage regression (instrument strength), but uncorrelated with the error term in the second stage (instrument validity). Since *cadastre* could be a consequence of a higher level of economic development, we use terrain ruggedness as a proxy for the pre-colonial levels of socioeconomic development. In this we follow Nunn and Puga (2012), who argued that bad geography was a blessing for many African countries as it shielded them from the devastating consequences of the slave trade.<sup>23</sup> Consequently, there should be a strong positive correlation between this instrument and *cadastre*. The theoretical rationale for our second instruments is anchored to the idea that the preference for formalization of individual rights on land may be stronger in countries with higher levels of population of European descent. Essentially, this is the argument made by Acemoglu et al. (2001) on the impact of European settlers on institutional quality in the former colonies, proxied with Nunn and Puga's (2012) share of population of European descent in 1900, which is of better quality and coverage than the settler mortality variable of Acemoglu et al. (2001). We believe that the exclusion assumption is upheld, as the relative importance of ruggedness and the share of residents of European descent in 1900 as potential predictors for tax collection from income taxes today is

<sup>22</sup> An indicator capturing the difference in elevation between adjacent cells of a digital elevation model (DEM).

<sup>23</sup> Nunn and Puga (2012) found that terrain ruggedness was associated with higher contemporaneous levels of GDP per capita and is uniquely accounted for through the history of the slave trade causal mechanism.

small. Table C3 of Appendix C reports the results of the first-stage regressions, which show that both instruments are statistically significant (at 99 per cent confidence level) predictors of *cadastre* and are signed positively as expected. The results of post-estimate tests suggest that these instruments are strong and there are no issues with overidentification.<sup>24</sup>

Table 2 reports OLS and 2SLS estimates.<sup>25</sup> *Cadastre* enters statistically significant at at least the 95 per cent confidence level across all models, and is signed positively as expected. The size of the estimates is of the same magnitude in OLS and 2SLS regressions: a transition from no cadastral system at all to the most efficient cadastral system that documents all land under private property rights is associated with about a 1.8 percentage point increase in direct taxes from individuals. The reported results hold when *cadastre* is instrumented with ruggedness only and using alternative indicators for democracy, and also when controlling for the average level of GDP per capita between the years 1980 and 1999.<sup>26</sup> In combination, these results provide convincing evidence that *cadastre* increases revenue intake from taxes on individuals, providing support for H2.

Table 2: Cadastre and revenue from direct taxes on individuals: cross-section averages

	<i>Dependent variable: log revenue from taxes on individuals</i>			
	1	2	3	4
	OLS	OLS	IV	IV
Cadastre	2.34*** (0.59)	1.82*** (0.64)	2.33*** (0.75)	1.78** (0.82)
Population (log)		0.03 (0.10)		0.03 (0.10)
Impartiality		0.23 (0.14)		0.24 (0.15)
Democracy		0.03 (0.06)		0.03 (0.06)
Constant	-0.06 (0.15)	-0.65 (1.63)	-0.06 (0.16)	-0.66 (1.63)
Observations	37	37	37	37
R <sup>2</sup>	0.31	0.38	0.31	0.38

Note: predictors are averaged for 1980–1999; DV is averaged for 2000–15; standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: authors' construction based on Afrobarometer (2019).

We next turn to panel data analysis, focusing on within-country, over-time variation and controlling for potential confounders. Given that we deal with institutional variables that change

<sup>24</sup> Partial R<sup>2</sup> = 0.61 and F statistic = 24. The null hypothesis for the Sargan test cannot be rejected, suggesting that the instruments are valid and the model is correctly specified.

<sup>25</sup> 2SLS estimator with degrees-of-freedom adjustments and small-sample statistics.

<sup>26</sup> In these alternative IV specifications partial R<sup>2</sup> = 0.32, and F statistic = 14. In the second state, the size of the coefficient for cadastre = 2.99 and it is statistically significant at the 95 per cent confidence level.

slowly over time, we utilize panel data with country/five years as the unit of analysis. Table 3 reports four estimates where Models 1–2 employ a two-way fixed effects estimator, which interrogates the within-country variation between *cadastre* and tax, and Models 3–4 employ first-difference estimators, requiring less-restrictive assumptions on exogeneity. *Cadastre* enters statistically significant (at least at the 95 per cent confidence level) across all four models, and is signed positively as expected. In other words, as countries increase the share of land held under individual property rights, the share of income tax as a share of GDP also increases. The fact that *cadastre*'s coefficients are statistically significant regardless of the estimator employed provides some reassurance that endogeneity may not be a problem affecting the estimates. The estimates for *cadastre* indicate that tax intake from direct taxes on individuals increases in the range of between 0.6 (Model 4) to 1.4 (Model 2) percentage points, as an immediate result of the cadastral reform.

Table 3: Cadastre and revenues from taxes on individuals: panel data estimates on country/five-years data

	<i>Dependent variable: log revenue from taxes on individuals</i>			
	1	2	3	4
	FE	FE	FD	FD
Cadastre	2.36*** (0.63)	1.39*** (0.44)	0.85** (0.32)	0.58** (0.22)
Population (log)		1.27* (0.63)		1.72** (0.80)
Impartiality		0.21*** (0.07)		0.08 (0.09)
Democracy		0.06** (0.03)		0.02 (0.03)
Constant	-0.32** (0.13)	-19.7** (9.66)	0.10*** (0.03)	-0.11 (0.11)
Year fixed effects	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.33	0.48	0.05	0.10
Observations	202	202	159	159
Number of countries	39	39		

Note: dependent variable is log of total income, capital gains, and profits taxes on individuals as a share of GDP; unit of analysis five-years/country averages; Models 1–2: two-way fixed effects estimates; Models 3–4: first-difference estimates; robust standard errors in parentheses, clustered on country level; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: authors' construction based on D'Arcy et al. (2019); ICTD/UNU-WIDER (2019); Teorell et al. (2021).

We re-run the analysis using country/year as the unit of analysis. Table C4 of Appendix C reports the results of the standard within estimator (Models 1–2) and also a dynamic model with lagged outcome variable (Models 3–7).<sup>27</sup> In Models 1–2 *cadastre* enters statistically significant (at the 99 per cent confidence level) and is signed positively as expected. The coefficient for *cadastre* in the model

<sup>27</sup> Because the danger of the Nickell bias (Nickell 1981) is relatively small in data with large T, given the fairly large number of periods in our panel (on average, each country is observed 21 times), the Nickell bias should be relatively small.

with all controls (Model 2) is of the same magnitude—1.3—as for the country/five-years models (Table 3, Model 2). Models 3–7 exploit a dynamic model. As such models can be specified in a number of different ways, we ‘tie our hands’ by adopting the empirical strategy of a highly cited paper relevant to our study (Acemoglu et al. 2019), where we control for country and year fixed effects, as well as for trends in tax revenues before *cadastre*. *Cadastre* enters statistically significant in three out of four models, with the coefficient ranging between 0.6 (Model 4) and 0.4 (Model 6). Model 7 reports estimates from a specification with outcome variable measures at  $t_{-1}$  and three control variables used in the previous analyses. In this model *cadastre* enters statistically significant (albeit at the 90 per cent significance level) with an estimate of 0.37. To assess the sensitivity of these results we re-run the fixed effects analysis, using alternative measures for democracy and also controlling for a measure of economic complexity, population growth, and economic growth (Table C5, Appendix C), and find the effects to be substantively the same as in the benchmark analysis (Model 2, Table 3, and Model 2, Table C4). These two analyses provide additional support for H2, i.e. that countries with a greater level of institutionalization of the regime of individual property rights (as proxied by the existence of state-administered public records of land ownership) collect more tax revenue from individuals.

In summation, the general pattern arising from our analyses is that *cadastre* is statistically significant and positively signed, when controlling for country and year fixed effects, pre-trends in the dependent variable, and time-variant relevant factors such as state capacity, democracy, and population. We interpret these results as being consistent with our hypothesis as to the positive association between the extent of formalization of individual property rights on land and tax revenue from individuals. Having said this, we recognize that in cross-country, over-time research, it is impossible to completely rule out reverse causality between institutional variables and indicators for tax revenue or the presence of important omitted variables that influence both cadastral institutions and tax revenue.

## 5 Conclusion

This paper takes the strength of property-rights-defining state institutions as the focus of the inquiry into the strength of the fiscal state. We argue that formalization of individual property rights by the state—the political authority of the first order—is central to the emergence of a robust fiscal contract and, consequently, an effective fiscal state. While sovereigns may have different reasons to tax their subjects, the people’s most immediate incentive to agree to taxation is the prospect of improving their economic standing by engaging in the new economic opportunities afforded by state-level formalization of property rights (i.e. economic exchange beyond their immediate social circles). As formalization enables the prospect of improved economic wellbeing, owners of economic resources will be more likely to pay tax demanded by the state. Applying these theoretical lenses to sub-Saharan Africa, we argue that while traditional authority remains the principal authority in matters of land rights, large sections of the population remain locked out of viable opportunities for improved economic wellbeing, consequently making them less likely to respond to tax demands by the state.

We tested this novel theoretical argument using individual survey and cross-country data, including new data on the extent of state-led formalization of individual property rights on land. At the individual level, we found a strong relationship between perceptions of the ease of access to state-recorded information on land ownership and tax consent, with the size of the effect being larger than for other commonly identified goods in the fiscal contract framework. In the cross-country analysis, cognizant of challenges regarding causal inference, we limit our claims to a robust positive association between the extent of cadastrification and the share of revenue from taxes on

individuals. In their totality, we interpret these results as consistent with our central idea that investment in legal infrastructure in the form of public-order, information-based property rights institutions is conducive to a more efficient tax state. Although the idea that legal capacity is one of the pillars of prosperity is not new (Besley and Persson 2011), our results suggest that a complete picture of legal capacity should include not only institutions that protect private property and enforce agreement between private parties but also property-defining institutions. Our research also provides an important piece of evidence in the ongoing debate on the pros and cons of individual property rights on land in SSA (Boone 2019; Peters 2013; Wile 2006). Having said this, the magnitude of our estimates suggests that strengthening public-order property-defining institutions on land is not the most potent immediate solution to SSA's weak tax state, as even full cadastrification of land in private possession would not allow the median SSA country to address the need for additional resources amounting to 19 per cent of GDP to finance the Sustainable Development Goals by 2030 in key areas of human wellbeing, such as education, health, water and sanitation, electricity, and roads (Gaspar et al. 2019).

While this paper constitutes an important step in unpacking the relationship between the information-based side of legal capacity and taxation, much additional work is needed to further both the theoretical framework and the empirical analysis. Theoretically, more attention needs to be paid to the conditions under which compatibility can be achieved between traditional authorities in matters of land property rights and state-imposed taxation. For example, can the integration of chiefs into national institutions (Henn 2018) affect the dynamic of the fiscal contract and fiscal outcomes? Empirically, a better understanding of the relationship between property rights and taxation, and indeed development outcomes and political attitudes and behaviour at the individual level, would be helpfully aided by the addition of questions about respondents' property ownership status to commonly used surveys such as Afrobarometer, the Demographic and Health Surveys, and national household budget surveys. This would enable us to further explore the relationship between variables at the heart of the political economy of households and individuals (property rights) and the state (taxation).

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