ONLINE APPENDIX

No taxation without property rights

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

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(Note: appendix unchecked)

A   Individual-level analysis

Table A1. Description of variables from Afrobarometer 7 (2019)

DV	
Mustpaytax	Q38c "For each of the following statements, please tell me whether you disagree or agree? The tax authorities always have the right to make people pay taxes". Answer options [1,5]: Strongly disagree, disagree, neither agree/nor disagree, agree, strongly agree. Refused/don't know are set as missing.
Mustpaytax_dummy	1 = agree and strongly agree, 0 = otherwise. Refused/don't know are dropped.
IV	
Land	Q18b "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. Refused/Don't know/haven't heard are set as missing.
Land (dummy)	1 = very likely, 0 = otherwise. Refused/Don't know/haven't heard are set as missing.
CONTROLS	
Satisfaction with services 1	An equally weighted index of satisfaction with five state provided services: basic health care, education, water and sanitation, electric supply and roads and bridges. "How well or badly would you say the current government is handling the following matters, or haven't you heard enough to say"? Q56g: improving basic health care services, Q56h: addressing educational needs, Q56i: providing water and sanitation services, Q56m: providing reliable electric supply and Q56l: maintaining roads and bridges. Answer options [1, 4]: very badly, fairly badly, fairly well, very well. Don't know/haven't heard enough are set as missing.
Satisfaction with services 2	An equally weighted index of three scores obtained with the help of principal component analysis (PCA) of eight questions pertaining to the satisfaction with services. PCA analysis revelated three underlying dimensions of state provided services: health and education, infrastructure (water and sanitation, electric supply and roads and bridges) and security (Q56f – reducing crime, Q56o: preventing or resolving violent community conflict, countering violence from armed extremists).
Trust in political institutions	An equal weighted index (first, based on raw scores and, second, based on the first components from PCA) of seven items measuring trust in political institutions. "How much do you trust each of the following, or haven't you heard enough about them to say?" Q43a: president, Q43b: national parliament, Q43c: national electoral commission, Q43d: subnational parliament, Q43g: Police, Q43h: army, Q43i: courts. Answer options [0, 3]: not at all, just a little, somewhat, a lot. Refused/don't know/haven't heard are set as missing
Partiality	Q85a: "How often, if ever, are [R's Ethnic Group] treated unfairly by the government?" Answer options [0,3]: always, often, sometimes, never. Not applicable/refused/don't know/not asked in the country are set as missing.
National political community	Original question Q85b. "Let us suppose that you had to choose between being a [R's national identity (NI)] and being a [R's ethnic group (EG)]. Which of the following statements best expresses your feelings? Answer options [1, 5]: I fell only (EG), I fell more (EG) than (NI), I feel equally (NI) and (EG), I feel more (NI) than (EG), I feel only (NI). Not applicable/refused/don't know/not asked in the country are set as missing
Corruption in land administrations	Q48f "In this country, how likely do you think it is that a rich person could pay a bribe or use personal connections to get away with registering land that does not belong to them?" Answer options [0, 3]: Not at all likely, not very likely, somewhat likely, very likely. Missing/refused/don't know/haven't heard are set as missing.
Corruption in tax administration	Q48d "And in this country how likely do you think it is that a rich person could pay a bribe or use personal connections to get away with: Avoiding paying taxes they owe to government?". Answer options [0, 3]: Not at all likely, not very likely, somewhat likely, very likely. Missing/refused/don't know/haven't heard are set as missing.

Satisfaction with democracy	Q36 "Overall, how satisfied are you with the way democracy works in [country name]? Answer options [1, 4]: Not at all satisfied, not very satisfied, fairly satisfied, very satisfied. The country is not a democracy/refused/don't know are set as missing.
Contract traditional leader	Q25E "During the past year, how often have you contacted any of the following persons about some important problems or to give them your views: traditional leaders? Asnwer options [0, 3]: Never, only once, a few times, often. Don't know, refused to answer are set as missing.
Wealth	An equally weighted index of six items respondents have in their possession. "Which of these things do you or anyone in your household own?" Q89A: radio, Q89B: tv, Q89C: car or motorcycle, Q89D: computer, Q89E: bank account, Q89F: mobile phone. Answer options [0, 2]: no, don't own; yes, someone else (in the household) owns; yes, do own. Missing/refused/don't know dropped. The variables that entered into the index were recorded as follows: 1 = "yes, do own"; 0 = otherwise.
Lived Poverty Index	Average index of 5 poverty items, constructed by the Eurobarometer.
Working	Original question Q95A (occupation) – 13 categories [0, 12], where 0 = never had a job, 1 = student, 2 = housewife/housemaker and 3-12 are different occupational categories – was recorded into *Working* where 1 = 0,1 and 2, and 0 is otherwise. Other/refused/don't know/missing are set as missing.
Working formal	Original question Q95A (employer) – four categories [1,4]: work for self, private sector, NGOs/civil society sector, government – recorded into *Working formal* where 0 = 1 and 1 = 2,3 and 4. Not applicable/refused/don't know are set as missing.
Urban	Original question URBRUR (urban = 1 , rural = 2, semi-urban = 3, peri-urban =460) is recorded into Urban where 1 = urban, semi- and peri-urban and 0 is otherwise.
Education	Ten categories [0, 9]: No formal schooling, informal schooling only, some primary, primary school complete, some secondary/high schooling, secondary/high school complete, post-secondary, some university, university competed, post-graduate. Refused/don't know are set as missing.
Female	Q101 respondent's gender: Male = 1, Female = 2.
Age	Q1 "How old are you?". Refused/don't know are dropped. *c.age#c.age* is the squared term of Age.

Table A2. Summary Statistics

Variable	N	mean	sd	min	max
Mustpaytax	41,939	3.81	1.23	1	5
Mustpaytax (dummy)	41,939			0	1
Land	39,155	1.36	1.15	0	3
Land (dummy)	39,155			0	1
Satisfaction with services 1	40,140	2.36	0.73	1	4
Satisfaction with services 2	36,957	-.01	1.08	-2.24	2.49
Trust in political institutions 1	37,281	1.61	0.87	0	3
Trust in political institutions 2	37,281	1.29e-08	2.03	-3.75	3.27
Partiality	37,714	0.51	0.87	0	3
National political community	38,209	3,54	1.2	1	5
Corruption in land administration	41,731	2.35	1	0	3
Corruption in tax administration	41,566	2.24	1.06	0	3
Contact traditional leader	38,408	0.7	1.09	1	3
Satisfaction with democracy	40,749	2.4	1	1	4
Wealth	42,362	.40	.29	0	1
Lived Poverty Index	42,990	1.22	0.91	0	4
Working	40,838			0	1
Working formal	28,236			0	1
Urban	43,424			0	1
Education	43,156	3.44	2.22	0	9
Female	43,417			1	2
Age	43,389	36.99	14.91	18	106

Table A3. Access to information on land ownership and citizen assent to pay taxes: probit regression estimates

|	1	2	3	4	5	6	7	8	9
Land	0.17***	0.17***	0.17***	0.17***	0.17***	0.17***	0.17***	0.16***	.057***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	
Satisfaction with services	0.04**	0.05**	0.04*	0.03**	0.03**	0.03**	0.03*	0.05**	.011**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	
Partiality	-0.09**	-0.09**	-0.09*	-0.09*	-0.09*	-0.09*	-0.08*	-0.07	-.029*
	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	
Trust in political institutions	0.07***	0.07***	0.07***	0.06***	0.06***	0.15***	0.15***	0.14***	.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	
National political community	0.04	0.05	0.04						
	(0.06)	(0.06)	(0.06)						
Corruption in land administration		0.06	0.05						
		(0.05)	(0.05)						
Corruption in tax authorities		-0.01	-0.00						
		(0.04)	(0.05)						
Satisfaction with democracy			0.07*	0.07*	0.07*	0.07*	0.06	0.10***	.024*
			(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	
Respondent SES	yes	yes	yes	yes	yes	yes	yes	yes	
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	
Pseudo R2	.0507	.0509	0.0510	0.0512	0.0512	0.0512	0.0516	0.0558	
Observations (n)	26,273	25,788	25,036	24,580	24,580	24,920	25,224	16,442	
Countries (N)	32	32	32	32	32	32	32	32	32

Note: Coefficients: for Land is "Very likely" category (reference "Not at al likely"); for Partiality is the "Always" category (reference is "Never"); for Education is for the "Secondary/high school completed" (reference "No formal education"); for NPC is "National identity only" (reference "Ethnic identify only"); for corruption variables is "Very likely" category (reference "Not at all likely"); for satisfaction with democracy is "Very satisfied" category (reference "Not at all"). Models 4-8 Satisfaction with services is an index of 8 items; Model 6 Political trust is trust in six political institutions; Model 7 wealth is measured through LivedPoverty_CAT variable; Model 8 is limited to working respondents only with a control for employment in formal sector; Respondent SES: age, age2, female, urban, working and wealth; robust standard errors are in parentheses, clustered at country level; *** p<0.01, ** p<0.05, * p<0.1

Table A4. Access to information on land ownership and citizen assent to pay taxes: logistic regression estimates

	1	2	3	4
Land	0.22***	0.21***		0.035***
	(0.05)	(0.05)		
Land (dummy)			0.19***	0.03***
			(0.04)	
Satisfaction with services	0.07*	0.08**	0.08**	0.011*
	(0.04)	(0.04)	(0.04)	
Trust in political institutions	0.12***	0.13***	0.13***	0.02***
	(0.01)	(0.01)	(0.01)	
Partiality	-0.22**	-0.27***	-0.26***	-0.037**
	(0.09)	(0.09)	(0.09)	
National political community	0.1			
	(0.11)			
Corruption in land administration	0.09			
	(0.11)			
Corruption in tax authorities	0.06			
	(0.09)			
Satisfaction with democracy	0.11			
	(0.08)			
Female	-0.03	-0.01	-0.01	
	(0.03)	(0.03)	(0.03)	
Age	0.01	0.01	0.01	
	(0.01)	(0.01)	(0.01)	
Age2	0.00	0.00	0.00	
	(0.00)	(0.00)	(0.00)	
Education	0.41***	0.41***	0.41***	0.068***
	(0.11)	(0.10)	(0.10)	
Working (dummy)	-0.03	-0.03	-0.03	
	(0.06)	(0.06)	(0.06)	
Urban (dummy)	-0.15**	-0.15**	-0.15**	-0.024**
	(0.07)	(0.07)	(0.07)	
Wealth	0.30***	0.34***	0.34***	0.04***
	(0.07)	(0.07)	(0.07)	
Country fixed effects	yes	yes	yes	
Constant	-0.35	-0.11	-0.10	
	(0.24)	(0.18)	(0.17)	
Pseudo R2	0.094	0.096	0.095	
Observations (n)	25,021	26,538	26,538	
Countries (N)	31	31	31	

Note: Models 1-3 report coefficients; estimated for the same categories and with regard to the same reference categories as in the probit main analysis; Model 4 reports average marginal effects calculated for Land from Model 1 and for Land_dummy from Model 3; Swaziland is omitted; robust standard errors in parentheses, clustered at country level; *** p<0.01, ** p<0.05, * p<0.1

Figure A1. Average Marginal Effects of Information on Land Ownership on Assent to Pay taxes to Government (dummy)
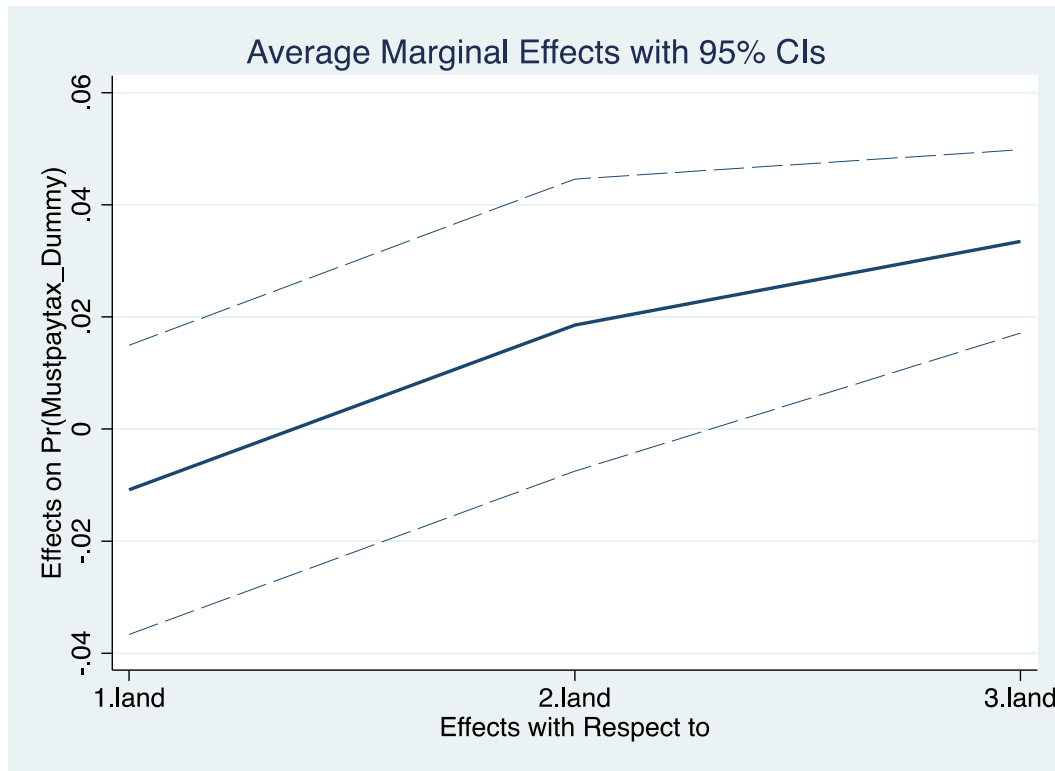
Note: DV: mustpaytax (dummy); 1.land = not very likely, 2.land = somewhat likely, 3.land = very likely

B   Constructing the *Cadaster* indicator

B1   Introduction

Cadasters are methodically arranged records of interests in land, which includes a presentation of land assets (their location, boundaries, dimension and features) and a description of interests – rights, responsibilities and restrictions – associated with these land holdings (Williamson and Enemark 1996). Although cadasters could be arranged by private actors (for example, large land holders), this paper focuses on state-administered cadasters.

Sub-Saharan African states initiated cadastral records at different points in time and achieved differing degrees of geographical reach in the recording of such. For example, Egypt has one of the oldest state-administered cadasters in the world, going back to 1000 CE (Kark 1997), while many countries, such as Angola, Benin, Burkina Faso, Liberia or Sierra Leone lack any system of land surveying and registration of land rights even today. In our sample Mauritius has currently the most developed system of state-administer cadaster, followed by Rwanda, South Africa, Eswatini (former Swaziland) and Kenya.

There are two main methods of land identification and representation: narrative or cartographic (maps). Cartographic (mapped) cadaster identifies a land asset – namely, location of the land parcel, its dimensions and features – based on systematic observations and instrumental measurements and represented as a drawing/sketch, linked to a register, containing information about the interests associated with the land asset. Narrative cadaster is a record that identifies a land asset (location, dimensions and features), based on observations and measurements of a less systematic character and represented in sentences of natural language (narrative description). While the overwhelming majority of SSA countries today use cartographic methods of land description, some – as, for example, Ethiopia or Guinea – continue to rely on the narrative method. Figure A1 shows examples of narrative and cartographic cadaster from Ethiopia.

B2   Assigning scores

To create the Cadaster variable we assigned a score for each country/year, based on the answers to the following questions:

- "Was there a state-administered cadaster?" Country/year receives 1 point if "yes" and 0 points if "no", yielding score component 1 ($z1_{it}$);
- "Was the cadaster narrative or cartographic?". Country/year receives 1 if cartographic and 0.75 if narrative, yielding score component 2 ($z2_{it}$)
- "How much of the country's territory was covered by the cadaster?". Country/year receives a score based on the proportion of the country's territory covered by the cadaster, yielding score component 3 ($z3_{it}$).[2]

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[2] For this paper the term $z3_{it}$ excludes cadastrified communal and state land. For example, although Mauritius's cadaster covers 100% of the country's territory, 22% of the land is state land (Truth and Justice Commission 2011, 31), resulting in the score of .78. Similarly, although Ethiopia has had a wide-ranging cadastrification programme of rural land since 1998, all rural land is state property, resulting in the score of "0" for the rural land component of Ethiopia's $z3_{it}$ term.

These coding principals went through a peer review process of the professional association of land surveyors (D'Arcy et al. 2019). The coding principles allow us to account for spatial and temporal change, as, for instance, slight deterioration in the cadastral coverage in Namibia after its independence from South Africa, or rapid deterioration of cadaster in Zimbabwe in the 2000s. Special care was taken in documenting the presence and attributes – type of cadaster and the spatial coverage – of cadasters at every t of the period. Instances of cadaster gradual decay are, unfortunately, not discussed in reputable literature in sufficient detail to allow us to account for this, quite plausible, scenario. This limitation, caused by the paucity of sources and research on the evaluation of cadaster systems, should be kept in mind.

By reviewing numerous primary sources and reputable secondary literature,[3] as well as consulting experts on cadasters, we record the answers to the above discussed questions, documenting supporting sources for each coding decision. A reference document with dates and sources for each SSA country for 1980-2015 is available upon request.

After this, we compute the Cadaster indicator for every country/year by multiplying all three score components by one another:

$$\text{Cadaster}_{it} = z1_{it} * z2_{it} * z3_{it}$$

The possible range of values is 0 to 1, where "0" stands for the absence of state-administered cadaster at all and "1" stands for a full (covering at least 90 percent of the territory) mapped cadaster.

B3   A note on $z3_{it}$

For cadasters of the 20 and 21st centuries we have to account for different dynamics of cadastrification of urban and rural land, impelled by rapid urbanization in the 20th century. The case of Ethiopia typifies the situation in SSA, where cadaster was initiated in the early 20th century in Addis Ababa and was limited to urban areas before the late 1990s when a large successful program of cadatrification of rural land began (Deininger et al 2008; Shibashi 2011). As of 2011, 30% of all urban parcels were properly surveyed and registered,[4] and about 60% of all rural parcels were registered using narrative description of land holdings (Shibeshi 2011).

To calculate $z3_{it}$, we multiply the share of cadastrified rural/urban parcels by the share of rural/urban population and sum the products. To illustrate, after independence in 1990, Namibia's effort to maintain the cadaster inherited from the times under the South African's mandate resulted in 20 percent of rural parcels and 60 percent of urban parcels being properly registered and surveyed (Owolabi 2004). We multiply 20 and 60 by the shares of rural and urban population (64.3 and 35.7 percent correspondingly) and sum the terms to obtain $z3_{\text{Namibia}1990\text{-}2004} = 0.343$.

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[3] There are three major sources of information on cadasters in SSA: 1) the UN-sponsored Cadastral Template Project, run by the International Federation of Land Surveyors (FIG) and 2) specialized academic literature and 3) documentation of international organizations (such as World Bank, USAID, SIDA and other international organizations) involved in cadastral reforms in SSA.

[44] The term "properly surveyed and registered" is a jargon expression of the of the International Federation of Surveyors (FIG), which refers to a process through which land parcels are surveyed using modern methods of measurement and cartographic method of presentation and linked to the holders of rights and obligations in this land.

While parcel-based measure of the coverage – share of the surveyed and registered parcels in the total number of parcels – is the most accurate measure, it is not available for all country/years. For most of the remaining country/years we have data on the implementation of rural cadasters, but the data comes in a number of different forms. First, it comes as the share of regularized agricultural land over the total agricultural land. For example, USAID (2011: 7) estimates that today in Cameroon only about 3% of rural land is regularized. Second, data on the coverage of rural cadasters comes as the share of the total land, which needs to be normalized through the share of agricultural land in the total land to calculate the coverage. For example, USAID (2010: 3) estimates that in Uganda c. 17.5% of all land is registered. Assuming that urban cadaster exists in at least some minimal form,[5] to accommodate the uncertainty related to urban cadaster in our estimate of the cadaster coverage, we divide 17.5% by share of agricultural land in the total land (c. 72%), arriving at the $z3_{Uganda2010-2015} = 24.3$.

Finally, for a number of country/years the available coverage data is even less specific. For example, the coverage is reported in the number of owners having full set of legal documents to land. For example, in 1975 Algeria began a program of cadastrification of the territory suitable for agriculture --- north of the 34th parallel (World Bank 1992: 7). However, in 1992 only "5 percent of private rural and urban owners have legal evidence of their property rights" (World Bank 1992, 6; see also World Bank 1992, 9; World Bank 2001, 2). In such cases we assume the share of "owners" to be equivalent to the share of "properly surveyed and registered" parcels in the total number of parcels}. In the case of Algeria $z3_{Algeria1992} = 0.05$.

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[5] In 2010, the share of urban population in Uganda was c. 19% (World Bank n.d.).

C   Country-level analysis

Table C1. Description of variables and of data sources

DV	
Tax on Individuals	Total income, capital gains and profit taxes on individuals (always exclusive of resource revenues in available sources) as % of GDP. 1980-2015, log transformed. Source: *Government Revenue Dataset* (ICTD/UNU-WIDER 2019). This variable is a subset of data capturing taxes on income, profits, and capital gains of both individuals and corporations and other entities. Parsing out individuals from corporations and other entities removes taxes on profits from the data we employ. Furthermore, we assume that capital gains tax, which is paid on income derived from the sale/exchange of an asset, such as a stock or property, is unlikely to be a high grossing tax in sub-Saharan Africa, as this is a tax on high-income individuals and even in developed countries capital gains taxes account for a modest portion of tax revenue. For example, in the USA in 2019, the most recent year for which data are not affected by temporary distortions resulting from the Covid-19 pandemic, taxes from capital gains constituted about 11 percent of individual income tax revenues or 0.9 percent of GDP (The Peter Peterson Foundation 2021). Therefore, this variable predominantly reflects income taxes.
IV	
Cadaster	Constructed by authors (D'Arcy et al. 2019, 2021). 1980-2015.
CONTROLS	
Population	Total population are midyear estimates, based on the de facto definition of population, counting all residents regardless of legal status or citizenship. 1980-2015, log transformed. Source: World Bank Development Indicators, the QoG standard dataset (wdi_pop), version Jan 2020.
Impartiality	Impartial public administration, 1980-2016. "The extent to which public officials generally abide by the law and treat like cases alike, or conversely, the extent to which public administration is characterized by arbitrariness and biases (i.e., nepotism, cronyism, or discrimination)". Source: V-Dem Institute, the QoG standard dataset, version Jan 2020.
Democracy	fh_ipolity2: average of Freedom House and Polity with imputed values. Scale ranges from 0-10 where 0 is least democratic and 10 most democratic. 1980-2015. Source: the QoG standard dataset, version Jan 2020.
	Vdem_polyarchy: index of the five components: Elected Officials, Clean Elections, Associational Autonomy, Inclusive Citizenship, and Freedom of Expression and Alternative Sources of Information. 1980-2015. Source: V-Dem Institute, the QoG standard dataset, version Jan 2020.
	vdem_libdem: index, including constitutionally protected civil liberties, strong rule of law, independent judiciary, effective checks and balances and the level of electoral democracy. 1980-2015. Source: V-Dem Institute, the QoG standard dataset, version Jan 2020.
GDPpc	mad_gdppc: real GDP per capita in 2011 US dollars, multiple benchmarks. 1980-2015, log transformed. Source: the Maddison Project (Bolt & van Zanden 2014), the QoG standard dataset, version Jan 2020.
GDPpc growth	wdi_gdpcapgr: annual percentage rate of GDP per capita based on constant local currency (based on constant 2010 U.S. dollars). 1980-2015. Source: World Bank Development Indicators, the QoG standard dataset, version Jan 2020.
Index of Economic Complexity	Structural sophistication of economy, 1995-2015. Source: The Growth Lab at Harvard University. 2021. Growth Projections and Complexity Rankings, V2 [Data set]. https://doi.org/10.7910/dvn/xtaqmc

Table C2A. Summary Statistics: cross-section data

Variable	N	mean	sd	min	max
Tax on individuals	37	2.03	1.97	.15	8.34
Tax on individuals (log)	37	.28	.9	-1.94	2.12
Cadaster	40	.13	.2	0	.78
Population (log)	40	15.63	1.23	12.91	18.3.
Democracy (fh_ipolity2)	41	5.34	2.25	1.16	9.63
Impartiality	41	-.15	1.04	-1.9	2.6
Terrain ruggedness	40	.93	1.19	.12	6.2
Terrain ruggedness (log)	40	-.6	.99	-2.16	1.82
% of European descent	40	1.5	4.04	0	18

Table C2B. Summary Statistics: panel data

Variable	N	mean	sd	min	max
Tax on individuals	796	2.04	2.18	0	13.4
Tax on individuals (log)	796	.22	1.09	-11.51	2.59
Cadaster	1,436	.124	.205	0	.78
Population (log)	1,426	15.85	1.27	12.64	19.01
Democracy (fh_ipolity2)	1,387	4.26	2.63	.25	10
State capacity	1,430	-.252	1.08	-3.03	2.83
Other control variables					
Democracy (vdem_polyarchy)	1,426	.362	.20	.077	.82
Democtacy (vdem_libdem)	1,426	.25	.18	.02	.71
Population growth (annual %)	1,426	2.6	.99	-6.18	.7.92
GDPpc growth (annual %)	1,397	.896	6.45	-50.23	91.65
Index of Economic Complexity	594	-.91	.58	-2.42	1.22

Table C3. Results of First stage Regression for Instrumental Variable Analysis

	DV: Cadaster	
	1	2
European Descent	0.34***	.32***
	(0.005)	(0.006)
Ruggedness	.064***	0.07***
	(.023)	(0.023)
Population (log)		0.028
		(0.02)
Impartiality		0.034
		(0.025)
Democracy		-0.004
		(0.001)
Constant	0.13	-0.29
	(0.03)***	(.28)
Observations	37	37
R-squared	0.63	0.67

Note: DV is averaged for 1980-1999; standard errors in parentheses;

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

Table C4. Cadaster and total tax on individuals: fixed effects and dynamic panel analysis (robustness check)

	FE	FE	Dynamic	Dynamic	Dynamic	Dynamic	Dynamic
DV: log of revenues from direct taxes from individuals							
	1	2	3	4	5	6	7
Cadaster	2.36***	1.29***	0.60**	0.51*	0.48*	0.41	0.37*
	(0.62)	(0.44)	(0.23)	(0.29)	(0.26)	(0.31)	(0.21)
Population (log)		1.61**					0.46
		(0.69)					(0.33)
Impartiality		0.19***					0.06
		(0.06)					(0.04)
Democracy		0.04**					0.02*
		(0.02)					(0.01)
Y_{t-1}			0.78***	0.88***	0.89***	0.86***	0.74***
			(0.04)	(0.09)	(0.10)	(0.07)	(0.04)
Y_{t-2}				-0.12	-0.12	-0.10	
				(0.09)	(0.11)	(0.11)	
Y_{t-3}					0.01	0.11	
					(0.06)	(0.09)	
Y_{t-4}						-0.07	
						(0.05)	
Country FE	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes
Constant	-0.38**	-24.86**	-0.10	0.01	0.05	0.18	-7.14
	(0.17)	(10.61)	(0.06)	(0.05)	(0.10)	(0.14)	(5.09)
Observations (n)	819	806	764	713	663	613	755
Countries (N)	39	39	39	39	39	39	39
R-squared	0.23	0.34	0.67	0.67	0.67	0.67	0.68

Note: DV is log of total income, capital gains and profits taxes on individuals as a share of GDP; robust standard errors in parentheses, clustered on country level; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table C5. Cadaster and total tax on individuals: fixed effects with alternative measures (robustness checks)

Cadaster	1.27***	1.28***	1.56***	2.06**
	(0.46)	(0.44)	(0.43)	(0.77)
Population (log)	1.60**	1.66**		2.50
	(0.69)	(0.72)		(1.54)
Impartiality	0.18***	0.18***	0.19***	0.23
	(0.06)	(0.07)	(0.06)	(0.27)
Democracy (dvem_polyarchy)	0.68			
	(0.41)			
Democracy (dvem_libdem)		0.75		
		(0.53)		
Democracy (fh_ipolity2)			0.05**	0.02
			(0.02)	(0.04)
Population growth (annual %)			0.03	
			(0.03)	
GDPpc growth (annuam %)			0.00	
			(0.00)	
Index of Economic Complexity				-0.05
				(0.10)
Country FE	yes	yes	yes	yes
Yes FE	yes	yes	yes	yes
				(0.10)
Constant	-24.67**	-25.67**	-0.31*	-40.54
	(10.54)	(10.95)	(0.18)	(24.81)
Observations (n)	819	819	800	372
R-squared	0.34	0.34	0.31	0.37
Countries (N)	39	39	39	27

Note: DV is log of total income, capital gains and profits taxes on individuals as a share of GDP; robust standard errors in parentheses, clustered on country level; *** p<0.01, ** p<0.05, * p<0.1

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