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Disparate geography and the origins of tax capacity

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Abstract

We establish a conceptual and empirical link between the geographic distribution of economic endowments within a nation and long-run fiscal capacity. Economic geography informs elites' incentives to facilitate large-scale central taxing bureaucracies. Sectoral economic advantage also provides them with leverage to transform these state-building incentives into policy and stable institutional equilibria. We argue that unequal economic endowments across the geography of a nation exacerbate distributive tensions. Political disagreement over the size and the scope of the state hinder centralized investments in state capacity to collect taxes. Using detailed sub-national data and indicators of geographic distribution, we demonstrate global patterns of sub-national economic geography, and how these patterns are related to sub-national variation in economic productivity. We show that divergence in sub-national economies varies across the world and is related to predictable differences in the size of the fiscal state.

Keywords Economic geography · Taxation · Spatial inequality · Political economy · State capacity

JEL Classification R12 · H2 · H73 · N40 · N90

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1 Introduction

Investment in central tax capacity is a political problem fought by potential winners, those who would gain from the reach of centralized power with scope over territory, and losers, those benefitting from a status quo characterized by relatively weak central bureaucracies and fiscal institutions. Industrial elites keen to compete in international markets or later, well organized labor movements, exemplify the former; by contrast, rural elites basing their wealth on large-scale plant-based agriculture exemplify the latter (Lizzeri and Persico 2004; Dincecco 2017; Congleton 2010). Conflict about tax capacity is a dispute over investments in particular sectors of the economy and the future ability to reallocate resources.

In this paper we explore the conceptual and empirical link between economic geography and fiscal capacity investments. We define economic geography as the economic endowments available to the nation and, in particular, how those endowments are distributed within the space of the nation (Henderson et al. 2011). In short, we argue that variation in sub-national geographic endowments, which translates into divergence in sub-national economic productivity, encourages territorial conflict over the size of the central fiscal state.

Economic geography shapes elites' incentives to facilitate large-scale central taxing bureaucracies because different economic sectors (and the sub-national regions in which those sectors flourish) gain disproportionately from the provision of central state policy. Political disagreement over the size and the scope of the state, accordingly, hinders investments in central taxation. The economic gains made possible by favorable geography provide certain elites with leverage to secure their interests in policy outcomes and stable institutional equilibria. Using detailed sub-national data and indicators of geographic distribution, we demonstrate global patterns in sub-national economic geography, and how these patterns are related to unequal economic development in particular regions of the country. We document patterns of sub-national economic geography that may exacerbate territorial distributive tensions. We show that these divergent sub-national economies vary across the world and are statistically related to predictable differences in the size of the fiscal state. First, we estimate the relationship between variation in agricultural suitability (soil quality, precipitation, elevation, length of growing period, land suitability) and variation in sub-national economic productivity. Second, we directly predict central tax capacity with measures of variation in sub-national agricultural suitability. Third, we use an instrumental variables approach whereby variation in agricultural suitability instruments for sub-national variation in economic productivity to predict central tax capacity. We take steps to address a large range of threats to inference, including explicitly addressing endogeneity of sub-national borders in theory and in our empirics.

Our analysis adds to the empirical exploration of existing research in economic geography and the development of the fiscal state. We bring focus to the geographic distribution of economic endowments within a nation as a new, important factor predicting investments in tax capacity. Existing research on geographic determinants of economic and political development has focused on national geography. In this

research, we emphasize the link between differences in geography within the national territory and the size of the fiscal state. Moreover, we stress a political mechanism, conflict over centralization, that translates sub-national economic variation into a crucial political outcome.

2 Geography, preferences for centralization, and tax capacity

A robust tradition in economics details the direct link between economic endowments and economic growth and development. These arguments come in two forms, a "strong geography" hypothesis—physical geography drives economic growth and distribution (Diamond 1998; Gallup et al. 1999; Sachs 2003), or a modified geography hypothesis—geography shapes institutions, institutions shape growth and distribution (Sokoloff and Engerman 2000; Rodrik et al. 2004). This research convincingly demonstrates that nations have different attributes to work with, some that encourage sustained growth and development, and others that work against nations' best efforts to improve their economic position.

An intermediate input that is shaped by economic geography is the development of the fiscal state. In research on economic endowments, we may understand the growth of tax state as the result of several clear developments. First, economic growth increases the size of the economic pie, so that more revenue may be extracted from the economy. This should imply a larger tax state, as more aggregate resources are collected from an increasingly larger economy. Second, if geography shapes the development of institutions, we may understand the growth of efficient and highly extractive fiscal states as part of the development of political institutions meant to capture society's resources to reallocate them to productive use (Besley and Persson 2013). In either case, favorable geography increases the revenue available to governments to distribute as they see fit.

The link between economic geography and the size of the fiscal state is clear, and difficult to dispute. However, as many scholars have pointed out, an exclusive focus on geography eliminates the political decisions made at the time of investments in the fiscal state (Acemoglu and Johnson 2007; Acemoglu et al. 2011). Moreover, we cannot understand much of the variation between nations with similar economic endowments (Kurtz 2013). We build upon this literature, seeking to refine the geography hypothesis to understand the link between geography and what are ultimately political choices to build the capacity of the central state. We also build upon research linking competition between economic elites (agricultural vs. capitalist) and investments in the fiscal state (Beramendi et al. 2019). We offer a spatial mechanism to connect the preferences of economic sectors to the development of tax capacity.

We start with the premise that economic endowments are never distributed uniformly across the geographic space of the nation. Because geographic endowments provide economic benefits, we consider those areas with greater endowments (fertile soil, access to trade routes, natural resources) to be privileged in relative terms to the rest of their nation. Variation in economic endowments creates divergence in economic productivity across the national territory (Henderson et al. 2017; Gen-

naioli et al. 2014). "Natural" sub-national divergence may be further exacerbated by economic tendencies toward spatial agglomeration (Krugman 1991). This economic inequality creates the possibility to view centralization of extraction, distribution, and policymaking at the national level as having the potential to impose disproportionate costs, or confer disproportionate benefits, on particular sub-national regions of the country (Bolton and Roland 1997). Centralization thus becomes a crucial political battleground fought between political elites that stand to gain or lose from a powerful national government (Alesina and Spolaore 2005; Alesina et al. 1995).

Within the conflict over centralization, we assume that sub-national regions seek to benefit from the central government and prefer to avoid paying for it (Giuranno 2009). In progressive or neutral tax systems, the bulk of central tax resources will be extracted from the most productive economic regions. This is true whether the major tax instrument is imposed on income, consumption, or trade (Baunsgaard and Keen 2010). If the central government directly redistributes from the most productive regions to less productive regions, the most economically endowed sub-national regions have incentives to oppose centralization.

Distribution by the central government oftentimes does not take the form of pure redistribution, however. Economic elites are more willing to invest in centralization when their sector benefits from national provision of public goods (Lizzeri and Persico 2004; Congleton 2010; Lindert 2004; Pincus and Robinson 2011). Moreover, certain centrally-provided goods enable the sharing of risks across the territory that may affect the most productive regions the same or more than the least productive (Rehm 2016). These can include, for example, central insurance programs (Moene and Wallerstein 2001). Similarly, productive sub-national regions understand that participation in a union entails externalities that cross sub-national borders. Centralization may thus be a feasible strategy to address common problems.

Existing evidence suggests that, overall, variation in economic productivity across sub-national regions is associated with smaller central governments (Lee and Rogers 2019). Initial inequalities shape institutional choices to manage territorial distributive conflict in the long-term (Hollenbach et al. 2013; Beramendi 2012). These premises provide reasonable motivation to explore the origins of variation in sub-national economic productivity that come from uneven economic endowments.

2.1 Hypotheses

Our first hypothesis examines whether the spatial distribution of economic endowments across a nation drives disparities in economic productivity across that nation's geography.

Hypothesis 1: Sub-national variation in economic endowments predicts long-run variation in economic productivity across sub-national regions.

If natural economic endowments shape relatively stable, long-run differences in economic productivity across regions within a nation, we expect persistent political conflict over centralization. We should observe a clear link between variation in economic geography and the size of the central fiscal state.

Hypothesis 2: Sub-national variation in economic endowments predicts long-run levels of central tax revenue.

2.2 Roadmap

In the following sections, we describe the data we use to examine the empirical link between variation in sub-national economic endowments, variation in sub-national economic productivity, and the size of the fiscal state. We explore these data to show global patterns of sub-national variation in economic endowments. In our empirical section, we first demonstrate that differences in geographic economic endowments predict long-run differences in productivity across sub-national regions. We then show the direct link between variation in sub-national economic geography and the size of the fiscal state (central tax revenue as a percentage of GDP) in the long-run. Finally, we discuss threats to inference and future research that may improve our understanding of the links between economic geography and outcomes.

3 Data description

The vast majority of research linking economic geography to outcomes of interest has focused on the national level. Our approach emphasizes the links between sub-national conditions and national outcomes, necessitating collection of data on economic geography at the sub-national level. We detail our data structure and variables in this section. Summary statistics are shown in Appendix Table 1.1. and descriptions and sources of all data are shown in Appendix Table 1.2.

3.1 Measures of economic geography

We expect economic development and state capacity to be influenced by initial economic endowments attributable to physical geography. The most obvious physical features related to economic development of a region are soil and climate conditions conducive to agriculture (Sachs 2003).[1] We draw on two main sources of data to construct measures of agricultural suitability. First, we calculate a summary variable, *Soil Quality Variation*, at the first administrative level (GEOLEV1) using Geographic Information Systems (GIS) measures from the Harmonized World Soil Database v1.2 available from the Food and Agricultural Organization of the United Nations. Once we have sub-national measures of soil quality, we calculate coefficients of variation (described below) in sub-national soil quality.

In addition to soil quality, we transformed the agricultural suitability variables from Henderson et al. (2017) for use in our regressions. *Soil Quality Variation* is a useful summary measure for agricultural suitability, but other inputs may also affect

[1] We might also plausibly consider access to trade routes as a potential source of sub-national variation. We focus on agricultural suitability due to its direct return to the sub-national region. With reduced transportation costs, the benefits of trade may be conferred broadly across the nation (Henderson et al., 2017).

the productivity of the land. Henderson et al. (2017) provide data for agricultural suitability (precipitation, elevation, length of the growing period, land suitability for agriculture) measured at geographic grid cells. We fit their data to GEOLEV1 using GIS to calculate coefficients of variation for these agricultural suitability measures. To incorporate these data into our analysis, we follow Galor et al. (2009) to conduct a principal components analysis to construct component variables useable in our regressions.[2] Agricultural suitability variables are in some cases highly correlated, which may impact the estimates in our OLS and instrumental variables approaches, and provide "redundant" information to capture agricultural suitability. In this circumstance, principal components analysis can provide summary indicators that capture the commonalities between the indicators with variables constructed to be uncorrelated between components (Abdi and Williams 2010).[3] Our results show that the majority of the variance can be explained with two component variables.[4] The first component picks up mainly variation associated with the precipitation and nation size and the second component picking up mainly soil quality and elevation. We show our results with both *Soil Quality Variation* and the *Agricultural Suitability 1* and *2* components in each analysis.

3.2 The region concept

We utilize the first-level administrative region as our sub-national unit of focus for our sample. This variable refers to states in cases such as the USA, Mexico, and Brazil, to provinces in places such as Canada and Argentina, to departments in Colombia, to regions in Russia, and the Nomenclature of Territorial Units for Statistics (NUTS2) level 2 designation in European Union countries. We use this level for important theoretical and empirical reasons. In the first place, the first level administrative region is typically the most important administrative and political unit. In decentralized nations, such as federations, the first level is where the majority of public policy is legislated and administered. The first level is also typically the crucial political sub-unit in most nations, serving as the relevant geography for upper houses in bicameral legislatures, and most often as boundaries for lower house electoral districts. Moreover, these units are generally consistent over time, and are the only units upon which data are regularly collected for population and economic censuses. Of course, other sub-national levels, such as municipalities, are in many countries important units of policymaking and administration, but we primarily focus on the first level region in this study.[5]

[2] See summary statistics and components loadings from our PCA in Appendix Section 2.

[3] In particular, including multiple highly correlated factors in our 2SLS estimations may inflate the significance of our first stage results.

[4] We also show our results with the additional component variables in Appendix 4.6 and 5.6. Adding these additional components does not meaningful impact our analysis.

[5] The countries with available sub-national GDP per capita data, the name and number of the first level administrative units, the time coverage, and the sources of the variables is detailed in Appendix 1.3. Data were originally compiled for Rogers (2015).

In our emphasis on consistency for our regional unit, we may mischaracterize the importance of the first administrative level in particular cases. In some countries, for example, the first administrative level is not a meaningful geographic unit for elections, or may not serve a functional purpose for substantive policy administration. We consider such cases to represent data error that biases against our empirical results. We also show the results for our main table at the second administrative level (GEOLEV2) in Table 4 to show our results do not depend on our choice on sub-national unit.

A second issue, discussed in more detail below, is that administrative regions are themselves endogenous to economic geography (Beramendi et al. 2018), decentralization, or other attributes that may affect preferences for centralization, such as ethnicity (Michalopoulos and Papaioannou 2013a, b). We address this concern in several ways. We discuss ways the variation in economic geography may be linked to the delineation of borders. If political actors have made efforts to draw sub-national borders with regard to economic geography, this supports our theoretical contention that fiscal and institutional development are centrally related to the spatial distribution of resources. Empirically, we test for endogeneity with variation in agricultural suitability calculated at "random" borders defined by grid cells in Table 4.

3.3 Cross-nationally comparable indicators of sub-national variation

We focus on two concepts in our measures of sub-national dispersion of productivity–the region-adjusted gini coefficient (*ADGINI*) and the coefficient of variation (*COV*).[6] Dispersion measures capture the extent of spread of values (e.g., endowments or productivity).

ADGINI and COV are measures of dispersion with different properties (Lessmann 2012). These indicators are explained below, using economic productivity (regional GDP per capita) as an example. The most simple, easy to interpret, regional variation measure is COV. COV is a dispersion measure without analytical weights and is constructed as follows:

$$\mathrm{COV} = \frac{1}{\bar{y}}\left(\frac{1}{n}\sum\nolimits_{i=1}^{n}(\bar{y}-y_i)^2\right)^{1/2} \tag{1}$$

where $\bar{y}$ denotes the country's average GDP per capita, y_i is per capita GDP of region i, and n is the number of sub-national units. COV is a widely used measure in the literature on regional economic growth and convergence (Barro and Sala-i Martin 1992; Sala-i Martin 1996).[7]

Similar to COV, the region-adjusted Gini coefficient (ADGINI) captures the dispersion of productivity across sub-national regions. Unlike COV, ADGINI retains meaningful information about the type of distribution. In ADGINI, additional weight

[6]For a full discussion of geographic distribution concepts and a new scope and scale-independent indicator, see Lee and Rogers (2017).

[7]Our results also hold with the population-weighted coefficient of variation (Lessmann 2009; Rodríguez-Pose and Ezcurra 2009).

is given to a region's per capita productivity as it veers father away from the mean of the inter-regional productivity distribution. This weighted value makes the inequality measure more sensitive to changes in the upper or lower tail of this distribution. ADGINI is calculated as follows:

$$\text{ADGINI} = \frac{2\sum_{i=1}^{n} i y_i}{n\sum_{i=1}^{n} y_i} - \frac{n}{n-1} \tag{2}$$

where y_i is the GDP per capita for region i and n is the number of subnational units (Lessmann 2009).

3.4 Tax capacity

To measure tax capacity we use *Central Tax Revenue* (% GDP) from the Government Revenue Database produced by the International Centre for Tax and Development (Prichard 2016). These tax measures are compiled from all available international sources, including the IMF Government Finance Statistics (GFS), IMF International Finance Statistics (IFS), the OECD, the UN's Economic Commission on Latin America, the UN's African Economic Outlook, and IMF country reports. The GRD has painstakingly standardized the values across the sources and, importantly, treated the revenue from natural resources revenues and royalties, and state-run firms consistently across the databases (Prichard 2016). The GFS and IFS have treated these values inconsistently, based on the reporting of individual countries. Given the important role of these resources in the revenue in many developing nations, in particular, it is important to evaluate them consistently and separately.

We include two alternative dependent variables in our study: total general tax revenue (% GDP) and government consumption (% GDP) that also reflect tax capacity. *General Tax Revenue* is taken from the Government Revenue Database. *Government Consumption* is drawn from the World Bank's World Development Indicators.

3.5 Control variables

In our regression estimates, we include standard controls that predict sub-national variation in economic productivity (Mahler 2002) and tax capacity at the national level (Brambor 2017). For sub-national variation in economic productivity, we include *GDP per Capita* (The World Bank 2018), *Land Area* in square kilometers (The World Bank 2018), and *Federalism* (Henisz 2002). The level of economic development should be associated with lower variation in economic productivity due to central government efforts to reduce sub-national inequalities (Tanzi 2000). With larger land area, we expect more variation in soil quality and other economic endowments, which may be associated with higher sub-national variation in economic productivity. Federalism may be linked to higher or lower levels of sub-national variation in productivity. On the one hand, countries may opt for federalism to limit the pooling of resources across the nation, implying higher variation in productivity. On the other hand, the political power of regions in federal systems may be amplified, allowing less productive regions to increase redistribution toward themselves, encouraging regional convergence in productivity. In our appendix, we test additional

models including controls for *Proportional Representation* (Strom et al. 2017), *Party System Nationalization* (Bochsler 2010), and *Central Tax Revenue* (Prichard 2016).

For our tax capacity models, we include *GDP per Capita*, *Land Area*, *Trade Openness* (Queralt 2015; Feenstra et al. 2015), *Federalism*, *War Mobilization* of 2% of the population for interstate war (Scheve and Stasavage 2010), and *Leftist Government* (Brambor and Lindvall 2018). In our appendix we include models to address specific alternative hypotheses: *Democracy* (Marshall and Jaggers 2002), *Ethnolinguistic Fractionalization* (Alesina et al. 2003), *Household Inequality* (The World Bank 2018), *Government Transparency* (Transparency International 2010), and *Government Stability* (Political Risk Services 2004). In our appendix, we also include models with global region fixed effects, and panel data to include year fixed effects.

4 Patterns of economic geography

In this section we preview our sub-national data with global maps of economic geography and variation in sub-national economic productivity. In the following section we present correlations between sub-national variation in economic geography, economic productivity, and the size of the fiscal state. The idea is to use maps and scatterplots as a preliminary illustration of the relationship between our measures of sub-national variation in economic endowments and productivity to our core variable of interest–tax capacity. More rigorous analysis follows in the subsequent sections.

Our conceptual framework asserts that economic geography (e.g., soil quality and climate) plays an important role in establishing the relative power of agricultural elites and activating the territorial political cleavage. Importantly, these agricultural conditions vary considerably within some nations, leaving some parts of the nation highly suited to cultivation (e.g., Greater Buenos Aires in Argentina) and other parts (e.g., Argentina's Northwest or Patagonian provinces) largely ignored by rural elites, who have seen little reason to develop capacity in these regions. We suggest variability in agricultural conditions drives inequality in sub-national economic productivity and, ultimately, national investments in the fiscal state.

In Fig. 1 we plot the coefficient of variation of one of our agricultural suitability variables, precipitation, by nation.[8] For example, precipitation across the USA varies dramatically, due to the size of the nation and its climatic and geological differences. Similarly, nations such as Argentina, India, and China, have large precipitation differences in comparative perspective. This map depicts one important difference in economic geography across the national scope. Those areas endowed with precipitation in an agricultural nation are expected to be relatively prosperous and worthy of state investments in public goods to realize economic gains, and investments in state capacity to collect taxes. The low quality areas, in the absence of alternative natural endowments, are likely to be the sites of limited state investment so long as the economy is primarily dependent on commodities (O'Donnell 1993). With the rise of

[8]Global maps for all of our agricultural suitability variables are shown in Appendix Section 3.

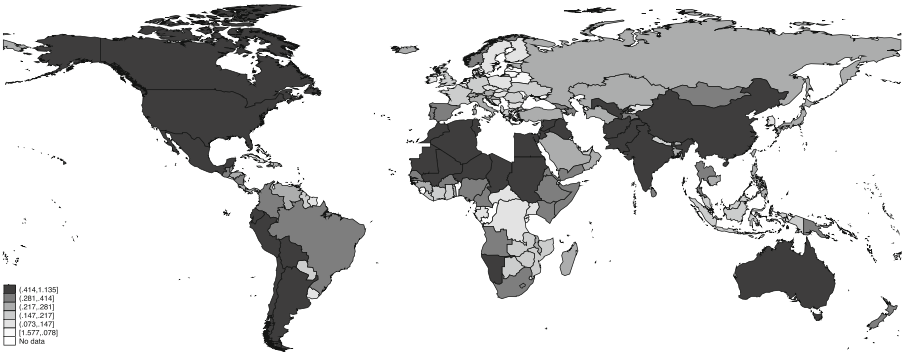

Fig. 1 Sub-National Variation in Precipitation. *Note*: Plotted values are the coefficient of variation of sub-national precipitation at GEOLEV1

the type of industrialization that boosts human capital, however, we may see a different connection between natural endowments and economic productivity and state investment.

Natural economic endowments are critical to investments in the fiscal state because they shape relatively stable, long-run differences in economic productivity across regions within a nation. Sub-national inequality in economic productivity increases distributive conflict across regions over the size of the fiscal state and the distribution of national resources.

To provide global context on sub-national variation in economic productivity, we display a global map of dispersion in sub-national GDP per capita (measured with *ADGINI*) in Fig. 2. The Latin American region is characterized by high sub-national variation in economic productivity. Sub-national variation in productivity in the middle stage of economic development and industrialization, such as those included in the BRICS designation–Brazil-Russia-India-China-South Africa–is very high in global perspective. In our theoretical approach, we suggest this high divergence in regional development is a function of relatively uneven economic geography that was exacerbated by the dynamics of late industrialization (Baer 1972).

5 Empirical approach

We approach our statistical analysis as a cross-sectional examination of the relationship between economic geography, sub-national variation in economic productivity, and tax collection. Our main independent variables, sub-national variation in agricultural suitability, are time invariant. While we do have time varying dependent variables (central and general tax revenue, government consumption) and co-variates, we argue that the patterns that we observe are largely stable over long periods of time, including the cross-national differences in tax collection. In each regression model we collapse all of our variables to their mean value, for a country cross-section structure, and we limit the number of controls given our small sample. With each empirical analysis, we demonstrate robustness by testing alternative independent variables,

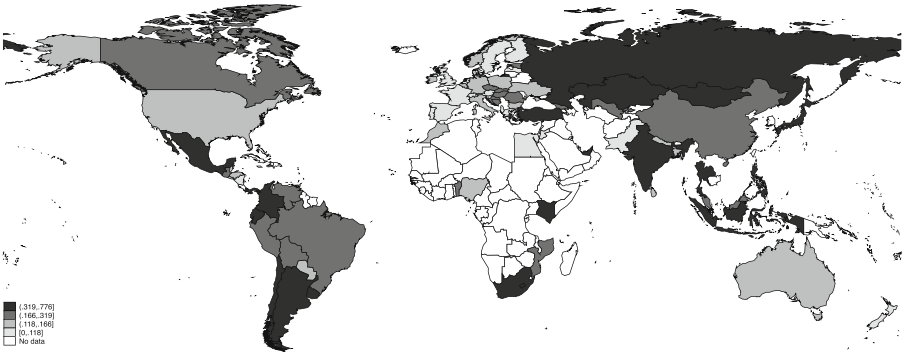

Fig. 2 Global Dispersion in Sub-national Economic Productivity. *Note*: The figure shows ADGINI (dispersion in sub-national GDP at GEOLEV1) for all available nations

alternative dependent variables, different levels of data (first and second administrative levels, and grid cells), alternative data structures, and different constructions of our main variables.

Consistent with our theoretical propositions, we first examine whether sub-national economic endowments drive long-run differences in sub-national economic productivity (H1). Next, we test the direct effect of sub-national economic endowments on long-run differences in tax collection (H2).

5.1 Predicting sub-national variation in economic productivity

Our conceptual framework suggests that sub-national variation in economic endowments creates diverging preferences for centralization. Economically prosperous areas may avoid investments in central tax collection even when the central government could provide beneficial public goods in order to avoid redistribution to less-prosperous areas or competing sectors. An important premise of our argument, therefore, is that sub-national variation in economic endowments is associated with long-run variation in economic productivity across sub-national units that perpetuate inter-regional distributive conflict over time. Figure 3 provides consistent evidence with that claim. On the x axis of the two figures is *ADGINI*, our primary measure of the dispersion of economic productivity across sub-national units. On the y axes are our two PCA variables, *Agricultural Suitability 1* and *2*. The line in each figure represents the linear fit between the two variables. In each figure, we see a clear positive relationship between variation in agricultural suitability and variation in sub-national economic productivity.

Nonetheless, we do not expect this relationship to be perfect. For example, the industrialization process in different countries conditions the relationship between economic geography and the development of tax capacity (Beramendi et al. 2019). In early industrializers, economic productivity has been increasingly decoupled from natural endowments and more dependent of physical and human capital. In late industrializers, however, industrialization was largely built around the rural economy, which increased the productivity of regions with favorable soil quality and allowed

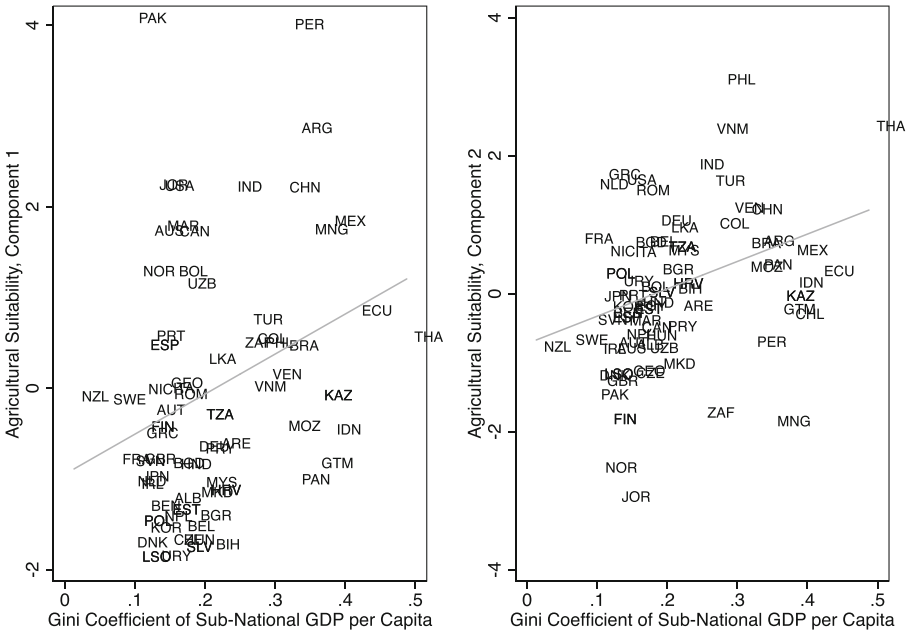

Fig. 3 Agricultural Suitability and Sub-national Variation in Economic Productivity. *Note*: Left Side Figure: The slope of the best fit line is 0.027***. The R^2 of the regression is 0.116. Right Side Figure: The slope of the best fit line is 0.031***. The R^2 of the regression is 0.123

them to pull farther ahead (Haber 2005). The variation we observe around the positive relationship seen in Fig. 3 is thus expected.

In Table 1 we show the results of our cross-sectional regression analysis. The dependent variables are our measures of sub-national variation in economic productivity, *ADGINI* (M1-M4) and *COV* (M5-M8). For each variable, we first show a simple correlation, with clustered standard errors, for the mean country values. We show the results of our summary variable, *Soil Quality Variation*, and our PCA variables (*Agricultural Suitability 1*, *Agricultural Suitability 2*). In our base models (M1, M3, M5, M7) we find a positive and statistically significant association between sub-national variation in agricultural suitability and sub-national variation in economic productivity. Next, we show how these results hold when we include covariates that are likely to also affect variation in sub-national economic productivity, including level of development, the size of the national territory, and a federal structure. The positive and significant association remains, for *Soil Quality Variation* and *Agricultural Suitability 2*, providing additional evidence that variation in agricultural suitability predicts variation in economic productivity within the nation. The substantive effect is notable. For example, a one unit increase in *Agricultural Suitability 2* in M3 and M4, is associated with an equivalent increase of 12 to 16% in *ADGINI*.

Agricultural Suitability 1 is significant in the base models but not the models with a range of covariates. As described earlier, *Agricultural Suitability 1* picks up the

Table 1 Predicting Sub-National Variation in Economic Productivity with Agricultural Suitability Variation

	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)	(M7)	(M8)
Dependent variable:	ADGINI				COV			
Soil Quality Variation	0.217***	0.173**			0.528***	0.386**		
	(0.080)	(0.078)			(0.191)	(0.172)		
Agricultural Suitability 1			0.021***	0.008			0.060***	0.019
			(0.007)	(0.012)			(0.020)	(0.030)
Agricultural Suitability 2			0.031***	0.025**			0.073***	0.059**
			(0.010)	(0.011)			(0.023)	(0.023)
ln(GDP per Capita)		-0.021***		-0.017**		-0.050***		-0.041**
		(0.007)		(0.007)		(0.017)		(0.018)
ln(Land Area, km^2)		0.016**		0.017		0.054**		0.053*
		(0.008)		(0.010)		(0.020)		(0.028)
Federalism		-0.020		-0.040		-0.070		-0.115
		(0.050)		(0.047)		(0.120)		(0.113)
Observations	68	59	68	59	68	59	68	59
R-squared	0.133	0.325	0.202	0.328	0.115	0.319	0.196	0.327
Controls	No	Yes	No	Yes	No	Yes	No	Yes

*Notes.*Estimation method is OLS with data collapsed by country. *Soil Quality Variation* is the coefficient of variation of soil quality at GEOLEV1. *Agricultural Suitability 1* and *2* are PCA components of the coefficient of variation of soil quality, elevation, precipitation, length of the growing period, and land suitability for agriculture at GEOLEV1. Clustered standard errors in parentheses. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.10$

variation that is driven by the size of the country (and thus its natural diversity). Given the correlation between *Agricultural Suitability 1* and *Land Area* at p=0.69, it is not surprising that this variable would lose significance with the inclusion of this covariate. *Agricultural Suitability 2*, on the other hand, captures more of the substantive variation in soil quality and elevation, in particular.

The control variables generally operate as expected. More developed countries have lower sub-national economic productivity variation. This is consistent with the idea that geography became less important for productivity in early developing (now more affluent) nations. It likely also reflects efforts by central governments in the more affluent nations to reduce economic inequalities through the territory via inter-regional and inter-personal redistribution (Mahler 2002; Tanzi 2000). Larger countries have higher variation in economic productivity. In these models, federalism is shown to be negatively associated with sub-national variation in economic productivity, but these differences are not significantly different from zero.

We take several steps to demonstrate robustness of our results in our Online Appendix. In our main models, we constrain our sample to the countries with available central tax revenue data. In Appendix 4.1 we show similar results with all available economic geography data. In Appendix 4.2 we show the direct relationship between the components of our *Agricultural Suitability* indicators (soil quality, length of the growing period, precipitation, elevation, land suitability) and our *ADGINI*

indicator. In Appendix 4.3, we include additional controls for proportional representation, party system nationalization, and central tax revenue. We include proportional representation and party system nationalization to capture the centralization of the party system. Because our primary theoretical concern is with elite decisions to centralize, for regional redistribution or tax collection, these are reasonable controls for this process. The tax collection control is an indicator of the government's means to equilibrate regional resources and reduce regional inequalities. Moreover, we show the main results with global region dummy variables in Appendix 4.4. The global region dummies in many cases absorb the effects of substantive variables such as per capita GDP but our results remain. The primary effect of disparate geography on sub-national variation in productivity holds under these specifications. Our results are also consistent when we structure the data as a country year panel, shown in Appendix 4.5.

Additionally, in Appendix Section 4.6 we show our results with alternative formulations of our principal components analysis. With PCA, the number of components included is subject to the choice of the researcher. We show our results with three and four agricultural suitability components in Appendix 4.6 (Table 11) and Appendix 4.6 (Table 12), respectively. We also perform factor analysis and use the resulting factors in our models. These results are very similar to the PCA, and are shown in Appendix 4.7. In all cases, the basic results of our analysis are consistent.

6 Predicting tax capacity

In the previous section we show the clear relationship between variation in sub-national economic endowments and variation in sub-national economic productivity. In this section we demonstrate the direct relationship between agricultural suitability and the long-run size of the fiscal state.

Again we begin with a simple cross-sectional diagram to demonstrate the relationship between variation in agricultural suitability and central tax revenue. We focus on central government revenue as the closest outcome measure to our theory. We show in Fig. 4a clear negative relationship between our measures of sub-national variation in agricultural suitability (y axis) and *Central Tax Revenue* (x axis).

We take two statistical approaches to examine the relationship between variation in agricultural suitability and central tax collection. First, we show simple OLS estimates to capture the direct relationship between variation in agricultural suitability and central tax revenue in Table 2. In Table 3, we employ the agricultural suitability variables as instruments for variation in sub-national economic productivity (*ADGINI*) in Two-stage Least Squares (2SLS) estimation.

In Table 2 we show regression results predicting levels of tax collection with variation in sub-national agricultural suitability. In M1 and M2 we correlate *Soil Quality Variation* with *Central Tax Revenue*; in M3 and M4 we use the PCA components as our main independent variables. We find consistent evidence that sub-national variation is related to significantly lower central tax revenue. This is apparent in simple

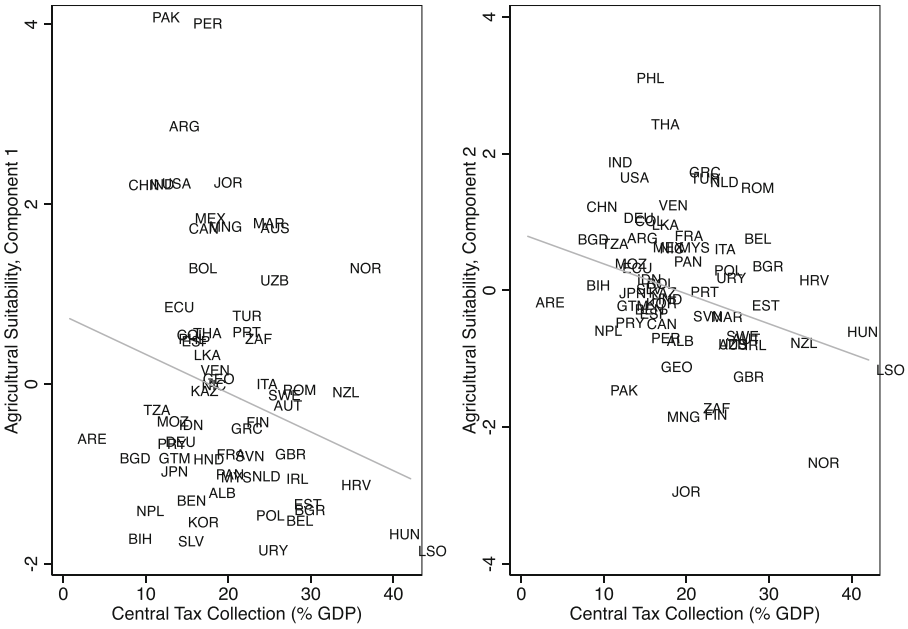

Fig. 4 Central Tax Capacity and Economic Geography. *Note*: Left Side Figure: The slope of the best fit line is -1.319**. The R^2 of the regression is 0.057. Right Side Figure: The slope of the best fit line is -2.120**. The R^2 of the regression is 0.093

correlations (M1 and M3) and models including covariates known to predict levels of tax revenue (development, trade openness, war mobilization, left government) and alternative hypotheses that may explain the soil quality relationship (federalism, but also development and perhaps trade openness) (M2 and M4).[9] The effect size is substantial. For example, in M3 and M4, a one unit increase in *Agricultural Suitability 2* is associated with a reduction in central taxation of between 1.3 and 2.2%. Given the average level of central tax revenue in our sample, 17.661, this represents a reduction of between 8 and 12%.

The control variables show anticipated results. *GDP per Capita* is associated with higher tax revenue, but the result is not significant once we control for other factors correlated with high development (such as trade openness and mobilization for war). *Trade Openness* is positively and significantly related to tax revenue. As expected by Scheve and Stasavage (2010), *War Mobilization* is associated with significantly higher overall tax revenue. Also anticipated in power resource theories, leftist gov-

[9]We include models for Table 2 with and without *ADGINI* in Appendix 5.3 (M1 and M7). On the one hand, we know these sub-national variation in economic productivity to be endogenous to tax collection and centralized distribution. On the other, we understand this variable to be a central concern related to tax capacity, so our analysis may suffer from omitted variable bias should we exclude it.

Table 2 Predicting Central Tax Revenue with Agricultural Suitability Variation

	(M1)	(M2)	(M3)	(M4)
Dependent variable:	Central Tax Revenue % GDP			
Soil Quality Variation	-9.580*	-7.243**		
	(4.953)	(2.870)		
Agricultural Suitability 1			-1.401**	-0.705
			(0.597)	(0.531)
Agricultural Suitability 2			-2.202***	-1.342**
			(0.707)	(0.547)
ln(GDP per Capita)		1.185		1.020
		(0.947)		(0.992)
Trade Openness		5.162***		4.525***
		(1.788)		(1.501)
War Mobilization		7.973***		7.659***
		(2.163)		(2.144)
Left Government		14.864		14.555
		(9.571)		(9.227)
Federalism		-11.127***		-9.919***
		(2.941)		(3.147)
Observations	68	64	68	64
R-squared	0.042	0.524	0.157	0.542
Controls	No	Yes	No	Yes

Notes. Estimation method is OLS with data collapsed by country. *Agricultural Suitability 1* and *2* are PCA components of the coefficient of variation of soil quality, elevation, precipitation, length of the growing period, and land suitability for agriculture at GEOLEV2 (M1-M2) and "random" grid cells (M3-M4). Clustered standard errors in parentheses. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.10$

ernment is associated with higher central tax revenue but the result is not significant (Korpi 1983). *Leftist Government* does predict significantly higher *General Tax Revenue* in our models in Appendix 6. *Federalism* is negatively associated with central tax collection, whether because federal countries have lower tax levels overall or federal countries decentralize revenue.

The 2SLS approach in Table 3 acknowledges our argument that the real driver of conflict over centralization is (endogenous) variation in economic productivity, not the variation in natural endowments per se. Accordingly, we instrument for *ADGINI* with our *Soil Quality Variation* and *Agricultural Suitability 1* and *2* measures. An instrumental variables approach requires the instrument to be exogenous to the dependent variable and for the instrument to have a direct effect on the dependent variable only through the mechanism specified in the justification for use of the instrument. In both cases the instrument conditions are plausibly satisfied. It is not plausible that central taxation affects sub-national variation in natural soil quality. Moreover, the only reasonable impact of soil quality *variation* on central tax rev-

Table 3 Predicting Central Tax Revenue with Agricultural Variables- Instrumental Variables Approach

	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)
Dependent variable:	Central Tax Revenue %GDP					
Estimation Method:	OLS			2SLS		
ADGINI	-28.013***	-17.813**				
	(6.665)	(6.956)				
ADGINI (Soil Instrument)			-44.203*	-28.869**		
			(23.729)	(14.105)		
ADGINI (Ag Suit Instrument)					-69.580***	-33.370**
					(24.797)	(14.923)
ln(GDP per Capita)		0.946		0.768		0.696
		(0.980)		(0.888)		(0.963)
Trade Openness		5.827***		5.804***		5.795***
		(1.741)		(1.627)		(1.623)
War Mobilization		6.552***		6.008***		5.787***
		(2.121)		(2.115)		(2.042)
Left Government		14.781		13.596		13.113
		(9.124)		(9.099)		(8.908)
Federalism		-10.629***		-10.408***		-10.318***
		(3.000)		(2.849)		(2.875)
Observations	69	64	68	64	68	64
R-squared	0.128	0.547				
Controls	No	Yes	No	Yes	No	Yes
Stock-Yogo Weak ID			19.93	19.93	19.93	19.93
First Stage F Statistic			7.27**	9.00**	8.67***	8.21***
Kleibergen-Paap Wald Statistic			4.991**	5.604**	10.283**	8.756**
Hanson J Statistic (p value)			–	–	0.899	0.674

*Notes.*Estimation method in M1 and M2 is OLS. Estimation method in M3-M6 is 2SLS. Data are collapsed by country. *ADGINI* instrumented with *Soil Quality Variation* in M3 and M4 and *Agricultural Suitability 1* and *2* in M5 and M6. First stage results in Appendix 5.1. Clustered standard errors in parentheses. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.10$

enue flows through conflict over centralization driven by variation in sub-national economic productivity.[10]

Table 3 shows three different sets of models. First, in M1-M2, we show the direct (endogenous) relationship between sub-national variation in economic productivity (measured with *ADGINI*) and *Central Tax Revenue*. We use these models for baseline estimates. Consistent with our argument, *ADGINI* is strongly related to lower central

[10]Sub-national variation in soil quality is a reasonably strong instrument for sub-national variation in economic productivity, based on the diagnostics listed in Table 3. However, the inflation of the coefficient estimates from the base models (M1 and M2) suggest the instrument is weak enough that we should not rely on the size of the coefficient estimates (Staiger and Stock 1994).

tax collection in the base model (M1) and the model with additional covariates (M2). In M3-M6, we show an instrumental variables approach with 2SLS in which *ADGINI* is instrumented with *Soil Quality Variation* (M3-M4) and *Agricultural Suitability 1* and *Agricultural Suitability 2* (M5-M6).[11] In all models we show a consistent, negative relationship between *ADGINI* and *Central Tax Revenue*.

We take several steps to demonstrate the robustness of our results in Tables 2 and 3. In Appendix 5.2, we directly predict central tax collection with the agricultural suitability measures that compose our PCA components variables. We also show our results with additional controls for *Democracy*, *Government Transparency*, *Government Stability*, *Household Inequality*, and *Ethnic Fractionalization* in Appendix 5.3. In Appendix 5.4 we show our results from Tables 2 and 3 with global dummy variables. Our main results are not changed by the addition of these additional covariates. We show our results with three and four PCA components (Appendix 5.5) and factor analysis (Appendix 5.6). Our results are consistent across these models.

We also test our main models with data aggregated at the second administrative level (GEOLEV2) rather than the first in Table 4 (M1 and M2).[12] We argue above that the first administrative level is the most politically meaningful unit of analysis in the majority of countries. Nonetheless, we want to assess whether our results are consistent across a different aggregation of sub-national borders to be assured our results are not sensitive to our unit choice (Soifer and Alvarez 2017). We find a consistent negative relationship between variation in agricultural suitability at the second administrative level. The relationship is not as strong as that seen at the first administrative level, suggesting that differences in the aggregation of sub-national geographic endowments may meaningfully impact the posited relationship. We consider the drawing of borders in more detail below.

Our measure of central taxation is the best indicator of the conflict over centralization of the tax state. However, we should see conflict over centralization matter in total tax revenue and in measures of government spending, shown in Appendix Section 6. We show our *Soil Quality Variation* and *Agricultural Suitability 1, 2* measures also predict *General Government Tax Revenue* and *Government Consumption*. We test these results with OLS and 2SLS approaches, just as with Tables 2 and 3 of the main text.

7 Further considerations

Our discussion is built upon a simple claim linking the distribution of sub-national economic endowments to conflicts over centralization. Underlying that discussion is a more complicated set of systems in which the geographic distribution of resources may become politicized in at least two related ways: the drawing of sub-national borders and decentralization.

[11] Our first stage estimates show positive and significant relationships between *Soil Quality Variation* and *Agricultural Suitability 1* and *Agricultural Suitability 2* with *ADGINI*. These results are shown in Appendix 5.1.

[12] Results of the PCA of GEOLEV2 variables is shown in Appendix 7.1.

Table 4 Predicting Central Tax Revenue, Second Administrative and "Random" Borders

	(M1)	(M2)	(M3)	(M4)
Dependent variable:	Central Tax Revenue %GDP			
Level of Data:	GEOLEV2		Grid Cells	
Agriculture Suitability 1 (GEOLEV2)	-1.225*	-0.355		
	(0.642)	(0.556)		
Agriculture Suitability 2 (GEOLEV2)	-1.869*	-1.082		
	(0.958)	(0.665)		
Agriculture Suitability 1 (Grid Cell)			-0.959	-0.184
			(0.602)	(0.561)
Agriculture Suitability 2 (Grid Cell)			-2.272**	-1.255*
			(0.899)	(0.745)
ln(GDP per Capita)		1.165		1.161
		(0.983)		(0.962)
Trade Openness		5.248***		5.137***
		(1.488)		(1.503)
War Mobilization		7.306***		6.988***
		(2.162)		(2.088)
Left Government		16.193		15.958*
		(9.801)		(9.225)
Federalism		-0.027		-0.032
		(0.021)		(0.023)
Observations	68	64	68	64
R-squared	0.098	0.524	0.122	0.530
Controls	No	Yes	No	Yes

Notes. Estimation method is OLS with data collapsed by country. *Agricultural Suitability 1* and *2* are PCA components of the coefficient of variation of soil quality, elevation, precipitation, length of the growing period, and land suitability for agriculture at GEOLEV2 (M1-M2) and "random" grid cells (M3-M4). Clustered standard errors in parentheses. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.10$

7.1 Endogenous borders

An important consideration of border endogeneity emerges with our question, and our specification of the sub-national unit of analysis. It is feasible that nations with the same natural distribution of economic endowments show very different values of sub-national economic inequality due to differences in the drawing of sub-national borders (Wong 2009). If the sub-national borders are endogenous to the natural economic endowments we measure, and perhaps concern with centralized taxation itself, we cannot easily establish the direction of the effect in our analysis. Indeed, we are not establishing causality of the configuration of borders as exogenous to the question, but rather a correlation between how governments have established their borders, given the distribution of their natural endowments, and the ultimate size of the fiscal state.

We expect border endogeneity to be critical to the question of centralization. Government borders are established with consideration of natural features, but also conflict over economic resources (Alesina and Spolaore 2005; Michalopoulos and Papaioannou 2013a). Valuable natural endowments are highly sought by economic elites with the intent to keep the best territory for themselves. Inequality in the distribution of natural resources is therefore a function of both natural geography and historical power imbalances that allowed concentration of resources amongst a subset of elites.

If borders are indeed drawn with consideration of natural endowments, we assert this strengthens our claims relating sub-national regions and distributive conflict over centralization. If elites were not concerned with resource sharing and centralization, the power to draw boundaries would be minimal. When all power is endowed to the central government, or when there is no connection between natural endowments and productivity, elites need not be concerned with segmenting their interiors, aside from transportation costs and economies of scale. Instead, the concern that elites would need to subsidize less fortunate individuals and economic sectors may induce elites to exclude those areas from their control.

To address empirically whether borders are endogenous, we also test our analysis with "random" regional borders. Henderson et al. (2017, p.371) offer global data in 1/4- degree grid cells "with each cell covering approximately 770 square kilometers (297 sq miles) at the Equator, decreasing with the cosine of latitude." This grid cell data does not follow any established sub-national borders. Using their data, we calculate coefficients of variation of the nations' grid-cells that we use to predict central taxation. Next, we first conduct a PCA to establish agricultural suitability components at grid cell levels.[13] In Table 4, M3 and M4, we show the correlation between variation in agricultural suitability at the "random" borders established by Henderson et al. (2017) and long-run central tax revenue. In general, we find expected negative and significant results using the grid-cell data, but they are weaker than those from the GEOLEV1 data.[14] We argue this relative weakness is expected because of endogenous borders. The relative strength of the GEOLEV1 data is evidence consistent with elites drawing borders to maximize inequality across regions.

7.2 Endogenous decentralization

Existing research establishes a connection between the degree of decentralization and the distribution of resources across the geography of the nation. Beramendi (2012) argues decentralization is an institutional solution to managing redistribution across sub-national regions. Lessmann (2012) and Rodríguez-Pose and Ezcurra (2009) shows that decentralization affects the growth of subnational disparity in economic productivity. One clear option for geographically disparate nations is to choose

[13] Results of the PCA at Grid Cells is shown in Appendix 7.2.

[14] We can not employ the 2SLS strategy for GEOLEV2 or Grid Cells because most governments do not report GDP or population at those levels. Thus we do not have the ADGINI variable at GEOLEV2 or Grid Cells to instrument with our agricultural suitability measures. We do not have the soil quality variation measure at GEOLEV2 or the Grid Cell Level.

decentralized governance to limit redistribution from rich places to poor (Bolton and Roland 1997). A motivating concern of our research is establishing the foundational links between economic geography and government resources so that we may better understand endogenous institutional selection.

As a potential threat to inference in our empirical results, we address endogenous decentralization in two main ways. First, we argue that our existing analysis is exogenous to the decentralization except as decentralization is structured by the establishment of regional borders, addressed in the previous section. Land features cannot be endogenous to the degree of decentralization. However, sub-national borders will affect the functioning of decentralization via the distribution of economic resources (land, but also capital and population). Should decentralization affect taxation through the mechanism of competition over regional borders, this would lend support for our primary claim that the sub-national distribution of resources drives conflicts over centralization.

Second, we take additional steps to control for the extent of decentralization in our analysis. Our main models include a control for federalism.[15] We test also our results with general government taxation in Appendix 6 to show our results are not driven by decentralization of tax effort.

8 Conclusion

This research discusses an analytical link between variation in sub-national economic endowments and long-run development of the fiscal state. Thus we provide a spatial mechanism linking economic structure and the development of the fiscal state in existing research (Congleton 2010; Dincecco 2017; Beramendi et al. 2019; Mares and Queralt 2015). We demonstrate that variation in economic endowments leads to differences in economic productivity across those regions. Those differences in economic productivity may discourage investment in the central fiscal state for fear that the resources will be redistributed to less productive sub-national regions. We find evidence consistent with these claims in cross-sectional analysis of a large sample of countries. We also show patterns of sub-national economic endowments and productivity across sub-national government regions that has not been extensively examined in previous research in political economy.

The research concerns discussed in Section 7 point to fruitful theoretical exploration of endogenous sub-national borders and endogenous decentralization. While the latter has been addressed by Lessmann (2009), among others, endogenous sub-national borders is a relatively open topic. While Michalopoulos and Papaioannou (2013a, b) consider the endogeneity of borders to ethnicity, no one to our knowledge has studied the endogeneity of sub-national borders to economic geography. Such a study could have a meaningful impact on the study of economic and political geography.

[15] We also tested alternative measures of decentralization, such as the Database of Political Institution's "state" and "auton" measures, and found highly similar results.

Furthermore, the theory and results of the paper provide a foundation for a much broader examination of economic geography and long run differences in the size and capacity of the fiscal state. Geography is surely not fully determinant of these outcomes. We see many cases of investments in human capital in places with both fortunate and unfortunate geography. Moreover, technological and other exogenous shocks change factor endowments, and should accordingly change the economic power and political dynamics that shape the development of the fiscal state (Rogowski 1987).

This analysis is also relevant to new findings that show, contrary to conventional wisdom, economic geography may better predict productivity levels in early developers than late developers. Henderson et al. (2017) argue that agricultural suitability predicts productivity better in early developers because their urban patterns were established before low transportation costs made coastal areas preferred locations for urban development. Thus, the association between economic geography and productivity would be stronger because the most endowed areas were also those with population bases and infrastructure that could benefit from an industrial economy. Our findings are certainly consistent with the notion that economic geography affects long-run productivity. The questions outstanding in their work point to the political (as well as economic) processes by which industrialization reinforces or disconnects geography from economic outcomes. For example, while spatial productivity differences remain in early developers, the economic condition of individuals is much more evenly distributed across the geography of the nation than in late developers. This speaks to a political effort via interpersonal, interregional, or inter-sectoral redistribution that bridged that gap.

In future work, we will show how the process of industrialization conditions the relationship between economic geography, long run fiscal capacity, and government efforts to address economic inequality. Building upon this work, we will first assert that the state's fiscal capacity is necessary condition for the politics of redistribution even to unfold. By implication, improving our understanding of the levels of fiscal capacity is an essential step to explain comparative patterns of inequality. Second, geography is a crucial determinant of fiscal capacity today through two channels. It mediates the degree of elite heterogeneity and the type of political competition that emerges as a result of industrialization. As we examine in this article, it also conditions distributive conflicts over revenue collection through the scope of cross-regional income differences in the long run.

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References

Abdi, H., & Williams, L.J. (2010). Principal component analysis. *Wiley interdisciplinary reviews: computational statistics*, *2*(4), 433–459.

Acemoglu, D., & Johnson, S. (2007). Disease and development: the effect of life expectancy on economic growth. *Journal of Political Economy*, *115*(6), 925–985.

Acemoglu, D., Ticchi, D., Vindigni, A. (2011). Emergence and persistence of inefficient states. *Journal of the European Economic Association*, *9*(2), 177–208.

Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., Wacziarg, R. (2003). Fractionalization. *Journal of Economic growth*, *8*(2), 155–194.

Alesina, A., Perotti, R., Spolaore, E. (1995). Together or separately? issues on the costs and benefits of political and fiscal unions. *European Economic Review*, *39*(3), 751–758.

Alesina, A., & Spolaore, E. (2005). *The size of nations*. Cambridge: Mit Press.

Baer, W. (1972). Import substitution and industrialization in latin america: experiences and interpretations. *Latin American Research Review*, *7*(1), 95–122.

Barro, R.J., & Sala-i Martin, X. (1992). Convergence. *Journal of Political Economy*, *100*(2), 223–251.

Baunsgaard, T., & Keen, M. (2010). Tax revenue and (or?) trade liberalization. *Journal of Public Economics*, *94*(9), 563–577.

Beramendi, P. (2012). *The political geography of inequality: regions and redistribution*. Cambridge: Cambridge University Press.

Beramendi, P., Dincecco, M., Rogers, M. (2019). Intra-elite competition and long-run fiscal development. *Journal of Politics*.

Beramendi, P., Lee, D.W., Rogers, M., Wikstrom, K. (2018). Endogenous borders. Technical report.

Besley, T., & Persson, T. (2013). Taxation and development. *Handbook of Public Economics*, *5*, 51–107.

Bochsler, D. (2010). Measuring party nationalisation: A new gini-based indicator that corrects for the number of units. *Electoral Studies*, *29*(1), 155–168.

Bolton, P., & Roland, G. (1997). The breakup of nations: a political economy analysis. *The Quarterly Journal of Economics*, *112*(4), 1057–1090.

Brambor, T. (2017). Fiscal capacity and the enduring legacy of the first income tax law. Technical report.

Brambor, T., & Lindvall, J. (2018). The ideology of heads of government, 1870–2012. *European Political Science*, *17*(2), 211–222.

Congleton, R.D. (2010). *Perfecting parliament: Constitutional reform, liberalism, and the rise of western democracy*. Cambridge: Cambridge University Press.

Diamond, J.M. (1998). *Guns, germs and steel: a short history of everybody for the last 13,000 years*. New York: Random House.

Dincecco, M. (2017). *State capacity and economic development*. Cambridge: Cambridge University Press.

Feenstra, R.C., Inklaar, R., Timmer, M.P. (2015). The next generation of the penn world table. *American Economic Review*, *105*(10), 3150–3182.

Gallup, J.L., Sachs, J.D., Mellinger, A.D. (1999). Geography and economic development. *International regional science review*, *22*(2), 179–232.

Galor, O., Moav, O., Vollrath, D. (2009). Inequality in landownership, the emergence of human-capital promoting institutions, and the great divergence. *The Review of economic studies*, *76*(1), 143–179.

Gennaioli, N., La Porta, R., De Silanes, F.L., Shleifer, A. (2014). Growth in regions. *Journal of Economic growth*, *19*(3), 259–309.

Giuranno, M.G. (2009). Regional income disparity and the size of the public sector. *Journal of Public Economic Theory*, *11*(5), 697–719.

Haber, S. (2005). Development strategy or endogenous processthe industrialization of latin america. Technical report, Stanford University.

Henderson, J.V., Squires, T., Storeygard, A., Weil, D. (2017). The global distribution of economic activity: nature, history, and the role of trade. *The Quarterly Journal of Economics*, *133*(1), 357–406.

Henderson, V., Storeygard, A., Weil, D.N. (2011). A bright idea for measuring economic growth. *American Economic Review*, *101*(3), 194–99.

Henisz, W.J. (2002). The political constraint index (polcon) dataset.

Hollenbach, F.M., Wibbels, E., Michael, D.W. (2013). State building and the geography of governance: Evidence from satellites. Technical report.

Korpi, W. (1983). *The democratic class struggle*. Evanston: Routledge.

Krugman, P.R. (1991). *Geography and trade*. Cambridge: MIT press.

Kurtz, M.J. (2013). *Latin American state building in comparative perspective: Social foundations of institutional order*. Cambridge: Cambridge University Press.

Lee, D.W., & Rogers, M. (2017). Measuring geographic distribution for political research. Technical report.

Lee, D.W., & Rogers, M. (2019). Inter-regional inequality and the dynamics of government spending. *Journal of Politics*.

Lessmann, C. (2009). Fiscal decentralization and regional disparity: evidence from cross-section and panel data. *Environment and Planning A*, *41*(10), 2455–2473.

Lessmann, C. (2012). Regional inequality and decentralization: an empirical analysis. *Environment and Planning A*, *44*(6), 1363–1388.

Lindert, P.H. (2004). *Growing public: Social spending and economic growth since the eighteenth century* Vol. 1. Cambridge: Cambridge University Press.

Lizzeri, A., & Persico, N. (2004). Why did the elites extend the suffrage? Democracy and the scope of government, with an application to britain's "age of reform". *The Quarterly Journal of Economics*, *119*(2), 707–765.

Mahler, V.A. (2002). Exploring the subnational dimension of income inequality: An analysis of the relationship between inequality and electoral turnout in the developed countries. *International Studies Quarterly*, *46*(1), 117–142.

Mares, I., & Queralt, D. (2015). The non-democratic origins of income taxation. *Comparative Political Studies*, *48*(14), 1974–2009.

Marshall, M.G., & Jaggers, K. (2002). Polity iv project: Political regime characteristics and transitions, 1800-2002.

Michalopoulos, S., & Papaioannou, E. (2013a). National institutions and subnational development in africa. *The Quarterly Journal of Economics*, *129*(1), 151–213.

Michalopoulos, S., & Papaioannou, E. (2013b). Pre-colonial ethnic institutions and contemporary african development. *Econometrica*, *81*(1), 113–152.

Moene, K.O., & Wallerstein, M. (2001). Inequality, social insurance, and redistribution. *American Political Science Review*, *95*(4), 859–874.

O'Donnell, G. (1993). On the state, democratization and some conceptual problems: A latin american view with glances at some postcommunist countries. *World Development*, *21*(8), 1355–1369.

Pincus, S.C., & Robinson, J. (2011). What really happened during the glorious revolution? Technical report, National Bureau of Economic Research.

Political Risk Services (2004). International country risk guide.

Prichard, W. (2016). Reassessing tax and development research: A new dataset, new findings, and lessons for research. *World Development*, *80*, 48–60.

Queralt, D. (2015). From mercantilism to free trade: A history of fiscal capacity building. *Quarterly Journal of Political Science*, *10*(2), 221–273.

Rehm, P. (2016). *Risk inequality and welfare states: social policy preferences, development, and dynamics*. Cambridge: Cambridge University Press.

Rodríguez-Pose, A., & Ezcurra, R. (2009). Does decentralization matter for regional disparities? A cross-country analysis. *Journal of Economic Geography*, *10*(5), 619–644.

Rodrik, D., Subramanian, A., Trebbi, F. (2004). Institutions rule: the primacy of institutions over geography and integration in economic development. *Journal of Economic Growth*, *9*(2), 131–165.

Rogers, M.Z. (2015). *The Politics of Place and the Limits of Redistribution*. New York: Routledge.

Rogowski, R. (1987). Political cleavages and changing exposure to trade. *American Political Science Review*, *81*(4), 1121–1137.

Sachs, J.D. (2003). Institutions don't rule: direct effects of geography on per capita income. Technical report, National Bureau of Economic Research.

Sala-i Martin, X.X. (1996). The classical approach to convergence analysis. *American Political Science Review*, *106*(437), 1019–036. https://doi.org/10.2307/2235375.

Scheve, K., & Stasavage, D. (2010). The conscription of wealth: mass warfare and the demand for progressive taxation. *International Organization*, *64*(4), 529–561.

Soifer, H.D., & Alvarez, A.M. (2017). Choosing units of analysis in subnational research: the modifiable areal unit problem and the study of local violence during civil war. Working paper.

Sokoloff, K.L., & Engerman, S.L. (2000). History lessons: Institutions, factors endowments, and paths of development in the new world. *The Journal of Economic Perspectives*, *14*(3), 217–232.

Staiger, D.O., & Stock, J.H. (1994). Instrumental variables regression with weak instruments.

Strom, K.W., Gates, S., Graham, B.A., Strand, H. (2017). Inclusion, dispersion, and constraint: Power-sharing in the world's states, 1975–2010. *British Journal of Political Science*, *47*(1), 165–185.

Tanzi, V. (2000). Taxation in latin america in the last decade. *Center for Research on Economic Development and Policy Reform, Working Paper*, *76*, 1–38.

The World Bank (2018). World development indicators.

Transparency International (2010). Corruption perception index http://www.transparency.org/news/feature/cpi_2013_now_is_the_time_for_action.

Wong, D. (2009). *The modifiable areal unit problem*. London: SAGE Publications.