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Asymmetric Decentralization and Inequality

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Abstract

Recent political trends in Europe and the United States have highlighted the importance of rising spatial inequality for a range of political outcomes. Existing research on spatial inequality has emphasized that distributional conflict between more and less productive subnational regions may result in limited taxation and spending. We build upon this research to link spatial inequality and asymmetric decentralization to high concentrations of wealth and feeble efforts to tax the rich. We consider how institutions that codify asymmetric decentralization may interact with spatial inequalities to affect redistributive effort. We demonstrate a robust association between high spatial inequality and high concentrations of wealth and low taxation from progressive sources. At the same time, nations with asymmetric regional authority tend to have lower inequality and higher tax revenue on average, yet those with legislative malapportionment, a different form of regional asymmetric design, have far higher inequality and lower tax revenue. The interaction of inequalities and institutions also matters: when nations have both high spatial inequalities and asymmetrically decentralized institutions, they tend to have higher inequality and lower progressive taxation. We link these findings to comparative research on the origins and implementation of tax policy.

Keywords: asymmetric decentralisation; inequality, fiscal federalism

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1 Introduction

The organization of political power is central to the origins and persistence of multiple forms of economic inequality. Disparities in the distribution of political influence stem from and help perpetuate disparities in the allocation of economic resources. The origins and nature of this connection is hardly a new area of interest in comparative politics and political economy. From classic and reductionist views of the state as the "managing committee of the bourgeoisie" (Marx, 1848), to modern efforts to understand how institutions shape coordination efforts to expand progressive taxation, social rights, and public good provision, the focus on the specifics of power as a mechanism behind inequality remains at center stage. In this paper, we focus on one specific aspect of this general problem: the connection between the organization of power in decentralized systems and the politics of economic inequality.

Reducing economic inequality requires capacity to enforce rules, to punish those who defect and to create incentives for people to comply willingly with the tax code. The ability of the modern fiscal state to curb inequality is a combination of all three factors. It requires a stock of capacity to act and the choice by governments to deploy such capacity in the pursuit of a more even allocation of resources. We focus on several core dimensions of efforts to reduce inequality, namely progressive taxation, as well as on different types of inequalities. Our efforts are guided by two well-established facts in the literature on inequality. First, rising inequality reflects disproportionately large increases at the top end of the distribution (Piketty and Saez, 2003, Piketty, Saez and Zucman, 2018, Blanchet, Chancel and Gethin, 2022).[1] Second, in the upper echelons, the distributions of income and wealth are increasingly overlapping (Piketty, 2014, Chancel et al., 2022). Hence, we pay particular attention to the distributions of income and wealth at the top of the distribution.

We argue that these efforts (progressivity and top taxation) and their associated outcomes (inequality) are in large part shaped by spatial asymmetries of political power. Asymmetry within decentralized polities is a multidimensional concept. It imbues certain subnational regions with greater authority to control their own finances, decide local policies, and greater voting power to decide national fiscal policy (asymmetric regional authority). These asymmetries may include de jure- legal protections on these special rules, such as foral re-

[1]The USA is perhaps the only case that sees both disproportionate increases at the top and reductions in the relative shares of income and wealth at the bottom occurring simultaneously.

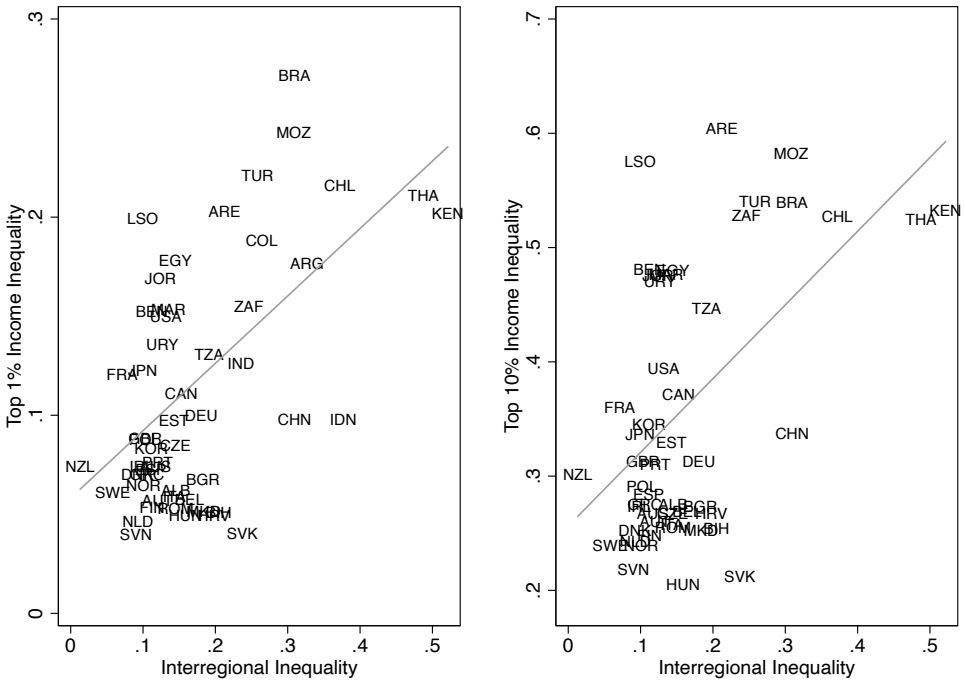
gions in Spain or constitutional provisions in Belgium. They may also include legislative malapportionment, which imbues certain regions with greater voting power in the national legislature. And of course, it embodies de facto differences in regional economic power (possibly other powers too) that mean certain regions hold greater sway in decision-making in their own regions and in the national arena.

In this paper, we link spatial inequality to the politics of collecting taxes from the wealthy under conditions of asymmetric decentralization. We argue that a central component of asymmetry in decentralized contexts concerns the uneven distribution of political power among constituent units, such as special powers given to certain regions (asymmetric regional authority) or legislative malapportionment. This uneven distribution is itself the outcome of pre-existing spatial patterns of economic and political power (Beramendi and Rogers, 2021). Asymmetric decentralization may help solidify and reproduce such patterns and in doing so it conditions both the capacity of states to tax and the ability of governments to use such capacity once achieved. Asymmetry in decentralized contexts may work as a mechanism that translates and consolidates spatial inequalities into higher levels of overall inequality through its constraining effect on the centers' ability to tax, redistribute, and regulate.

By way of motivation, we show initial evidence in support of our claim that spatial inequality is associated with feeble efforts to tax the wealthy in Figure 1. Using the Gini coefficient of subnational GDP per capita as a measure of spatial inequality, we find it is strongly correlated with top-level income inequality, both Top 1% income share and Top 10% income share. In our empirical analysis below, we show that this relationship holds across a range of indicators of progressive taxation and types of inequality, and that this relationship is conditioned by the existence of endogenous institutions of asymmetric decentralization, such as asymmetric regional authority and legislative malapportionment.

Our paper proceeds as follows. In Section 2, we develop our argument that spatial inequalities, and their interactions with institutions that codify asymmetries in regional powers, shape progressive taxation and inequality. We introduce hypotheses that guide our analysis. In Section 3, we describe our data and empirical analysis, in which we measure spatial inequalities with natural features of economic geography to address concerns over endogeneity. We provide preliminary results in Section 4. Section 5 concludes with next

Figure 1: Link between Spatial Inequality and Top Income Inequality



Notes: Mean Sample Values. Top 1% and Top 10% income inequality Alvaredo et al. (2018). Interregional inequality measured with the region-adjusted Gini coefficient of subnational GDP per capita Rogers (2015).

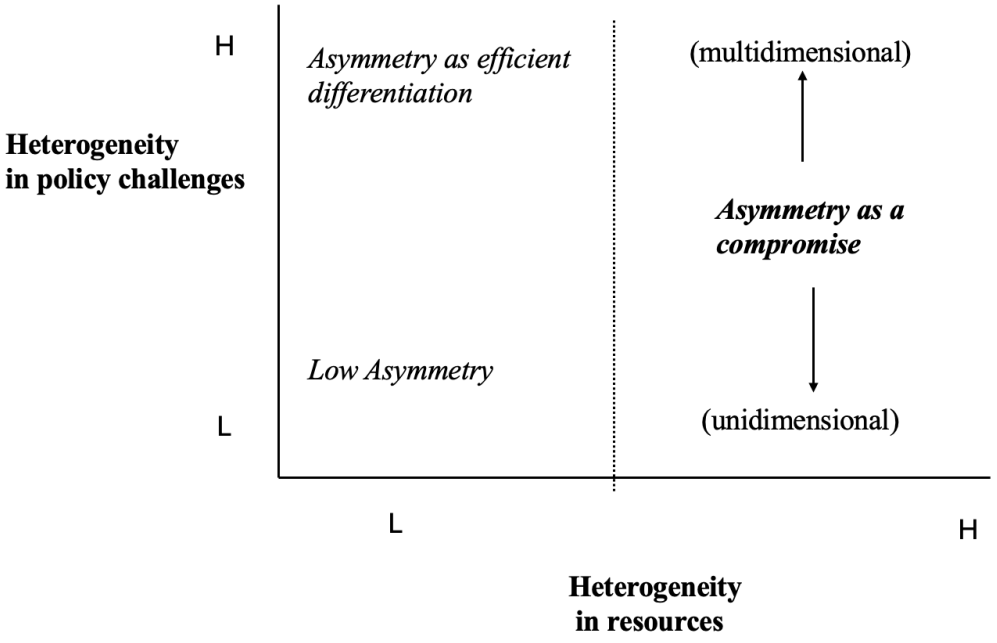
steps for our paper and implications for decentralized polities.

2 Asymmetry as a Compromise and its Implications

Asymmetric decentralization, that is the uneven distribution of representation, policy autonomy, and resources across levels of government within a polity, is in itself a political choice. It reflects the outcome of an ongoing political struggle between elites at different levels of government. At times, winners manage to constitutionalize some of their relative gains, making them harder to change; otherwise, the degree of asymmetry under federalism is a recurrent object of political contention.

Choices about asymmetry reflect the combination of two vectors: (1) heterogeneity in policy challenges; and (2) heterogeneity in resources. By *policy challenges* we refer to differences across localities in the nature of issues requiring policy interventions; by *resources* we refer to differences in productivity and economic development; the larger these differences,

Figure 2: Asymmetry in Federations



the stronger the distributive conflict within the federation (Lee and Rogers, 2019). Figure 2 displays the combination of these two dimensions. This simple exercise allows us to distinguish three scenarios. The first one is the least interesting one: politics with low levels of heterogeneity in both dimensions will feature lower levels of asymmetry. The contrast between the other two scenarios brings us closer to understanding the link between asymmetry and inequality.

Consider first a federation in which units are relatively balanced in terms of productivity and economic development but there are significant differences in other dimensions, such as demographic, cultural, linguistic, religious or identity-defined characteristics. In this case, decentralization is primarily about policy configurations that limit the mismatch between needs and interventions. This is the classic case of asymmetric regional authority. It may be about accommodating regionally concentrated minorities with specific cultural[2], linguistic, or identity characteristics, or simply about managing informational asymmetries even

[2]Asymmetry often accommodates territorially concentrated minorities; enhanced self-rule can expand access to education, health, and social protection for previously under-served populations, reducing vertical (interpersonal) and horizontal (group-based) inequalities (Zuber, 2011, Watts, 2008)

when there are no minorities to accommodate. For instance, granting differentiated autonomy may let regions tailor anti-poverty and social policies to local needs and preferences, improving allocative efficiency and the incidence of transfers, which can lower interpersonal inequality (Oates, 1972, Bardhan and Mookherjee, 2006, Faguet, 2012).

In addition, this form of asymmetry may bring about two additional benefits, well-established by classical theories of federalism. First, it can facilitate stronger accountability; bringing policy closer to voters—especially in regions with distinct preferences—can tighten electoral accountability and curb elite capture, reorienting outlays toward broad-based, pro-poor goods. Second, asymmetry may allow for "laboratories" in which progressive redistributive programs can be piloted and, once proven, emulated by other jurisdictions or the center, amplifying inequality-reducing policies (Volden, 2006, Shipan and Volden, 2008). This form of asymmetry as a source of efficient policy differentiation is, in principle, perfectly compatible with high levels of cost-sharing, coordination among units, and ultimately perfectly consistent, a priori, with high levels of economic equality. Thus we might expect asymmetric regional authority to be linked to positive policy outcomes, including lower inequality and more progressive taxation because some of the most contested elements of policy are devolved, allowing for more cooperative national decision-making.

Asymmetry works rather differently in the presence of baseline economic differences across constituent units (right-half in figure 2). In principle, where some regions have stronger egalitarian preferences or higher willingness to tax, asymmetric autonomy lets them adopt more progressive packages than a national median would permit, lowering aggregate interpersonal inequality even if cross-regional averages diverge (Beramendi, 2012). It is also the case that well-designed intergovernmental transfers can offset disparities created by asymmetric authority in the presence of inequality (Boadway and Shah, 2007, Boadway and Flatters, 1982). When coupled with well-designed equalization grants, asymmetric arrangements can lift fiscal capacity in poorer jurisdictions and sustain progressive spending, compressing regional and interpersonal disparities (Boadway and Flatters, 1982, Boadway and Shah, 2007, Smart, 2007). By contrast, poorly designed schemes can entrench them via adverse incentives and become a source of lagging taxation, inefficient redistribution, and persistent inequalities.

To the extent that asymmetry is itself the outcome of a distributive conflict, the latter

tends to be a frequent scenario. Where spatial inequality is high at baseline, prospective taxpayers care about the design of the federation. As a result, the design of the specific contours of asymmetry becomes a crucial element of political contention geared towards the long run preservation of their political and economic advantage. Seen from this angle, in the presence of spatial skew in economic capacity and productivity, asymmetry emerges endogenously as a compromise at the expense of taxation, redistribution, and equality (Beramendi, 2012, Rogers, 2015, Beramendi and Rogers, 2025).

To begin with, asymmetry becomes a necessary condition to hold the polity together. Where affluent, especially if also identity-salient regions, leverage autonomy or exit threats, the response often takes the form of asymmetric political influence. The preservation of the union requires channeling resources to pivotal regions, tilting inequality patterns (Alesina and Spolaore, 2003, Bolton and Roland, 1997, Zuber, 2011). In turn, the continuity of this arrangement over time requires the adoption of a number of institutional characteristics that bear direct implications for the politics of inequality.

Asymmetry reflects, in the first place, representative institutions that solidify unequal patterns of political influence. These institutions, centered around various forms of special privileges for certain regions (Sahadžić, 2018, Watts, 2008) and/or the overrepresentation of specific interests and legislative malapportionment (Samuels and Snyder, 2001, Beramendi et al., 2025), help overcome potential commitment (and time-inconsistency) problems. Critically, asymmetry increases the number and strength of veto players and can empower privileged jurisdictions to block nationwide equalization or demand favorable side-payments, shifting redistributive outcomes and spatial inequality (Tsebelis, 2002, Beramendi, 2012).

As a result, a key necessary condition for redistribution to work, namely a strong, capable, and institutionally endowed center (often assumed in classical theories of fiscal federalism (Oates, 1972, 1999), may become hollowed out where regions have unequal political and economic power (Beramendi and Rogers, 2021). Confronting a relatively weak central state, privileged regions in asymmetric polities have an incentive to exploit their advantage further. They may pull ahead as agglomeration hubs and limit their contributions to the rest of the polity. Concerning the former, greater autonomy and influence for some regions intensifies inter-jurisdictional competition over mobile tax bases, pressuring capital taxation and (often) social spending (Zodrow and Mieszkowski, 1986, Wilson, 1999, Keen and Marc-

hand, 1997). This translates directly into lower levels of progressivity and higher levels of inequality. Similarly, privileged areas concentrating a large share of the tax base may be unwilling to provide insurance against asymmetric economic shocks. Given that central governments are in charge of insuring against asymmetric shocks, institutionalized differences in autonomy and influence can amplify moral hazard or impede risk-sharing compacts, altering transfers that shape the interpersonal distribution of income (Persson and Tabellini, 1996). Finally, uneven power allocations may create incentives for capture in the form of expectations of central bailouts for influential or special-status regions, diverting resources and weakening rules that underpin broad redistribution (Rodden, 2006, Rodden, Eskeland and Litvack, 2003).

2.1 Implications for Taxation and Inequality

The analysis above suggests that there are two forms of asymmetry in decentralized polities. The first one takes the form of differential institutional and policy responses to spatially differentiated political realities. It may deal with second-dimension issues (culture, identity, religion), with different policy specificities driven by the concentration of varying population subgroups even in a unidimensional policy space (say retirees in Florida or Mediterranean Spain) or both. As such, this first definition of asymmetry need not undermine taxation or increase inequality, provided that the underlying disparities among constituent units within the federation are relatively low. In fact, these asymmetric arrangements may provide credible commitments to affluent or minority regions that they will have sufficient authority to opt out of policies they do not prefer. This may lower the stakes of redistributive policies, and thus enable greater redistribution.

The second form of asymmetry, captured by the notion of *asymmetry as a compromise*, lies at the core of redistributive conflicts in complex unions. Asymmetry, whether of presence, of influence within the representation system, or in the ability to secure access to transfer, is an endogenous compromise reached precisely to moderate the reach of the tax state, progressive taxation and ultimately, efforts to reduce inequality. This is particularly the case in unions with high levels of spatial inequality at baseline. As both the economy and the state grow, the political pressure for new social contracts (as within a conscription of wealth logic) increases, a spatial perspective points to two important aspects of the process. Conflict between productive and unproductive regions, taxation comes from rich regions and

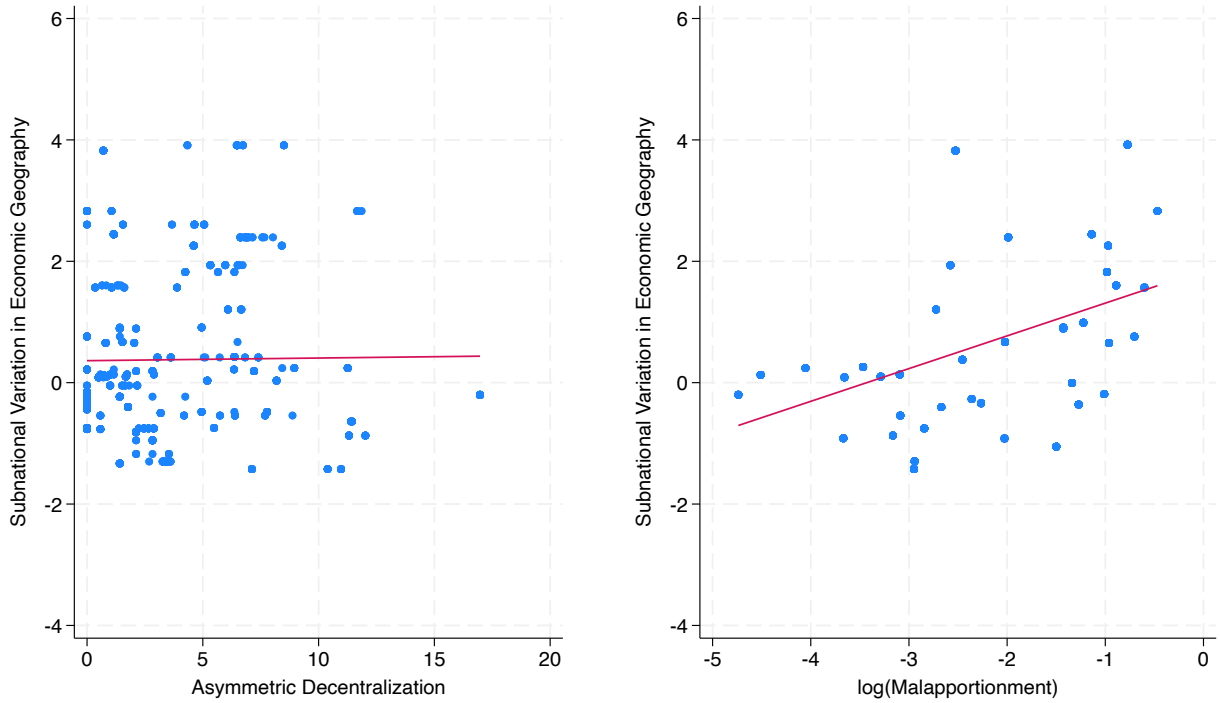
redistributive spending might well go out to poorer regions. In the case of wealth taxation, this is exacerbated for three reasons: (1) Tax revenue comes disproportionately from cities and productive areas, whether it is CIT, PIT, VAT (Baunsgaard and Keen, 2010); (2) Rich people tend to live in cities in industrialized countries (even in less industrialized ones); and (3) Taxing the wealthy will mean extraction from property and capital, which puts the large burden on the productive areas.

In response, elites in rich regions may coordinate with elites in poor regions to secure an agreement that prevents overall taxation and redistribution from expanding and sustains very high levels of interpersonal income and wealth inequality as a result. This is the case in legislatively malapportioned systems (Beramendi and Rogers, 2025). Political asymmetry in the federal contract and in the influence as the contract gets updated (through democratic means) guarantees the stability of the compromise over time. To the extent that asymmetry in decentralized contexts reflects this logic it will serve as a political factor limiting tax progressivity and preserving high levels of inequality.

Importantly, whether those institutions compound existing spatial inequalities may depend on the extent to which they are endogenous to existing spatial inequalities. In Figure 3, we show a basic correlation plot between our two focal institutions–asymmetric decentralization and malapportionment–with underlying spatial inequalities in natural economic geography. While malapportionment, in the right panel, is highly correlated with underlying spatial inequalities, asymmetric decentralization (measured with the standard deviation in the regional authority index) is not clearly related to spatial inequalities. This may be the case because, for example, legislative malapportionment is highly intertwined with fiscal decision-making, and is designed to lock in spatially uneven economic development (Beramendi and Rogers, 2025). On the other hand, asymmetric decentralization emerges for multiple reasons, relating not only to issues of spatial economic inequalities, but also diversity in terms of language, culture, religion, and identity across regions, that may or may not be associated with spatial economic differences. As argued above, regional authority asymmetries may even lower the stakes of redistribution at the national level, making it more likely to occur.

Thus we consider whether these institutional approaches to addressing diversity in decentralized polities, asymmetries in terms of self-rule or legislative malapportionment, may

Figure 3: Correlation between Asymmetric Decentralization and Spatial Inequalities



condition whether the negative impacts of spatial inequalities on progressive taxation and redistribution are compounded or lessened.

We argue that underlying spatial inequalities are always associated with higher inequality and lower progressive taxation. Yet the institutions that codify unequal political power for regions, asymmetric regional authority and malapportionment, will have divergent associations with inequality and progressivity. While legislative malapportionment is designed to keep in place spatial economic inequalities, asymmetric regional authority may help keep the union together by accommodating a range of differences that coincide with geography, such as clusters of language communities. Asymmetric regional authority may be associated with lower inequalities and higher progressive taxation because by allowing the devolution of certain powers that protect certain regional interests, the majority of regions may be more favorable to centralized policies such as progressive taxation.

However, we expect the interaction of spatial inequalities and asymmetric institutions to be associated with lower taxation and higher inequality. This is because these institutions

can compound underlying spatial inequalities. In the case of asymmetric regional authority, for example, richer regions can extract better fiscal deals for themselves to keep their resources in their region, which reduces the central pot for redistribution. This has been shown for the case of Spain, for example (Zabalza and López-Laborda, 2017, de la Fuente, 2022). In the case of legislative malapportionment, the worse the spatial inequalities, the more severe tend to be the malapportionment, and the more regressive the fiscal state.

We consider empirical implications of our argument:

H1: Higher spatial inequality is associated with higher inequality and lower progressive taxation.

H2: Higher asymmetric regional authority is associated with lower inequality and higher progressive taxation.

H3: Legislative malapportionment is associated with higher inequality and lower progressive taxation.

H3: The interaction of spatial inequalities and institutionalized asymmetries is associated with higher inequality and lower progressive taxation.

The rest of the paper turns to evaluate them in detail.

3 Data

To empirically link spatial inequality to taxation outcomes, we draw up on a broad range of datasets, examining a range of dependent variables to show a consistent result.

3.1 Measuring Subnational Endowments and Addressing Endogeneity

Our main spatial inequality variables focus on exogenous variation in sub-national physical geography. To capture variation in natural economic geography, we calculate multiple predictors of agricultural endowments and trade access at fine grained levels of geography using Geographic Information Systems (GIS). Our methodology is described in greater detail in the sidebar "Measuring Economic Geography." We aggregate these economic geography measures into two administrative levels (the first and second) and "exogenous" grid cells. We then calculate sub-national variation in these values (Beramendi and Rogers, 2021).

One of the most obvious physical features related to economic development is soil conditions conducive to agriculture (Sachs, 2003). We employ *Grow Days*, the length, in days, of the growing period from FAO (2012) and a *Land Suitability* for agriculture indicator, measured as the predicted value of the likelihood that a given parcel of land would be under cultivation using four measures of climate and soil, from Ramankutty et al. (2002). In addition to these agriculture-specific measures, we capture *Precipitation* as the long-run (1960-1990) average of rainfall available from Willmott and Matsuura (2012), *Elevation* in meters, from Isciences (2008), and Temperature, the long-run (1960-1990) average available from UEA-CRU, Harris et al. (2013) based on Mitchell and Jones (2005).

We also include variables focus on access to trade routes, particularly via water routes that may account for economic differences. *Coastal Access*, *Lake Access*, *River Access*, and *Harbor Access* measure the average distance from the cells within the region to the nearest coast, large lake, navigable river, and natural harbor (Henderson et al., 2017).

For our main economic endowments measure, we follow Galor, Moav and Vollrath (2009) to conduct a principal components analysis (PCA) to construct component variables usable in our regressions.[3] Our economic suitability variables are in many cases highly correlated, which may impact the estimates in our analysis, and provide "redundant" information to capture economic endowments. We use the primary load factor as our main indicator of spatial inequality, which captures around 60% of the variance in the subnational economic geography subindicators. We will also show similar results with subcomponents of our PCA indicators.

3.2 Asymmetric Regional Authority

To measure asymmetric regional authority, we employ the most common measure, the standard deviation of the Regional Authority Index (Hooghe et al., 2016).

The Regional Authority Index (RAI) measures how much authority a regional government exercises over its own territory and how much influence it has in national decision-making. It is built from two domains:

Self-rule captures authority a region wields within its borders, assessed on:

[3]See summary statistics and components loadings from our PCA and alternative PCA calculations in our Appendix.

- *Institutional depth*: how autonomous and self-standing the regional tier is as a governing unit;
- *Policy scope*: the range of policy areas in which the region can legislate or regulate;
- *Fiscal autonomy*: the region's power to set and levy its own taxes;
- *Borrowing autonomy*: the region's discretion to borrow on its own account;
- *Representation*: whether the region has an elected assembly and a regional executive accountable to it.

Shared rule captures a region's influence over national decisions that affect it, assessed on:

- *Law making*: the region's formal role in national legislation;
- *Executive control*: participation of regional actors in national intergovernmental executive bodies;
- *Fiscal control*: regional influence over national revenue sharing and allocation;
- *Borrowing control*: regional say in setting national rules that constrain subnational borrowing;
- *Constitutional reform*: the region's role in altering the constitutional order.

The index rises as regions have deeper institutions, broader competencies, greater fiscal discretion, stronger representation, and more influence over national decision-making.

Let c denote a country and t a year. Let $\mathcal{R}_{ct}$ be the set of regions coded in the Regional Authority Index (RAI-MLG) for (c,t), and let $R_{rct} \in [0,30]$ be the total RAI score (self-rule + shared rule) for region $r \in \mathcal{R}_{ct}$.[4] Our asymmetric regional authority measure is the within-country dispersion of regional authority,

$$\bar{R}_{ct} \;=\; \frac{1}{R_{ct}} \sum_{r \in \mathcal{R}_{ct}} R_{rct}, \qquad A_{ct} \;=\; \sqrt{\frac{1}{R_{ct}-1} \sum_{r \in \mathcal{R}_{ct}} \left(R_{rct} - \bar{R}_{ct}\right)^2},$$

[4] RAI is built at the region level and sums self-rule (range 0–18) and shared rule (range 0–12) (Hooghe et al., 2016, Shair-Rosenfield et al., 2020, Hooghe et al., 2021).

where $R_{ct} \equiv |\mathcal{R}_{ct}|$. $A_{ct} = 0$ under perfect symmetry (all regions have identical authority) and increases with inter-regional differentiation in authority—i.e., greater asymmetry (Watts, 2008, Zuber, 2011).

We also run our analyses with standard deviation in self-rule, to isolate the particular aspect of asymmetric decentralization that may be related to taxation and redistribution. We also employ other dispersion measures, such as the coefficient of variation in RAI, to be sure that our findings are not dependent on any particular

3.3 Unit of Geography

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]

This unit of analysis matches the authority unit from the RAI dataset in our sample. This is an appropriate unit because the locus of authority for both self-rule and, in the case in our sample, legislative constituencies.

[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).

3.4 Inequality and Tax Collection Data

3.4.1 Top Level Inequality Measures

We draw on existing cross-national data sets to measure taxation and inequality.

- Top 1% and Top 10% Inequality (Alvaredo et al., 2018)
- Top Income Tax Rate (Seelkopf et al., 2019)
- Tax Collection (Prichard, Cobham and Goodall, 2014)
- Gini Disposable and Gini Market (Solt, 2009)

3.5 Empirical Structure

We show correlations between subnational variation in exogenous measures of economically valuable land and a range of outcomes related to wealth inequality and wealth taxation. We use these static measures of variation in economic geography given the high likelihood that taxation structures current outcomes in subnational GDP per capita (Beramendi and Rogers, 2018). Given the structure of these subnational economic measures, however, this requires to focus on cross-country variation in taxation rather than overtime variation via fixed effects. Given the cross-national nature of our argument, focused on levels of taxation rather than overtime adjustments, this makes sense econometrically.

Specifically, we use OLS to estimate:

$$F_t = \alpha + \beta_1 S_{t-1} + \beta_2 S_{t-1} * A_t + \lambda_t + \boldsymbol{\gamma}' \mathbf{X_{t-1}} + \epsilon_t, \tag{1}$$

where t indexes each year. F_t is one of the income or wealth inequality or taxation indicators. S_{t-1} is our measure of subnational variation in economic endowments. A_t is the asymmetric institution measure. λ_t are period fixed effects. $\mathbf{X_{t-1}}$ is a vector of controls for observable characteristics–GDP per capita (logged), market inequality, and others depending on the specification. $\epsilon_{i,g,t}$ is a random error term. All standard errors are robust, clustered at the country level to account for any within-country serial correlation in the error term.

4 Results

4.1 Income and Wealth Inequality

We begin our results with an examination of the relationship between spatial inequalities and asymmetric decentralization institutions and income and wealth inequality.

In Table 1 we find that greater variation across subnational geographies is associated with higher top income inequality: coefficients on spatial inequalities are positive and significant in most specifications for both the top 1% and top 10%. Asymmetric regional authority is consistently negative, indicating lower top-end income inequality where asymmetric arrangements exist. The interaction is small and insignificant for the top 1% inequality, but positive and significant for the top 10%, implying asymmetric decentralization amplifies the inequality-increasing effect of spatial inequalities for the broader top decile.

Table 1: Top Income Inequality, Asymmetric Regional Authority

Dependent variable:	**Top 1% Income Ineq**			**Top 10% Income Ineq**		
	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)
Var in Subnational Geo	0.003***	0.013***	0.011***	0.002	0.020***	0.007*
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.004)
Asymmetric RAI		-0.001***	-0.001***		-0.002***	-0.001**
		(0.000)	(0.000)		(0.001)	(0.001)
Var in Subnational Geo*			0.001			0.003***
Asymmetric RAI			(0.000)			(0.001)
ln(GDPPC)	-0.017***	-0.012***	-0.012***	-0.037***	-0.022***	-0.023***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)
Observations	3,140	546	546	2,906	486	486
R-squared	0.271	0.367	0.369	0.365	0.341	0.363
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2 show that both spatial inequalities and malapportionment are robustly and positively related to top income inequality. The interaction between the two is positive and significant for the top 1% (but not for the top 10%), suggesting that in spatially uneven nations, more malapportioned systems further increases concentration at the very top.

Table 2: Top Income Inequality, Malapportionment

Dependent variable:	**Top 1% Income Ineq**		**Top 10% Income Ineq**	
	(M1)	(M2)	(M3)	(M4)
Var in Subnational Geo	0.013***	0.022***	0.028***	0.026***
	(0.001)	(0.003)	(0.002)	(0.005)
Malapportionment	0.008***	0.006***	0.009***	0.010***
	(0.001)	(0.001)	(0.002)	(0.002)
Var in Subnational Geo*		0.005***		-0.001
Malapportionment		(0.001)		(0.003)
ln(GDPPC)	-0.013***	-0.014***	-0.040***	-0.040***
	(0.001)	(0.001)	(0.002)	(0.002)
Observations	856	856	775	775
R-squared	0.471	0.479	0.509	0.509
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In Table 3, focused on wealth inequality, spatial variation economic geography is strongly and positively associated with top wealth shares (top 1% and top 10%). Asymmetric regional authority is generally negative (reducing top wealth inequality), and the interaction is positive and significant for the top 10% (but not for the top 1%), indicating that asymmetric arrangements temper inequality on average yet can magnify the inequality-raising role of geographic variation in economic endowments for the broader top decile.

Table 3: Top Wealth Inequality, Asymmetric Regional Authority

Dependent variable:	**Top 1% Wealth Ineq**			**Top 10% Wealth Ineq**		
	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)
Var in Subnational Geo	0.016***	0.047***	0.041***	0.024***	0.057***	0.042***
	(0.003)	(0.004)	(0.007)	(0.003)	(0.004)	(0.007)
Asymmetric RAI		-0.006***	-0.008***		-0.001	-0.004*
		(0.002)	(0.002)		(0.002)	(0.002)
Var in Subnational Geo*			0.001			0.003**
Asymmetric RAI			(0.001)			(0.001)
ln(GDPPC)	0.015***	0.037***	0.036***	0.038***	0.055***	0.052***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Observations	3,140	546	546	2,906	486	486
R-squared	0.271	0.367	0.369	0.365	0.341	0.363
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

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

In Table 4 we find that, with malapportionment, top wealth inequality rises: malapportionment is positive and significant across specifications. The effect of subnational variation is mixed (negative or insignificant for the top 1%, small positive for the top 10%), and the interaction is at most marginally positive, hinting that malapportionment tends to strengthen the inequality effect of spatial inequalities at the very top.

Table 4: Top Wealth Inequality, Malapportionment

Dependent variable:	**Top 1% Wealth Ineq**		**Top 10% Wealth Ineq**	
	(M1)	(M2)	(M3)	(M4)
Var in Subnational Geo	-0.029***	0.006	0.013**	0.023
	(0.008)	(0.022)	(0.006)	(0.016)
Malapportionment	0.097***	0.085***	0.058***	0.055***
	(0.011)	(0.013)	(0.008)	(0.009)
Var in Subnational Geo*		0.020*		0.006
Malapportionment		(0.012)		(0.009)
ln(GDPPC)	-0.000	-0.006	0.022***	0.020***
	(0.003)	(0.005)	(0.002)	(0.003)
Observations	856	856	775	775
R-squared	0.471	0.479	0.509	0.509
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In Table 5 our dependent variable is disposable-income inequality, measured with the Gini coefficient. We control for market inequalities in this specification. Spatial inequalities are strongly positive, whereas asymmetric regional authority is negative and the interaction is negative and significant. This indicates that asymmetric regional authority is associated with lower disposable-income inequality directly and may dampen the inequality-increasing impact of spatial inequalities.

Table 5: Income Inequality, Asymmetric Regional Authority

Dependent variable:	**Gini Disposable**		
	(M1)	(M2)	(M3)
Variation in Subnational Geo	0.703***	1.256***	1.878***
	(0.060)	(0.102)	(0.167)
Asymmetric RAI		-0.122***	-0.107***
		(0.034)	(0.034)
Variation in Subnational Geo*			-0.147***
Asymmetric RAI			(0.031)
$\ln(\text{GDPPC})_{t-1}$	-2.736***	-4.310***	-4.363***
	(0.055)	(0.093)	(0.092)
Gini Market_{t-1}	0.915***	1.096***	1.074***
	(0.014)	(0.026)	(0.026)
Observations	3,152	982	982
R-squared	0.677	0.785	0.789
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6 shows that under malapportionment, spatial inequalities are associated with disposable-income inequality (positive), but malapportionment itself is negative (reducing Gini) in these models; however, the interaction is positive and significant. Together this suggests that in more malapportioned systems, spatial inequalities have a stronger inequality-increasing effect, even though malapportionment's direct association with disposable Gini is negative here.

Table 6: Income Inequality, Malapportionment

Dependent variable:	**Gini Disposable**		
	(M1)	(M2)	(M3)
Variation in Subnational Geo	0.703***	0.706***	1.118***
	(0.060)	(0.113)	(0.232)
Malapportionment		-0.122***	-0.107***
		(0.034)	(0.034)
Variation in Subnational Geo*			0.227**
Malapportionment			(0.112)
$\ln(\text{GDPPC})_{t-1}$	-2.736***	-4.037***	-4.073***
	(0.055)	(0.101)	(0.102)
Gini Market_{t-1}	0.915***	0.974***	0.970***
	(0.014)	(0.022)	(0.022)
Observations	3,152	747	747
R-squared	0.677	0.886	0.887
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.2 Tax Revenue

In this section we examine redistributive effort by the state in the form of progressive taxation. This progressive taxation feeds into the previous results on income inequality, as the state makes effort to reduce inequality by redistributing from richer citizens to poorer citizens through welfare policies.

In Table 7 for the share of progressive taxes in total revenue, asymmetric regional authority is uniformly positive across categories, indicating a larger progressive share in asymmetric systems. Spatial inequalities by itself tends to negative, but once asymmetric regional authority is included the interaction is negative, implying that asymmetric arrangements raise progressive shares overall, but spatial inequalities under asymmetry attenuates that relationship.

Table 7: Progressive Tax Revenue (% Total Tax Revenue), Asymmetric Regional Authority

Dependent variable:	**Direct**		**Direct (No SSC, Resource)**		**Income Prop Cap Gains**	
	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)
Variation in Subnational Geo	-0.183	0.640***	-0.191*	0.620***	-0.325***	0.698***
	(0.115)	(0.193)	(0.114)	(0.189)	(0.117)	(0.194)
Asymmetric RAI	0.114***	0.126***	0.117***	0.129***	0.221***	0.242***
	(0.038)	(0.038)	(0.038)	(0.037)	(0.039)	(0.038)
Variation in Subnational Geo*		-0.186***		-0.185***		-0.232***
Asymmetric RAI		(0.035)		(0.035)		(0.036)
ln(GDPPC)	3.331***	3.229***	3.347***	3.246***	2.375***	2.243***
	(0.098)	(0.098)	(0.097)	(0.097)	(0.099)	(0.099)
Observations	904	904	909	909	900	900
R-squared	0.593	0.605	0.598	0.610	0.448	0.474
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In Table 8, malapportionment is consistently and strongly negative across all progressive revenue share categories, pointing to a smaller progressive tax share where representation is more malapportioned. Spatial inequalities are generally modestly negative or insignificant; interactions are mostly small, with a positive and significant interaction only for the income/property/capital gains category, suggesting limited offset of malapportionment's

negative effect.

Table 8: Progressive Tax Revenue (% Total Tax Revenue), Malapportionment

Dependent variable:	**Direct**		**Direct (No SSC, Resource)**		**Income Prop Cap Gains**	
	(M1)	(M2)	(M3)	(M4)	(M5)	(M6)
Variation in Subnational Geo	-0.303**	-0.234	-0.307**	-0.212	-0.259**	0.207
	(0.128)	(0.269)	(0.129)	(0.270)	(0.121)	(0.253)
Malapportionment	-0.837***	-0.855***	-0.833***	-0.858***	-0.919***	-1.041***
	(0.151)	(0.163)	(0.151)	(0.163)	(0.142)	(0.153)
Variation in Subnational Geo*		0.038		0.052		0.256**
Malapportionment		(0.130)		(0.130)		(0.122)
ln(GDPPC)	3.449***	3.444***	3.457***	3.451***	2.651***	2.618***
	(0.127)	(0.128)	(0.128)	(0.129)	(0.121)	(0.122)
Observations	1,014	1,014	1,014	1,014	1,011	1,011
R-squared	0.513	0.513	0.513	0.513	0.434	0.436
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In Table 9, for progressive revenue as a share of GDP, asymmetric regional authority is mildly negative for overall tax revenue net of local/subcentral components, but positive for general income tax. This is not surprising given that regional self-rule often involves delegation of fiscal authority to subnational levels, which would take away resouces from central taxation. The interactions are negative in both panels, indicating that greater spatial inequalities diminish the pro-progressive association of asymmetric regional authority with income tax and further depresses overall net progressive revenue.

Table 9: Progressive Tax Revenue (% GDP), Asymmetric Regional Authority

Dependent variable:	**Income Tax (Central)**		**Income Tax (General)**	
	(M1)	(M2)	(M3)	(M4)
Variation in Subnational Geo	-0.392***	-0.005	-0.290	0.684**
	(0.114)	(0.178)	(0.212)	(0.315)
Asymmetric RAI	-0.064*	-0.044	0.258***	0.248***
	(0.033)	(0.034)	(0.055)	(0.054)
Variation in Subnational Geo*		-0.087***		-0.242***
Asymmetric RAI		(0.031)		(0.059)
ln(GDPPC)	2.100***	2.076***	3.025***	3.006***
	(0.110)	(0.109)	(0.212)	(0.207)
Observations	471	471	300	300
R-squared	0.519	0.528	0.554	0.580
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

For Table 10, we find that under malapportionment, progressive revenue as a share of GDP is lower across both overall and income-tax measures (negative and significant malapportionment coefficients). Spatial inequality is generally positive (often significant), and the interaction terms are positive, suggesting that geographic variation partly offsets malapportionment's drag on progressive revenues, though not enough to reverse the strong negative direct effect of malapportionment.

Table 10: Progressive Tax Revenue (% GDP), Malapportionment

Dependent variable:	**Income Tax (Central)**		**Income Tax (General)**	
	(M1)	(M2)	(M3)	(M4)
Variation in Subnational Geo	0.078	0.423*	0.255*	0.809**
	(0.110)	(0.235)	(0.152)	(0.327)
Malapportionment	-0.440***	-0.540***	-1.382***	-1.514***
	(0.130)	(0.143)	(0.179)	(0.191)
Variation in Subnational Geo*		0.184*		0.297*
Malapportionment		(0.111)		(0.155)
	(0.110)	(0.109)	(0.212)	(0.207)
ln(GDPPC)	1.908***	1.891***	3.383***	3.365***
	(0.113)	(0.113)	(0.163)	(0.163)
Observations	853	853	575	575
R-squared	0.321	0.323	0.542	0.545
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5 Conclusion

In this paper we argue that spatial inequalities and the ways they may be codified through asymmetric institutions may matter for inequalities in income and wealth and an important policy remedy to reduce inequality–progressive taxation. Spatial inequalities have clear connections to these outcomes, because they severely complicate national level efforts to redistribute because regional interests diverge dramatically. Yet institutions to address regional differences could help or hurt redistributive efforts. We find that asymmetry in regional authority is generally associated with lower inequalities and higher progressive taxation, but that this relationship is attenuated under conditions of high spatial inequalities. In contrast, malapportionment is linked to high inequality and low progressive taxation, and these conditions appear to worsen under conditions of high spatial inequalities. We are not surprised that these institutions have negative effects under conditions of high spatial inequalities–they place barriers to policy change that might harm the regions opposed to redistribution.

Overall, the results tell a consistent story without the policy-adoption pieces: greater subnational geographic variation is associated with higher concentration at the top of the income and wealth distributions and with higher disposable-income inequality, whereas asymmetric regional authority generally leans egalitarian—reducing inequality and increasing progressive tax shares—though its benefits attenuate as variation rises and it can occasionally amplify inequality for the broader top decile; for revenues as a share of GDP, asymmetric regional authority is mildly negative for overall net progressive revenue but positive for general income tax, with interactions that are typically negative. Malapportionment is reliably regressive: it correlates with higher top income/wealth shares and with smaller progressive tax shares and progressive revenues, and it usually strengthens the inequality-increasing role of spatial inequalities. In short, asymmetric allocation of authority is associated with less inequality and more progressive fiscal effort, while unequal representation via malapportionment is associated with more inequality and less progressivity; spatial inequality tends to amplify whichever institutional asymmetry is in place.

This manuscript is a work in progress and we hope to improve several features of the analysis as continue our work. Our theory is preliminary, and will require more attention. In particular, we will consider in more detail the conditions under which asymmetric regional authority and malapportionment are adopted to assess whether they are driven by initial

spatial inequalities. Our empirical analysis will include a range of robustness checks to ensure that our results are not driven but our choice of indicator. We will also expand our interpretation of the results and consider the implications of our findings in an expanded conclusion.

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