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## Why Adopt a Federal Constitution? And why Decentralize? – Determinants Based on a New Dataset

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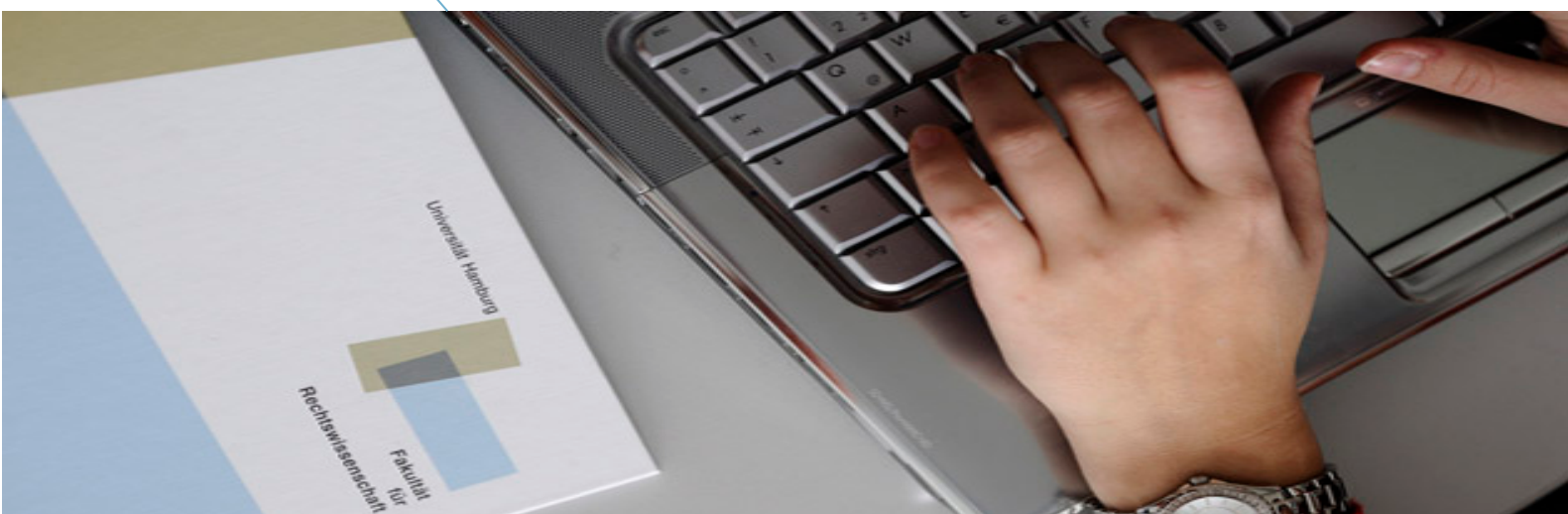
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Jerg Gutmann  
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# Why Adopt a Federal Constitution? And why Decentralize? – Determinants Based on a New Dataset

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## *Abstract:*

*Measurement of both federalism and decentralization has been contentious. We introduce three new indicators reflecting important aspects of both federalism and decentralization. The three new indicators are the result of principal component analysis. When we try to identify their main determinants, it turns out that the only explanatory variable that is significantly correlated with all three is the geographical size of a country. Other variables, such as the size of the population, linguistic fractionalization, or the level of democracy, only help to explain variation of one component. We interpret this as evidence that it is important to distinguish between federalism and decentralization, if one is interested in ascertaining their causes and consequences. We further test for the first time the effect of spatial inequality in a country on the adoption of federalism or decentralization and we find that it correlates significantly with constitutional federalism. This suggests that economically heterogeneous states are more likely to adopt a federal constitution.*

*Key words:* Federalism, Fiscal Federalism, Decentralization, Geography, Institutions, Endogenous Constitutions.

*JEL classification:* H1, H3, H5, H8.

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# **Why Adopt a Federal Constitution? And why Decentralize? – Determinants Based on a New Dataset**

## **1 Introduction**

The effects of both federalism and decentralization are the topic of an extensive literature. The factors that lead a society to choose a federal constitution, or its politicians to generate a high level of fiscal decentralization, however, have caught the attention of only few scholars. Here we use a novel dataset to shed light on the determinants of federalism and decentralization.

In previous work, it has been argued that federalism and (fiscal) decentralization ought to be kept apart systematically. A federal constitution is the consequence of constitutional choice, whereas decentralization is the result of continuous policy-making. At least in principle, federally constituted countries can be highly centralized; just as unitary ones can be highly decentralized. To validate this claim empirically, Blume and Voigt (2011) run a principal component analysis (PCA) based on 25 frequently used indicators of federalism and decentralization. Blume and Voigt are able to extract seven principal components from this data, which shows that the cross-country variation in traits related to federalism and decentralization cannot be reduced to just two latent variables.

Voigt and Blume (2012) inquire into the relationship between these seven principal components and cross-country differences in fiscal policies, quality of governance (including government effectiveness and corruption), income per capita, and economic growth. They find that institutional details matter in the sense that the seven components are associated with different (mostly economic) country characteristics.

Here we are interested in the factors determining both the decision in favor of a federal constitution and the level of decentralization implemented by government policies. To tease out whether different dimensions of federalism and decentralization are driven by different determinants, we rely on PCA once again. However, rather than extracting components from a small cross-sectional dataset, we focus on variables that are available for multiple years and a large number of countries. This allows us to identify differences in the level of federalism and fiscal decentralization between a substantial number of countries and their evolution over time.

The indicators resulting from our PCA, do not allow us to reduce federalism and decentralization to a single (potentially binary) indicator. Instead, we show that

three dimensions of the phenomenon are reflected in the data. These latent variables can be interpreted as constitutional federalism (i.e., a *de jure* component), *de facto* decentralization, and top-down federalism (which deals with subnational governments and the way their leaders are selected). Our panel dataset allows us to explain variation in these dimensions both between countries and over time. We further add to the literature by testing novel explanations for the extent of federalism and decentralization. We ask, for example, whether higher levels of spatial income inequality are significantly correlated with our principal components.

Our most important finding is that the only variable that can be considered a determinant of all three components is the size of the land area covered by the respective country. The larger a country is, the higher the probability that it has a federal constitution and that it is decentralized. Another important finding is that changes in federalism over time cannot be used to predict changes in decentralization, and vice versa. This underlines the importance of distinguishing the two.

The rest of this article is structured as follows. Sections 2 and 3 define key concepts and briefly summarize the extant literature on the determinants of federalism and decentralization. Section 4 describes the results of our PCA. Section 5 presents our findings and offers possible interpretations, and Section 6 concludes.

## 2 Key Concepts

Studies on the effects of federalism and decentralization by far outnumber those inquiring into their causes. The few studies interested in the latter deal almost exclusively with fiscal decentralization. The next section serves to summarize the extant literature on the factors determining federalism and (the level of) decentralization. Before we get there, we propose definitions for some key concepts and try to clarify important differences between federalism and decentralization.

Riker (1975:101) defines federalism as “*a political organization in which the activities of government are divided between regional governments and a central government in such a way that each kind of government has some activities on which it makes final decisions.*” In other words, federations consist of constituent governments (the regional governments) and one central government, and both levels of government are endowed with final decision-making power in at least one policy area. Now, this allows for a huge diversity: at one extreme, the central government could have final decision-making power in only one policy area; at the other end of the spectrum, the central government has the final say in all policy areas but one. Since the definition allows for such a variety of institutional designs,

a simple dummy variable, indicating whether the country has a federal or a unitary constitution, may not be fine-grained enough to deal with the heterogeneity that exists in reality.

Federal as well as unitary states can decentralize (or centralize) activities (see Diamond 1969 and Elazar 1976). In unitary states, however, the decision to decentralize can always be revoked by the central government, which demonstrates that even after decentralization, ultimate decision-making power belongs to the central government level. Thus, the terms *federalism* and *decentralization* describe traits of government decision-making on different levels of state organization: being a *federation* is a constitutional-level characteristic, whereas *decentralization* describes a policy choice at the post-constitutional level.<sup>1</sup> A federal structure is not a necessary condition for decentralized policies, as these can also be implemented under unitary constitutions.

Note that federalism, as defined here, does not necessitate the presence of democracy (neither does decentralization). Federalism deals with the allocation of government power to either one center (unitarism) or a number of centers (federalism). The question whether the various political leaders have been selected in contested elections or in some other way is not relevant.

### **3 Survey of the Literature on Endogenous Federalism and Decentralization**

There seems to be a divide between political scientists and economists who study federalism and decentralization. The most important contributions of the former group originate from William Riker (e.g., 1964). The latter group focuses on “fiscal federalism”, with William Oates (e.g., 1972) being one of the early and still highly relevant authors in this tradition.

Riker (1975, 113) portrays himself as a representative of an exclusively political approach to identifying the necessary conditions for the choice of a federal structure. In his view, the most important condition for founding a sustainable federation is the existence of a military threat. He looks at all 19 federations of the early 1970s and tries to show that they were subject to a military threat at the time of their founding. Likewise, he looks at 16 former federations that had already ceased to exist by the early 1970s and shows that they had not been subject to a military threat at the time of their foundation.

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<sup>1</sup> The distinction between constitutional and post-constitutional choice is fundamental in constitutional political economy (see, e.g., Buchanan 1975).

According to Riker's definition, federations allow for significant variation in the implemented level of decentralization. He conjectures that the extent of centralization is determined by the degree to which the party system is centralized. This argument was later taken up in Garmann et al. (2001, 2006) and Enikolopov and Zhuravskaya (2007).

Gerring et al. (2011) are interested in identifying the reasons for variation in the degree of "indirect rule" across countries. Their theory is not confined to the analysis of federalism but can also be applied to the degree of delegation chosen by kings, colonizers, and emperors. Their main argument is that the more effective regional governments were before the formation of the current nation state, the higher the likelihood that indirect rule was installed, for example, by a federal constitutional order. In their empirical analysis, Gerring et al. (2011) include variables that reflect up to seven alternative explanations, which they describe as "fairly commonsensical".

Economists and political scientists have often tried to separate different factors when inquiring into the potential determinants of federalism (see, e.g., Treisman 2006). Among the most frequently mentioned ones are geographical factors (such as country size), cultural ones (including colonial history), the level of economic development, and political institutions.

The economic literature is usually confined to explaining variation in the level of fiscal decentralization, most frequently proxied with either the share of local government expenditure (or revenue) in total government spending (or revenue). Oates (1972) argues that an increase in per capita income has important consequences for the level of fiscal decentralization. According to Wagner's Law, higher income implies a higher share of state consumption in GDP. This could allow for taking advantage of economies of scale in the provision of local public goods, making their provision more likely (see Wallis and Oates 1988). Population size can play an important role in the same way: The more populous a country is, the more it can benefit from economies of scale in providing public goods locally.

Several economic studies have tested theories on the potential determinants of fiscal decentralization. Panizza (1999), for example, finds that country size, income per capita, ethnic fractionalization and the level of democracy are significant determinants of decentralization.

Arzaghi and Henderson (2005) propose to think of fiscal decentralization as effective or *de facto* federalism. This distinction hints at the possibility that the constitutionally formalized (*de jure*) level of federalism is not translated into reality.

Arzaghi and Henderson (2005) is one of the very few papers to date that also considers “institutional decentralization” which they equate with “greater federalism” (ibid., 1163). They assume a country consisting of two regions, the coastal region – where government is located – and the hinterland region. They check whether an increase in the size of the population (holding population shares between the “coastal” and the “hinterland” regions constant) affects the likelihood of federalization. Arzaghi and Henderson conjecture that an increase in population size makes dividing the various units more likely as the fixed costs of splitting are borne by more people. They apply the same argument to income: If people are richer, it is easier to afford the fixed costs of splitting up. Fast economic growth can, hence, increase the probability of federalizing.

Interestingly, Arzaghi and Henderson find the fractionalization of society to be positively correlated both with institutional decentralization and with the share of *central* government consumption. So, it seems that countries with a fractionalized society adopt higher levels of institutionalized decentralization, but *de facto*, they are more centralized than other states. In a sense, these results indicate a *de jure-de facto* gap in countries marked by fractionalization.

Many of the arguments presented so far assume that more efficient institutions are more likely to be implemented than less efficient ones. Treisman (2006), however, reminds us that the institutional arrangements preferred and implemented by politicians do not necessarily coincide with the most efficient ones.

#### **4 Principal Component Analysis**

To check whether the conceptual distinction between federalism and decentralization is reflected in the data, we apply principal component analysis (PCA) to various indicators of both federalism and decentralization. In the next section, the principal components derived here will serve as our dependent variables.

PCA is a statistical technique for data reduction. It can reduce the number of variables in an analysis by identifying a set of uncorrelated linear combinations of the variables that contain most of the variance of these variables. The first principal component captures most of the variance in the data. The second principal component has the highest variance among all unit-length linear combinations that are uncorrelated with the first component, and so on. Together, all principal components contain the same information as in the original variables. Principal components are by construction orthogonal to each other. As PCA is just a linear



transformation of the data, it does not require the assumption that the data satisfies a specific statistical model.

For our PCA, we put together a panel dataset comprised of established indicators for diverse aspects of federalism and decentralization. These indicators are primarily selected based on data quality and their availability for a large cross-section of countries and over a long time period. All selected indicators cover more than 100 countries and a time period of at least 40 years. This is important, as we expect institutional change with respect to federalism and decentralization to take place rather slowly and over long periods of time. For the same reason, we use 5-year averages instead of annual data. In total, we use 16 indicators from four independent data sources. All indicators are described in detail in Appendix A.

The Comparative Constitutions Project by Elkins et al. (2009) contributes 12 indicators. Elkins et al. ask if the state is described in the constitution as federal, confederal or unitary. A second indicator shows whether laws of the federal government prevail in case of conflict with laws produced at the subnational level. The next five indicators describe the allocation of lawmaking power by the constitution to subsidiary units. They capture whether subsidiary units have lawmaking power at all and, if this is the case, whether they are the “residual lawmaker,” that is, whether they have law-making power regarding all issues the constitution does not explicitly allocate to the central government. Three dummy variables indicate whether only the legislature, only the executive or both organs of the subsidiary units have lawmaking power.

Two more indicators from the Comparative Constitutions Project are concerned with fiscal policy. Do subsidiary units have the power to levy taxes, and does the constitution specify a plan for revenue sharing between the national government and the subsidiary units? The final three indicators obtained from Elkins et al. (2009) ask whether subsidiary units have their own executive and, if so, whether this executive is appointed by the central government. Moreover, it is specified whether subsidiary units have their own independent legislature.

The remaining four indicators come from three different sources and provide more aggregated information on the *de facto* situation in a country. Henisz (2000) codes whether independent subnational entities can impose substantive constraints on national fiscal policy. We use another two indicators from the Database of Political Institutions (Cruz et al. 2016), which reflect whether there are autonomous regions and whether state or provincial governments are locally elected. The final indicator is part of the Varieties of Democracy (or V-DEM) dataset and combines information on whether there are elected regional governments, and to what extent

they can operate without interference from unelected bodies at the regional level (Lindberg et al. 2014).

Table 1: Principal Components Analysis – Eigenvalues

Component	Eigenvalue	Difference	Share	Cumulative
C1	5.20	3.43	0.33	0.33
C2	1.78	0.33	0.11	0.44
C3	1.44	0.37	0.09	0.53
C4	1.08	0.05	0.07	0.59
C5	1.03	0.12	0.06	0.66
C6	0.90	0.09	0.06	0.71

Note: N=643.

Table 1 lists the eigenvalues of the correlation matrix, that is, the variances of the principal components, in descending order. There are two common approaches for choosing the appropriate number of principal components to describe the variance in the data. The Kaiser criterion would suggest retaining the first five components with an eigenvalue larger than one. Studying a screeplot of the eigenvalues – or the column displaying the differences in eigenvalues in Table 1 – indicates that most of the additional variance is accounted for by the first three principal components. Although reliance on the screeplot seems to be more appropriate here, given that there are a number of eigenvalues just above or below the critical value of one, we use parallel analysis as suggested by Horn (1965) to validate our decision. This method contrasts eigenvalues produced via PCA on a random dataset with the same number of variables and observations as our observational dataset to produce eigenvalues that are adjusted for sample error-induced inflation (see Dinno 2009). Based on 50 iterations of the analysis, the adjusted eigenvalues suggest retaining exactly three components (the results are displayed graphically in Appendix B).

Table 2 shows the scoring coefficients of the PCA, after an orthogonal varimax rotation of the Kaiser-normalized matrix (following Blume and Voigt 2011). We have omitted coefficients smaller than 0.3 from the table to enhance its readability. The interpretation of the first two components seems straightforward. One reflects the constitutional (thus, *de jure*) organization of a federal state. Ideally, this implies the establishment of a federal constitutional order with an independent executive and legislature in subnational units, the latter of which has lawmaking power (although federal laws are still superior in case of conflict). The second component is clearly an indicator of *de facto* decentralization. It reflects subnational units that have the power to levy taxes and constrain national level fiscal policy. There tend to be autonomous regions and state governments are locally elected. Regional governments are able to operate without interference from unelected bodies at the

regional level. The first two indicators can, thus, be interpreted as indicators of “constitutional federalism” and “*de facto* decentralization”. The third component describes countries where the legislature and executive in subnational units have lawmaking power, but the subnational executive is appointed by the central government. This could be descriptive of some sort of “top-down federalism”.

Table 2: Scoring Coefficients for Orthogonal Varimax Rotation after PCA

Variable	Comp. 1	Comp. 2	Comp. 3	Unexplained
CCP: fedunit	0.349			0.42
CCP: fedsep	0.307			0.70
CCP: sublaw	0.398			0.18
CCP: subres				0.46
CCP: suborg_1	0.450			0.28
CCP: suborg_2				0.76
CCP: suborg_3			0.531	0.52
CCP: subtax		0.344		0.36
CCP: subrev				0.64
CCP: subexec	0.356		0.344	0.20
CCP: subexel			0.551	0.38
CCP: subleg	0.335			0.35
POLCON: f		0.421		0.48
DPI: auton		0.339		0.76
DPI: state		0.393		0.61
V-DEM: v2xel_regelec		0.425		0.48

Note: blanks indicate |loading|<0.3.

Table 3 shows the cross-sectional correlation between our principal components. Note that after rotation with Kaiser-normalization, these components are no longer orthogonal by construction. All correlations are positive. The highest correlation can be observed between federalism and decentralization, closely followed by the correlation between *de facto* decentralization and top-down federalism. Only the correlation between our second and third principal component is statistically insignificant.

Table 3: Correlation between Principal Components, after Rotation

	FED	DEC	TDF
Constitutional federalism	1.00		
<i>De facto</i> decentralization	0.55	1.00	
Top-down federalism	0.46	0.16	1.00

Note: Mean value for 2006-2010.

Appendix C shows the principal component scores averaged over all 5-year periods. Overall, the scores are intuitively highly plausible. The countries with the strongest constitutional federalism are Venezuela, Brazil, and Australia. However, only

Brazil and Australia also exhibit high levels of *de facto* decentralization. Venezuela, in contrast, is not decentralized at all. The lowest levels of constitutional federalism are found in Denmark, Greece, and Nicaragua. The most decentralized countries in our dataset are the United States, followed by Germany and Brazil. Guatemala, Zimbabwe, and El Salvador have the lowest scores in this category. The category top-down federalism is clearly led by India and Sri Lanka. This is not surprising, as state governors in India are directly appointed by the president, as are the provincial governors of Sri Lanka.

<<< Figure 1 about here >>>

Figure 1 shows trends in federalism and decentralization in four of the countries we referred to in the previous paragraph. Sri Lanka exhibits a clear pattern of increasing decentralization, and particularly top-down federalism, following its 1987 constitutional amendment, which established the legal status of its provinces. In contrast, the United States show no changes in federalism or decentralization between 1975 and 2015. It maintains very high levels of *de facto* decentralization and intermediate levels of constitutional federalism. Venezuela exhibits a marked increase in *de facto* decentralization during the 1990s. This trend ended when Hugo Chavez took office. Since its independence, Zimbabwe was not characterized by federalism or decentralization. More generally, Figure 1 demonstrates that our data captures important and well-known trends in federalism and decentralization. At the same time, the United States are representative of a wide range of countries with little to no changes in the established levels of federalism and decentralization, even over decades of observation. These observations suggest that our panel dataset adds relevant information to the analysis of federalism and decentralization. At the same time, most of the variation in the data is cross-sectional and fixed effects-estimation to study the role of time-variant factors of interest is unlikely to yield any results.

To further check the validity of our newly constructed indicators, we check the bivariate correlations with the principal components retained by Blume and Voigt (2011) and with the regional authority index of Hooghe et al. (2016).<sup>2</sup> Our indicator of constitutional federalism is significantly correlated with the components four, five, and six by Blume and Voigt (2011). These reflect democratic elections at the subnational level, the competence of the subnational level to veto national legislation, and the question whether the states have residual autonomy. Clearly, these are the components representative of constitutional federalism and the bivariate associations are as one would expect. In contrast, we find that our *de facto* decentralization indicator is significantly correlated with the same three indicators,

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<sup>2</sup> Results are available on request for all correlations described hereafter.

but with none of the other four components retained by Blume and Voigt. This is an interesting result as it reiterates that our second principal component reflects *de facto* decentralization on the institutional level, which is not necessarily reflected in concrete financial flows. Blume and Voigt, in contrast, rely heavily on financial flows as a proxy for the decentralization of policies. Finally, our third indicator of top-down federalism is only significantly correlated with component number six, indicating the degree to which states enjoy residual autonomy. This seems to be more likely when the state executive is appointed by the national government.

The Regional Authority Index by Hooghe et al. (2016) measures the authority of regional governments in ten dimensions: institutional depth, policy scope, fiscal autonomy, borrowing autonomy, representation, law making, executive control, fiscal control, borrowing control, and constitutional reform. These dimensions constitute two domains of authority: the authority a regional government exerts within its own territory and that which it exerts in the country as a whole. Our indicators of constitutional federalism and *de facto* decentralization are positively correlated with the regional authority index ( $r=0.56$  and  $r=0.86$ ) and with every one of its ten dimensions. All correlations are significant at the 1% level and the correlations with *de facto* decentralization tend to be larger. In contrast, top-down federalism is neither correlated with the overall index, nor with any individual dimension. This shows that top-down federalism certainly is a category of its own and this form of regional delegation does not represent regional authority as envisioned by Hooghe et al. (2016). More generally speaking, the correlations of our principal components with other indicators show a consistent and intuitively plausible picture, underlining their suitability for the following econometric analysis.

## 5 Empirical Analysis of Possible Determinants

As described in Section 3 above, Gerring et al. (2011) are interested in identifying the determinants of indirect rule. They explicitly deal with federalism, decentralized revenue, and the existence of autonomous regions. We use their empirical model as a baseline specification in our attempt to identify the determinants of the three dimensions of federalism and decentralization represented by our principal components. Table 4 contains the results based on the independent variables proposed by Gerring et al. (2011). Appendix D shows the descriptive statistics for all dependent and independent variables. Each column of Table 4 is based on one of our three principal components as the dependent variable. Our empirical model differs from that of Gerring et al. in a few dimensions. First, we cover a larger number of countries and a longer time period. Second, we use five-year averaged

data instead of annual data. Third, we employ clustered standard errors on the country level. Fourth, we include time fixed effects instead of a linear time trend. And fifth, we use seemingly unrelated estimation of our three models to obtain more efficient estimates. We consider all these differences to be improvements in the specification and estimation of our empirical model relative to Gerring et al. (2011).

Table 4: Replication of Gerring et al. (2011)

	Constitutional Federalism	<i>De facto</i> Decentralization	Top-down Federalism
State antiquity	0.62 (0.73)	-0.90 (-1.16)	0.71 (1.02)
Land area	0.36 ** (3.02)	0.20 * (2.28)	0.13 + (1.84)
Population (ln)	0.21 (1.02)	0.32 ** (2.60)	0.01 (0.08)
Population density	-0.00 (-0.48)	0.00 (0.51)	0.00 (0.11)
Urban population	0.02 (1.01)	0.01 (0.54)	-0.02 (-1.10)
Linguistic diversity	0.76 (0.94)	0.80 (1.49)	1.08 * (2.20)
Income p.c. (ln)	-0.08 (-0.35)	0.18 (1.20)	-0.00 (-0.00)
Democracy	0.02 (0.57)	0.04 * (2.19)	0.03 (1.49)
Latin America	1.60 ** (2.64)	0.05 (0.11)	0.78 * (2.14)
Western Europe	0.46 (0.61)	1.41 ** (2.77)	0.39 (0.81)
Middle East	-0.50 (-1.01)	-0.87 (-1.52)	0.31 (0.72)
Africa	0.18 (0.36)	-0.20 (-0.59)	-0.51 (-1.43)
Constant	-4.89 (-1.49)	-7.39 *** (-4.33)	-0.33 (-0.16)
Region fixed effects	Chi <sup>2</sup> =12.1 [0.02] *	Chi <sup>2</sup> =10.5 [0.03] *	Chi <sup>2</sup> =10.0 [0.04] *
Time fixed effects	Chi <sup>2</sup> =4.4 [0.73]	Chi <sup>2</sup> =3.6 [0.83]	Chi <sup>2</sup> =8.3 [0.31]
Time period	1975-2015	1975-2015	1975-2015
Observations	528	528	528
Countries	105	105	105
R <sup>2</sup>	0.34	0.53	0.16

Note: All models are estimated using seemingly unrelated estimation of OLS estimators, z-values in parentheses are adjusted for clustering on the country level, p-values in brackets, observations are averages over 5-year intervals, \*\*\*: p<0.001, \*\*: p<0.01, \*: p<0.05, +: p<0.1.

The take home message of Gerring et al. is that state antiquity is highly significantly correlated with their dependent variables. In their models, state antiquity always

shows a positive sign and is significant at the 1% level. Contrast this with our own results: In no case is state antiquity even close to any conventional level of statistical significance.

So, what are our main findings? The only variable that is highly correlated with all three components is *land area*. The larger a country is, the more it exhibits our three dimensions of federalism and decentralization. Increasing a country's land area by one standard area would, according to our estimates, imply an increase in its level of constitutional federalism by 55% of a standard deviation. The same change in land area implies an increase in *de facto* federalism by 23% of a standard deviation. Finally, the effect on top-down federalism amounts to only 13% of a standard deviation and this coefficient estimate is only significant at the 10%-level.

The size of the population is only significantly correlated with our second component (i.e., *de facto* decentralization), but not with the other two. Increasing a country's log-population size by one standard deviation implies an increase in the level of *de facto* decentralization by 38% of a standard deviation. It seems that, in practice, public goods are more likely to be provided on the subnational level, the larger the population. The *de jure* allocation of powers between the different levels of government as written down in the constitution is, however, unaffected by population size. The same argument can be made with regard to the level of democracy. Higher levels of democracy are accompanied by more decentralization, but not necessarily by more federalized constitutions.

Higher levels of linguistic fractionalization are significantly correlated with top-down federalism, our third component.<sup>3</sup> This is consistent with the cases of India and Sri Lanka, where regional ethnic heterogeneity is met with federal structures in which the regional executive is appointed by the central government. Regarding geographic regions, countries in Latin America are significantly more likely to pass a federal constitution and to implement top-down federalism. A tentative interpretation of this finding is that Latin American countries are more likely to experience a *de jure-de facto* gap than countries in other world regions. Latin American countries might have a federal constitutional set-up, but the regions are effectively not given much power. None of our models show statistically significant time fixed effects, which implies that there are no general trends in the prevalence of federalism and decentralization that could not be explained by the covariates proposed by Gerring et al.

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<sup>3</sup> Gerring et al. (2011) rely exclusively on linguistic fractionalization as a proxy for fractionalization in general. Our results are not robust to using alternative indicators of fractionalization.

Overall, our results differ substantially from those of Gerring et al. (2011). Overall, it seems fair to say that these results are rather sobering, as many of the suspected determinants of both federalism and decentralization are not significant. This evaluation is not confined to the results of Gerring et al. (2011), but our null results also contradict arguments advanced by Oates (1972), Panizza (1999), and Arzaghi and Henderson (2005).

The coefficient of determination for our three models is between 0.16 and 0.53. Since much of the cross-country variation in federalism and decentralization remains to be explained, we now move on to add more variables to our baseline model à la Gerring et al. (2011). In other words, we try to test hypotheses that have been proposed in the literature, but were not tested by Gerring et al. (2011). As mentioned above, Riker (1975) has argued that a military threat is a necessary condition for a federation to be successful. We test whether such a threat affects politicians' choice to organize their state federally or to decentralize competences by adding an indicator for the international security environment (see Nordhaus et al. 2012) to our baseline regression. Based on the argument of Riker, we would expect that countries facing an adverse international security environment are more likely to organize their state federally and to decentralize competences. Note, however, that what is tested here differs somewhat from the original argument put forward by Riker. We are not studying the threat environment at the time a federation is created to understand its persistence over time, but we are only able to study the contemporary correlation between countries' threat environment and their levels of federalism and decentralization.

Following Arzaghi and Henderson (2005), we also include a dummy for French law. Another indicator we are interested in originates from Lessmann (2014) who studies the relationship between spatial inequality and development. In contrast to income inequality, as for example measured by a regular Gini index, spatial inequality refers to the distribution of income across the regions of a country. The weighted coefficient of variation proposed by Lessmann also takes into account the different population sizes of the regions within a country. Lessmann (2014) is interested in the determinants of spatial inequality. Here, we propose to use his indicator to explain the adoption of federalism and decentralization. More specifically, we expect that higher spatial inequality is conducive to both federalism and decentralization, because we assume that spatially unequal countries are heterogeneous in their preferences and needs and are, thus, likely to profit from a decentralized provision of public goods.



Table 5: Regression Analysis – Further Results

	Constitutional Federalism	<i>De facto</i> Decentralization	Top-down Federalism
Military threat	-2.08 (-1.04)	0.18 (0.14)	-0.66 (-0.55)
Spatial inequality	4.41 * (2.38)	0.28 (0.32)	-2.43 + (-1.77)
French legal origin	1.33 * (2.02)	0.50 (0.88)	0.14 (0.24)
Region fixed effects	YES	YES	YES
Time fixed effects	YES	YES	YES
Control variables	YES	YES	YES
Time period	1975-2005	1975-2005	1975-2005
Observations	113	113	113
Countries	39	39	39
R <sup>2</sup>	0.66	0.74	0.66

Note: See Table 4. Control variables as in Table 4 are included, but their coefficient estimates are omitted.

When we add the aforementioned indicators to our baseline model, the number of observations and countries falls drastically. This is mostly because of the limited availability of spatial inequality data. The results are reported in Table 5. We find that spatial inequality is indeed related to a higher level of constitutional federalism. French legal origin countries also exhibit higher levels of constitutional federalism. *De facto* decentralization, however, is unrelated to any of our new covariates. For top-down federalism we only find weak evidence that spatial inequality might have a negative effect.

## 6 Conclusion and Outlook

Above, we have argued that federalism and decentralization are two concepts that are better kept apart. Federalism is the result of constitutional choice, whereas the level of decentralization is the result of policy choice. In principle, then, countries with a federal constitution can be highly centralized, and countries with a unitary constitution can be highly decentralized. Since federalism and decentralization are distinct concepts, also the factors that make countries choose a more federal constitution (or not) and those responsible for the adopted level of decentralization might be different ones.

To test this conjecture empirically, we employ principal component analysis from which we derive three new indicators that we label *constitutional federalism*, *de facto decentralization*, and *top-down-federalism*. We analyze the determinants of each of these indicators by replicating and extending a study by Gerring et al.

(2011). Except for the area of land covered by a country, none of the other explanatory variables are highly correlated with all three components. This seems to confirm the conjecture that the determinants of the three components are not the same. We demonstrate for the first time that spatial inequality encourages the adoption of constitutional federalism. In contrast, we find no evidence that the existence of federalism and decentralization is linked to the level of military threat a country is exposed to.

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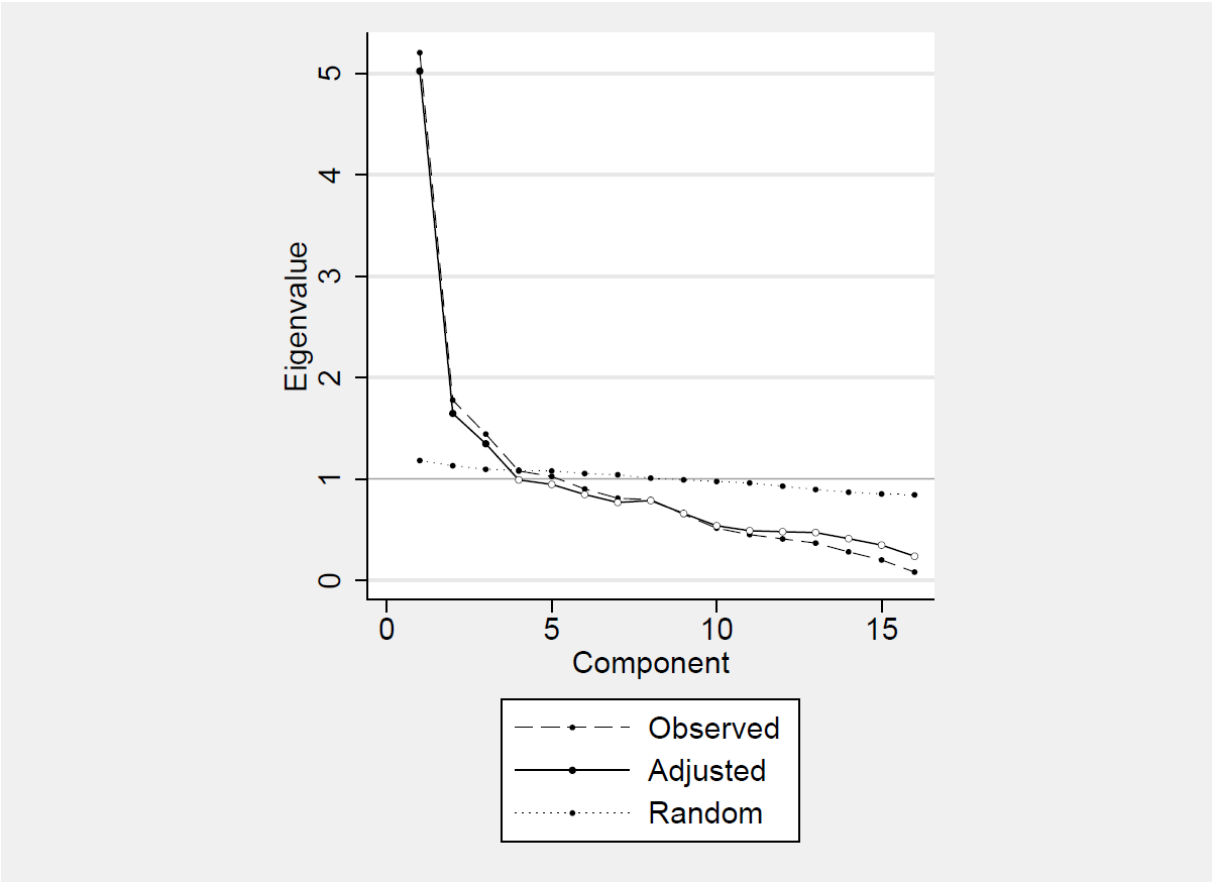
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## Appendix A: Variables Relied Upon to Extract the Principal Components

Variable	Description
CCP: fedunit	Is the state described as either federal, confederal, or unitary? “federal” = 1, 0 otherwise.
CCP: fedsep	Which level of government has superior legal status in the case of conflict? “laws of the federal or national government are superior” = 1, 0 otherwise.
CCP: sublaw	Do the subsidiary units have lawmaking power? “yes” = 1, “no” = 0.
CCP: subres	Is the federal government or subsidiary unit the residual lawmaker? “Subsidiary unit governments” = 1, 0 otherwise.
CCP: suborg_1	Which organs of the subsidiary units have lawmaking power? “legislature” = 1, 0 otherwise.
CCP: suborg_2	Which organs of the subsidiary units have lawmaking power? “executive” = 1, 0 otherwise.
CCP: suborg_3	Which organs of the subsidiary units have lawmaking power? “legislature and executive” = 1, 0 otherwise.
CCP: subtax	Do the subsidiary units have the power to levy taxes? “yes” = 1, “no” = 0.
CCP: subrev	Does the constitution specify a plan for revenue sharing between the national government and the subsidiary units? “yes” = 1, “no” = 0.
CCP: subexec	Do the subsidiary units have their own executive (such as a governor)? “yes” = 1, “no” = 0.
CCP: subexel	How are subsidiary unit executives selected? “Appointed by central government” = 1, 0 otherwise.
CCP: subleg	Do the subsidiary units have their own independent legislatures? “yes” = 1, “no” = 0.
POLCON: f	Independent sub-federal entities (states, provinces, regions, ...) are coded (F = 1) when these institutions impose substantive constraints on national fiscal policy.
DPI: auton	Are there autonomous regions? “yes” = 1, “no” = 0.
DPI: state	Are state/province governments locally elected? “legislature and executive locally elected” = 1, “legislature locally elected” = 1/2, “no local elections” = 0.
V-DEM: v2xel_regelec	Are there elected regional governments, and – if so – to what extent can they operate without interference from unelected bodies at the regional level?

Note: CCP: Comparative Constitutions Project by Elkins et al. (2009); POLCON: Political Constraint Index by Henisz (2000); DPI: Database of Political Institutions by Cruz et al. (2016); V-DEM: Varieties of Democracy Dataset by Lindberg et al. (2014).

Appendix B: Principal Component Analysis (Parallel Analysis)



	Adjusted Eigenvalue	Unadjusted Eigenvalue	Estimated Bias
C1	5.02	5.20	0.18
C2	1.65	1.78	0.13
C3	1.35	1.44	0.10
C4	0.99	1.08	0.09

Note: Results of Horn’s Parallel Analysis for principal components, 50 iterations, using the mean estimate. Criterion: retain adjusted components > 1.

**Appendix C: Individual Country Values (Average Over All 5-year Periods)**

Country	Constitutional Federalism	<i>De facto</i> Decentralization	Top-down Federalism
Afghanistan	-1.054	-1.522	-0.532
Albania	1.009	-0.469	1.041
Algeria	-0.693	-1.364	0.704
Angola	-0.953	-1.739	1.071
Argentina	3.887	1.662	0.854
Armenia	-0.599	-1.584	-0.036
Australia	4.513	3.409	-0.100
Austria	3.514	1.608	-0.400
Azerbaijan	-1.357	-0.178	-1.173
Bangladesh	-1.674	-1.033	-1.028
Barbados	-1.644	-0.278	-0.939
Belarus	-1.680	-1.190	-1.046
Belgium	1.990	3.034	-0.101
Benin	-0.665	-0.529	-0.812
Bhutan	-0.741	-0.896	0.365
Bolivia	0.894	-0.812	1.808
Botswana	-1.658	0.055	-0.979
Brazil	4.655	4.119	0.571
Bulgaria	-1.151	-0.628	0.684
Burundi	-1.465	-1.123	-0.419
Cambodia	-1.129	-0.945	-0.858
Cameroon	-0.959	-1.666	-0.360
Canada	3.090	2.447	1.640
Cape Verde	-1.683	-0.573	-1.053
Central African Rep.	-1.568	-1.244	-0.989
Chad	2.617	-0.230	1.421
Chile	0.079	-1.097	1.947
China	1.673	0.234	-0.017
Colombia	2.116	1.555	0.854
Comoros	2.581	1.048	0.931
Congo	-1.545	-0.771	-0.994
Congo, Dem. Rep.	-1.686	-1.327	-1.062
Costa Rica	-1.649	-0.408	-0.954
Cote d'Ivoire	-1.136	-0.551	-1.167
Croatia	-1.659	0.028	-0.982
Cuba	3.011	-0.591	-0.141
Czech Republic	0.108	0.008	-0.977
Denmark	-2.005	1.629	-0.919
Djibouti	-1.671	-0.719	-1.019
Dominican Republic	-0.788	-1.097	1.814
Ecuador	1.763	0.315	0.794
Egypt	-1.558	-0.637	-1.034
El Salvador	-0.935	-1.996	1.120
Eritrea	-1.686	-1.337	-1.063
Ethiopia	2.465	1.890	0.652
Finland	-1.232	0.098	-0.382
France	-0.528	2.276	-0.678
Gabon	-1.680	-1.184	-1.045
Gambia	-1.662	-0.031	-0.989
Germany	3.599	4.350	0.674
Germany, East	-0.887	-0.253	-0.732
Ghana	-1.219	-1.001	-0.576
Greece	-1.997	1.129	-0.899

Guatemala	-0.865	-2.385	1.056
Guinea	-0.649	-1.123	-0.578
Guyana	-0.977	0.711	-0.600
Haiti	0.018	0.404	1.387
Honduras	-0.987	-0.939	-0.650
Hungary	-0.964	-0.373	-1.096
Iceland	-1.696	-0.888	-1.090
India	0.033	0.565	6.938
Indonesia	-1.243	-0.110	-0.551
Iran	0.466	-1.695	1.204
Ireland	-1.705	-0.408	-1.113
Italy	2.368	3.488	1.527
Japan	-0.982	0.572	-1.144
Jordan	-1.686	-1.332	-1.063
Kazakhstan	-1.016	-0.974	-1.246
Korea, North	0.639	-0.477	-0.527
Korea, South	-1.774	0.218	-0.960
Kyrgyzstan	-1.009	-0.795	-1.225
Laos	-0.279	-1.990	0.895
Lebanon	-1.685	-1.318	-1.061
Lesotho	-1.667	-0.868	-1.008
Libya	-1.705	-0.408	-1.113
Lithuania	-0.994	-1.120	-1.184
Macedonia	-1.687	-1.367	-1.067
Madagascar	1.536	0.240	0.356
Malawi	-1.687	-1.367	-1.067
Malaysia	4.386	1.963	0.011
Maldives	-1.041	-1.755	-0.041
Mali	-0.967	-0.540	-0.513
Mexico	3.474	0.998	-0.430
Mongolia	2.364	-1.031	1.540
Morocco	0.393	-1.339	0.622
Mozambique	0.410	-1.488	0.851
Nepal	-0.859	-0.497	-0.610
Netherlands	2.586	0.366	0.684
New Zealand	-1.669	0.491	-1.007
Nicaragua	-1.873	0.107	-0.923
Nigeria	3.378	0.230	-0.106
Norway	-1.656	0.120	-0.972
Pakistan	4.142	2.393	2.325
Panama	-0.617	-0.251	-0.185
Peru	1.961	-0.350	0.781
Philippines	-1.154	2.267	0.495
Poland	-1.088	-0.104	-1.064
Portugal	0.468	-0.494	1.868
Romania	-1.666	-0.140	-1.002
Rwanda	-1.380	-1.451	-0.172
Saudi Arabia	0.560	-1.853	2.028
Senegal	-1.663	-0.057	-0.992
Sierra Leone	-1.680	-1.181	-1.045
Slovakia	-0.838	1.190	-0.468
Solomon Islands	-1.672	0.401	-1.018
South Africa	0.848	1.507	0.947
Spain	-1.586	3.644	-0.264
Sri Lanka	-0.803	1.129	5.503
Sudan	1.397	0.527	0.217
Swaziland	-0.641	-1.982	0.799



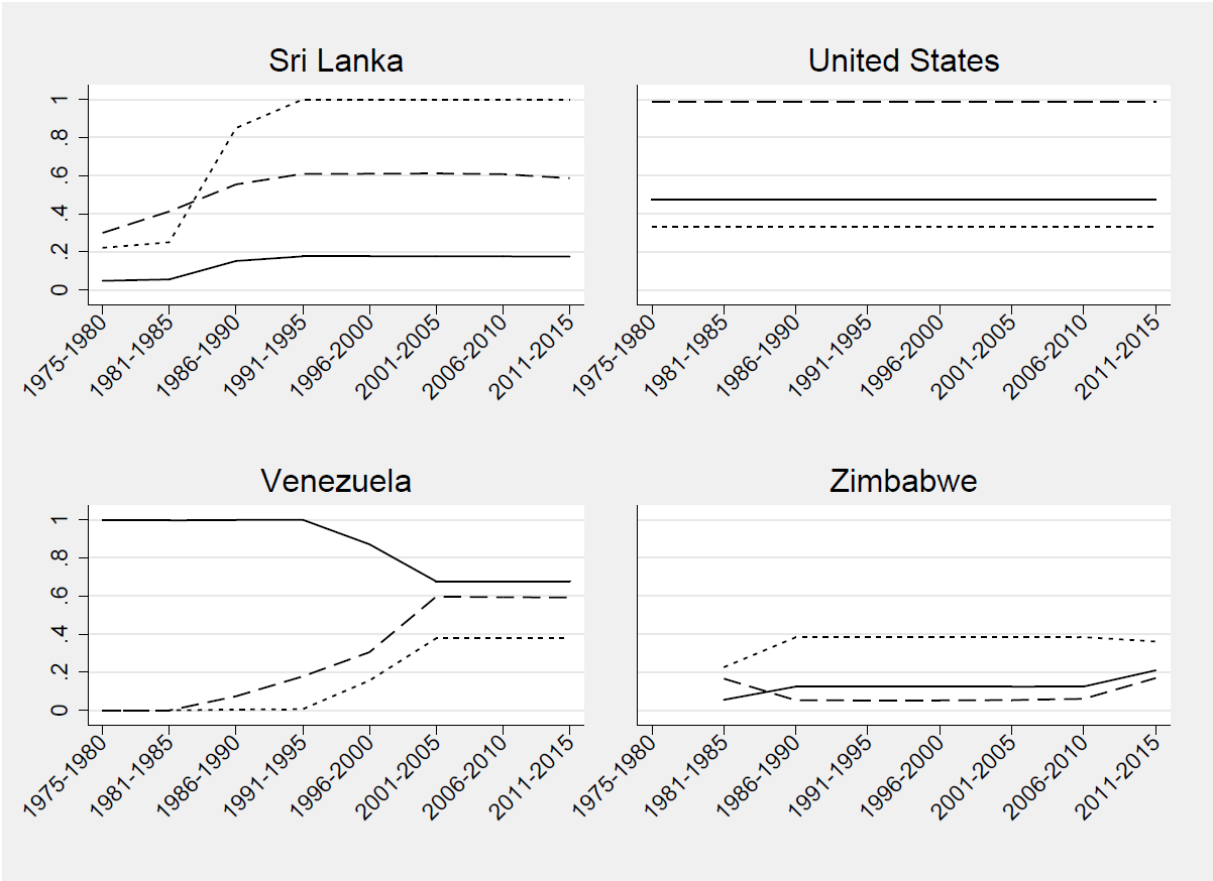
Sweden	-1.654	0.161	-0.967
Switzerland	0.960	3.410	-0.606
Syria	-1.687	-1.198	-1.065
Tajikistan	2.129	-0.064	2.179
Tanzania	1.124	-1.335	0.007
Thailand	-1.630	-1.002	-0.795
Togo	-1.612	-0.228	-0.665
Tunisia	-1.009	-0.780	-0.695
Turkey	-1.682	-1.250	-1.053
Turkmenistan	-1.684	-1.293	-1.058
United States	2.025	4.351	0.499
Uruguay	1.834	1.228	1.017
Vanuatu	-1.690	-0.030	-1.068
Venezuela	5.301	-0.605	-1.320
Yemen, South	2.342	-1.359	0.062
Zimbabwe	-0.928	-2.068	0.805

**Appendix D: Descriptive Statistics**

Variable	N	Mean	SD	Min	Max
Constitutional federalism	528	0.04	2.03	-2.01	6.47
De facto decentralization	528	0.12	1.66	-2.69	4.43
Top-down federalism	528	0.02	1.45	-3.09	7.79
State antiquity	528	0.48	0.25	0.03	0.96
Land area	528	1.09	2.20	0.01	9.33
Population (ln)	528	16.59	1.41	13.44	21.03
Population density	528	97.97	135.68	1.46	1200.16
Urban population	528	54.03	22.05	3.93	97.75
Linguistic diversity	528	0.38	0.30	0.00	0.90
Income p.c. (ln)	528	7.89	1.61	4.82	11.07
Democracy	528	3.35	6.57	-9.60	10.00
Latin America	528	0.18	0.38	0	1
Western Europe	528	0.13	0.34	0	1
Middle East	528	0.04	0.20	0	1
Africa	528	0.30	0.46	0	1
1981-1985	528	0.08	0.28	0	1
1986-1990	528	0.09	0.29	0	1
1991-1995	528	0.13	0.33	0	1
1996-2000	528	0.15	0.36	0	1
2001-2005	528	0.18	0.38	0	1
2006-2010	528	0.16	0.37	0	1
2011-2015	528	0.14	0.35	0	1
Military threat	113	0.20	0.16	0.04	0.72
Spatial inequality	113	0.28	0.17	0.06	0.90
French legal origin	113	0.45	0.50	0	1

Note: Sample based on regression models in Tables 4 and 5, respectively.

**Figure 1: Federalism and Decentralization Trends in Selected Countries**



Note: Indicators are standardized between 0 and 1. Solid lines indicate constitutional federalism, dashed lines indicate *de facto* decentralization, dotted lines indicate top-down federalism.