

Fiscal Federalism: A Return to Theory and Measurement

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Abstract. Most empirical work on fiscal federalism, understood as a system in which sub-central governments enjoy widespread taxation and expenditure autonomy, is fundamentally flawed, because the operationalization and measurement of fiscal federalism in the empirical literature conflict with the conception of the system in the theoretical literature. A broader view of fiscal federalism as a system of “economic self-rule” matches up better with the concept employed in the theoretical literature, but its measurement requires sacrificing the beguiling precision of the currently used, ratio-scale variables. Cross-national empirical tests using a proposed measure for 43 countries find that more fiscally federal countries have smaller government consumption and government share of GDP.

Introduction

Political scientists and economists alike have long studied the effects of fiscal federalism on economic growth, government spending and debt, and inequality in theory and in practice. However, attempts to test the theory of fiscal federalism have often run aground on conceptual and measurement problems. In particular, empirical operationalizations of fiscal federalism have conflicted with the conception of the system in the theoretical literature.

The remainder of this paper is laid out in four sections. The first section stipulates a definition of fiscal federalism and shows that this understanding of fiscal federalism underlies the theoretical literature on the political and economic consequences of the system. The second section demonstrates how previous attempts to operationalize fiscal federalism have fallen short, and how these shortcomings have affected the validity of empirical results. Ironically, it turns out that using merely fiscal indicators to measure fiscal federalism yields misleading results. The third section presents new operationalizations of fiscal federalism and shows that the resulting variables explain variation in fiscal size of government for 43 democratic countries from 1950 to 2005 in a manner consistent with theory. The fourth section concludes and suggests possible uses for the new fiscal federalism variable in future research.

Fiscal Federalism in Theory

Fiscal federalism has been defined and measured in various ways, but following Riker (1964, 11), Weingast (1995, 4), and Rodden (2004), we can identify the following elements of the ideal type:

- 1) Sub-central governments (SCGs) enjoy *programmatic autonomy*, i.e., exclusive authority to decide a subset of economic policy (creating, repealing, and adjusting programs and regulations).

- 2) SCGs face a *hard budget constraint*, funding their own spending largely out of autonomous revenues, i.e., revenues raised through taxes over which the SCGs enjoy the authority to set rates, base, or both, and may not have access to unlimited credit.
- 3) There is a *common market*, so that SCGs may not enact barriers to the free flow of goods, capital, and labor across their borders.
- 4) The system is *institutionalized*, so that the central government may not alter it at will.

Fiscal federalism as defined here does not necessarily include the ability of SCGs to participate in central government decision-making. This aspect of federalism could be thought of as “shared rule” as opposed to mere “self-rule” (Hooghe et al. 2008a, 123).

The classic economic arguments both for and against fiscal federalism explicitly or implicitly rely on the foregoing formulation of the system. Charles Tiebout (1956) developed a stylized model of “sorting” across jurisdictions. The model predicts that with easy mobility and a large number of jurisdictions, individuals will move to those jurisdictions with public goods and tax levels more to their liking. In the limit, the level of public goods provision ends up being exactly efficient in every jurisdiction. Centralization inhibits this process by reducing the diversity of public goods provision by location and by increasing mobility costs across jurisdictions, since one might have to emigrate altogether to find a mix of public goods more to one’s liking (Oates 1999). For the Tiebout model to work, it must assume a system satisfying all the elements of our definition: programmatic autonomy (so that public goods levels can differ across jurisdictions), hard budget constraints (so that jurisdictions cannot externalize the costs of providing public goods), a common market (so that individuals can freely move across borders), and institutionalization (so that the competencies of the jurisdictions can be treated as exogenous in the model: politics can be safely ignored, as it is in the Tiebout model, only if the political system is assumed to be exogenous, i.e., perfectly self-enforcing).

Weingast's (1995) "market-preserving federalism" research agenda, which draws on earlier work by Hayek (1939 [1948]) and Brennan and Buchanan (1980), provides another argument in favor of fiscal federalism. Under market-preserving federalism, citizens flee jurisdictions that levy higher taxes and regulations than necessary to provide the public goods that citizens want. To avoid losing their tax base, governments must rein in their predatory activities, thus reducing rent-seeking and market distortions and promoting economic development. Weingast and collaborators have paid particular attention to the conditions under which decentralization is self-enforcing. For instance, Qian and Weingast (1997) argue that China's policy of permitting anonymous bank accounts prevented the central government from discovering or punishing tax evasion and made it possible for managers of local state-owned enterprises to capture the full revenue stream generated by their business activities without fear of future reprisal or expropriation.

According to Weingast (1995, 4), the four elements outlined above together comprise market-preserving federalism. In this model, the problem with centralization is that it reduces the proportion of economic policy-making that is made by governments subject to a strict competitive constraint. Presumably, free international flows of labor, capital, and goods could make national governments themselves subject to the zero-rents constraint, but the costs of emigration will probably ensure that most central governments enjoy significantly more autonomy to enact inefficient policies than do SCGs. Accordingly, transferring fiscal and regulatory authority from sub-central to central governments should increase rents and reduce economic growth.

On the other hand, interjurisdictional competition of the kind Weingast touts could well increase regional inequalities by reducing redistribution from rich regions to poor ones (Prud'homme 1995). If rich regions provide better public services than poor ones because they are able to afford a lower tax rate given their larger tax base, then rich regions would continue to attract more investment than poor ones, and the gap between rich and poor would widen. Whether we should reduce inequality

and pay an efficiency price through fiscal centralism, or increase efficiency and pay an inequality price through fiscal federalism, is ultimately an ideological question (Rodden 2003, 695). The questions for empirical social scientists are whether fiscal federalism reduces overall government expenditure and increases economic growth, as Hayek (1939 [1948]), Brennan and Buchanan (1980), and Weingast (1995) predict, and whether fiscal federalism increases regional inequality, as Prud'homme (1995) predicts. How one evaluates those findings for policy is beyond the scope of positive social science.

Fiscal Federalism in Practice

There are now a number of empirical studies on the effects of fiscal federalism or decentralism of various kinds on government spending and debt and on economic growth. Indeed, one might be forgiven for believing the debate to be all but settled. The canonical works are Wibbels (2000), Rodden and Wibbels (2002), and Rodden (2002; 2003; 2004; 2006). Recently, however, the research has been turning up some odd results (e.g., Fiva 2006). I will argue that the measurement of fiscal decentralization, while achieving greater precision and temporal scope, has gone down the wrong track.

Much of the early research used a measure from the IMF called "fiscal decentralization." The IMF measure is simply SCG spending divided by total government spending. As Rodden (2004, 483) points out, this variable is not a suitable indicator of programmatic autonomy, let alone full-fledged fiscal federalism. Unitary Denmark is scored as more fiscally decentralized than the federal United States, despite the fact that the Danish government has devolved only minor policy responsibilities on the counties and municipalities, since many central government programs in Denmark are administered through the county and local governments. Another approach has been to use indicators of political federalism. Wibbels (2000) finds that federal and semi-federal countries in the developing world have more debt, deficits, and inflation than their unitary counterparts. As it turns out, federal developing countries typically fall short on the hard budget constraints criterion. Jones, Sanguinetti, and Tommasi (2000) show that federal discretionary grants to state governments allowed the latter to spend the

country into debt, eventually resulting in macroeconomic crisis.¹ Rodden (2002) examines the sub-central budget constraint (own-source revenues as a percentage of sub-central spending) and finds that “fiscal decentralization” as measured by the IMF promotes government indebtedness if sub-central spending is funded out of fiscal transfers rather than own-source revenues, and the central government has not imposed a hard limit on sub-central spending.

Rodden (2003) tests one implication of the market-preserving federalism thesis, the argument that fiscal federalism reduces overall government spending. To improve on the IMF measure of fiscal decentralization, Rodden introduces a new variable: sub-central own-source revenues as a percentage of total government revenues (central and sub-central), where revenues are counted as “own-source” if they are raised by SCGs, even if they have no discretion over tax rate or base. He finds that more fiscally decentralized countries in this sense do indeed have lower government spending. When included in the same model, the IMF measure of decentralization correlates positively with size of government, implying that devolving spending authority on SCGs while funding their spending through transfers encourages growth in government spending.

As Rodden himself acknowledges (2003, 709-10), this measure of own-source revenue decentralization is not the correct variable to test the market-preserving federalism thesis, since it includes revenues automatically transferred to SCGs through revenue-sharing schemes, as well as mandated taxes over which SCGs have no discretion. If SCGs have no discretion over tax rates, they cannot compete with each other for taxpayers on this basis. For this reason, he uses a fixed-effects error correction model, under the assumption that within-country diachronic change in the variable reflects largely changes in truly autonomous taxation powers.

¹ Some developing countries also fail to guarantee a common market, allowing regional governments to regulate immigration and transport from other regions, as Indonesia has done (Goodpaster and Ray 2000).

Stegarescu (2005) presents the results of a massive undertaking in data collection, including a measure of autonomous sub-central (tax) revenues as a percentage of total government (tax) revenues (excluding social security revenues and taxes paid to the EU) for 23 OECD countries for the years 1965 to 2001.² Table I compares country scores on three indicators of tax revenue decentralization, measured as a percentage of consolidated general government revenue, excluding social security and EU taxes, averaged for the years 1996-2001 (Stegarescu 2005, 13). The first indicator uses autonomous sub-central revenues in the numerator, the second autonomous and shared revenues, and the third all tax revenue accruing to SCGs (including taxes set by the central government but collected by SCGs). The third indicator closely corresponds to that used in the Rodden (2003) study.

[Table I about here]

Even on the basis of the narrowest conception of sub-central tax decentralization, Sweden is reported as the third most decentralized country in the OECD, more decentralized even than the United States. Japan is fourth. Highly centralized countries Denmark and Finland appear more decentralized than federal Belgium and Australia. The broader measures of tax decentralization are even worse. Something appears to be amiss.

Despite its problems, the Stegarescu dataset has been used in substantive research. Fiva (2006) uses them to test the market-preserving federalism hypothesis for 18 OECD countries. Consistently with Rodden (2003), he finds that tax revenue decentralization (the first variable reported in Table I) decreases the size of the public sector, while expenditure decentralization increases the size of the public sector. The former effect is driven by a reduction in social security transfers. This finding should give us pause, since no country has decentralized social security policy. The competitive tax-cutting logic of market-preserving federalism predicts economies precisely in SCG programs. Education,

² Governments receive some revenue from non-tax sources, such as interest and rental income, fees, fines, and privatization proceeds. Stegarescu (2005) therefore reports both total revenue and tax revenue figures.

transportation, natural resources, and administration are all areas in which we should find that fiscal federalism reduces the size of government, but not social security or defense spending. Fiva (2006, 270-71) acknowledges puzzlement at these results.

Why are the tax decentralization data in Rodden (2003) and Stegarescu (2005) flawed? The Stegarescu data do represent an advance over the Rodden data in that they exclude revenue-sharing programs. However, the tax decentralization variables take no account of unfunded or partially funded mandates on SCGs. In Denmark and Sweden, health care policy is administered through the counties (since 2007, the Danish counties have been replaced by a smaller number of regions and their taxing authority removed) (Hooghe et al. 2008b). The national health services are expensive programs, but they are partly funded by local taxes rather than central government grants. County governments have no autonomy over health care policy; they have no choice but to fund these programs, although they enjoy some autonomy in setting local income tax rates. In Sweden, county councils are directly elected, but county governors are appointed by the central government. Accordingly, the Swedish counties lack both the programmatic and full political autonomy characteristic of federal or even semi-federal states. Japanese prefectures enjoy more political autonomy than the Swedish and Danish counties, but nearly a quarter of their funding derives from matching grants from the central government (Hooghe et al. 2008b). Matching grants, being tied to specific programs, encourage self-funded spending by SCGs that also cannot be considered truly autonomous, because SCGs face the loss of central grants if they cut their own spending.³

The Rodden and Stegarescu data on tax decentralization are flawed not only in that they ignore programmatic and political autonomy, but also in the choice of denominator, total government tax revenues. Tax decentralization measured in this way might be a reasonable approximation of sub-

³ Federal grants to states that are tied to specific programs are also common in the United States, but they are less important as a source of subnational revenue than they are in Japan.

central tax-raising powers (but not fiscal federalism) across countries, but it is inappropriate for time-series analysis, as Stegarescu (2005, 20) acknowledges. The business cycle causes fluctuations in the tax decentralization variable that are not due to changes in the distribution of competencies. For instance, if property tax revenues are less sensitive to the business cycle than are income tax revenues, and local governments depend principally on property taxes, while the central government depends more on income taxes, then tax decentralization will appear to increase during recessions and decrease during expansions.

This is not all. When the central government cuts tax rates, tax decentralization appears to increase, even when local programmatic autonomy decreases or remains static. This could happen if the central government continued to fund its programs through debt rather than current tax revenues. Figure A shows the tax decentralization data for the United States from 2001 to 2006.⁴ Because of federal tax cuts, this appears to be a time of significant decentralization in the U.S., despite the fact that expert observers consider this period to have been marked by the expansion of federal economic power at the expense of the states (Conlan and Dinan 2007).

[Figure A about here]

In summary, all existing measures of fiscal decentralization yield bizarre results in cross-national analysis. However, they are also inappropriate for time-series analysis. For instance, Rodden's (2003) study used a fixed-effects error correction model of the following form:

$$\Delta \text{LOG GOVERNMENT SIZE}_{it} = \beta_0 + \beta_1 \text{LOG GOVERNMENT SIZE}_{it-1} + \beta_2 \Delta \text{LOG GRANTS} / \text{TOTAL REVENUE}_{it} + \beta_3 \text{LOG GRANTS} / \text{TOTAL REVENUE}_{it-1} +$$

⁴ State and local autonomous tax revenue comes from the Census Bureau, while federal revenue figures come from the Office of Management and Budget. Social security and retirement receipts are excluded from the federal data. The data differ somewhat from Stegarescu's data, which come from the OECD.

$$\beta_4 \Delta \text{LOG OWN SOURCE SUBNAT. REV.} / \text{TOTAL REVENUE}_{it} +$$

$$\beta_5 \text{LOG OWN SOURCE SUBNAT. REV.} / \text{TOTAL REVENUE}_{it-1} + \sum \text{CONTROLS} +$$

$$\sum \text{COUNTRY DUMMIES} + \varepsilon \tag{1}$$

The dependent variable is a change variable, and the model includes fixed effects, so that the model is predicting yearly changes in government spending that are larger than average for each country, controlling for pre-existing government spending. In countries like the United States, Canada, and Australia, there have been no major, recent changes in the programmatic autonomy of the SCGs, and the yearly changes that the model is predicting have mostly to do with the business cycle and federal tax policy. The finding that an above-average score for tax decentralization in a year reduces government spending more than average the next year presumably just reflects the fact that when central governments decide to cut taxes, they often have to cut spending as well. This result would seem to have nothing to do with the logic of sub-central tax competition. Rodden's result might depend on true changes in programmatic autonomy in other countries, but it is impossible to know for certain.

Other empirical results that use Stegarescu's data are similarly suspect, such as Thornton's (2007) lack of a finding on the effect of tax decentralization on economic growth and Lessman's (2006) finding that tax decentralization reduces regional inequality. If we want to test the Tiebout, Weingast, and Prud'homme hypotheses about the effects of mobility and interjurisdictional competition on growth, government size, and regional inequality, we need to go back to the drawing board and devise a measure of fiscal federalism that comports more accurately with the theoretical ideal type. If we merely want to test the effects of soft and hard budget constraints on government debt, then the existing measure of vertical fiscal imbalance is perfectly valid (sub-central own-source revenues divided by sub-central expenditure) (Rodden 2002). But this is not fiscal federalism.

Fiscal Federalism as Local Economic Self-Rule

To test the classic theories of fiscal federalism, we need a measure that takes into account all four elements of the system: programmatic autonomy in economic affairs, hard budget constraint, common market, and institutionalization. Until recently, cross-national measures of programmatic autonomy were unavailable. Early studies used a simple federal versus non-federal dummy variable, which ignores the important variation in regional powers within federal and non-federal systems. Arzaghi and Henderson (2005) provide an index of institutional autonomy for 16 countries from 1960 to 1995, awarding points for the election of local officials, the revenue-sharing and revenue-raising authority of local governments, and the inability of the central government to suspend or veto local decisions. It is not fully suitable for our purposes, since it does not measure the scope of policy responsibilities of SCGs, and since revenue-sharing should also count as a move away from fiscal federalism. Brancati (2006) measures political decentralization and shared rule on a six-point scale for 40 countries for the years 1985-2000, awarding a point for sub-central elections, sub-central control over tax authority, education, and police, and a point for sub-central veto over constitutional amendments. The final item could be excluded from a fiscal federalism measure, while the others would need to be combined with measures of tax-raising powers from other sources to create a fiscal federalism variable.

The most comprehensive coding of regional authority covers 42 (43 if West Germany is counted separately from unified Germany) OECD and European countries annually for the 1950-2006 period (Hooghe et al. 2008c). The project measures regions (conceived as sub-central jurisdictions with an average population of at least 150,000, thus excluding the most local levels of governance) on indicators of both “self-rule” and “shared rule.” For purposes of measuring fiscal federalism, the shared rule indicators, which code the regional role in central governance, can be ignored. The self-rule indicators are institutional depth (0-3), policy scope (0-4), fiscal autonomy (0-4), and representation (0-4). The researchers simply add scores on each of these indicators to create an overall measure of regional self-

rule, but as argued below, these authority characteristics are interdependent in a complex manner that merely summing them does not capture. One limitation of this dataset as a way of measuring decentralization is that it ignores the subregional, municipal level. However, in most countries regional governments have more authority than municipal governments (New Zealand is an exception), and those countries that lack regional governments altogether are highly centralized by any measure (e.g., Iceland, Luxembourg, the Baltic republics). Factor analysis of various decentralization indices, including those mentioned above, shows even the simple summed self-rule indicator to be generally more reliable than previous measures of decentralization (Schakel 2008).

The regional self-rule variables can be used to create an index of fiscal federalism that takes into account scope of economic policy autonomy, tax-raising powers (budget constraints), and institutionalization. (For almost all of the country-years in the sample covered, the common market criterion can largely be assumed to be satisfied.) The policy scope variable takes on a value of zero if regional governments have no authoritative competencies over economic policy, cultural-educational policy, or welfare state policy; a value of one if regional governments have authoritative competencies in one of those areas; a value of two if regional governments have authoritative competencies in two of those areas; a value of three if regional governments have authoritative competencies in two of those areas plus at least two of the following: residual powers, police, authority over own institutional setup, local government; and a value of four if regional governments satisfy the foregoing criteria and have authority over immigration or citizenship. The last category is irrelevant to fiscal federalism, so the “4” codes can be recoded as “3” before processing into the fiscal federalism measure.

The most significant limitation of this indicator of policy autonomy is that it does not take into account central government activism within the remit of the SCGs. If the central government sets a high fiscal or regulatory baseline, then SCGs have little room to experiment with different policies even if they enjoy nominal autonomy. For instance, the growth of the central government in the United States

over the 20th century entailed a corresponding decline in the effective autonomy of state governments, because they could no longer choose to have, say, a different kind of Social Security system, a lower-than-federal minimum wage, or a different antitrust policy, even though the states' formal competencies remained the same. Existing fiscal decentralization measures do try to take this factor into account by explicitly examining the share of sub-central fiscal activity in total government revenue or expenditure.

The tax-raising powers variable is scored zero if the central government sets rate and base of all regional taxes; one if the regional government sets the rate of minor taxes; two if the regional government sets the rate and base of minor taxes; three if the regional government sets the rate of at least one major tax: personal income, corporate, value added, or sales; and four if the regional government sets both rate and base of at least one major tax. This is a cruder method of measuring the regional government budget constraint than simply taking regional autonomous revenues divided by regional expenditure. Unfortunately, the latter data are not yet available cross-nationally beyond 2001.

The institutional depth variable is scored zero if there is no functioning general-purpose administration at the regional level; one if there is a deconcentrated, general-purpose, regional administration (i.e., regional administrations are mere central government outposts); two if regions have non-deconcentrated, general-purpose administrations that are subject to central government veto; and three if regions have non-deconcentrated, general-purpose administrations that are not subject to central government veto.

Political autonomy is also a critical element of institutionalization, for if the central government appoints the regional administration, then regional officials lack the autonomy to implement policy priorities different from those of the central government, whatever the constitution might otherwise say about regions' formal powers. Political democracy is not part of the definition of fiscal federalism, but for fiscal federalism to operate as designed, regional officials should not generally be held

accountable to the central government. The relevant alternative to central control for the countries in this dataset is democratic, regional self-government. The representation variable is scored by giving regions one point for an indirectly elected assembly, two points for a directly elected assembly, one point for dual executives appointed by the region and the central government, and two points for a regionally elected executive (directly or indirectly by the regional assembly), for four possible points in all.

[Table II about here]

Table II presents the scheme for the coding of the fiscal federalism variable used in this paper. The elements are multiplied together because all four elements of fiscal federalism are essential: If one is missing, then SCGs do not actually enjoy effective autonomy. For instance, if regional governments have extensive policy and fiscal powers, but the central government appoints all regional officials, then regional policies will almost certainly follow the preferences of the central government. Likewise, if the regional legislature is elected and has extensive policy powers, but the central government funds all regional activities through grants or shared taxes, then the region enjoys no fiscal autonomy, and the interjurisdictional competition and sorting effects predicted by Weingast and Tiebout under fiscal federalism will not obtain. Finally, the case of political and fiscal autonomy without much policy autonomy corresponds reasonably well to the Swedish, Danish, and Japanese cases handled so poorly by the Stegarescu data.

The resulting variables are multiplied by 0.9 if the central government maintains a veto over regional policies. A mild reduction was chosen because it is assumed that explicit veto power is not a very important tool once political realities are taken into account. If the central government can appoint regional officials, they can exercise informal pressure behind the scenes, but revoking regional laws, especially those passed by an elected assembly, invites a nasty political conflict that politicians would rather avoid.

Country-level fiscal federalism scores are created as a population proportion-weighted average of the regional fiscal federalism scores. Some countries allow more autonomy for some regions than others, and some countries have multiple regional layers. To deal with the latter problem, the regional level with the highest fiscal federalism score is used. In the most complex case, the UK as of 2006, the Welsh and Northern Irish assemblies are scored as lacking any fiscal autonomy, since they do not have tax-varying powers, while Scotland is scored 36 (policy scope=3, fiscal autonomy=3, representation=4, institutional depth=3). The rest of Britain is scored according to the counties' level of responsibility, since they do have minor taxation powers. The overall score for the UK is the Scottish fiscal federalism score times the proportion of the British population living in Scotland plus the rest-of-Britain fiscal federalism score times the proportion of the British population living outside Scotland ($36*0.09+7.2*0.91=9.8$).

Table III shows the ranking of countries on fiscal federalism in 2006.

[Table III about here]

This ranking arguably passes the test of intuition much better than the Stegarescu “autonomous tax decentralization” and Rodden “own-source revenue decentralization” measures. Bosnia, Canada, Serbia and Montenegro, and Switzerland appear to be the most fiscally federal countries in this dataset in 2006. When one looks at this group of countries, it becomes apparent that effective fiscal federalism should depend on the number of SCGs competing with each other. Effective Tiebout sorting and Weingast-style tax competition are unlikely to happen in countries with just two federated entities, like Bosnia and Serbia and Montenegro. Therefore, in the quantitative analysis to follow, the fiscal federalism scores will be interacted with the number of units at the regional level(s) used to generate the country scores, with the expectation that fiscal federalism will have stronger effects the larger the number of units competing with each other.

Following the four countries at the top is the United States, which falls just behind due to the District of Columbia’s being subject to congressional oversight. Then come three recently federalized countries: Spain, Belgium, and Italy. They are followed by three older, fiscally consolidated federations: Australia, Austria, and Germany. A raft of “regionalized” but non-federal countries follows. Portugal and Finland just avoid being scored with the non-fiscally-federal countries at the bottom because of the special autonomy they accord their island regions. The mean fiscal federalism score is 12.7, the median is 5.4, and the standard deviation is 16.9, reflecting a left-skewed distribution. Figure B shows the evolution of fiscal federalism from 1950 to 2006 for those 21 countries coded for the entire period.

[Figure B about here]

As discussed above, this measure of fiscal federalism does not take into account central government policy activity and thus may not serve well as a time-series indicator. To improve on the ordinal policy autonomy measure employed here, one could devise a measure of programmatic autonomy based on continuous fiscal data. The formula for this proposed measure is

$$Fiscal\ Autonomy = \frac{\left(\frac{Autonomous\ SCG\ expenditure}{Total\ SCG\ expenditure}\right) * Autonomous\ SCG\ tax\ revenue}{SCG + central\ government\ expenditure} \quad (2),$$

where “autonomous SCG expenditure” refers to SCGs’ spending on programs controlled and initiated by the SCGs themselves, excluding both funded and unfunded mandates. The formula takes that portion of autonomous SCG tax revenue that goes to autonomous SCG programs and divides it by total government expenditure, the final number thus taking into account both the budget constraint faced by SCGs and their programmatic autonomy. If one assumed that regulatory activism would be fully reflected in the fiscal data, then it would only remain to take into account the effective political autonomy of the SCGs and common market provisions in order to have a reasonable indicator of institutionalized fiscal federalism. Unfortunately, coding which SCG programs are autonomously

determined and which are centrally mandated would be an intensive exercise requiring detailed research into the legislation of each country in the dataset.

Empirical Analysis: Fiscal Federalism and Size of Government

In this section I perform a validity check on the indicator of regional economic self-rule, by analyzing its effects on total government expenditure across countries and over time. I test what Rodden calls the “Leviathan hypothesis” and what Weingast refers to as “market-preserving federalism.” Theory suggests that tax competition among economically autonomous jurisdictions will restrain government taxation and expenditure in those jurisdictions. The dependent variables used here are total government share of GDP (consumption plus investment, transfers excluded) and government consumption alone as a percentage of GDP. Government consumption measures spending on current operations and is dominated by the government wage bill. It is the usual indicator of the economic “footprint” of government (e.g., Garrett 1998; Rodrik 1998; Barro 2000). Government investment may be either less or more productive than government consumption, depending on whether it complements or crowds out private investment. In Weingast’s theory, fiscal federalism should increase government consumption and investment on positive-marginal-benefit projects and programs and decrease unproductive spending.

Hypothesis 1: Fiscal federalism reduces government share of GDP.

Hypothesis 2: Fiscal federalism reduces government consumption share of GDP.

Government share of GDP is available from the Penn World Table 6.2 (PWT) for the years 1950 to 2004. General government consumption as a percentage of GDP is available from the World Bank’s World Development Indicators (WDI) for 1960 to 2005. Both variables are measured on a 0-100 percentage scale.

The chief independent variables are country-level fiscal federalism (population-weighted regional economic self-rule scores), the number of regional jurisdictions for each country, and an

interaction between the two. Fiscal federalism is expected to exert strongest downward pressure on size of government when the number of jurisdictions is high. These variables are available for all 42 democratic countries covered by the

A number of control variables are also included in the regressions. The first is GDP per capita, to account for Wagner's Law. WDI has Purchasing Power Parities (PPP) per capita in thousands of 2000 international dollars for the years 1975 to 2005. For PWT, the general approach of which is to infer GDP figures for countries that do not report reliable data, PPP per capita in thousands of 2000 international dollars is available from 1950 to 2004 and for pre-unification West Germany, which is not covered by WDI. I have therefore performed two separate regressions of government consumption; the first uses data from WDI for the independent variables and thus covers the time period 1975-2005, and the second uses data from PWT for the independent variables and covers 1960-2004. The GDP variables are also first differenced to create a GDP growth variable and account for the fact that size of government increases during recessions. The third control variable is the natural log of population, which is available from PWT for 1950-2004 and from WDI for 1960-2005. Economists argue that very small countries have bigger governments because some public goods enjoy declining average costs over population (Alesina and Spolaore 1997; Bolton and Roland 1997; Alesina and Wacziarg 1998). The fourth control is trade (exports plus imports divided by GDP), available from PWT for 1950-2004 and from WDI for 1960-2005. Rodrik (1998) and others have argued that trade openness encourages growth of government. Dummy variables for European Union countries (1992 and on) and for countries with single member district ("majoritarian") electoral systems are also included. Bawn and Rosenbluth (2006) argue that government spending rises under multiparty governments, which are more common in multi-member district systems.

Finally, control variables for post-socialist transitions are created. Countries just coming out of socialism should have bigger governments, all else equal, but that difference should decay with time. I

have no prior expectations about the rate at which government spending declines during post-socialist transitions. Therefore, I have first created a variable measuring the number of years since transition to a market economy, where the first year of transition is scored “1” and countries that have never been socialist are scored “0.” Then, fractional polynomial regressions are performed on both government share of GDP and government consumption share of GDP, with covariates and lagged dependent variables included, to determine the best nonlinear fit of government spending to transition years in three degrees. Figures C and D present the results, showing how government GDP share and consumption change during and after market transitions and giving the functions that define the polynomial prediction curves.

[Figure C about here]

[Figure D about here]

The jump from “0” to “1” shows that government size tends to increase at first in newly transitioning economies, more than in non-socialist countries. As transition proceeds, government tends to shrink, but after about ten years it starts to rise again, though not to the previous level. Perhaps this last tendency is capturing the establishment of new social welfare systems in Central and Eastern Europe. For the regression analyses, then, three control variables are created from the raw variable *YSMT* (“years since market transition”). For the government consumption regressions, those control variables are $\ln(YSMT+1)$, $(\ln(YSMT+1))^2$, and $(\ln(YSMT+1))^3$. For the government share of GDP

regressions, the three controls are $\frac{1}{\sqrt{YSMT+1}}$, $\frac{\ln(YSMT+1)}{\sqrt{YSMT+1}}$, and $\frac{(\ln(YSMT+1))^2}{\sqrt{YSMT+1}}$.

Figures C and D also show that government spending was more unpredictable in the early 1990s in post-transition countries, and that government spending clustered much more closely around the predicted level in the 2000s in these same countries. This is an example of the phenomenon of contemporaneous, panel-wise heteroskedasticity in time-series cross-section (TSCS) data. Beck and Katz

(1995) recommend an adjustment to standard errors in ordinary least squares regressions, “panel-corrected standard errors,” that the regressions in this paper use.

An alternative model structure for TSCS data is some form of fixed effects, in which either country dummies are included or, to economize on degrees of freedom, all variables are de-measured. This approach, used by Rodden (2003), is inappropriate for these data since the independent variable of interest, fiscal federalism, only infrequently changes. In fact, it never changes in some countries, which would need to be dropped from the regression if fixed effects were used. Instead, these models include a lagged dependent variable to account for the fact that last year’s size of government affects this year’s size of government. The coefficients on the independent variables thus reflect the effect of a one-unit increase in the independent variable on *change* in government size the next year. Asymptotic long-run effects of each independent variable can be calculated as $\frac{\beta}{1-\alpha}$, where α is the coefficient on the lagged dependent variable.

Table IV presents the results of the six regressions. The first regression has government share of GDP as the dependent variable, uses PWT data, and covers the years 1950-2004. The second regression adds to the first the number of jurisdictions and its interaction with fiscal federalism. The third regression uses government consumption share of GDP as the dependent variable, uses PWT data, and covers the years 1960-2004, while the fourth adds the two additional terms. The fifth regression uses government consumption as the dependent variable, uses WDI data, and covers the years 1975-2005, and the sixth adds the two additional terms. Table V gives marginal effects and significance tests for the interacted variables from regressions two, four, and six at different values of the companion variable.

[Table IV]

[Table V]

The jurisdictions variable and interaction term do not greatly improve the regressions. As the marginal effects table shows, we can be more confident of fiscal federalism’s downward pressure on

government consumption when the number of jurisdictions is large, but the number of jurisdictions does not statistically significantly reduce government size even at fairly high values of fiscal federalism. The effects on both variables are in the expected directions, but it appears that the more parsimonious regression models (1, 3, and 5) are fully adequate.

The substantive and statistical significance of fiscal federalism is markedly more apparent when government consumption is the dependent variable. Since government share of GDP includes both government consumption and investment, we can infer that fiscal federalism definitely depresses government consumption but has less effect on government investment. From the third regression, the estimated long-term effect of a one-unit increase in fiscal federalism on government consumption is 0.17 percentage points of GDP. A twenty-point increase in fiscal federalism, such as that experienced by Italy between 1992 and 1997, would in the long run reduce government consumption by 3.4 percentage points of GDP. A forty-point increase in fiscal federalism, such as a move from New Zealand's 2004 score (7.2) to Switzerland's 2004 score (48), would reduce government consumption by about seven percentage points of GDP, or just slightly more than the difference between New Zealand and Switzerland in 2004 (17.8% and 11.9%, respectively). This estimated effect is larger than that of a \$10,000 increase in GDP per capita.

These findings comport with one of the predictions of the "market-preserving federalism" model, that fiscal federalism reduces government spending. Since scholars broadly endorse this theorized relationship regardless of normative judgments about fiscal federalism, these findings are an important check of external validity on the proposed fiscal federalism measure. While previous work using state-of-the-art data on autonomous tax decentralization (Fiva 2006) has only found that decentralization reduces social security transfers, which is likely a spurious finding, we now have robust evidence that institutionalized fiscal federalism, more broadly conceived, reduces the proportion of the economy dedicated to the ongoing activities of government, as theory predicts. Theory also helps us to

understand why fiscal federalism reduces government consumption but not government investment, if mobile factors view government investment as largely providing complementarity with their own production.

Conclusion

The central contention of this article is that previous empirical work using spending or revenue decentralization as proxies for fiscal federalism is fundamentally flawed, because it has ignored the political context of fiscal federalism, especially the programmatic and political autonomy (institutionalization) of the sub-central jurisdictions. Existing measures of fiscal decentralization do not correlate well with a more robust operationalization of fiscal federalism. Guidelines for future attempts to measure fiscal federalism have been developed, along with a proposed variable that foregoes some precision for greater accuracy. As a validity check, government consumption and government share of GDP have been regressed on the proposed measure of fiscal federalism for 43 democracies, with the expected results obtaining. Fiscal federalism reduces government consumption share significantly over time, with somewhat weaker effects on government GDP share due to a lack of effect on government investment.

Nevertheless, the proposed fiscal federalism measure is not perfect. It ignores the common market component, which must be taken into account in some federal developing countries. It also does not take into account the nationwide baseline of public services and regulations that the central government may set. An alternative formula that does take into account the degree to which central government activism informally constrains lower-level jurisdictions was presented, but the data needed to create the measure are simply not available at present. Future empirical research on the effects of fiscal federalism on size of government, economic growth, and regional inequalities should forego the existing fiscal decentralization measures and use broader indicators that take into account all elements of the system as conceived in political-economic theory.

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Table I

Tax Revenue Decentralization by Country, 1996-2001 (Stegarescu 2005)

Country	Autonomous Taxes	Autonomous + Shared	All Tax Revenue
Australia	20.9	20.9	20.9
Austria	3.5	28.7	28.7
Belgium	24.2	44.2	44.5
Canada	52.4	52.4	52.4
Denmark	31.8	31.8	33.6
Finland	25.3	25.3	30.4
France	19.2	19.2	19.4
Germany	7.3	49.6	49.6
Greece	0.2	0.2	2
Iceland	24.7	24.7	24.7
Ireland	2.3	2.3	3.9
Italy	8.6	8.6	13.1
Japan	36.7	36.7	40.5
Luxembourg	8.3	8.3	8.3
Netherlands	5.1	5.1	5.1
New Zealand	5.7	5.7	5.8
Norway	22.6	22.6	23
Portugal	3.1	3.1	8.4
Spain	20.8	23.2	25.2
Sweden	43.7	43.7	43.7
Switzerland	53.9	57.8	57.8
UK	4.9	4.9	4.9
USA	36.3	36.3	36.3

Table II

Coding Procedures for the Fiscal Federalism Variable

If Institutional Depth < 2	If Institutional Depth = 2	If Institutional Depth = 3
0	Policy Scope (up to 3) * Fiscal Autonomy * Representation * 0.9	Policy Scope (up to 3) * Fiscal Autonomy * Representation

Table III

Fiscal Federalism Rankings, 2006

Country	Fiscal Federalism
Bosnia-Herzegovina	48
Canada	48
Serbia and Montenegro	48
Switzerland	48
USA	47.9904
Spain	36.744
Belgium	36
Italy	36
Austria	24
Germany	24
Australia	23.9376
Denmark	16.2
Norway	16.2
Sweden	16.2
Japan	14.4
UK	9.792
Russia	8.1
Croatia	7.2
Hungary	7.2
New Zealand	7.2
France	5.4
Netherlands	5.4
Portugal	1.13568
Finland	0.18
Albania	0
Bulgaria	0
Cyprus	0
Czech Republic	0
Estonia	0
Greece	0
Iceland	0
Ireland	0
Latvia	0
Lithuania	0
Luxembourg	0
Macedonia	0
Malta	0
Poland	0
Romania	0
Slovak Republic	0
Slovenia	0
Turkey	0

Table IV

Fiscal Federalism and Size of Government

Dependent variable:	Gov. share of GDP	Gov. share of GDP	Gov. consumption	Gov. consumption	Gov. consumption	Gov. consumption
Data source:	PWT	PWT	PWT	PWT	WDI	WDI
Years covered:	1950-2004	1950-2004	1960-2004	1960-2004	1975-2005	1975-2005
Variable	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)
Fiscal federalism	-0.0041 (0.0021)*	-0.0031 (0.0025)	-0.0068 (0.0033)*	-0.0049 (0.0055)	-0.0076 (0.0016)***	-0.0057 (0.0028)*
Jurisdictions		0.0007 (0.0009)		0.0005 (0.0013)		0.00008 (0.0017)
FF * Jurisdictions		-0.00004 (0.00006)		-0.00009 (0.00012)		-0.000094 (0.000099)
Real GDP per capita	0.018 (0.005)***	0.018 (0.005)***	0.023 (0.006)***	0.024 (0.006)***	0.026 (0.005)***	0.027 (0.005)***
Δ RGDPCC	-0.81 (0.060)***	-0.81 (0.060)***	-0.634 (0.060)***	-0.632 (0.060)***	-0.672 (0.080)***	-0.669 (0.081)***
Ln(Population)	-0.032 (0.020)	-0.035 (0.021)	-0.0229 (0.0262)	-0.0186 (0.0257)	0.0026 (0.0237)	0.0092 (0.0250)
Trade	0.0003 (0.0009)	0.0003 (0.0009)	0.0000004 (0.0008)	0.00005 (0.00075)	0.0013 (0.0011)	0.0013 (0.0011)
EU	-0.120 (0.078)	-0.124 (0.078)	-0.111 (0.077)	-0.122 (0.075)	-0.115 (0.085)	-0.124 (0.085)
Majoritarian	0.029 (0.067)	0.019 (0.070)	0.050 (0.058)	0.052 (0.070)	0.012 (0.057)	0.027 (0.070)
Transition variable 1	29.5 (15.0)*	29.6 (15.0)*	2.71 (1.53)	2.75 (1.51)	3.35 (1.39)*	3.36 (1.39)*
Transition variable 2	-12.9 (6.6)	-12.9 (6.6)*	-2.81 (1.42)*	-2.83 (1.41)*	-3.11 (1.26)*	-3.10 (1.26)*
Transition variable 3	1.78 (0.92)	1.78 (0.92)	0.67 (0.32)*	0.67 (0.32)*	0.69 (0.28)*	0.68 (0.28)*
Lagged dep. var.	0.96 (0.01)***	0.96 (0.01)***	0.96 (0.01)***	0.96 (0.01)***	0.96 (0.01)***	0.96 (0.01)***
Constant	-28.2 (15.0)	-28.2 (15.0)	1.14 (0.42)**	1.07 (0.42)**	0.48 (0.45)	0.38 (0.48)
R ²	97.1%	97.1%	95.6%	95.6%	95.2%	95.2%
N (countries)	1492 (43)	1492 (43)	1202 (42)	1202 (42)	923 (39)	923 (39)
Notes: Ordinary least squares regressions with panel-corrected standard errors. T-tests two-tailed except on "fiscal federalism." * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$						

Table V

Marginal Effects of Fiscal Federalism and Number of Jurisdictions

Variable	Testing Point	Regression 2	Regression 4	Regression 6
		Marginal Effect	Marginal Effect	Marginal Effect
Fiscal federalism	Median of "Jurisdictions" (9)	-0.0035	-0.0057	-0.0066**
	Mean of "Jurisdictions" (18.9)	-0.0040*	-0.0066*	-0.0075***
	75th percentile of "Jurisdictions" (21)	-0.0040*	-0.0068*	-0.0077***
Jurisdictions	Median of "Fiscal federalism" (3)	0.0005	0.0002	-0.0002
	Mean of "Fiscal federalism" (12)	0.0002	-0.0006	-0.0010
	75th percentile of "Fiscal federalism" (23.3)	-0.0003	-0.0016	-0.0021

Figure A

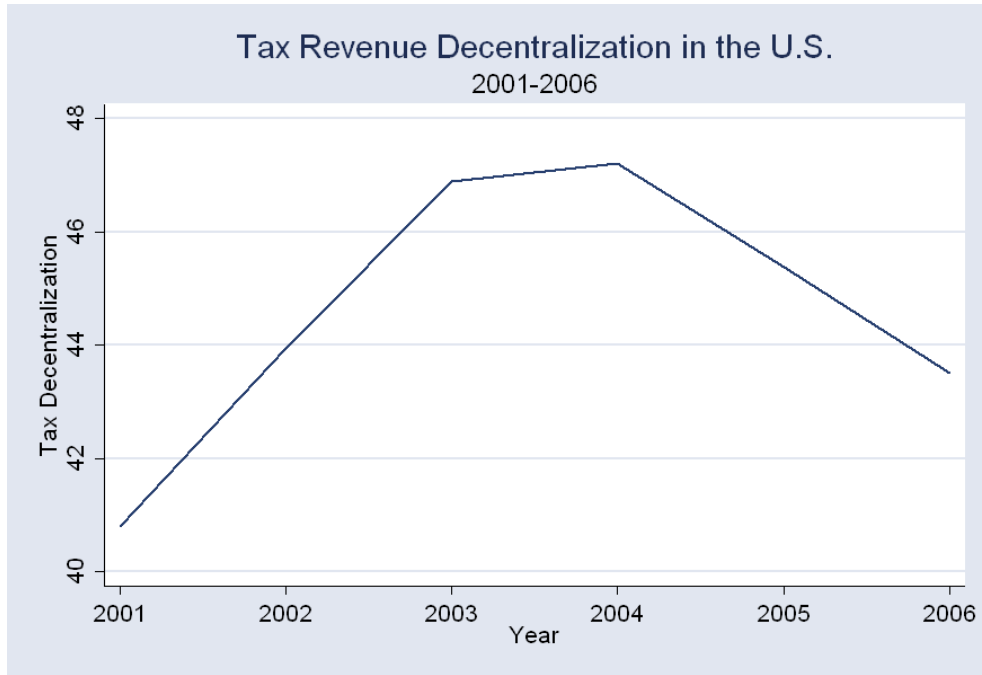


Figure B

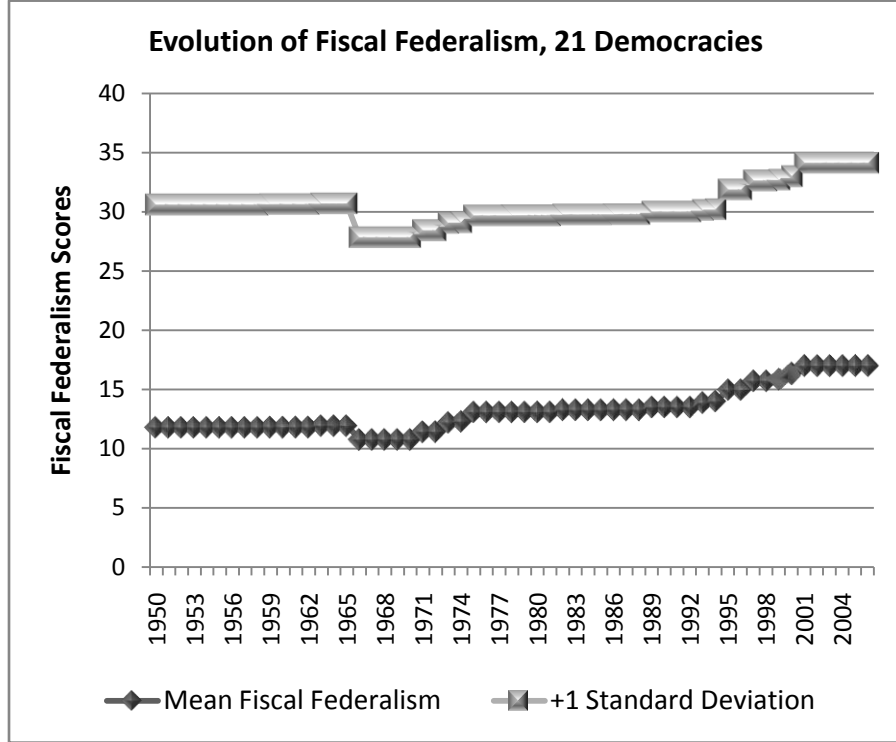
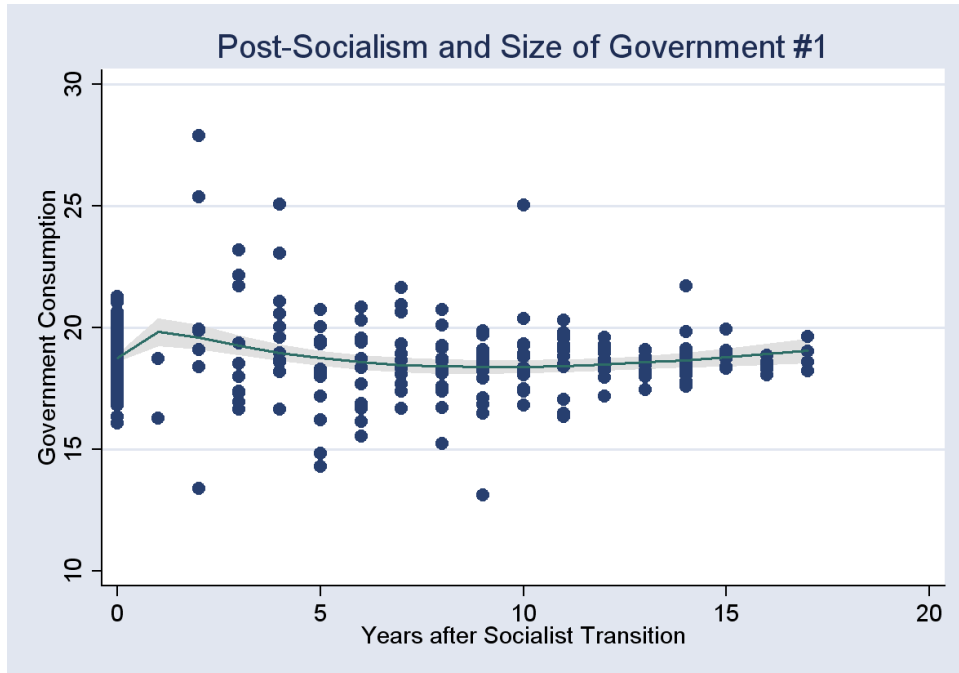
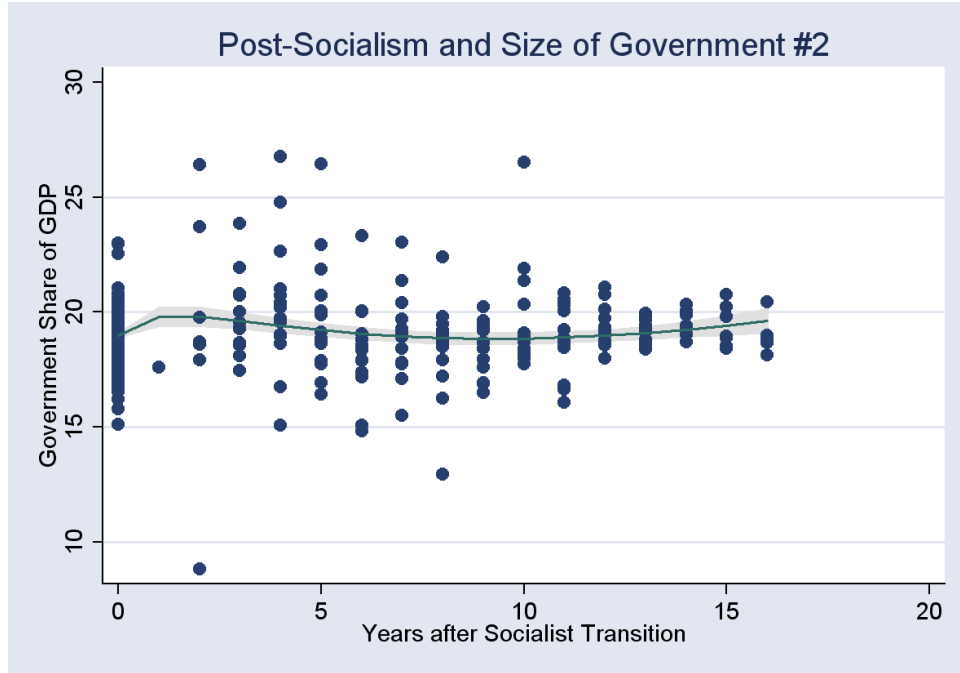


Figure C



$$y_t = 19.7 - 0.06 \left(\ln \left(\frac{YSMT + 1}{10} \right) + 1.302 \right) + 1.62 \left(\ln \left(\frac{YSMT + 1}{10} \right)^2 - 1.696 \right) \\ + 0.68 \left(\ln \left(\frac{YSMT + 1}{10} \right)^3 + 2.208 \right) + 0.96y_{t-1} + \beta(CTRLS)$$

Figure D



$$y_t = 19.84 + 29.73 \left(\frac{1}{\sqrt{\frac{YSMT + 1}{10}}} - 0.475 \right) - 14.96 \left(\frac{\ln\left(\frac{YSMT + 1}{10}\right)}{\sqrt{\frac{YSMT + 1}{10}}} + 0.707 \right) + 5.71 \left(\frac{\ln\left(\frac{YSMT + 1}{10}\right)^2}{\sqrt{\frac{YSMT + 1}{10}}} - 1.053 \right) + 0.96y_{t-1} + \beta(CTRLS)$$