Fiscal Decentralization in Specific Areas of Governments. An empirical evaluation with country panel data.

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Abstract:

This present paper is intended to explaining fiscal (FD) decentralization across countries end over time. Our contribution is twofold. First; we state that the median voter is faced with a cost versus efficiency trade-off plus numerous institutional restrictions when it comes to the optimum degree of FD, which is defined differently for each type of government's expenditure. In light of this, our empirical analysis examines the case of six specific types of decentralization, which contrasts with FD being seen a one-dimensional variable. Second, since the available data set from the IMF, as well as some of the related variables needed to make the empirical analysis are incomplete, an imputation procedure is made in order to produce a balanced panel of 44 countries. Results confirm that different State's functions exhibit different patterns when it comes to the explanatory variable being used.

Keywords:

Public Politics, Expenditure, Fiscal Federalism, Decentralization.

JEL Code:

D720, H110, H710, H770.

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1. Introduction.

An extensive theoretical as well as empirical literature exists upon the effects of fiscal decentralization on various areas of public sector (Letelier 2012, Voigt y Blume 2012). Similarly, some research has been made to shed light over the reasons why some countries are more fiscally decentralized than others and/or why they exhibit a predictable pattern over time as regards this matter (Panizza, 1999, Letelier 2005, Arzaghi y Henderson; 2005). Nonetheless, a vacuum still exists when it comes to explaining why some specific areas of government are more likely to be decentralized than others. While the bulk of the research so far provides sound explanations regarding why the share of sub national government's expenditure relative to the general government's tends to rise (decline) in response to well defined exogenous variables, it ignores the fact that public goods may exhibit important differences from one another in both the particular technology needed to produce them and the very capacity of decentralized jurisdictions to provide suitable administration support and funding.

We hypothesizes that two driving forces are key determinants in the extent to which decentralization is a welfare wining option in particular public goods. On the one hand, decentralization entails better locally based information being available to policy makers and public managers. On the other, decentralization may lead to a loss in scale economies from public provision, which raises the price (taxes) being pied for such services (Letelier and Sáez 2012). Superimposed on above arguments, there in an exogenously given institutional structure that frames underlying incentives of the political economy game. Our aim hinges upon the need to explaining why particular areas of government differ in their decentralization pattern. We estimate an unbalanced panel model that includes 44 countries for which data are available from the IMF (*GFS)* and other related sources. In order to obtain a balanced panel, we complete missing values by using an imputation technique.

The remaining of this paper is as follows. Section 2 describes the existing theory about the country determinants of fiscal decentralization. The empirical model is presented in section 3. Section 4 discusses econometric results. Conclusions are presented in section 5.

2. Fiscal Decentralization in Theory and Practice.

The theory on why decentralization may produce a better (or worse) public sector quality outcome dates back as far as Hayek (1945) and his acknowledgement of decentralization being a socially efficient way to taking advantage from "dispersed individual information on the needs and demands in society". While normative public finance tradition in economics has made this contention into a theorem (Oates, 1972), it falls short in differentiating case specific public goods in the analysis. Similarly, despite the so called "second generation of Fiscal Federalism" (Lokwood, 2006; Oates 2008) has made sound contributions in understanding the underlying political process that explains fiscal decentralization, it makes no explicit mention of the multiple dimensional nature of public goods. Although the role being played by inter jurisdictional externalities (Oates, 1972; Zodrow and Mieszkowski, 1986), the extent of scale economies being seen as an obstacle for small sub national governments to be in charge (Oates, 1985; Bennett 1994) and a myriad of other counter arguments to decentralization (Prud'homme, 1995) have been extensively examined in the empirical literature, little effort has been made to formalize such a complex variety of cases in a comprehensive way. A contribution in this regard is the work by Letelier and Saez (2012), thereby two opposing driving forces in explaining fiscal decentralization are identified. At the one hand, the so called "Von Hayek Effect" (*VHE*) results from the gains in government's information about the particular demands of the local constituency resulting from a stronger local representation. At the other, the "Scale Effect" (*SCE*) generated by the loss in economies of scale from decentralization is assumed to have a cost push effect on public goods provision. Since both effects are specific public goods sensitive, it follows that different public functions may exhibit different degrees of decentralization.

Among variables generally recognized as relevant in driving public sector structure, median voter's income is certainly the one that deserves most attention. It has been argued that as income rises, voters become more demanding on the quality of public goods as well as on the type of public goods they want. In the same way as more demand for equity oriented public expenditure may be expected as the median voter (*MV*) becomes more affluent, it may also be expected that more demand for highways and public infrastructure will emerge (Pryor 1967). Some argue this has tended to strengthen the share of intermidium levels of governments among federal countries (Pommerehne 1977; Marlow 1988; Wallis and Oates 1988) *vis a vis* the national and local levels. Another argument worth mentioning states that as the *MV*'s income rises, so does the national budget and the corresponding ruling government's spoils from office. As this becomes more significant and visible, the *MV* will be more likely to prefer a decentralized arrangement thereby budget control is spread up across smaller autonomous sub national governments (Panizza 1999). Nevertheless, Letelier and Sáez (2012) contend that a rise in the *MV*'s income does not necessarily lead to more decentralization, as we expand the model to more than one public good. On the one hand, more centralization lowers public goods quality. On the other, the cost reducing effect of centralization may be further strengthened as total expenditure on one particular public service rises, driving some of it away from lower tiers of government and into the national level. Areas of governments in which large and usually indivisible investments are needed may be subject to such a pattern. Conversely, public goods in which the quality benefit of decentralization and/or the ideological sensitivity of widening the gap between the local and central *MV* is high, are likely to be more decentralized.

The effect of people "diversity" has been often taken as a factor leading to a more public goods differentiated demand. Similarly, voters diversity entails a larger "ideological distance" between the median and every different community (Panizza 1999), which makes decentralization a welfare wining option. This contention is strongly rooted on theoretical predictions (Tiebout 1956), as well as in the empirical evidence (Oates, 1972; Pommerehne, 1977; Panizza 1999, Letelier 2005). Separate mention deserves individuals' heterogeneity as this entails a potential demand for differentiation. Thus, more political,

cultural or ethnic diversity may lead to more fiscal decentralization (Pommerehne, 1977; Letelier 2005).

A number of other potentially significant explanatory variables have been currently singled up. One worth mentioning is population density, on account of its potential effect on the ideological distance between national and local constituencies (Panizza, 1999) and/or the minimum scale operation required to efficiently provide services (Litvack and Oates 1971, Letelier and Saez 2012), which is usually weighted against the gains of distributing a fixed cost over a larger population (Buchanan 1965). Globalization is certainly a factor worth considering. Some argue that political and/or economic integration may lead to less power on traditional national states, and therefore, more visibility and chances of autonomy from sub national governments (Alesina and Spolaore 1997, Bolton and Roland 1997, Alesina et al. 2000, Tanzi 2008). Nevertheless, globalization is also likely to strengthen the link between the national business cycle and the international one, which entails the need for stronger compensation mechanisms to operate in favors of those regions (countries) most affected. As such a measurements should be centrally run policies, more integrated countries may be expected to be more fiscally centralized. Empirical evidence is not fully conclusive. While some studies have found that globalization leads to more centralization (Garrett and Rodden 2003), opposite results have been reported by Garrett and Rodden (2003).

Finally, the influence of political factors in the making and enforcement of fiscally decentralized rules is twofold. First, we will assume that "institutions" matter, so that the existing rules of the game have a visible impact on the distribution of public revenues. Second, we state that national governments are generally reluctant to fiscal decentralization. Theory predicts that an underlying conflict exists between the spoils from office form running a large national budget by the federal (central) government, and the alleged benefits from fiscal decentralization prescribed by the normative arguments above (Pannizza, 1999; Arzaghi M. and Henderson, 2005). Such a trade off expresses itself in an effort by the national government to keeping control of the budget, on the one hand, and the pressure from organized regionally and locally based groups to get a larger share State's

revenues. Thus, we may expect that institutional arrangements that strengthen the national government's power will prevent decentralization. At the other end, weak and fractionalized parties and parliamentary regimes will generally favor fiscal decentralization. Albeit ideology may have a saying in the issue at hand, it not cut clear what the sign of this correlation is. While the traditional neoliberal view advocates an all across the board budget devolution (e.i. Tiebout, 1956; Brenan and Buchanan, 1980), some argue that "participation" is a political asset in its own right that should be promoted at all levels, this being a precondition for fiscal decentralization to occur (Falleti 2005).

3. The empirical model.

The model presented in this section is intended to explain the extent of FD in the areas of education, health, housing, social protection, culture and recreation and transportation. Albeit the model structure being proposed follows similar former studies on the subject matters, it explicitly acknowledges that FD has an important path dependence dynamics, which is capture by the lags of FD being included in the regression. It is stated that each of our six expenditure items j ($j = 1, ..., L$) are generally explained by Ec.1:

$$FD_{ij,t} = f(FD_{ij,t-s}, N_{it}, IP_{it}) \; \forall j = 1,\ldots, L \tag{1}$$

where $i = 1, ..., N$, account for our countries (groups), and $t = 1...T$, stands for time (years) units. As for explanatory variables, $FD_{ij,t-s}$ is the s lag of our endogenous variable, . N_{it} is meant to capture the set of normative (non political) factors that affect FD and IP_{it} encompasses a set of institutional an political variables that limit the MV's capacity to enforce his will through the political process.

The set called N (sub indexes omitted from now onward) include GDP per capita ($GDPpc$), population density (D), the degree of country's globalization (G), urbanization (U) and social plurality (SP) (table 1). Although a higher $GDPcap$ is associated with a higher demand for public goods' quality - which may be achieved through more decentralization, every different type of expenditure contains a varied component of "national public good".

Although education is typically treated as a local public good in light of its closeness to community life, it is also true that it entails a significant redistributive elements as it is usually associated with a redistributive oriented type of expenditure. Similar arguments can be made in the cases of health, housing and social security. As far as *D* is concerned, discussion above precludes that a trade-off will exist between the benefit of coordination and more centralization as *D* rises, and the lower cost per head of genuinely decentralized services in highly populated areas. Similarly, formerly presented hypotheses are not unanimous in predicting the sign of its impact on *FD*, let alone the specific *FD* cases being examined.

[TABLE 1]

Among institutional-political variables, the set *IP* in Ec.1 is made up of five exogenous variables. Tow fundamental features are captured by a dummy for federal countries (*FED*), and a dummy for democracy (*DEM*). This last one is in turn interacted with national government's majority coalition (*DEM* × *MAJ*), the ruling government's ideology (*DEM* × *IDEO*) and the effective number of effective parties in parliament (*DEM* × *NP*). The kind of institutional regime is also included (*IR*), which stands for the type of executive. It follows that the explicit function to be estimated takes the form depicted in Ec.2:

$$FD_{ij,t} = \sum_{s=1}^{T-1} \alpha_s FD_{ij,t-s} + \beta_1 GDPpc_{it} + \beta_2 D_{it} + \beta_3 G_{it} + \beta_4 U_{it} + \beta_5 SP_{it} + \lambda_1 FED_{it} + \lambda_2 MAJ_{it} +$$
$$\lambda_3 IDEO_{it} + \lambda_4 IR_{it} + \lambda_5 NP_{it} + \varepsilon_{ij,t} \quad \forall j = 1,\ldots,L$$

$$(2)$$

$$\varepsilon_{ij,t} = \mu_i + u_{ij,t} \quad \forall j = 1,\ldots,L$$

where $\varepsilon_{ij,t,}$ is a random disturbance, μ_{ij} stands for country's *i* unobserved time invariant fixed effects[3] and $u_{ij,t}$ is an idiosyncratic country *i* error observations.

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[3] In the model already specified the variable D_{it}, which is a country-specific effect, *t*-invariant.

4. Model Estimation.

4.1 The estimation strategy.

The estimation of our empirical model in the context of a dynamic panel presents two serious problems econometric. First, we have a sample heterogeneity problem - namely unobserved i fixed effects, which are time invariant. If this is not properly addressed it leads to inconsistent estimations. Second; if estimated by OLS, the presence of lagged endogenous variables in the mode is conducive to biased and inconsistent estimations resulting from the correlations between these lags and error term. In dealing with above problems, Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) propose the use of the generalized method of moments (GMM) estimator GMM difference (DIFF-GMM) and GMM system (SYS-GMM). In our case, the SYS-GMM estimator is used in two stages, which produces robust estimations under autocorrelation and heteroskedasticity whenever there is a high degree of persistence in the series and the number of temporal observations is small (Blundell and Bond, 1998). The consistency of SYS-GMM estimators is based upon the validity of the conditions of no disturbance time correlation and the exogenous status of explanatory variables. We use the Arellano and Bond (1991) statistics to evaluate autocorrelation, in which the null is no correlation. Ortogonality conditions are tested by using Hansen test (1982).

4.2 Data.

Following previous empirical research, our fiscal decentralization measurements *FD* are based upon IMF's Government Financial Statistics (GFS). The general definition of *FD* being used equals sub national government's expenditure as a share of the general government's. In our case, such a measurements are focused on specific areas of expenditures. In particular; we examine the cases of education *(FDED)*, health *(FDHE)*, housing *(FDHO)*, social protection *(FDSP)*, recreation, culture and religion *(FDRCR)* and transportation *(FDTRANS)* (table 1).

Selected countries are the ones for which information is available from the aforementioned source. This entails 44 countries, whose available annual information differ over time, leading to an unbalanced panel that covers OCDE, Latin America, Asia and Eastern European countries. Among them, the longest available time series spans from 1972 to 2008 (table 2).

[TABLE 2]

As opposed to previous empirical studies, we have imputed 56 missing data for both endogenous as well as exogenous variables (table 1), which was done according to Rubin's (1987) multiple method (MI). Such a procedure hinges upon a Monte Carlo simulation that assumes a random pattern for the missing data, a high correlation between imputed variable, a set of co variables and a model for imputed endogenous variables similar to the one reported in the econometric results. An advantage of this imputation technique is that it does not modify the statistical properties of the original series, avoiding relevant changes on the imputed variables distribution.

4.3 Model testing and Results.

The table 3 presents of the dynamic panel estimation defined in Ec.2, with separate results for *FDED*, *FDHE*, *FDHO*, *FDSP*, *FDRCR* and *FDTRA*. Only significant lags of the endogenous variables were included, which amounts to three in all cases but social protection.

[TABLE 3]

In all six cases, the SYS-GMM provide consistent estimators as the orthogonality condition is not rejected (Hansen's test) and no second-order correlation is detected (Arellano-Bond test for AR (2) in first differences). Hansen's test supports the validity of specified instruments and so do the Arellano-Bond for the absence of AR (2) autocorrelation. The Wald test shows that the set of explanatory variables specified in the model of fiscal decentralization are significant. it follows that the estimation of our

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dynamic model by using a first differentiated system of equations generates efficiency gain in all six functions of fiscal decentralization.

As far as the estimated coefficients are concerned, the first thing to notice is that *GDPpc* affects FD negatively in all cases but transportation. Such a result calls into question the view that regardless of the type of government's expenditure at stake, FD necessarily rises with development, which is in contrast with most previous literature. Most likely, a public good component predominates in the cases of *FDED*, *FDHE*, *FDHO*, *FDSP* and *FSRCR*. This comes to no wonder when it comes to equity oriented expenditures as it is indeed the case of above functions but *FDRCR*. The quest for national standards as *GDPpc* grows is likely to be a case in point when it comes to education. Nevertheless, common standards may not necessarily be just about education's content, but also - and even more importantly- about the specific types of expenditures to be funded by sub national governments. An aspect worth mentioning in this regard is the question as to what tier of government is in charge of paying teachers' payroll, who are very often strongly unionized and rather reluctant to decentralization (e.i. Galilea et. al. 2011). Similarly, albeit primary health services at the community level may be focused on the specific kind of needs from local residents - which reinforces a *GDPpc* driven decentralization demand, most expensive health treatments are national in scope, as they require highly complex interventions which are very often performed in large centrally run specialized hospitals. To this must be added the need for an efficient logistic management, which may become a major challenge as inputs purchases become large enough. Separate mention deserves the likely rise in political demands for more equity as *GDPpc* grows. As such a goal may not be satisfactory accomplished through decentralization, some re-centralization trend are observable over recent years (Saltman 2008). Similar arguments hold for the cases of housing (*FDHO*) and social protection (*FDSP*), in which equity considerations are a key policy component. As opposed to aforementioned state's functions, religion, culture and recreation (*FDRCR*) and transportation (*FDTRA*) share the fact of not being "social oriented" expenditures. Nevertheless, the cost versus quality trade-off referred to above may explain the sign of the *GDPpc* coefficient on each case. As for transportation, the role being played by sub national governments - most likely municipal ones - appears to become more significant as

GDPpc rises, which is in line with an increasing public goods' "quality demand" by residents. Despite government's expenditure on religion, culture and recreation is often regarded as a local responsibility, reported *GDPpc* coefficient suggests this being mostly funded by the central government. This comes to no wonder if we acknowledge a likely major role being played by sub national governments in running cultural related policies, albeit not in funding them.

Population density (*D*) appears to have a significant positive effect on *FDED* and *FDTRA*. As stated earlier, the net cost saving effect of decentralization becomes a major consideration in this case. Expectedly, low density population areas are unlikely to run schools efficiently and/or be able to funding high quality transportation services. This effect becomes more visible as some share of the whole funding is based upon the number of students being attended, as it is the case in the voucher based funding scheme. Although rather few countries operate under such a system, some exhibit a significant share of it being funded that way. As for transportation, the potential gains from some kind of coordination across local governments when *D* rises, makes it mutually beneficial to hand over important responsibilities onto higher levels of government. Although this may be sorted out at the regional (state) level in federal countries, it will be the national government the one to become in charge in unitary countries. As for *FDHE* and *FDHO*, they may be expected to be functions in which the national public good component is significant. On the one hand, the procurement of equipments and medical supplies is likely to be subject to important scale economies as *D* rises, which makes complex health centers to be more efficiently run by the national (state) level. On the other, migration of housing policy beneficiaries makes such a function to be more efficiently performed by the national level. Finally, social protection does not appear to be sensitive to *D*.

Remaining socio economic variables exhibit effects that generally conform the set of hypotheses stated above. First, globalization index (*G*) appears to affect FD positively, which comes to be all the more significant as it shows no exceptions in the cases being studied. Second, the fact of urbanization (*U*) having a positive effect suggests that cities are more likely to conform autonomous local governments in which some functions may be

efficiently performed. Interestingly, the exception to the rule is social protection (*FDSP*), which hosts a variety of unspecific public policy actions that encompass retirement pensions, subsidies to those in need and the like. Once more, mobility of potential beneficiaries entails low political benefits for local urban governments to take responsibility. Third; similar reasons may explain why social protection appears to be the only type of FD being sensitive to social plurality (*SP*).

Similarly, politico-institutional variables have different effects across types of FD. As expected, federal countries (*FED*) have a higher degree of FD. Nevertheless, this appears to have no effect in housing and transportation. Another clear breakthrough is the one that discriminates between a dictatorship, a parliamentary democracy and a presidential democracy (*RI*). Once again, education and health appear to be clearly sensitive to such institutional features. However the cases of *FDHO* and *FDRCR*, majority supported governments (*MJ*) are clearly less decentralized. We may expect that those functions in which the general government's budget is larger, the effect of *MJ* will be stronger, as rents from centrally administered services become more significant. Our results confirm this, as main social functions - namely education, health and social protection, absorb a substantial share of general government's budget. As far as ideology is concerned (*IDEO*), reported results suggest that right wing coalitions are more centralized in education, health and social protection, and more decentralized oriented on housing, recreation and religion and transportation. A pattern may be identified as we acknowledge that main social income-redistributive functions are subject to technological characteristics that make unlikely for ideological factors to have an effect on them being more (less) decentralized. Conversely, *FDRCR*, *FDTRA* and *FDHO*, are likely to have a stronger local government component, as they usually require public policies to fit specific local demands. As for the number of political parties being represented in parliament (*NP*), this must be taken as a politically based proxy for diversity, which is expected to affect FD positively. Albeit *NP* coefficients are consistently positive in all regressions, this variable is just strongly significant in education, and marginally significant in housing. Finally, lags of FD being reported show that a strong path dependence exists in all six functions.

5. Conclusions.

This paper is intended to explain fiscal decentralization (FD) both across countries and over time. Two contributions are made to former literature on the subject matter. First, a comprehensive panel data base is made available by combining existing country level data sources with an imputation technique, that significantly expands the size of the data base. Second, we contend that general government's FD does not necessarily follow the same pattern as specific areas of government's expenditure do. Generally, we hypothesize that the central government is reluctant to decentralization as this lowers its power on the budget, this effect being stronger the more strongly supported the national government is. Similarly, income per head, population density and population diversity are taken to test their effects. A trade-off between local knowledge benefits from decentralization and its likely effect on costs of service delivery is hypothesized, so that differentiated effects are expected across types of FD. In this regard, six separate types of expenditure FD - namely education, health, housing, social protection, religion, culture and recreation and transportation- are examined separately in order to identify the extent to which a set of socio economic, political and institutional variables affect FD. As expected, the effect of each explanatory variable differs across types of FD.

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APPENDIX

Multiple imputation method.

We take advantage from the multiple imputation method (IM) in order to produce efficient imputations of missing data which do not change the statistical properties of the series (Rubin 1987). The IM method is based on three assumptions: i) the pattern of missing data is random, ii) in the case of multivariate imputations, variables being imputed must be highly correlated with the vector of covariates, and iii) in the imputations of the endogenous variable (FD in Ec.2), the specified IM model must be identical to the Ec.2 (Rubin 1987 and 1996). In all cases, twenty imputations were made to achieve a 96% efficiency (see table below for more details).

[TABLA A]

Table 1. Variable

Variable	Definition	Measurement	Source	Nº. Observations Imputation
FDED	Education fiscal decentralization	Education expenditures of state and local government / Education expenditure of the local, state and central	IMF's Government Financial Statistics (GFS)	4
FDHE	Healt fiscal decentralization	Healt expenditures of state and local government) / Healt expenditure of the local, state and central	IMF's Government Financial Statistics (GFS)	4
FDHO	Housing fiscal decentralization	Housing expenditures of state and local government) / Housing expenditure of the local, state and central	IMF's Government Financial Statistics (GFS)	5
FDSP	Social protection fiscal decentralization	Social protection expenditures of state and local government / Social protection expenditure of the local, state and central	IMF's Government Financial Statistics (GFS)	5
FDRCR	Recreation, culture and religion fiscal decentralization	Recreation, culture and religion expenditure of state and local government / Recreation, culture and religion expenditure of the local, state and central	IMF's Government Financial Statistics (GFS)	2
FDRTRANS	Transportation fiscal decentralization	Transportation expenditure of state and local government / Transportation expenditure of the local, state and central	IMF's Government Financial Statistics (GFS)	5
GDP	Gross domestic product	Constant prices, international &, base year = 2000	World Bank. World Development Indicators.	0
D_{it}	Density population	People per square Km.	World Bank. World Development Indicators.	0
G_{it}	Index of globalization	Weighted average of the following variables: economic globalization, social globalization and political globalization	Dreher. KOF Index of Globalization.	0
U_{it}	Population in the largest city	Population in largest city is the percentage of a country's urban population living in that	World Bank. World Development Indicators	0

Table 1. Variable

Variable	Definition	Measurement	Source	Nº. Observations Imputation
		country's largest metropolitan area		
SP_{it}	Social plural	Classification society based on the ethno-linguistic fractionalization index of Alesina et al. (2003): heterogeneous (1), and homogeneous (0).	Pipa Norris Data. John F. Kennedy School of Government, Harvard University.	0
FED_{it}	Decentralization constitutions federal	Type of unitary or federal constitution: federal (1), and unitary/hybrids unions (0)	Pipa Norris Data. John F. Kennedy School of Government, Harvard University.	0
MAJ_{it}	Majority of government	Majority of government (0-1): number of government seats divided by total seats	Keefer, P, DPI2009. Data of political institution. Development Research Group The World Bank.	0
$IDEO_{it}$	Political orientation of government	Political orientation of government: right (1); left (-1); center (0).	Keefer, P, DPI2009. Data of political institution. Development Research Group The World Bank.	0
IR_{it}	Institutional regime	Political regimes in which democracies are distinguished by the type of executive: dictatorship (0); parliamentary democracy (1); mixed executive/democracy (2); and presidential democracy (3).	Pipa Norris Data. John F. Kennedy School of Government, Harvard University.	0
NP_{it}	Effective number of parliamentary or legislative parties	Effective number of parliamentary or legislative parties constructed using the formula from Laakso and Taagepera (1979).	The QoG Social Policy Datase (version 27May10). University of Gothenburg: The Quality of Government Institute	31
DEM_{it}	Democratic or autocratic regime	Type of democratic or autocratic regime: democratic (1) or dictatorship (0)	Pipa Norris Data. John F. Kennedy School of Government, Harvard	0

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Table 1. Variable

Variable	Definition	Measurement	Source	Nº. Observations Imputation
			University.	
Population	Number of eople country	People the	World Bank. World Development Indicators	0

Table 2. Panel data: country and times series[a]

País	Times series
Albania	1995 - 1998
Argentina	1972 - 2001
Australia	1972 - 1998
Austria	1972 - 1994
Botswana	1994
Bulgaria	1988 - 2007
Canada	1979 - 2007
Chile	1974 - 1988
China M.L	1995 - 1999
China Macao	1996 - 2001
Colombia	1974 - 1986
Croatia	1995 – 2001
Czech Republic	1993 - 2007
Denmark	1972 - 2000
Estonia	1991 - 2001
France	1978 - 1993
Germany	1974 - 1996
Hungary	1990 – 1999
Iceland	1972 – 1998
India	1974 – 2005
Indonesia	1975 – 1993
Iran, I. R.	1999 – 2008
Ireland	1982 – 1997
Israel	1976 – 1999
Kazakhstan	1997 – 2007
Kenya	1986 – 1994
Latvia	1994 – 2007
Lithuania	1993 – 2003
Luxemburg	1972 – 1995
Malasia	1990 – 1991

Table 2. Panel data: country and times series[(a)]

País	Times series
Mongolia	1992 – 2002
Norway	1980 – 1999
Poland	1994 – 2000
Romania	1990 – 2001
Slovakia	1996 – 2002
Spain	1995 – 1997
Switzerland	1990 - 2006
Tailandia	1988 - 1996
The Netherlands	1991 – 1997
Uganda	1999 – 2011
United Kingdom	1979 – 1998
United States	1980 – 2001
Zimbabwe	1984 - 1989

[(a)] Excluding South Africa because the database IMF's Government Financial Statistics (GFS) data are not central government expenditure on education, health, housing, social protection, recreation, culture and religion, and transportation.

Table 3: Estimation of the dynamic model of decentralization of public spending in the world

	Estimator two-step system GMM					
Exogenous variables	Endogenous variables					
	$FDED_{it}$ [1]	$FDHE_{it}$ [2]	$FDHO_{it}$ [3]	$FDSP_{it}$ [4]	$FDRCR_{it}$ [5]	Log $FDTRA_{it}$ [6]
$GDPpc_{it}$	-0.00000141***	-0.00000154***	-0.00000805***	-0.000000935***	-0.00000380***	0.00000465***
	(-8.90)	(-4.62)	(-27.60)	(-6.35)	(-11.16)	(4.24)
D_{it}	0.0000598***	-0.00000485***	-0.0000108***	0.000000775	-0.00000458***	0.000376*
	(4.30)	(-3.99)	(-4.31)	(0.97)	(-3.75)	(2.21)
G_{it}	0.000476***	0.00129***	0.00284***	0.00106***	0.00134**	0.00193***
	(3.31)	(7.67)	(15.62)	(9.86)	(3.28)	(3.79)
U_{it}	0.000352*	0.000361**	0.000914*	-0.000224*	0.000913***	0.000171
	(2.05)	(2.84)	(2.18)	(-2.02)	(3.54)	(0.44)
SP_{it}	0.00436	-0.00219	-0.0246	0.0394***	0.0300	0.166
	(0.80)	(-0.34)	(-0.60)	(3.75)	(0.30)	(1.44)
FED_{it}	0.0597***	0.0729***	0.0154	0.0427*	0.0673***	-0.0673
	(5.42)	(7.90)	(1.59)	(2.40)	(5.09)	(-0.44)
$DEM_{it} \times MAJ_{it}$	-0.0389***	-0.0974***	-0.0288	-0.0669***	0.00560	-0.113***
	(-6.19)	(-22.87)	(-1.55)	(-13.37)	(0.39)	(-3.77)
$DEM_{it} \times IDEO_{it}$	-0.00234***	-0.00769***	0.00400*	-0.00314***	0.00436***	0.00750***
	(-3.60)	(-21.05)	(2.41)	(-8.92)	(4.79)	(5.60)
RI_{it}	0.0166*	0.0220***	0.0260	0.00303	0.0225	0.0555
	(2.33)	(7.45)	(1.23)	(0.65)	(1.65)	(1.64)
$DEM_{it} \times NP_{it}$	0.00177**	0.000736	0.00583*	0.000393	0.000890	0.00215

Table 3: Estimation of the dynamic model of decentralization of public spending in the world

Exogenous variables	Endogenous variables					
	$FDED_{it}$ [1]	$FDHE_{it}$ [2]	$FDHO_{it}$ [3]	$FDSP_{it}$ [4]	$FDRCR_{it}$ [5]	Log $FDTRA_{it}$ [6]
	(3.26)	(1.32)	(2.34)	(0.99)	(1.16)	(1.69)
$FD_{j,t-1}$ [a]	0.709***	0.536***	0.728***	0.807***	0.457***	0.193***
	(21.29)	(34.45)	(68.01)	(63.29)	(10.39)	(4.34)
$FD_{j,t-2}$ [b]	0.120***	0.0396**	-0.179***		0.273***	0.257***
	(3.41)	(3.18)	(-25.08)		(16.18)	(8.47)
$FD_{j,t-3}$ [c]	0.0437***	0.157***	0.158***		0.457***	-0.153**
	(5.25)	(11.82)	(29.88)		(10.39)	(-3.19)
Number of obs.	445	449	438	500	422	383
Number of groups	38	39	38	40	36	33
Test Wald	chi2(13)= 3.00e+07	chi2(13) = 656943.52	chi2(13) = 3.59e+07	chi2(11) = 1.65e+06	chi2(12) = 1.37e+07	chi2(13) = 8.67e+08
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Arellano-Bond test for AR(1) in first differences: z	-2.02	-1.80	-2.62	-1.23	-2.56	-2.85
Prob > z	0.043	0.072	0.009	0.219	0.010	0.004
Arellano-Bond test for AR(2) in first differences: z	-1.12	0.70	0.05	-0.10	-1.56	-2.01
Prob > z	0.262	0.486	0.962	0.917	0.118	0.045
Hansen test of overid. Restrictions	chi2(61) = 23.56	chi2(61) = 24.89	chi2(61) = 24.10	chi2(63) = 27.59	chi2(62) = 23.38	chi2(60) = 17.15
Prob > Chi2	1.000	1.000	1.000	1.000	1.000	1.000
Difference-in-Hansen tests of exogeneity of instrument subsets: iv [$GDPpc_{it}$, D_{it}, G_{it}, U_{it}, SP_{it}, FED_{it}, MAJ_{it}, $IDEO_{it}$, RI_{it}, NP_{it}]						
Hansen test excluding group	chi2(52) = 20.21	chi2(52) = 22.82	chi2(52) = 24.55	chi2(54) = 27.25	chi2(53) = 19.95	chi2(51) = 20.27
Prob > Chi2	1.000	1.000	1.000	0.999	1.000	1.000
Difference (null H = exogenous)	chi2(9) = 3.35	chi2(9) = 2.07	chi2(9) = -0.45	chi2(9) = 0.34	chi2(9) = 3.43	chi2(9) = -3.12
Prob > Chi2	0.949	0.990	1.000	1.000	0.945	1.000

z statistics in parentheses: * p<0.05, ** p<0.01 and *** p<0.001

[a] $FD_{j,t-1}$ descentralización de la política de gasto j (j= 1, …, L) retardada un periodo (año)

[b] $FD_{j,t-2}$ descentralización de la política de gasto j (j= 1, …, L) retardada dos periodos (años)

Table 3: Estimation of the dynamic model of decentralization of public spending in the world

Exogenous variables	Endogenous variables					
	Estimator two-step system GMM					
	$FDED_{it}$ [1]	$FDHE_{it}$ [2]	$FDHO_{it}$ [3]	$FDSP_{it}$ [4]	$FDRCR_{it}$ [5]	Log $FDTRA_{it}$ [6]
[c] $FDj_{,t-3}$ descentralización de la política de gasto j (j= 1, …, L) retardada tres periodos (años)						

Table A. Imputation data missing

Variable	Country	Time
Local Government Expenditure on Education	Luxemburg	1989
	Colombia	1986
Central Government Expenditure on Education	Mongolia	1999
	India	2005
Local Government Expenditure on Health	Luxemburg	1989
	Colombia	1986
Central Government Expenditure on Health	Mongolia	1999
	India	2005
Local Government Expenditure on Housing	Luxemburg	1989
	Colombia	1986
Central Government Expenditure on Housing	Mongolia	1999
	India	2005
	Estonia	2001
Local Government Expenditure on Social Protection	Luxemburg	1989
	Colombia	1986
Central Government Expenditure on Social Protection	Mongolia	1999
Local Government Expenditure on recreation, culture and religion	Luxemburg	1989
Central Government Expenditure on recreation, culture and religion	Mongolia	1999
Local Government Expenditure on Transportation	Luxemburg	1989
	Uganda	2001
Central Government Expenditure on Transportation	Mongolia	1999
	Iran, I. R.	2001
	India	2005
Effective number of parliamentary or legislative parties	Bulgaria	1988, 1989, 2001, 2003-2007
	Canada	2003-2007
	Czech Republic	1993-1995, 2003-2007
	Latvia	2003-2007
	Switzerland	2003-2006