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ADB Working Paper Series

**FISCAL EQUALIZATION SCHEMES
AND SUBCENTRAL GOVERNMENT
BORROWING**

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Abstract

Examining the cases of Canada, Germany, and Spain, the role played by fiscal equalization schemes in determining subnational borrowing was analyzed, and the link between regional governments' primary fiscal balances and gross domestic product per capita was tested econometrically. The study results show that either poor or rich regions can display higher regional public borrowing on average, and these results can be linked to the institutional design of regional equalization systems in place. Particular elements, such as tax efforts and fiscal capacities, also play relevant roles in this regard. Reforms of these schemes can therefore prove instrumental in reducing regional heterogeneity in public borrowing.

JEL Classification: R5, H7

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1. INTRODUCTION

Subcentral government public finances have deteriorated sharply in several developed economies since the global financial crisis, contributing significantly to the deterioration of general government fiscal balances in countries with highly decentralized fiscal policies (Ter-Minassian and Fedelino 2010). In some cases, subcentral governments' public finances have experienced diverging evolutions, casting doubts on the achievement of national fiscal objectives (European Commission 2012, Foremny and von Hagen 2012). Existing subnational borrowing rules and other fiscal restraints may play a role in ensuring greater homogeneity in regional borrowing, but the heterogeneity in regional fiscal constraints may be difficult to diminish when regions face different fiscal needs and fiscal capacities. This study investigates the way that differences in fiscal capacities, which are primarily determined by regional differences in gross domestic product (GDP) per capita, influence regional public borrowing depending on the existing fiscal equalization scheme.

The effective contribution of subcentral governments to national fiscal consolidation objectives may be severely constrained for two reasons. First, regions usually face long-lasting income differentials, which make some largely dependent on intergovernment grants to ensure sufficient access to public goods and services according to nationally set standards. This regional heterogeneity in fiscal capacities can be directly linked to differences in productivity and competitiveness levels, which are unlikely to vanish in the medium term and, in many instances, the long term (Barrios and Strobl 2009). Second, the decentralization of fiscal policy also leads to an imperfect transfer of fiscal responsibilities, as incentives for regional governments to keep their public finances in order may be lower than those for central governments, leading to different borrowing behaviors. Indeed, when national resources are available for regional redistribution, regional governments may be less concerned about the impact of their individual fiscal decisions on the total amount of financial resources for other regions. This is known as "common-pool" problems in fiscal federalism (Velasco 2000; Rodden, Eskeland, Litvack 2003).

Likewise, cross-regional income differences can have a protracted effect on public debt and deficit given that incentives to undertake structural reforms and/or to avoid budgetary slippages are notoriously poor in the presence of permanent fiscal transfers (Duval and Elmeskov 2006). Evidence suggests that this is more likely if similar levels of public services are expected across constituencies with large differences in GDP per capita and if the fiscal equalization scheme does not provide appropriate mechanisms to deter and/or to reduce excessive regional fiscal imbalances (Rodden 2006). The extent to which these permanent redistribution schemes may face the opposition of richer (i.e., net creditor) regions and/or may compromise the conduct of national fiscal policies remains a source of discussion.

Generally, the possibility for subnational entities (i.e., states, regions, or cities) to benefit from financial rescue either through bailouts or vertical grants modifies their intertemporal budget constraint. Regional fiscal policy decisions may thus be more distorted than, for example, country-level fiscal policy decisions, since regions naturally set their fiscal policy objectives by anticipating the resources from the central government.¹ Recent cross-country evidence suggests that in countries where vertical fiscal imbalances are high, national public deficits also tend to be large (Eyraud and Lusinyan 2013).

¹ See, for instance, Padovano (forthcoming) for a recent analysis of regions in Italy.

Several factors have been put forward in the literature explaining how fiscal decentralization can influence regional borrowing and affect country-level fiscal policy. These elements range from soft-budget constraints and misperception of the cost of public services, the size and age structure of the population, to the degree of political fragmentation (Buettner and Wildasin 2006; Velasco 2000; Alt and Lowry 1994; Egger, Koethenbuerger, Smart 2010).

This study argues that the design of fiscal equalization schemes may also matter. The design refers to the main components of equalization grants used for interregional solidarity, that is, fiscal capacity (i.e., the economic capacity of regions to finance their own public spending through taxes) and normative fiscal effort (i.e., the benchmark tax rate set at the national level) determining the extent of transfers in favor of relatively poor regions (Boadway and Shah 2007). Regions with differing fiscal capacities may incur higher or lower indebtedness depending on expected tax revenues redistributed through central government grants and the degree of public revenue smoothing within the country. However, depending on the design of the fiscal equalization scheme and national policy objectives, either rich or poor regions may incur higher deficits. Empirical findings concerning Germany and Spain support these hypotheses, while the evidence from Canada remains mixed. In Germany, the poorer *Länder* (states) are more prone to borrow (after controlling for other factors), while the opposite occurs in Spain.

In this study, a fiscal reaction function was estimated for regions of Canada, Germany, and Spain, explaining subnational borrowing as a function of standard regressors used in the literature (i.e., business cycle, lagged public debt, and others) together with the GDP per capita. These econometric estimates provide country-specific results with different patterns in regional public borrowing according to whether rich or poor territories were considered. The extent to which the particular design of the equalization grants condition the relationship between regional borrowing and GDP per capita was then investigated to explain the different patterns observed across countries according to their regional fiscal redistribution scheme. To do so, a simple theoretical model was used with a stylized equalization formula that illustrates basic intuitions determining the different fiscal behavior of subnational governments.

2. FISCAL EQUALIZATION SCHEMES AND SUBCENTRAL GOVERNMENT BORROWING: CANADA, GERMANY, AND SPAIN

2.1 Fiscal Decentralization and Intergovernment Transfers

Canada, Germany, and Spain are three countries with notoriously decentralized fiscal policies. All have experienced substantial decentralization of their public finances either on the spending side, tax revenue side, or both. They differ notably, however, in the fiscal equalization schemes used and regarding the evolution of regional indebtedness over the past 2 decades. Table 1 shows the different elements that, given the focus of this study, are likely to influence the relationship between public borrowing and regional income differences.

Table 1: Fiscal Frameworks of Canada, Germany, and Spain

	Public Expenditure (% of general government expenditure)		Tax Revenues (% of general government tax revenue)		Intergovernment Transfer Revenues (% total regional revenues)		Tax Autonomy (% total regional revenues)	
	1995	2010	1995	2010	1995	2010	1995	2010
Canada	40.44	46.88	37.06	39.52	18.37	21.19	37.10	38.90
Germany	18.74	21.41	21.64	21.16	17.20	18.05	21.60	22.90
Spain	21.60	34.42	4.80	18.24	73.30	49.00	4.80	22.30

Note: See OECD (2012) for a definition of the tax autonomy indicator.

Sources: OECD and authors' calculations.

The first difference concerns the degree of tax revenue decentralization. Considering 2010 figures, Canada stands out, as regions there have the highest level of own-tax revenues in relation to the total revenues of the central government. The degree of tax autonomy is also the most advanced. German and Spanish regions have a significantly lower degree of tax autonomy and tax revenues in relation to the central government total tax revenues. Spanish and German regions have also less leeway in determining their own-tax rates or tax bases. Regional government revenues and expenditure are more unbalanced in Spain than in Canada and Germany, although this gap has been reduced since 1995. In Canada and Germany, the share of regional revenues stemming from federal grants ranged between 17% and 21% of total revenues over the period and remained around that level for most of the period. In Spain, however, the share of total revenues stemming from central government grants was largely dominant in 1995, representing 73.3% of total regional revenues, and still substantial in 2010 at 49.0%.

These figures reflect important differences across the countries in terms of design and implementation of intergovernment transfers. In Canada, these transfers are formula-based grants from the central government, which are set according to the differences in fiscal capacities (Bird and Tassonyi 2003). It also means that Canadian provinces have little leeway to conduct discretionary fiscal policy. In addition to these vertical transfers, Canadian provinces receive substantial funds to ensure the provision of health care and social services, which together represent around 65% of total transfers to the provinces (Dahlby 2008).

In Germany, fiscal equalization is enshrined in the Constitution, and it takes place after splitting revenues from shared taxes between the federal and *Länder* level in three successive stages. The redistribution criteria depend on the tax capacities and financial needs of each *Länder*. Horizontal redistribution is topped up by vertical redistribution from the federal government to further smooth per capita tax revenues among regions. These vertical grants became especially relevant as of 1995, when former East German *Länder* (as well as for some small former West German *Länder*) entered this scheme.²

In Spain, regional financing is essentially vertical through central government grants.³ The Constitution recognizes equal access to public services across the national

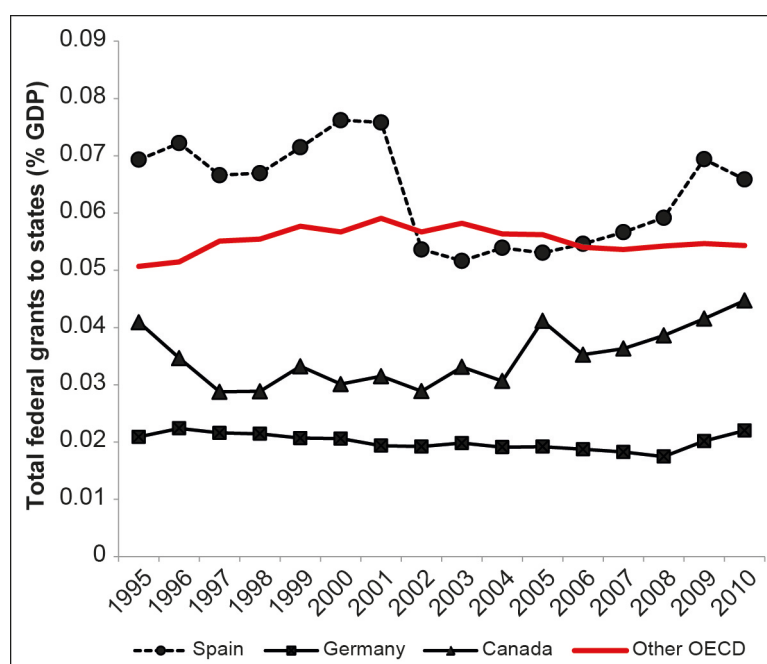
² For former East German *Länder*, this financial support followed transitory post-reunification-specific funds (Zipfel 2011; Government of Germany, Federal Ministry of Finance 2009).

³ The exceptions to this system are the Basque Country and Navarre, which have a chartered regime. These regions have autonomy in terms of tax collection (except for customs) and send the central government a pre-arranged amount (*cupo* and *aportacion*) in proportion to their income and population.

territory; from the early 1990s, this criterion has evolved into providing similar per capita financing across regions through a myriad of funds. Overall, the Spanish regional financing system has moved to more financial autonomy through a greater regional share of tax revenues and spending competencies, most notably in the area of education and health, which has also translated into a greater dependence of some communities on vertically redistributed funds. The regional financing system in Spain has been characterized by a high degree of arbitrariness in intergovernment transfers, evolving into a strategic game among the different administrative levels. As a result, the imbalance between the regional expenditure attributions and the financial means allocated for this purpose has tended to increase (Vallés and Zárate 2004).

Given the above evidence, one would expect that potential changes to intergovernment transfers would have a substantial impact in Spain compared to in Canada and Germany. Indeed, Figure 1 suggests that both the size and variability of financial transfers to the regions have been higher in Spain compared to Canada and Germany.

Figure 1: Financial Transfers from Federal to Regional Governments
(% of national GDP)



GDP = gross domestic product, OECD = Organisation for Economic Co-operation and Development.

Note: "Other OECD" is the simple average figure for Austria, Belgium, Switzerland, and the United States.

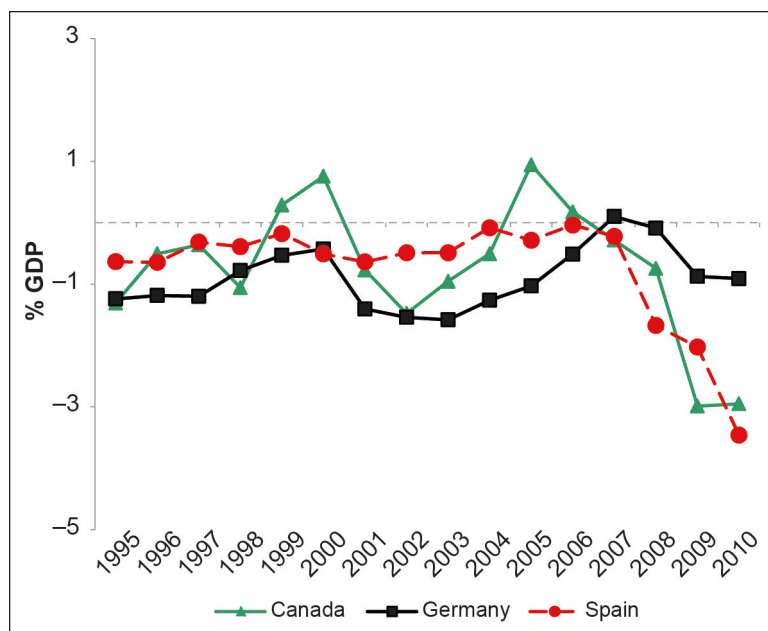
Sources: OECD and authors' calculations.

In all of these countries, the global financial crisis has also had a significant impact on regional borrowing, especially in Canada and Spain (Figure 2). Spain illustrates the successive periods of tax revenue windfalls and shortfalls linked to the housing boom that impacted Spanish regions' public finances (Barrios and Rizza 2010). In Canada, this was mainly due to increased financing of current expenditures through regional borrowing (Guillemette 2010).⁴

As a consequence, these two regions do not participate in the Spanish fiscal equalization scheme (Ruiz-Huerta and Herrero 2008).

⁴ Other important aspects are not considered here, such as the degree of regional government budgetary monitoring, existence of fiscal rules, and access to financial markets and private bank credits. As there

Figure 2: The Evolution of Net Lending and Net Borrowing in Canada, Germany, and Spain, 1995–2010



GDP = gross domestic product.

Sources: OECD and authors' calculations.

2.2 Fiscal Equalization Schemes

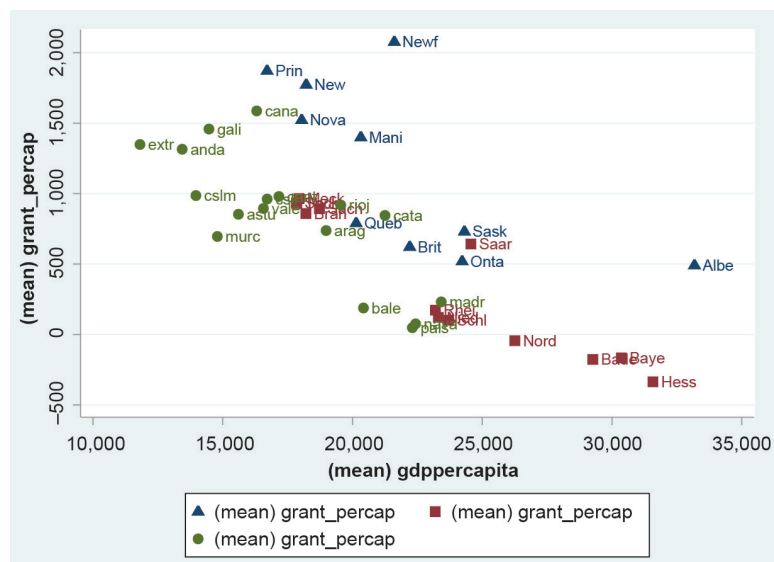
Fiscal equalization schemes have led to similar patterns of income redistribution across the three countries (Figure 3). Barring national differences in GDP per capita levels, the relationship between the degree of regional income redistribution and the regional level of GDP per capita is similar.⁵ Simple ordinary least squares (OLS) regressions between the (log) level of grant per capita and the (log) GDP per capita indicate that the redistributive effect of intergovernment grants tends to be similar in Germany and Spain. For instance, a decrease in the level of GDP per capita of 10% entails an increase of 40% and 38% of the intergovernment grants per capita in Germany and Spain, respectively.⁶ In Canada, this increase is about half of these figures (22%). In this context, the existence of fiscal equalization grants in the presence of large differences in regional income per capita are likely to increase regional public borrowing in poor regions and, in some cases, rich regions.

are three different case studies (i.e., not a pool), specific institutional features existing in each country do not play a crucial role in explaining individual behavior. However, ongoing research is examining links between fiscal rules and borrowing; see, for instance, Sutherland, Price, and Joumard (2005); Guillemette (2010); Zipfel (2011); Balassone and Zotteri (2002); and Argimon and Hernandez de Cos (2012).

⁵ Some regions can be considered specific cases, such as Newfoundland and Labrador, and Alberta in Canada, which benefit from large tax revenues thanks to abundant natural resources, mainly oil and gas. The Basque Country and Navarre in Spain or the city-states of Berlin, Bremen, and Hamburg in Germany could also be considered specific cases.

⁶ The result for Germany was obtained including the city states of Berlin, Bremen, and Hamburg. When excluding these city-states, the redistributive nature of the system appears slightly more pronounced, going from 40% to 54%.

Figure 3: Federal Grants versus Gross Domestic Product per Capita in Canada, Germany, and Spain



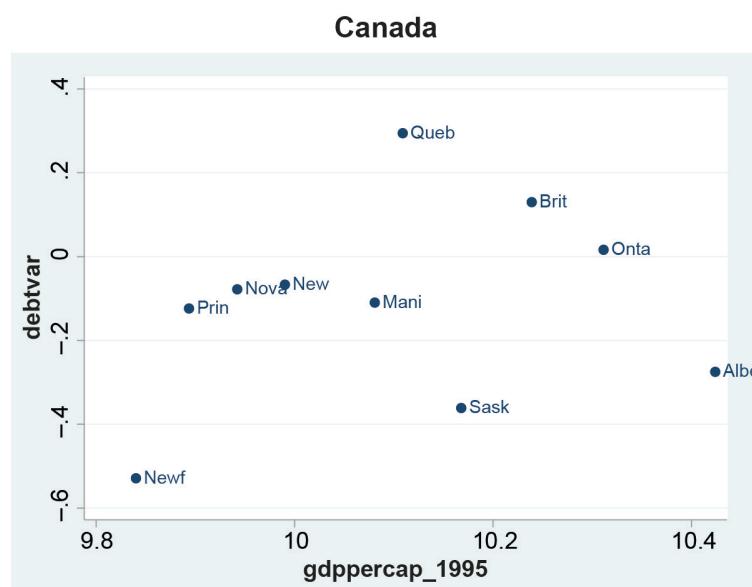
GDP = gross domestic product.

Note: Average figures for 1995–2009 in current euros.

Sources: Statistics Canada, Destatis, Ministerio de Economía y Finanzas, and authors' calculations.

Figure 4 considers the link between GDP per capita and the change in public debt over 1995–2010 for Canada, Germany, and Spain. In Canada and Spain, the relationship appears positive (i.e., suggesting that richer regions tend to have experienced a higher increase in public borrowing during this period). On the contrary, in Germany, the opposite seems to hold. It is, of course, premature to draw conclusions from this evidence, given the influence of a number of factors not accounted for, such as the starting level of debt or influence of the business cycle, which may condition the relationship between indebtedness and regional income per capita differences.

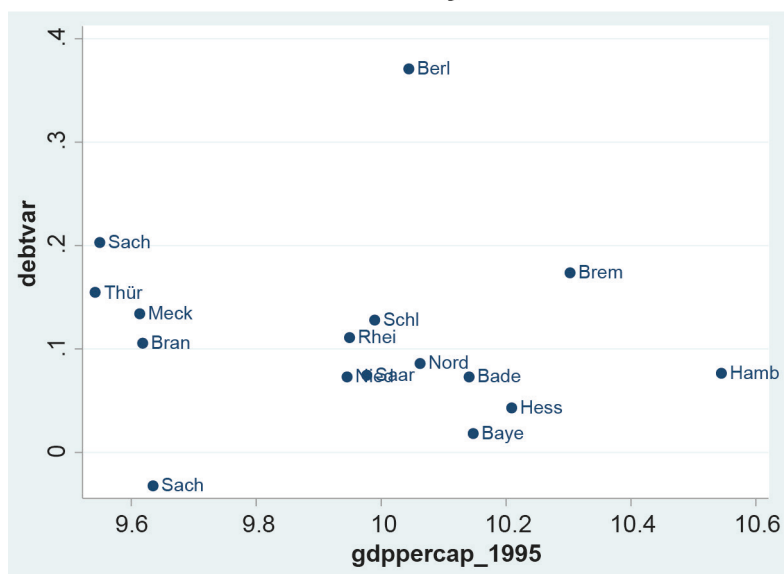
Figure 4: Regional Debt Variation, 1995–2011 versus Level of Gross Domestic Product per Capita, 1995



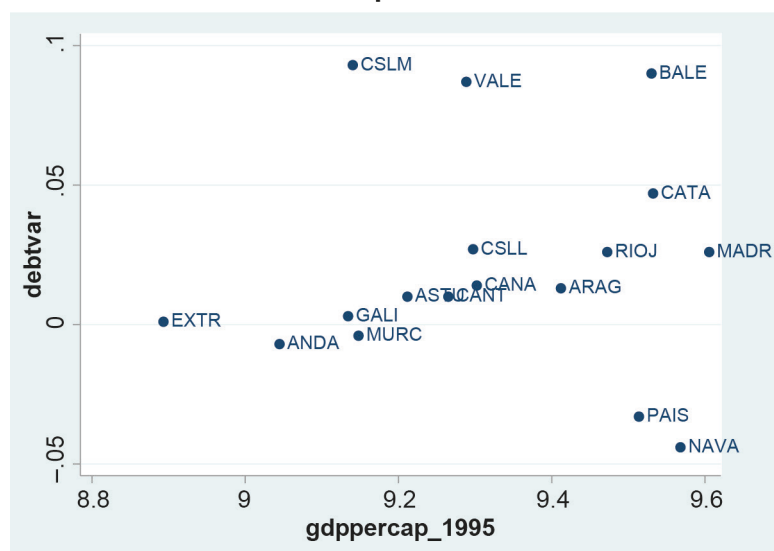
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Figure 4 continued

Germany



Spain



Sources: Statistics Canada, Destatis, Ministerio de Economía y Finanzas, and authors' calculations.

2.3 Econometric Analysis of the Determinants of Regional Government Borrowing with Fiscal Equalization

To analyze the link between differences in income per capita and regional borrowing, the fiscal reaction function approach was adopted, now widely used in public financial literature (Bohn 1998). An econometric model was specified where regional borrowing, represented by the primary balance (i.e., net lending minus interest payment expressed in percentage of GDP), is a function of past borrowing, debt level, and business-cycle factors. The equation was written as:

$$pb_{i,t} = \beta_1 + \beta_2 pb_{i,t-1} + \beta_3 D_{i,t-1} + \beta_4 OG_{i,t} + \beta_5 Ycap_{i,t} + \beta_6 \mathbf{X}_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where

the indexes indicate the region (i) and the year (t);

the dependent variable is the primary balance, which is regressed on its past level (at $t-1$);

D is the debt level;

OG is the output gap;

$Ycap$ is the regional GDP per capita;

while \mathbf{X} is a vector of control variables and ε is a time- and region-specific error component.

Usually, the main parameter of interest in such a fiscal reaction function is the coefficient β_3 whereby a positive coefficient indicates that fiscal policy is sustainable.

The output gap captured the impact of the business cycle on fiscal policy and was indirectly intended to reflect the size of automatic stabilizers; they are especially relevant in the Spanish case as long as a significant part of regional revenues were linked to the housing boom.

The output gap was obtained for each region using the Hodrick and Prescott (1997) filter with a smoothing parameter, $\lambda = 6.25$, as suggested by Ravn and Uhlig (2002) for annual data. The nominal GDP was used to build this indicator, such that the output gap also included the effect of inflation (and therefore of seigniorage revenues).⁷ The main coefficient of interest was β_5 , which was expected to be either positive or negative, depending on whether poor or rich regions (i.e., regions with a low or high value of $Ycap$, respectively) tend to incur higher net borrowing. By estimating equation 1 for each country, whether cross-country institutional differences influence the sign of the estimated coefficient β_5 was examined. The primary balance was measured net of the grants received through regional equalization.

In practice, however, it is difficult to know whether these grants influence regional fiscal policy by modifying the intertemporal budget constraint. A clear identification problem was thus faced when attempting to interpret the coefficient β_5 of the GDP per capita variable. To deal with this issue, a number of control variables (represented by \mathbf{X} in equation 1) were included to reflect structural differences in financing capacity and regional public services needs following the literature on regional fiscal policy (Buettner 2006).

The first control variable was the share of each region in the total population of the country reflecting the fact that regions with larger populations tend to face higher public spending needs. In addition, political factors may also influence fiscal policy decisions (Fátas and Mihov 2003). Another control, a dummy variable indicating whether in a given year regional elections took place, was thus included. One could also consider that the influence of a regional election process on regional fiscal behavior may differ when it coincides with general elections, as it may condition national fiscal policy and impact regional public finances. Consequently, another control variable was added, taking a value equal to 1 when the regional election year coincides with a general election year, and zero otherwise. For both election variables, data provided by Schakel (2011) were used. Finally, the amount of grants received during the period

⁷ The sources for Spain are the National Statistics Institute for statistics and the Ministry of Finance and Public Administration for fiscal data. For Germany, data are from the Federal Ministry of Finance for fiscal variables and from Destatis for other variables. For Canada, data are from Statistics Canada, the Department of Finance, and the Royal Bank of Canada for the fiscal variables.

($t-1$) was also controlled for, which may affect the amount of revenues expected by the region in period (t).

The time period available for each of the variables listed above differed across countries. To be able to compare results across countries more accurately, the post-1994 period was the focus.

Table 2: Summary Statistics of Variables Used for Estimation of the Regional Fiscal Reaction Functions, 1995–2010: Average Value and Standard Errors

	Primary Balance (net of government grants, % GDP)	GDP per Capita	Output Gap	Public Debt (Gross, % GDP)	Intergovernment Grants (% GDP)
Canada	−0.03240 (0.03500)	10.35030 (0.27100)	0.00005 (0.00200)	0.58620 (0.19270)	0.06110 (0.04050)
Germany	−0.04110 (0.03250)	10.02790 (0.23950)	0.00002 (0.00154)	0.21280 (0.09210)	0.01980 (0.02510)
Spain	−0.05330 (0.04270)	9.70580 (0.31440)	0.00020 (0.00070)	0.05290 (0.02340)	0.04780 (0.03770)

GDP = gross domestic product.

Note: Standard errors in parentheses.

Sources: OECD and authors' calculations.

Results of equation (1) are presented by country, pooling all regions and years together. When dealing with such pooled data, it is natural to pay specific attention to the error in term $\varepsilon_{i,t}$ of equation (1). In a panel data context, this term can be considered two components, an *i.i.d.* term $\varphi_{i,t}$ with the classical statistical properties ensuring that equation 1 was correctly estimated, and a panel-specific (or fixed) effect such as μ_i , assumed to be region-specific and invariant such that $\varepsilon_{i,t} = \varphi_{i,t} + \mu_i$.

The parameter μ_i included region-specific effects, which, when not properly accounted for, can lead to biased estimates. This region-specific parameter thus played a specific role, as it represented the potential elements specific to a given region i that do not vary across time but that could bias the estimated relationship between regional borrowing and GDP per capita. This could also occur for regions with special status, such as city-states in Germany, or overseas regions entitled to specific grants, such as the Canary Islands in Spain. Therefore, equation 1 was estimated by controlling for region-specific effects with a panel fixed-effect estimation, removing the potential influence of region-specific unobserved parameters μ_i .

The potential endogeneity bias resulting from the estimation of equation 1 (e.g., between the dependent variable and its lagged value and the level of debt) required the use of instrumental variables. For this reason, a bias-corrected least-square dummy variable dynamic panel data estimator was used based on the Blundell and Bond (1998) system estimator, which allowed accounting for both endogeneity and region-specific fixed effects, while correcting the standard errors based on the Kiviet (1995) methodology (i.e., the generalized method of moments [GMM] system estimator).⁸ Standard OLS estimations are also reported for information purposes only.

The main results are reported in Tables 3–5.

⁸ See Celasun and Kang (2006) for a discussion of the advantages of the GMM system estimators over other panel estimators when estimating a fiscal reaction function.

Table 3: Econometric Results for Canada
(dependent variable = provincial primary balance net of federal grants, 1994–2008)

	(1) Fixed-effects	(2) Fixed-effects	(3) Fixed-effects	(4) GMM-system	(5) GMM-system	(6) GMM-system	(7) OLS
Primary balance (t–1)	0.800*** (0.0822)	0.668*** (0.0974)	0.671*** (0.0966)	0.967*** (0.0455)	0.852*** (0.0600)	0.851*** (0.0461)	0.812*** (0.0818)
GDP per capita (t–1)	–0.00493 (0.00664)	–0.00751 (0.00660)	–0.00739 (0.00667)	–0.00860 (0.00634)	–0.0113 (0.00802)	–0.0111 (0.00891)	0.00121 (0.00561)
Output gap (t–1)	–1.263** (0.561)	–1.185** (0.551)	–1.133** (0.547)	–1.350** (0.562)	–1.189** (0.588)	–1.125* (0.594)	–1.343** (0.532)
Public debt (t–1)	–0.0258 (0.0162)	–0.0170 (0.0163)	–0.0204 (0.0166)	–0.0234 (0.0241)	–0.0199 (0.0280)	–0.0228 (0.0281)	0.00128 (0.00817)
Grants (t–1)		–0.246** (0.101)	–0.216** (0.102)		–0.178 (0.120)	–0.150 (0.115)	–0.126* (0.0755)
Regional elections year (t)			–0.00393 (0.00239)			–0.00434 (0.00277)	–0.00366 (0.00246)
Congruence regional/general elections (t)			–0.000746 (0.00522)			–0.000649 (0.00665)	–0.00236 (0.00520)
Population share (t–1)			–0.516 (0.366)			–0.479 (0.361)	0.000837 (0.0112)
Observations	140	140	140	130	130	130	140
R-squared	0.486	0.510	0.530	–	–	–	0.887
F-test for no fixed-effects ($\mu_i = 0$)	1.60 [0.1211]	1.91 [0.0561]	2.11 [0.0333]	–	–	–	–
Difference-in-Sargan statistic (level IV)	–	–	–	19.29 [0.056]	18.76 [0.066]	23.17 [0.017]	–
Difference-in-Sargan statistic (difference IV)	–	–	–	3.57 [0.312]	3.53 [0.474]	8.07 [0.327]	–
Number of regions	10	10	10	10	10	10	

GMM = generalized method of moments; OLS = ordinary least squares; GDP = gross domestic product.

Note: Bootstrap standard errors in parentheses for the Least Square Dummy Variable (LSDV) estimations; *** p < 0.01, ** p < 0.05, * p < 0.1. P-values for t F and Sargan test in square brackets

Table 4: Econometric Results for Germany
(dependent variable = *Länder* primary balance net of federal grants, 1994–2011)

	(1) Fixed-effects	(2) Fixed-effects	(3) Fixed-effects	(4) GMM-system	(5) GMM-system	(6) GMM-system	(7) OLS
Primary balance (t–1)	0.424*** (0.0622)	0.535*** (0.0663)	0.491*** (0.0660)	0.572*** (0.0641)	0.677*** (0.0534)	0.633*** (0.0508)	0.755*** (0.0609)
GDP per capita (t–1)	0.0361*** (0.00705)	0.0325*** (0.00687)	0.0359*** (0.00663)	0.0283*** (0.00925)	0.0273*** (0.0104)	0.0302*** (0.00994)	0.0308*** (0.00489)
Output gap (t–1)	–1.508*** (0.389)	–1.237*** (0.381)	–1.086*** (0.369)	–1.463*** (0.315)	–1.175*** (0.326)	–1.065*** (0.313)	–2.149*** (0.368)
Public debt (t–1)	–0.00591 (0.0193)	–0.0129 (0.0187)	–0.0214 (0.0180)	–0.00923 (0.0228)	–0.0182 (0.0245)	–0.0237 (0.0234)	–0.0178** (0.00881)
Grants (t–1)		0.255*** (0.0643)	0.215*** (0.0635)		0.253*** (0.0902)	0.212*** (0.0787)	0.0716 (0.0520)
Regional elections year (t)			–0.000102 (0.00143)			–0.000393 (0.00224)	0.000399 (0.00160)

continued on next page

Table 4 continued

	(1) Fixed-effects	(2) Fixed-effects	(3) Fixed-effects	(4) GMM-system	(5) GMM-system	(6) GMM-system	(7) OLS
Congruence regional/ general elections (t)			−0.00695*** (0.00233)			−0.00682** (0.00286)	−0.00769*** (0.00258)
Population share (t−1)			−1.279*** (0.421)			−0.998** (0.400)	0.0192 (0.0125)
Observations	221	221	221	208	208	208	221
R-squared	0.497	0.533	0.578	—	—	—	0.945
F-test for no fixed-effects ($\mu_i = 0$)	3.56 [0.000]	5.02 [0.000]	5.77 [0.000]	—	—	—	—
Difference-in-Sargan statistic (level IV)	—	—	—	3.24 [0.999]	3.81 [0.997]	4.20 [0.997]	—
Difference-in-Sargan statistic (difference IV)	—	—	—	0.75 [0.861]	1.46 [0.8333]	8.63 [0.280]	—
Number of regions	13	13	13	13	13	13	13

GMM = generalized method of moments; OLS = ordinary least squares; GDP = gross domestic product.

Note: Bootstrap standard errors in parentheses for the LSDV estimations; *** p < 0.01, ** p < 0.05, * p < 0.1. P-values for t F and Sargan test in square brackets.

Table 5: Econometric Results for Spain
(dependent variable = region primary balance net of central government grants, 1994–2009)

	(1) Fixed-effects	(2) Fixed-effects	(3) Fixed-effects	(4) GMM-system	(5) GMM-system	(6) GMM-system	(7) OLS
Primary balance (t−1)	0.756*** (0.0633)	0.943*** (0.139)	0.933*** (0.141)	0.921*** (0.0375)	1.019*** (0.0348)	1.044*** (0.0280)	0.951*** (0.138)
GDP per capita (t−1)	−0.0245*** (0.00604)	−0.0255*** (0.00606)	−0.0258*** (0.00614)	−0.0180** (0.00771)	−0.0177*** (0.00624)	−0.0176*** (0.00673)	−0.00622 (0.00517)
Output gap (t−1)	−7.646*** (2.038)	−7.075*** (2.067)	−7.053*** (2.088)	−7.219*** (2.466)	−6.478*** (2.218)	−6.570*** (2.238)	−9.342*** (2.098)
Public debt (t−1)	−0.247** (0.106)	−0.219** (0.107)	−0.238* (0.124)	−0.169 (0.150)	−0.152 (0.126)	−0.177 (0.139)	−0.0125 (0.0711)
Grants (t−1)		0.236 (0.157)	0.233 (0.159)		0.271*** (0.0758)	0.286*** (0.0649)	−0.0268 (0.139)
Regional elections year (t)			0.00150 (0.00316)			0.00140 (0.00414)	0.000776 (0.00326)
Congruence regional/ general elections (t)			0.00356 (0.0119)			0.00462 (0.0146)	0.00260 (0.0113)
Population share (t−1)			0.261 (0.789)			0.377 (0.734)	0.0340 (0.0327)
Observations	238	238	238	238	238	238	238
R-squared	0.540	0.545	0.546	—	—	—	0.786
F-test for no fixed-effects ($\mu_i = 0$)	2.03 [0.0125]	2.18 [0.006]	2.09 [0.009]	—	—	—	—
Difference-in-Sargan statistic (level IV)	—	—	—	24.74 [0.025]	11.02 [0.609]	11.55 [0.565]	—
Difference-in-Sargan statistic (difference IV)	—	—	—	4.55 [0.208]	5.43 [0.246]	11.40 [0.122]	—
Number of regions	17	17	17	17	17	17	17

GMM = generalized method of moments; OLS = ordinary least squares; GDP = gross domestic product.

Note: Bootstrap standard errors in parentheses for the LSDV estimations; *** p < 0.01, ** p < 0.05, * p < 0.1. P-values for t F and Sargan test in square brackets.

The relationship between the regional GDP per capita and primary balance (i.e., primary surplus in the econometric analysis) displays different signs across countries when using the panel fixed-effect model according to Column 1. The results indicate that in Spain and Canada, rich regions tend to have lower primary surpluses (i.e., higher primary deficits). The results for Germany go in the opposite direction: relatively poor *Länder* tend to have higher deficits. In both the German and Spanish cases, the coefficients obtained for the GDP per capita variable are highly significant at the 1% level. The same coefficient is statistically insignificant in the Canadian case.

In the German case, the results indicate that a *Land* with a GDP per capita of 10% more than the average will have a primary budget balance 0.361 percentage point higher per year, an arguably economically significant figure. In the Spanish case, the result suggests that richer regions incur higher borrowing in the absence of intergovernment transfers. The coefficient is also economically significant, since Spanish regions with an average GDP per capita of 10% more than the average will also have a –0.245 percentage point lower primary surplus.

These findings are consistent with previous works. Lago (2005) obtained a similar result for Spanish regions over 1984–1999.⁹ For Germany, Schuknecht, Von Hagen, and Wolswijk (2009) showed that poorer *Länder* (also net recipients of intergovernment transfers) experience softer budget discipline from financial markets and tend to run higher budget deficits than richer regions. This study also looked at Canadian provinces, and showed a similar pattern. The federal government in Canada is, in principle, not allowed to bail out provinces, but in Germany, bailouts can happen, as in the cases of Bremen and Saarland.¹⁰ The evidence reported by Heppke–Falk and Wolff (2008) indeed suggested that after the Federal Constitutional Court decisions favoring the bailouts of Bremen and Saarland, *Länder* with high interest debt burdens tended to have lower risk premiums.

The estimation of the fiscal reaction function checked whether regional fiscal policy was sustainable during the period considered. A positive coefficient on the (lagged) debt variable would indicate, for instance, that a given region reacts to an increase in debt by increasing its primary surplus. Yet a negative coefficient on the debt variable would indicate that a given regional government runs a larger deficit (or lower surplus) as a consequence of a rise in public debt.

In all three countries, regional governments tend to run unsustainable fiscal policies, although this characteristic is especially pronounced in Spain, where the coefficient estimate on the public debt variable is both large and significant.¹¹ Another common result is that regional fiscal policy appears to be largely pro-cyclical (i.e., a deterioration of the output gap leading to an increase in the primary surplus and vice versa), with Spain again showing an especially large coefficient in absolute terms.

Columns 2 in Tables 3–5 deal with impact equalization transfers on the regional primary balance. To do so, the regressions reported in Column 1 were re-estimated by including federal grants (lagged one period to avoid a potential endogeneity bias) as the explanatory variable. The sign and size of the coefficient on the GDP per capita variable obtained previously still holds. The coefficient estimated on the lagged grant

⁹ Lago (2005) also considered a variable measuring the spending responsibilities of Spanish regions, which differed across regions during the period covered by this author.

¹⁰ Saskatchewan and Alberta were bailed out, although they took place in the 1930s and 1940s, respectively (Bird and Tassonyi 2003).

¹¹ See Potrafke and Reischmann (2012) for further research of the German case.

variable is only significant in Germany and Canada, although with opposite signs. In Canada, the level of federal grants received in the previous period tends to lower the primary surplus in the subsequent period, while the opposite is true in the German case. In all cases, however, the inclusion of federal government grants received as an additional control variable does not significantly change the results reported in Column 1.

In Column 3 of Tables 3–5, the fiscal reaction function was further re-estimated, including the additional control variables represented by the share of each region in the national population with the two electoral dummy variables. Including these variables did not alter the main result regarding the sign and size of the coefficient estimate for the GDP per capita variable. These additional control variables are not significant; in Germany, the congruence of regional and general elections tends to deteriorate regional primary balances.

Columns 4–6 report results on the same specification tested in Columns 1–3 but using the GMM system estimator correcting for potential endogeneity. The coefficient estimated for the GDP per capita variable remains similar and is only significant in the German and Spanish cases, although the size of this coefficient is slightly lower for Spain. A similar conclusion regarding the sustainability of fiscal policy also holds.

Several robustness checks of the results presented in Tables 3–5 were also conducted. In the Spanish case, the two regions with special status, the Basque Country and Navarre, were excluded. Results remain broadly similar. In the German case, the impact of the Federal Constitutional Court judgement of 1992 in favor of indebted *Länder* was considered, using a dummy variable. A positive, although nonsignificant coefficient, was obtained. This result can be explained by the fact that the decision concerned two regions with relatively high (Bremen) and medium (Saarland) GDP per capita. Separately, West German *Länder* during 1986–2011 were considered. In this case, the GDP per capita remains positive, albeit insignificant, suggesting that the inclusion of significantly poorer East German regions into the regional equalization scheme may explain the divergence in regional borrowing. In Canada, resources-rich provinces were dropped, as well, but results remain qualitatively similar.

3. DISCUSSION OF RESULTS

There are two main econometric results: in the German case, the poor regions borrow more than the rich ones, but in the Spanish case, the opposite happens. Why are these econometric estimates country-specific? Can these results be explained by country-specific features regarding the equalization system? In the following section, a simple, albeit general, theoretical model is used linking the institutional design and implementation of equalization grants to regional decisions on public borrowing.

Next, the main conclusions are derived from the theoretical model developed in detail in the technical appendix of the paper.¹² The main difference between regional and national fiscal policy—that regional governments are usually net receiver (or net payer) of permanent or quasi-permanent fiscal equalization transfers—is emphasized. In such a framework, fiscal equalization is likely to affect the regional intertemporal budget constraint and borrowing behavior of the regions.

¹² Available in the working paper version published at <http://webs.uvigo.es/infogen/WPA.htm>.

For the theoretical model, a federal country is assumed, consisting of two regions with different income per capita. The federal government redistributes funds across the two regions using financial resources from taxing labor and capital incomes. Each regional government provides a local public good aimed at maximizing the utility of a representative household over two periods of time.

A simple assumption regarding the distribution of regional public revenues over time is used to explain regional borrowing versus savings behavior. The regions ineligible to obtain resources from the equalization system only can finance their public expenditures in period 2 on the basis of previous savings in period 1. This simple assumption allows analysis of the link between equalization and regional decisions on deficit.¹³

The simple assumption allows separation, albeit theoretically, of the determination of regional public deficit from that of vertical redistributive grants. The financial resources available at the regional level come from income taxes (shared with the federal government) and borrowing in period 1; for the next period, an equalization grant can be provided and, in this case, savings from period 1 are appropriately capitalized. During the second period, the regional government must pay back the borrowing (if any) used in the first period at a given interest rate.

The formula for equalization grants is central. A standard expression for equalization is used below. This formula is rooted on the institutional design usually followed in existing federations and has been extensively studied in the literature.¹⁴

$$Z^j = N^j \alpha \left((\bar{w} - w^j) \bar{t}_l l \right), \quad (2)$$

where N^j is the population in region j ,

α is the degree (if partial or total) of fiscal equalization,

\bar{t}_l the normative income tax rate at regional level ($0 < \bar{t}_l < 1$),

\bar{w} the normative wage rate at regional level, and

l the labor supply.

Both \bar{t}_l and \bar{w} can be thought as representing the level of fiscal effort and fiscal capacity, respectively, which the central government sets as the benchmark.

The interpretation behind equation 2 is straightforward. The equalization transfer is a proportion α of the difference between the tax revenues raised by the regional government and a given (normative) level of fiscal capacity. The degree of fiscal equalization α will thus depend on the extent to which the central government is seeking to equalize the level of public goods available in each region, given the size of the population and the existing difference in income per capita, which determine ex ante the fiscal capacity of each region.

¹³ An alternative approach is to consider that borrowing and equalization grants are determined simultaneously, but it would then be impossible to identify the nature of the causality between regional income differences and borrowing behavior.

¹⁴ See Boadway and Flatters (1982), Zabalza (2003), and Ahmad and Searle (2005) for properties of this type of intergovernment grant.

The crucial points are the assignment of financial resources available for the regional governments in each period and the performance of the equalization formula with respect to changes in its basic parameters. Accordingly, any region, regardless its relative income per capita, will borrow in period 1 when the equalization system guarantees it enough resources in period 2 for providing the public good and paying back past borrowings. The intuition of the reasoning is unchanged when rich regions transferring money to poorer regions via the equalization system see how their payments fall, they, too, will decrease the savings generated in the first period.

Consequently, when the value of \bar{w} increases, poor (or rich) regions will receive (or make) more resources (less payments for redistribution) as equalization grants, and that will lead to higher deficits (i.e., lower surplus) in regional public accounts.

Interestingly, the equalization formula may result in positive federal transfers for rich regions as well when \bar{w} reaches high enough values or when rich regions' contributions to the equalization scheme decreases. In this context, rich regions receiving positive transfers (or paying less) in the second period may behave as poor regions; they smooth their consumption over time by increasing their borrowing in the first period to match the higher level of consumption obtained, thanks to the intergovernment transfer in the second period.

Results become more intricate when the impact of the degree of equalization α and the normative fiscal effort $\bar{\tau}_i$ on the regional public borrowing are considered. The difference in GDP per capita ($\bar{w} - w^j$) plays a key role in the determination of regional public borrowing.¹⁵ It follows that changes in the parameters determining the degree of fiscal redistribution and normative fiscal effort entering the fiscal equalization scheme, as in equation 2, have a different impact on regional borrowing, depending on whether a given region is relatively poor or relatively rich. When the normative fiscal effort rises ($\bar{\tau}_i$), the poor region increases its borrowing. The poor region thus has an incentive to increase its public spending in the first period thanks to higher borrowing, given that it will benefit from larger revenues in the second period, allowing a higher level of public good in both periods. The opposite situation holds for the rich region. However, the impact of changes in the degree of equalization α on regional public borrowing is not analytically unambiguous and will also depend on the relative fiscal capacity of the region and with the same dichotomy as in the case of $\bar{\tau}_i$.

Next, the theoretical model can be used to understand the Spanish and German experiences, where alternatively rich and poor regions tend to display higher primary deficits. There are two particular features of the Spanish case that are relevant. First, the Spanish equalization scheme is focused on spending needs, that is, on the regional population (Blöchliger and Charbit 2008); equalization of fiscal capacities (parameter α) plays a negligible role. Secondly, the normative fiscal effort ($\bar{\tau}_i$) used in the Spanish system tends to be very low with respect to the actual tax bases in all regions (Ruiz-Huerta and Herrero 2008). According to our theoretical model, low values of α and $\bar{\tau}_i$ lead to relatively low public borrowing of poor regions and relatively high public borrowing in rich regions. This result also corresponds to the empirical evidence provided by the econometric findings for the Spanish case.

¹⁵ The technical appendix available in the working paper version showed that the sign of the partial derivatives of public borrowing with respect to α and $\bar{\tau}_i$ is indeterminate and depends on ($\bar{w} - w^j$); see expressions (A.29) and (A.30) reported therein.

A similar exercise can be conducted for the German case. As discussed previously, the German federal system has the explicit aim of providing sufficient resources to ensure equal access to public services by all *Länder*. Although fiscal equalization is topped up, the German territorial financing system is based on strong horizontal redistribution of tax revenues, especially through the redistribution of value-added tax revenues so that no single regional government has less than 95% of the average per capita budgetary resources. Therefore, the parameter α can be thought as being relatively high. There is no explicit benchmark tax rate for the equalization, as *Länder* enjoy very little tax autonomy. Consequently, the value of \bar{t}_i is close to that of the federal government tax rate; that is, it is relatively high compared to the Spanish one. The German fiscal equalization system is also focused on fiscal capacities (Government of Germany, Federal Ministry of Finance 2009). This suggests that the gap between w and \bar{w} (which is a proxy of the differences in fiscal capacities) plays an important role in Germany, and that \bar{w} is set at relatively high level, which is unsurprising given the high level of regional inequalities in this country, especially since reunification in 1991. As in the Spanish case, the theoretical model again is aligned with the econometric results. Relatively high values of α and \bar{t}_i lead poor regions to borrow relatively more than rich regions.

Results become more complex when considering the econometric results for Canada. The Canadian equalization system is, in principle, focused on equalization of fiscal capacities (i.e., α in the model) without assigning much importance to differences in spending needs across provinces. However, a large share of intergovernment transfers is represented by the two programs devoted to health care and education spending, and these have a clear link to fiscal needs. In addition, the scope of the intergovernment grants is not as general as in Germany and Spain, given that only one-third of the Canadian population lives in net recipient provinces and that many provinces do not benefit from these grants.¹⁶ As evidenced earlier (Figure 3), the intensity of redistribution is also not high given that the richer regions are not equalized down (Dahlby 2008). Concerning the normative fiscal effort (i.e., the \bar{t}_i variable), tax policy in Canada is highly decentralized, and provinces have much tax autonomy while regional redistribution is encapsulated into a formula-based approach.

Finally, the role played by the difference between the fiscal capacity and its benchmark level (i.e., the difference between w and \bar{w}) remains unclear given the characteristics of the Canadian fiscal equalization system combining generic and program-oriented grants. Since the mid-1990s, the standard parameter of fiscal capacity is not computed over all provinces but excludes the richest province and the five poorest ones. In such a context, the econometric analysis suggests that richer provinces tend to borrow relatively more, although this relationship is not statistically significant as shown by the econometric results. Overall, given the institutional characteristics of the Canadian equalization system, from a theoretical viewpoint, no clear distinction emerges between rich and poor regions in terms of fiscal policy making.

¹⁶ See Dahlby (2008).

4. POLICY IMPLICATIONS

Several policy implications can be drawn from the analysis. Both the evidence and discussion presented indicate that the design and implementation of territorial financing systems matter for public borrowing at the subnational level.¹⁷ The design of territorial financing systems may provide strong incentives for excessive regional deficits, which should be considered as additional efficiency costs, especially in times of fiscal hardship. Equalization grants depend on cross-regional differences in fiscal capacities, which are strongly correlated with differences in GDP per capita. The analysis of the Canadian, German, and Spanish cases suggests that this is indeed the case, implying that reforms of territorial financing systems may alter this relationship and thus prove appropriate to reduce incentives to regional overborrowing.

First, it is interesting to note that one of the most influential parameters driving equalization is the standard fiscal capacity \bar{w} , which appears to have a positive impact on the variation of regional public borrowing, more so when cross-regional differences in this parameter are large. The government should therefore reduce the standard fiscal capacity offered by equalization grants when territorial financing systems lead to excessive regional borrowing.

The reduction of \bar{w} can be obtained in different ways: by computing \bar{w} using the regions with the lowest GDP per capita levels, applying an evolution index for updating \bar{w} evolving below the actual (and average) \bar{w} of the federation, or diminishing the average \bar{w} by a given percentage before setting up as benchmark value.

The implicit political assumption behind using a relatively low value for \bar{w} is that the equalization system must take as a reference a minimum threshold in relation to the average fiscal capacity, which is also considered politically acceptable. Moreover, the use of high values for fiscal capacity in the equalization formula may result in higher outlays by the federal government. Reform of the equalization system in 2007 in Canada provides a good example. The deterioration of the fiscal balances during the global financial crisis, fueled by equalization payments in favor of the recipient provinces after including all the regions for the computation of \bar{w} instead of the five provinces considered in the old standard fiscal capacity, was corrected by the federal government imposing a cap on equalization payments from 2009. This cap consisted of a reduction *de facto* in \bar{w} .

Generally, regional governments willing to raise additional financial resources should also be able to do so by changing their own taxes rather than counting on additional resources stemming from the equalization system. However, it is widely accepted that many regional governments have little discretionary power over their own taxes. Reforms of fiscal equalization systems should thus be accompanied by reforms on the regional tax policy side to rebalance the efficiency versus equity trade-off by making regional governments more accountable for their own fiscal policy choices on both the expenditure and revenue sides.

¹⁷ The results are also in line with the standard dilemma between efficiency and equity when public policies are designed. A particular territorial financing system admits different degrees of redistribution, with its corresponding trade-off in terms of efficiency. The typical approach to the efficiency implications derived from equalization began with the canonical contribution by Smart (1998) and continued with subsequent papers such as Martínez-López (2005), Buettner (2006), and López-Laborda and Zabalza (2015).

Second, changes in the normative fiscal effort \bar{t}_i add a layer of complexity in regional fiscal policy making, explaining why regional borrowing behaviors diverge. The analysis shows that the effect of this parameter on regional public borrowing is sensitive to whether the region considered is poor or rich; there exists a positive relationship between regional public debt and \bar{t}_i when poor regions are involved, while the opposite occurs when rich regions are considered. Consequently, provided that the normative fiscal effort is set up at a relatively high value, poor regions will increase their public borrowing much more than rich regions. In contrast, when the parameter \bar{t}_i is reduced, the incentives for borrowing are more intense in the richest regions.

In this context, a benchmark value should be fixed for the standard tax rate as close as possible to its average value, exempting extreme values for its computation (i.e., regions that can be classified as outliers) to promote more homogenous public borrowing across regions according to their fiscal capacity. A possible strategy could consist of fixing the normative fiscal effort equal to the national tax rate set up by the central government. This would prove feasible as long as most of the taxes used in the equalization system are shared between different levels of government.

It should be noted, however, that reforms affecting \bar{t}_i are likely to be negligible when the real impact on equalization payments is low, as in the Spanish case.¹⁸ This, in turn, blurs the overall fiscal equalization scheme, so policy bargaining becomes dominant. Therefore, while increasing the tax autonomy of subnational governments appears to improve the efficiency of territorial redistribution systems (e.g., by improving regional fiscal accountability), such reforms should also be combined with a reinforced role for the normative fiscal effort \bar{t}_i in the equalization formula to avoid undesirable effects on fiscal performance. Such an effect is illustrated in the German case, in which the incentives for *Länder* to reduce their own-tax revenues are significant given the substantial compensation received in the form of federal grants (Buettner 2009).¹⁹ In this case, the political benefits of cutting taxes may be strong enough to compensate the revenue loss (Baretti, Huber, Lichtblau 2002).

Third, the degree of fiscal equalization α is also likely to play an important role in regional borrowing. Recall that this parameter indicates the percentage of the difference between the relative (and normative) fiscal capacities of regions covered by the equalization system. This parameter is related to both the degree of redistribution chosen and to the tax power assigned to regional governments. The greater the tax power, the lower the degree of equalization, given a determined inequality aversion in the federation.

The definition of a value for α above 100% involves overequalizing the fiscal capacity of regions and reducing their incentive to use tax revenues efficiently. Providing that a 100% guarantee of the equalization system closes the gap between fiscal capacities, regions would be immersed in a poverty-trap problem, given the political cost of raising revenue with taxes. Despite this consequence, existing vertical grant systems may sometimes result in overequalization. This effect usually does not come from the equalization system *per se*, but from the confluence of a set of vertical grants (including equalization transfers) in favor of some regions, altering the ranking of regions according to the criterion of financing per capita.

¹⁸ Recall that the tax effort required by the Spanish equalization system is very low in relation to the actual tax rates usually chosen by Spanish regions (Ruiz-Huerta and Herrero 2008).

¹⁹ Buettner (2009) estimated that an own-tax revenue decline of €1 is compensated by an equalization transfer of about 34 euro cents in the German case.

For instance, Hierro, Atienza, and Patiño (2007) highlighted how the territorial distribution of fiscal resources after vertical grants turns out to be progressive, especially in Germany but also in Spain and Canada, with significant changes in the relative position of regions when ranked according to their total revenues per capita. The 2007 Canadian reform of its equalization scheme introduced a regulation that the total fiscal capacity of any equalization-receiving region (including all revenue sources and the equalization payment) could not exceed the fiscal capacity of the poorest nonequalization-receiving region.

An additional source of complexity stems from nonformula-based intergovernment transfers, that is, resources coming from the central government that are not derived from an explicit scheme of equalization. While the influence of these nonformula-based transfers has not been examined here, these must be mentioned when coming to policy conclusions. The political bias in the territorial allocation of grants across regions is particularly strong as equalization systems become weaker and less transparent (Pitlik, Schnedier, Strotmann 2006; Simon-Cosano, Lago-Peñas, Vaquero 2013). Therefore, recent policy recommendations made by the Organisation for Co-operation and Development suggest electoral and political factors, by becoming less influential, should contribute to simpler, more transparent regional equalization systems (OECD 2013).

Finally, inefficient vertical and horizontal strategic interactions can result in unsound fiscal policies (Goodspeed 2002; Boadway and Shah 2007). Baskaran (2012) disregarded this possibility for Germany by showing that *Länder* have been more concerned with their chances of receiving extraordinary resources than with their amounts; hence, the extent of federal resources for territorial redistribution does not seem to matter. By contrast, Molina-Parra and Martínez-López (2015) found some evidence that a kind of vertical interaction is present in Spain, as the higher the central deficit, the bigger fiscal imbalances at the state level. The overborrowing of Spanish regions is interpreted in terms of yardstick competition models.

5. CONCLUSIONS

The determinants of regional public borrowing were analyzed under alternative fiscal equalization schemes. The link between the fiscal capacity (measured by the level of GDP per capita)²⁰ and the public budget balances in Canada, Germany, and Spain were tested econometrically at regional level. The analysis suggests that the relationship between these two variables can be either positive (as in the German case) or negative (as in the Canadian and Spanish cases), signifying that either poor or rich regions tend to have on average higher primary deficits. This relationship was found to be significant only in the German and Spanish cases, however.

In the German case, poorer regions tend to run significantly lower primary surpluses, because the German fiscal equalization scheme is largely focused on smoothing fiscal capacities. Hence, poorer regions tend to run larger deficits, as they expect the federal government to fill their budgetary gaps. In the Spanish case, however, the fiscal equalization scheme is more focused on spending needs and less so on fiscal capacities, since regions have relatively little tax power. As a result, richer regions tend to run larger deficits. In the Canadian case, a significant difference was not found between poor and rich regions' fiscal policies, because interregional transfers are

²⁰ A note of caution is necessary. Since the seminal contribution by Buchanan (1950), the appropriate measure of fiscal capacity is still an open question. This approach has simplified this issue by taking income per capita as a proxy.

formula-based grants from the federal government, leaving less scope for strategic behaviors that exist in Germany and Spain.

However, the link between the borrowing level and regional differences in income per capita is more complex than the situations described in the simple model. Normative parameters setting regional financial transfers are either not clearly stated, left open to political discretionary choices, or both. The nature of the relationship between fiscal capacity and regional public borrowing depends on the country considered, and can move in both directions depending on the specific fiscal equalization scheme in place. Reforms of a territorial financing system can therefore prove instrumental to reducing cross-regional heterogeneity in public borrowing, thus enhancing national fiscal policy making in countries with highly decentralized public finances.

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