RESEARCH ARTICLE

Tax autonomy mitigates soft budget constraint: evidence from Spanish Regions

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Abstract

Within the framework of the soft budget constraint problem, this article investigates the impact of a legislative reform that increased regional tax autonomy on the propensity of Spanish regional governments to incur a deficit. For this purpose, a dynamic panel data model is estimated, using data for the period 1984–2019. The sample shows a breakpoint in 2002, when the reform of the regional financing system came into force, providing Spanish regions with greater tax autonomy, more fiscal competency, and lower intergovernmental transfers. Results show that the budget constraint has hardened, as regions have fewer incentives to accumulate budgetary deficits with the expectation of future compensations from the central government. A comprehensive review of the evolution of other factors previously identified as determinants of soft budget constraints, and the analysis of two regions not included in this financing system, suggest no other possible explanation for these results.

Key words: dynamic panel data; fiscal autonomy; intergovernmental relations; regional policy; Soft Budget Constraint

Introduction

Soft Budget Constraint (SBC) syndrome appears when an organisation – a public administrative body, in this case – has no incentive to control its expenditure and balance its budget owing to the existence of another agent – the central government, in this case – that will provide assistance in the event of financial difficulties. Although this problem was initially described to investigate the economic behavior of certain enterprises in socialist economies, it was quickly utilised to analyse the fiscal relations between, on the one hand, regional and local governments and, on the other, central government. This phenomenon may also emerge in certain situations involving supranational entities, such as the European Union.

In the late 1970s, Spain experienced a transition to democracy. The new constitution, approved in 1978, and subsequent legislative changes, devolved numerous competencies to the newly created regional governments, known as Autonomous Communities. Spain has seventeen Autonomous Communities, two of which (Basque Country and Navarre) are excluded from the regional financing system. The Constitution devolves to the Basque Country and Navarre the privilege to collect taxes (under the same regulation) within their territory and the duty to make an annual transfer of money to the central government, computed as the value of the services provided by national institutions in these two "historic" regions.

The financing system of the regional governments has experienced several reforms (Atienza and Hierro 2005; De la Fuente and Gundin 2008; Zabalza and Lopez-Laborda 2011) and remains a controversial issue in Spain. From the time the regional bodies were created in the mid-1980s, until 2001, financing of the regions was heavily dependent on central government transfers and was under continuous revision.

The reform approved in 2001 was intended to put an end to this transition period. The competencies assumed by the 15 regions were homogenised, several tax revenues were transferred to regional governments, thus, reducing discretionary transfers from the central government, and regions gained autonomy over several tax rates and the creation of new taxes. Nevertheless, despite further modifications to the system in 2009 that gave greater fiscal autonomy to regional governments, the system remains rigid. Tax revenues are distributed across regions mostly according to demographic variables, the autonomy to alter certain tax rates is limited by the central government, and current transfers, although significantly reduced, remain an important part of regional budgets. The new system also did not seem to introduce relevant incentives for strong tax competition at the regional level in the main tax categories either (Lopez-Laborda et al. 2006).

Since the creation of this regional financing system, the problem of SBC has been regularly discussed. There is no legislative plan to deal with episodes of insolvency, and the electoral cost, together with secessionist tensions, makes the prospect of regional default unconceivable. Some regional governments are promoting system reforms that will give them greater autonomy. At the same time, since the recent fiscal crisis, pressure from the European Union and the Eurozone has mounted for greater fiscal discipline and stronger institutions. Reformation of the financing system is expected soon. Therefore, an evaluation of the current state and evolution of the system is apposite.

This study analyses the existence of SBC in Spain's regional financing system and, in particular, estimates whether the 2001 reform significantly reduced the SBC problem. For that purpose, panel data from the period 1984–2019 were used to estimate the determinants of public deficit at the regional level, with particular attention paid to fiscal policy indicators. The results unambiguously support the hypothesis that Spanish regional budgets have been considerably hardened post-reform. Increases in expenditure more heavily affect the public balance and are not compensated as much by additional central government transfers as before.

The remainder of the paper is structured as follows: "Insights from economic theory: determinants of soft budget constraint" section revises the literature on the theoretical determinants of Soft Budget Constraint. "Methodology" section

describes the analysis methodology and specifies the econometric model. "Results" section presents and discusses the results. "Robustness tests" section develops some robustness tests. "Conclusions" section offers the conclusion.

Insights from economic theory: determinants of soft budget constraint

An early definition for SBC was by Kornai (1979). Later, Kornai et al. (2003) developed the concept for public companies within the context of socialist economies. Wildasin (1997) constructed a two-level model for public administration. According to this model, SBC is optimal for central governments in the presence of positive externalities provoked by public expenditure at the local level. Wildasin's study concluded that the budget constraint is softer the larger the importance of these externalities, and that SBC is more likely among relatively larger administrations. This is a recurring result in the literature.

Qian and Roland (1998) expanded the model by introducing the additional budget constraints of local government-controlled firms. The model, designed to replicate several aspects of the Chinese economy, concluded that increasing fiscal decentralisation can tighten the budget constraint, but at the expense of generating incentives for over-investment at the local level. In fact, the relationship between SBC and degree of fiscal decentralisation has proven to be a popular research topic, with most studies concluding that fiscal autonomy contributes to the tightening of budget constraint (see Vigneault (2005) for a detailed review).

Inman (2003) modeled the issue as a three-stage sequential game: in the first stage, the central government announces its transfers policy; in the second stage, local governments make their fiscal policy decisions; and, in the third stage, if any local administration is in a state of insolvency, the central government decides on the terms of the bailout. SBC emerges in the second stage, when the local government internalises the possibility of a bailout.

Other studies have focused attention on the political institutions that foment SBC. Goodspeed (2002) demonstrated that a bailout could be an optimal strategy for a government to maximise the number of voters even when there are not externalities in the provision of the public good. In this model, the central government has no incentive to predetermine a credible bailout strategy ex ante. However, Robinson and Torvik (2009) identified conditions under which it is optimal to announce future bailouts of financed projects in circumstances when failure can be anticipated. This result appears in a framework in which politicians cannot commit to undertaking policies that are not optimal ex post. This happens, in particular, when the bailout implies a redistribution of income towards voters who could not otherwise attract public resources.

Besfamille and Lockwood (2008) developed a model in which SBC is optimal if the local government makes an effort to raise the likelihood of the success of investment projects. Otherwise, local governments may under-provide the public good owing to the deviation of resources to support the investment project. Finally, Catalán-Hoffmann (2012) came to a similar conclusion in a framework that more accurately replicates intergovernmental relations. In the context of asymmetric regional shocks and intertemporal exchange, the use of discretionary transfers to

mitigate the volatility of consumption caused by the shocks could be desirable. In conclusion, a trade-off exists between fiscal insurance against a local shock and fiscal discipline.

Methodology

Related studies

This section focuses on three specific aspects of related empirical literature: the alternative explanatory and dependent variables used to estimate the SBC problem, the methodological approach considered, and the interpretation of the estimated coefficient. This review illustrates how far scholars are from reaching consensus with respect to the three aspects under consideration.

Rodden (2002) estimated SBC determinants using panel data from 43 countries for the period 1986–1996. His work takes very seriously the presence of endogeneity and addresses this issue with two alternative methodological approaches: the use of a simultaneous equation model, in which borrowing autonomy is, in addition to budgetary deficit, a simultaneously generated dependent variable; and a dynamic generalised method of moments (GMM) panel data model similar to that used in this study but including most variables in first differences. In addition to the discretionary definition of the borrowing autonomy index, the main shortcoming of the simultaneous equation approach is the lack of dynamic behavior of some of the variables used to construct the model. This impedes the exploitation of the panel's time dimension.

Buettner and Wildasin (2006) and Buettner (2009) use a Vector Error Correction Model (VECM) to estimate the dynamics of fiscal adjustment based on panel data from USA and German municipalities. Esteller-More et al. (2002) applied a similar analysis to 137 Spanish municipalities (1992–1999) and found no evidence of SBC. Their methodological approach explored the dynamic relationship between the main accounts of the public budget, and this was particularly useful with local-level data as the large number of coefficients to be estimated demanded the availability of a large number of observations.

Based on a panel estimation of SBC for 260 Swedish municipalities, Pettersson-Lidbom and Dahlberg (2005) use past bailout episodes and current bailouts of neighboring governments as the instrument for bailout expectations. This instrument seemed to work relatively well, and estimated a significant increase of public debt (around 30%) when bailout expectations showed up. The use of this instrument, however, is only possible given the specific characteristics of Swedish local institutions which face, constitutionally, no borrowing restrictions.

Ben-Bassat, Daham and Klor (2016) estimated whether several types of local government interventions recently introduced by a legislative change in Israel made budget constraint in these localities harder. For this purpose, they used the difference-in-difference method for their panel data model. This method exploits the comparison of outcomes between units that have suffered intervention with those that have not. This methodological approach is valid when a sample of simultaneously comparable units is available, of which some have been treated and some have not. However, the intervention threat introduced by legislative change may

itself influence the degree of softness of budget constraint in all units. To capture SBC, the authors used six alternative dependent variables, although some were extremely characteristic of their local-level data. Budgetary deficit, debt, and expenditures were among the alternative dependent variables, while the dummy variables were explanatories that represented the three alternative types of central government intervention, population size, socioeconomic development, and the share of the largest party in each municipal government.

From a panel of 26 Organisation for Economic Co-operation and Development (OECD) countries (1975–2009), Baskaran and Hessami (2017) estimated the impact of the Maastricht Treaty and the introduction of the euro in the budget constraint of EU member states. They used fiscal deficit as the dependent variable (with three versions: primary deficit, current deficit, and cyclically adjusted deficit), expressed as a share of Gross Domestic Product (GDP) and economic openness, GDP per capita growth, unemployment rate, inflation rate, dependency ratio, political dummies, and interest rates as explanatories. Applying a difference-in-difference methodology, their conclusions are only relevant when the methodology is applied to a subset of five European Monetary Union countries and yields the result that, while signing the Maastricht Treaty reduced public deficits in these countries, the introduction of the euro softened their budget constraint again.

Due to the particularities and subsequent reforms of the financing of Spanish regional governments, some attention has been paid to the analysis of SBC applied to this particular problem. Garcia-Mila et al. (2002) constructed a model based on a theoretical framework in which a regional government's borrowing decision is driven by its expectations that the central government will partly assume previously generated debt. Their dependent variable was the level of regional borrowing expressed in per capita (constant) euros. The explanatory variables capturing hard (soft) budget constraint were income per capita (as their model predicted, under SBC, a positive relationship between income per capita and the dependent variable) and the income share of the region (over the total national economy). If deficits incurred by regional governments are ultimately paid by the central administration, then income share plays a role due to the SBC implications for national taxation. Therefore, larger regions will have fewer incentives to increase their deficit.

Monasterio-Escudero and Fernández-Llera (2009) also used the relative size of regions as an indicator of the existence of SBC. However, as an alternative, they also considered central government per capita transfers and per capita discretional transfers (one period lagged). The motivation to use these variables lies in the assumption that the larger the transfer (or the discretional transfer) received, the softer the regional administration perceives the budget constraint. Similar to Lago-Peñas (2005), they concluded that political variables are not determinants of regional deficits. Nevertheless, Lago-Peñas considered the size of the region to be irrelevant and investigated the use of taxation revenues as an alternative dependent variable to capture the existence of SBC, although his study did not yield interesting results in this respect. The general concern, as explicitly explored in Sorribas-Navarro (2011), was that the frequent adjustments of the financing system during the nineties served as implicit bailout episodes.

Many other studies, although not specifically focused on estimating the presence of SBC, have estimated the determinants of budget imbalance, bailout episodes, and

related variables. Establishing the degree to which this empirical evidence measures the existence of SBC may be difficult, as this is not the main focus of these studies.

For example, Von Hagen, et al. (2000) and Hernández-Trillo et al. (2002) estimated the determinants of bailouts of subnational governments for four OECD countries and Mexican states, respectively, Nicolini, et al. (2002) and Sorribas-Navarro (2011) estimated the determinants of certain discretionary transfers to explore whether these behaved as implicit bailout instruments, and Esteller-Moré and Solé-Ollé (2004) estimated the determinant of fiscal adjustment in Spanish regions. This literature yields interesting results that will be referred to throughout this paper and will be used to decide on the variables and the functional form of our empirical model.

Table 1 includes the main features of selected empirical studies that have sought to determine the existence of SBC in intergovernmental relations, with a particular focus on studies exploring Spain's Autonomous Communities.

Modelling

This article uses annual data for the period 1984–2019 from the 15 regional governments under the regional financing system. In 2002, a reform of the law that rules the financing system of Spanish regions (called LOFCA) came into force. The reform enlarged the tax autonomy of regional governments and significantly altered the distribution of income in Spanish regions. This statement is further analysed in Appendix A. We aim to study whether the implementation of this normative change tightened or loosened the budget constraints of Spanish regional governments.

To formally establish the existence of a breakpoint in our dataset, we first run structural break tests for unknown breakpoints, as discussed in Bai and Perron (1998) and Bai and Perron (2003), and their application for panel data, as discussed in Ditzen et al. (2021) and Karavias et al. (2021). We simultaneously tested whether our dependent and budget-related independent variables contained a break at an unknown date. These tests led to the conclusion that, at the 1% confidence level, there was a break in 2001–2002. This remains the case with or without controlling for cross-sectional dependence, heteroskedasticity, and autocorrelation in the panel.

To capture the identified break in our regressions, we used a dummy variable called *Post Reform,* which takes value 1 from 2002 onwards and value 0 for the previous periods.

The dependent variable

We focus on the deficit (-surplus) of the regional administration, measured as its level over regional GDP, as the dependent variable.

Regional primary deficit reflects the summary of the consequences of the decisions taken by the regional government, and of the decisions taken by the central government that affect local public accounts. Consequently, most of the literature assessing the SBC uses a fiscal stance as the dependent variable.

Our choice of dependent variable may raise some concerns. On the one hand, as described in the previous section, scholars are not in agreement regarding which dependent variable to use. Although deficit is the most often chosen, other studies

Table 1. Empirical estimation of the soft budget constraint from panel data models. Selected literature review

	Dependent variable	Soft budget constraint	Other explanatory variables	Data coverage	Method	Main results
Rodden (2002)	Surplus (-deficit) and borrowing autonomy	Share of intergovernmental grants in total revenues and borrowing autonomy	Area, population, decentralisation level, size of jurisdictions, wealth, Central Bank independence, social cohesion, dependency, and political variables	43 Countries (1986–1996)	Simultaneous equation and dynamic panel data (over first differences)	Governments with strict borrowing limitations and fiscal independence show low deficits while simultaneous dependence on transfers and borrowing autonomy leads to Soft Budget Constraint
Pettersson and Dahlberg 2005	Local government debt per capita (constant prices)	Bailout expectations instrumented by own bailouts in past-episodes and current bailouts to neighbor localities	Income, population, density, proportion of population over 65 and under 16, unemployment	290 Swedish local governments 1974–1992	Instrumental variables	Average increase on debt of 30% when municipalities expect to be bailed-out (as instrumented)
Buettner and Wildasin (2006); **Buettner** (2009)	Own revenue, grants, expenditure, and debt service in a VECM	Responses in the other fiscal variables to a shock	City size (sample-breaking)	1270 US cities (1972–1997) and 1102 German municipalities (1974- 2000)	Vector Error Correction model in which four fiscal variables are simultaneously estimated	Presence of Soft Budget Constraint in German municipalities relative to US municipalities.
Ben Bassat et al. (2011)	Deficit, short term debt, expenditure, salary payments, tax collection and school students' performance	Dummy for central government intervention	Population, socio-economic status, and share of largest party in municipal government	Israel municipalities (193), 2000–2008	Difference-in-difference	Some types of interventions might be able to support budget balance although results are not very strong
Baskaran and Hessami (2017)	Public deficit (%GDP)	Dummy for Maastricht Treaty and introduction of the euro	Economic openness, GDP growth, unemployment, inflation, dependency ratio, government ideology and fragmentation and interest rates	26 OECD countries (1976–2009)	Difference in difference	Budget constraint has softened after introduction of the euro in five EU countries

(*Continued*)

Table 1. (*Continued*)

	Dependent variable	Soft budget constraint	Other explanatory variables	Data coverage	Method	Main results
Garcia Milá et al. (2002)	Borrowing per capita (constant prices)	Income per capita and relative share of the regional economy (both in an interaction term)	Grants per capita, dummies for competencies assumed (health and education)	Spanish regions 1984–1995	Random effects panel data	Spanish regions expect to be bailed out and, thus, borrow inefficiently
Lago-Peñas (2005)	Deficit and tax revenues	Per capita GDP and dummy for competencies assumed	Political cycle variables	Spanish regions	OLS (1984–1999)	Richer regions tend to increase deficit
Sorribas Navarro (2008)	Discretionary grants	Debt (one year lagged)	Population, degree of fiscal autonomy, income, unemployment rate, political variables	Spanish regions 1986–2001	Fixed effects panel data and GMM	Discretionary grants depend on the level of debt, which is an indicator of a soft budget constraint
Monasterio and Fernández Llera (2009)	Debt (constant prices)	Discretional transfers in the previous period, distance to the average per capita transfers and size	Political cycle variables, dummy for regions with more competencies, dummy for excessive deficit in previous period	Spanish regions 1994–2005	Fixed effect panel data (panel corrected errors)	Size of jurisdiction and discretional transfers seem to reveal soft budget constraint issues

Table 2. Variable description and sources of data

Label	Description	Unit of measure	Source
Deficit	*Non-financial balance (expenditures minus revenues) of the regional government (accrual basis)*	% regional GDP	Database "Liquidación de Presupuestos de las Comunidades y Ciudades Autónomas" (1986–2003: DG Communities and Regional Finance; 2003–2019: Ministry of Finance and Public Administration)
Current expenditure	*Public current expenditures, excluding financial operations and investment*		
Tax revenues	*Revenues from direct and indirect taxes*		
Current transfers	*Income of current transfers from other public administrations, not corresponding to tax revenues. Includes transfers from the central government and the EU*		
Agriculture intensity	*Primary sector importance in the regional economy*	% regional GDP	INE (Instituto Nacional de Estadística): National Statistical Office.
Debt	*Excessive deficit procedure (EDP) for public debt*		Bank of Spain
Population	*Population at 1st of July in the municipal register of inhabitants*	Millions of people	INE (Instituto Nacional de Estadística): National Statistical Office
Pop<16		% of population	
Pop>64			
Employment rate	*Share of workers over working-age population*	Share	
GDP deflator	*Regional GDP deflator (Base year 2016)*	Index	(De la Fuente 2020)
GDP	*Regional Nominal Gross Domestic Product*	Thousands of euros	
Growth	*Regional Gross Domestic Product growth rate*	Growth rate	
After	*Dummy variable: takes value 1 from year 2002 onwards*	–	–

Note: Variables in per capita terms are real-term variables, after being multiplied by the regional deflator, and divided by Population.

(Monasterio-Escudero and Fernández-Llera 2009; Vallés 2002; Garcia-Mila et al. 2002) use debt. Nevertheless, Pettersson-Lidbom (2010) shows that the results for the estimate of the level of the soft budget effect – which he defines as the probability that the central government provides lump-sum grants or transfers to a local government – are very similar notwithstanding if the fiscal stance of the (Swedish) local government is measured as level of debt, change in debt (i.e. deficit), cash deficit (i.e. primary deficit), or total spending.

On the other hand, GDP, the scaling variable for our fiscal components might generate endogeneity concerns. Table 4 presents the regression results for primary deficit over GDP. Even so, to address these issues, in Appendix, we include the regressions for models with debt and primary deficit in per capita terms as dependent variables. The results do not change our conclusions.

Finally, one might consider measuring the change in the hardness of the budget constraint by using current expenditure or current transfers as the dependent

Table 3. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Deficit	540	.0065	.0108	−.0303	.0888
Current expenditure	540	.0982	.0558	.0072	.2438
Tax revenues	540	.0532	.0378	.0005	.1365
Current transfers	540	.0515	.0404	−.0304	.1761
Agriculture intensity	510 (1986–2019)	.0514	.0363	.0006	.1568
Growth	540	.0237	.02592	−.0645	.1811
Population	540	2.6388	2.2778	2.5910	8.4484
Pop<16	540	.1753	.0384	.1078	.3014
Pop>64	540	.1673	.0356	.0846	.2587
Employment rate	540	.4436	.0589	.3091	.6079
Debt	390 (1994–2019)	.1120	.0929	.0228	.4327

Table 4. Determinants of the primary deficit. Dynamic panel data estimates

Dependent var:	Deficit/GDP			
	[1]	[2]	[3]	[4]
Deficit (t−1)	**.4591*****	**.4618*****	**.3118*****	**.3196*****
St. deviation	.043	.038	.040	.037
Current expenditure	**.0653*****	**.0599*****	**.1998*****	**.2027*****
St. deviation	.016	.015	.022	.022
Tax revenues	**−.0235**	**−.0112**		
St. deviation	.029	.028		
Current transfers			**−.1588*****	**−.1642*****
St. deviation			.020	.019
Post reform	**−.0070****	**−.0089*****	**−.0141*****	**−.0149*****
St. deviation	.003	.003	.003	.002
Post reform × Curr exp	**.0561*****	**.0707*****	**.0372*****	**.0424*****
St. deviation	.022	.020	.019	.018
Agriculture intensity	**−.0595*****		**−.0325**	
St. deviation	.027		.024	
Growth	**−.0789*****	**−.0895*****	**−.0753*****	**−.0805*****
St. deviation	.016	.015	.014	.013
Pop>64	**−.0458**	**−.0465**	**−.1376*****	**−.1333*****
St. deviation	.034	.032	.030	.028
Pop<16	**.0455***	**.0363***	**−.0108**	**−.0176**
St. deviation	.024	.022	.022	.020
Employment rate	**−.0053**		**−.0034**	
St. deviation	.013		.011	
AB[1] (p-value)	.501 (.62)	−2.324 (.02)	−2.365 (.02)	−2.016 (.04)
AB[2] (p-value)	−.272 (.79)	−1.030 (.30)	1.563 (.12)	.401 (.69)
Sargan test stat(p-value)	475.2 (.61)	479.9 (.56)	543.97 (.04)	524.43 (.10)
Obs (groups)	495 (15)	510 (15)	495 (15)	510 (15)

*, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

variable and the lagged fiscal stance (primary deficit or debt) as the main regressor. However, current transfers and current expenditure only embed one side of the decisions of the local government. Therefore, a relevant part of the story is veiled.

Very few papers address SBC related questions in this "reverse" way. Mello (2007) tests the presence of a stable long-run statistical association between changes in transfer receipts and sub-national net worth for a panel of countries. He argues

Table 5. Time evolution of the main determinants of a soft budget constraint in the Spanish regional administration

Factor	Impact over SBC	Summary
Size	Increase	*The decentralisation process initiated in the 1990s increased the fiscal importance of the regional public administration.*
Budget flexibility	Decrease	*Diversification of sources of finance, with the transfer of the revenues and normative capacities of several taxes.*
Vertical fiscal imbalance	Decrease	*Significant reduction of current transfers compensated by larger tax autonomy. The financing system continues to suffer many rigidities, is rather distributive, and tax autonomy is limited.*
Cycle Asynchrony	Slight decrease	*Greater synchrony in the business cycle could reduce the SBC as all regions would simultaneously get close to insolvency episodes. On the contrary, the likelihood of a "general bailout" may arise.*
Electoral cycle	None or slight decrease	*One might observe a weak relationship between deficit and elections year only at the beginning of the sample. No impact of regional-central government alignment or regional support to central government is observed.*
Competency areas	Increase	*Since the late 1990s, all regions take control over the provision of education and health, which increases the sensitivity of the central government towards situations of insolvency.*
Debt level	Increase	*Although subsequent reforms have tried to limit the capacity of regions to incur debt (except for the year 2006 reform), one can observe a generalized increase in regional administration debt levels.*

that causality may be found in both directions, depending on the econometric technique used. He finds evidence in favor of the largely extended *deficit-bias hypothesis* when a dynamic fixed-effects model is estimated. This hypothesis sustains that, due to a range of institutional and political-economy factors, dependence on grants and transfers from higher levels of government creates a deficit bias at the sub-national level because it encourages recipient jurisdictions to underutilise their own tax bases at the expense of sharable bases and/or to spend beyond their means. Therefore, this evidence goes in favor of the general view that uses deficit or debt as the dependent variable.

His second hypothesis suggests that *Indebtedness causes transfers*. When subnational jurisdictions are free to borrow, they form expectations about how the central government reacts to their financial stance. He finds evidence in favor of this hypothesis when a dynamic Ordinary Least Square (OLS) regression is run, but not in the case you include the lag of the dependent variable as a regressor, as we do, to account for the high persistence of these variables.

In view of Mello's (2007) conclusions and the partial picture it would provide to us, we stick by the generally used dependent variables and develop our analysis with GMM dynamic panel data models that account for potential endogeneities and two-way causality. We leave the "reverse" option in Appendix (See Table 10).

Regressors
Among the control variables, *current expenditure* is assumed to capture the potential existence and importance of SBC. The coefficient attached to this variable describes the relationship between political expenditure decisions and their impact

on budgetary deficit, controlling for the main sources of income. Therefore, the larger the value of the estimated coefficient, the tighter the budget constraint in Spanish regions. We introduce an iteration term of this variable with the dummy, in order to estimate whether the reform has balanced the budget constraint.

Our models had to, of necessity, omit one of the main budget variables to avoid multicollinearity. In the regressions, we decided to exclude either tax revenues or current transfers. In consequence, we are making a crucial implicit assumption that affects the interpretation of the main coefficient (see Kneller et al. 1999)[1] – since we controlled for changes in one income variable, the changes in *current expenditure* are assumed to be partially financed (or compensated) by the other omitted income variable. For this reason, there is no coefficient of 1 for *current expenditure* (i.e. not all the extra expenditure is transferred to the deficit). The larger the coefficient for *current expenditure*, the less the omitted variable cares for the contention of deficit. Therefore, when the omitted variable is *tax revenues,* this coefficient also implicitly accounts for the carefulness of the regional government in containing its deficit via tax revenue adjustments, which is consistent with the smaller coefficient obtained in this version of the model. When the omitted variable is current transfers, the coefficient for *current expenditure* also implicitly accounts for the level of rescuer behavior exerted by the central government on regional governments (i.e. the larger the coefficient the less the central government compensates with transfers).

Other control variables used are *agriculture intensity*, measured as the importance of the primary sector in the value added to the region, which seeks to capture the role of the sectoral distribution of income; *growth,* measured as the GDP growth rate, which represents the importance of the business cycle; *population,* which captures the effect of the size of the jurisdiction; *pop>64* and *pop<16*, which capture the impact of population pyramid; and, *employment rate*, which is a proxy for the level of relative wealth of the region. Existing literature, cited in "Related studies", reveals that the use of political and electoral cycle variables yields poor results. Table 2 describes the variables and data sources, while Table 3 reports the summary statistics. All variables are defined over the period 1984–2019, except *agriculture intensity*, which is only available from 1986 onwards, and *debt,* from 1995 onwards.

The reference model used in this study estimates the impact of political expenditure decisions at the regional level concerning the public deficit of Spanish regional administrations, during the period 1984–2019. With this purpose, a dynamic panel data model with regional public deficit as the dependent variable and regional current expenditure among the set of control variables is estimated:

$$deficit_{it} = \rho\, deficit_{it-1} + \beta_1 current\_expenditure_{it} + \beta_2 income_{it} + \gamma\, m_{it} + \mu_i + \varepsilon_{it} \tag{1}$$

where sub-indexes i and t denote *region* and *year*, respectively. The variable *income* represents one of two alternative sources of income – *tax income* and *current transfers*. m_{it} is a vector composed of the remaining explanatory variables, that includes a dummy variable for the post-reform period and the iteration of the dummy with *current transfers*, μ_i is the idiosyncratic effect and ϵ_{it} is the error term. To control the endogeneity of the control variables and capture the dynamic behavior of the

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[1]Details of this assumption are explained in "Results" section.

dependent variable,[2] the Arellano and Bond (1991) GMM estimator is used to estimate equation 1. This estimator internalises fiscal variables are endogenous and the variable representative of the cycle is predetermined, thus controlling this source of bias.

In Appendix B "Spatial dependence", we explore the persistence of our results with the introduction of spatial dependence (this involves some degree of "contagion" between regions with fiscal variables that depend both on the value of the control variables and on the evolution of the same fiscal variables in other regions). The main conclusions regarding the variables of interest remain practically unchanged for that version.

Results

Table 4 reports the outcome for the estimations of equation (1), making use of the Arellano and Bond (1991) estimator. We assume that fiscal variables are endogenous and that *growth* is predetermined.[3] Other studies (Durán 2007; De la Fuente and Gundín 2008) have already assumed this reform of the financing system as a breakpoint and that it was due to relevant changes in size and sources of income, the development of further taxation autonomy, and the assumption of additional competencies.

Primary *deficit* as a ratio of GDP at the regional level is the dependent variable in Table 4. Models [1] and [2] include *tax revenues* and omit *current transfers,* while models [3] and [4] do the opposite.[4] As we have previously argued, the explanatory variable capturing the hardness of the budget constraint is *current expenditure*. Its coefficient captures the extent to which public expenditure decisions are transferred to deficit alterations, keeping constant the income source included in the regression. However, when interpreting the coefficients in these regressions, we must bear in mind that the omission of one main component of the budget imposes an implicit assumption on the financing sources of changes in the included expenditure variable. This explains why the coefficient of *current expenditure* is largely different when models [1] and [2] are compared with models [3] and [4].

When the omitted variable is *current transfers*, the estimated coefficients assume that expenditure alterations are partially backed by transfers from other levels of public administration. Therefore, this captures the extent to which central government acts as a rescuer (i.e. the smaller the coefficient for *current expenditure* the softer the budget constraint, thanks to help from the central government). When the omitted variable is *tax revenues*, the coefficients assume that part of the variation in expenditure is compensated by tax income adjustments. Therefore, this captures how much regional governments care about (the self-contention of) their deficits.

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[2]A preliminary version of this paper also included the equivalent "fixed-effects" model with an autoregressive error term, assuming that variables were perfectly exogenous. Estimated results were only slightly different for some coefficients but the main conclusions remain unaltered.

[3]A more detailed description of the estimator can be found in Wooldridge (2002).

[4]Other public budget accounts were omitted from the regression, namely, capital and financial operations, as their importance is relatively minor.

Note that the coefficient for the dummy variable, *Post Reform*, is negative and significant at the 1% confidence level. This indicates that regional deficits have reduced once we control for current expenditure and economic growth. This is true regardless of which main income component is included.

The coefficient of the interaction term, *Post reform × Current expenditure*, indicates whether the transmission of current expenditure alterations changed following the reform of the financing system. This coefficient is also significant and positive in the four models. Hence, after the reform, a larger share of any increase in current expenditure is converted into deficit.

Both phenomena reveal that the budget constraint has hardened somewhat since 2001. Intergovernmental transfers seem to respond better to computational rules rather than serving as instruments used discretionarily by the central government to cover short-term increases in regional expenditure.

The size and significance level of the other control variables are reasonable and are not subjected to deep analysis in this study. We should mention, however, that the coefficients are quite robust in alternative versions of the model.

Robustness tests

Apart from our analysis of legislative reform, some other factors may have affected the Spanish regional economy. A summary of the evolution and expected impact of these factors is shown in Table 5. This table is expanded in Appendix A, with reference to other legislative, institutional, and macroeconomic changes that occurred during the period under consideration.

The legislative reform we identify as the main source of SBC change also affects two of the factors identified in Table 5: It partially equilibrates the *vertical fiscal imbalance* (the asymmetric degree of control over the expenditure and revenues side of the budget) and gives larger *budget flexibility* to regional governments.

The evolution of the other factors does not seem to mitigate SBC. The business cycle is slightly less synchronous between regions. However, this does not seem powerful enough to change fiscal trends, and the literature is not conclusive about its effects, as there are opposing forces. The electoral cycle does not seem to play an important role in determining budget imbalances, and the alignment of regional governments with the national government is also not associated with the larger budgetary deficit.

Finally, the nature of the additional competencies assumed by regional governments, namely, health and education, and the regulation and evolution of regional debt, favor an increase in, rather than the mitigation of, the SBC problem. In conclusion, financing and legislative reform appear to be the main causes of the results we obtained.

We run two other robustness tests. First, Figure 1 reports the evolution of the current expenditure estimated coefficient, omitting the intercept and using a rolling sample of eight years. The estimated coefficient jumped when the sample covered the period 2001–2008 and remained stable at a value of approximately 0.7 until the last reported sample. The figure supports our hypothesis for the breakpoint in 2002.
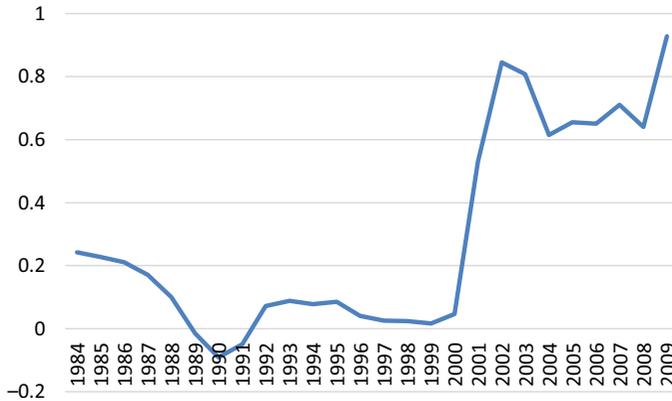
Figure 1. Evolution of the coefficient attached to the variable Current Expenditures in the baseline model for an eight-year rolling window.
The horizontal axis represents the starting year of the eight-year rolling sample used to estimate the coefficient.

Second, for historical reasons, the Basque Country and Navarre are not part of the financing system. Given that they have particular financing systems, but assume similar competencies and structures as the other regions, they represent a suitable reference to evaluate whether the observed changes have been effectively caused by the reform. As a robustness test, we estimated regression models containing all 17 Spanish regions. The results are shown in Table 6. These models include interaction variables for all the fiscal components we accounted for, with a dummy which identifies the two "historic" regions. We also included a three-term interaction variable: *Post reform × hist × current expenditure*, to establish whether the coefficient for current expenditure also changed in these two regions after the reform. The outcome of the estimation and its interpretation are reported in Appendix B "Joint analysis of regional governments not included in the standard financing system" We conclude that the value of the coefficients estimated for the 15 regions under the general financing system converged to the (more stable) value in these two historic regions. This, again, supports the hypothesis that the observed changes were caused by the 2002 reform.

Conclusions

SBC in public administration appears when policymakers find incentives to overspend in the hope of a bailout from another, usually superior, level of the administration in the event of insolvency. The current Spanish Constitution, approved in 1978, includes the deployment of regional bodies, called Autonomous Communities, with multiple competencies devolved from the central government. Since the creation of this regional system, the financing of the Autonomous Communities has been controversial. Initial financing agreements were based on massive transfers from the central government, which were generally perceived as discretionary. Several studies have shown that subsequent agreements were used as implicit bailout instruments.

The financing system, as well as other aspects of regional organisation, were substantially reformed in 2001. Regional income became more dependent on tax revenue, and regional governments increased their capacity to alter rates and create new taxes. Their dependence on transfers from the central government was substantially reduced, although not eliminated. The tax autonomy of Autonomous Communities remains limited. For instance, regarding the two main sources of tax revenue, the central government only permits alterations to the regional share of income tax within a range, while the regions have no control over the VAT rate.

Consequently, there were doubts that the reform was a useful tool for the imposition of further fiscal discipline in the Spanish regions. This paper investigated if the SBC problem of Spanish regional governments has been partially solved with the reform of the financing system. The (disperse) econometric methodology used by other scholars was reviewed to design an econometric model that could estimate the relationship between regional expenditure and deficit for the panel data of 15 Spanish regions. The analysis incorporates a dummy variable and its interaction with fiscal variables turning 1 in 2002, when the reform was enforced. We used the Arellano-Bond GMMs estimator for panel data which controls for the endogeneity of some control variables. As an innovation assimilated by recent studies using fiscal variables at the regional level, an extension of the baseline model also incorporated a spatial lag in the dependent variable, in the form of an SAR model, to capture imitation and contagion across regions.

The results undoubtedly reveal that the relationship between expenditure and deficit has been tightened, substantially reducing the SBC problem; regional governments are now more responsible for their own expenditure decisions and increases in expenditure are not supported by additional governmental transfers with the same strength as in the years before the reform.

Although the results of this study are conclusive, the problem is far from being resolved. During the latest crisis, the Spanish regions accumulated sizeable deficits. The primary deficit has returned, in most cases, to reasonable levels, but the financial situation of some regions is problematic. A substantial reform of the financing system is expected and, depending on the political situation, this reform could partly reverse the progress made in regional fiscal discipline. Meanwhile, regional redistribution of fiscal power is expected in many other European countries, for which the results reported here might offer valuable insight.

Finally, our results may be relevant to other countries or levels of public administration. As the most decentralised countries in the European Union, Germany and Spain have relatively similar degrees of fiscal autonomy and sources of finance (see De la Fuente et al. 2016). This problem is relevant given that other European countries, such as Italy (Breton and Fraschini 2016) and Poland (Holesch 2018), are in the process of giving more fiscal autonomy to their regions (Alber and Valdescalici 2012). In fact, the Council of European Municipalities and Regions recognises that 36 out of its 41 member states are implementing territorial reforms affecting regional or local administration, half of which are considered major reforms. This organisation points out that the goal of the reforms "is no longer exclusively to advance decentralisation but also to adjust the functioning of local and regional authorities to the budgetary and operational restrictions imposed by the central governments" (CEMR 2013).

The findings of this study suggest that further fiscal autonomy in budget expenditure should be accompanied by equivalent tax transfers if the aim is to maintain fiscal discipline. This result is compatible with previous evaluations of fiscal decentralisation outcomes. Governatori and Yim (2012) found that, for a panel of 27 EU countries, the fiscal autonomy of subnational governments may harm budgetary discipline when it is financed by transfers from the central government rather than by subnational taxes. Rodríguez-Pose and Krøijer (2009) found fiscal decentralisation to have a similar impact on economic growth for a panel of 16 central and eastern European countries.

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References

Alber E and Valdescalici A (2012) Reforming fiscal federalism in Europe. Where does the pendulum swing? *L'Europe en Formation*, **363**(1): 325–365.

Arellano M and Bond S (1991) Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies*, **58**: 227–297.

Argimon I and Hernández de Cos P (2012) Fiscal Rules and Federalism as Determinants of Budget Performance: An Empirical Investigation for the Spanish Case. *Public Finance Review*, **40**(1): 30–65.

Atienza P and Hierro L (2005) ¿Hasta dónde la corresponsabilidad fiscal en el sistema español de financiación autonómica de régimen común? Un ejercicio de comparación con el caso canadiense. *Revista de Estudios Regionales*, **74**: 43–88.

Bai BYJ and Perron P (1998) Estimating and Testing Linear Models with Multiple Structural Changes. *Econometrica*, **66**(1): 47–78.

Bai BYJ and Perron P (2003) Computation and Analysis of Multiple Structural Change Models. *Journal of Applied Econometrics*, **18**(1): 1–22.

Baskaran T and Hessami Z (2017) Monetary Integration, Soft Budget Constraints, and the EMU Sovereign Debt Crises. *Economics and Politics*, **29**(3): 252–275.

Bassols M, Bosch N, and Vilalta MT (2010) *El modelo de financiación autonómica de 2009: descripción y valoración*. Barcelona: Generalitat de Catalunya.

Ben-Bassat A, Daham M, and Klor EF (2016) Is Centralization a Solution to the Soft Budget Constraint Problem? *European Journal of Political Economy*, **45**: 57–75.

Besfamille M and Lockwood B (2008) Bailouts in Federations: Is a Hard Budget Constraint Always Best? *International Economic Review*, **49**(2): 577–593.

Breton A and Fraschini A (2016) Is Italy a federal or even a quasi-federal State? *Institute of Public Policy and Public Choice – POLIS Working* Papers 234.

Buettner T (2009) The Contribution of Equalization Transfers to Fiscal Adjustment: Empirical Results for German Municipalities and US-German Comparison. *Journal of Comparative Economics*, **37**(3): 417–431.

Buettner T and Wildasin DE (2006) The Dynamics of Municipal Fiscal Adjustment. *Journal of Public Economics*, **90**(6–7): 1115–1132.

Carrasco Durán M (2013) Estabilidad presupuestaria y Comunidades Autónomas. *Revista d'Estudis Autonòmics i Federals*, **18**: 169–203.

Catalán Hoffmann MJ (2012) Ensayo sobre Restricciones Presupuestarias Blandas en sistemas fiscales federales. *Instituto de Investigaciones Económicas de la Universidad Nacional de Tucumán, Reunión de Discussión*, **48**: 1–49.

CEMR (2013) *Decentralisation at a Crossroads. Territorial Reforms in Europe in Times of Crisis*. Brussels: Council of European Municipalities and Regions.

Dall'erba S and Le Gallo J (2008) Regional Convergence and the Impact of European Structural Funds over 1989–1999: A Spatial Econometric Analysis. *Papers in Regional Science*, **87**(2): 219–244.

De la Fuente A (2020) Series largas de algunos agregados económicos y demográficos regionales: Actualización de RegData hasta 2019. *RegData y RegData Dem versión 6.0–2019*.

De la Fuente A and Gundin M (2008) The Spanish System of Regional Financing: A Critical Analysis and Some Reform Proposals. *Investigaciones Regionales-Journal of Regional Research*, **13**: 213–262.

De la Fuente A, Thöne M, and Kastrop C (2016) Regional Financing in Germany and Spain: Comparative Reform Perspectives. *BBVA Research Working Paper*: 16–04: 1–66.

Delgado Téllez, Lledó VD, and Pérez JJ (2016) On the Determinants of Fiscal Non-Compliance. An Empirical Analysis of Spain's regions. *Bank of Spain Working Paper Series*, no. 1632: 1–35.

Ditzen J, Karavias Y, and Westerlund J (2021) Testing for Multiple Structural Breaks in Panel Data. *arXiv:2110.14550v2 [econ.EM]*.

Durán JM (2007) La corresponsabilidad fiscal en la financiación autonómica. Un tema aún pendiente. *Revista Principios: Estudios de Economía Política*, **7**: 109–121.

Elhorst JP (2012) Dynamic Spatial Panels: Models, Methods and Inferences. *Journal of Geographical Systems*, **14**(1): 15–28.

Esteller-Moré A and Solé-Ollé A (2004) Estabilidad presupuestaria y financiación autonómica. *Hacienda Pública Española* (número extraordinario): 173–202.

Esteller-More A, Sole-Olle A, and Sorribas-Navarro P (2002) Fiscal Adjustment to exogenous shocks: Evidence from Spanish municipalities. *V Encuentro de Economía Aplicada*, https://dialnet.unirioja.es/descarga/articulo/3126757.pdf.

Fernández Llera R, Lago Peñas S, and Martínez-Vazquez J (2012) La autonomía presupuestaria de las Comunidades Autónomas y su (des)uso: presencia de una restricción presupuestaria blanda. *XX Encuentro de Economía Pública*, https://dialnet.unirioja.es/descarga/articulo/4673860.pdf.

Garcia-Mila T, Goodspeed TJ, and McGuire TJ (2002) Fiscal Decentralization Policies and Sub-National Government Debt in Evolving Federations. *UPF Economics and Business Working Paper*, no. 549: 49.

González González AI (2000) La corresponsabilidad fiscal de las Comunidades Autónomas: un balance. *Entemu*, **12**: 63–84.

Goodspeed TJ (2002) Bailouts in a federation. *International Tax and Public Finance*, **9**: 409–421.

Governatori M and Yim D (2012) Fiscal Decentralisation and Fiscal Outcomes. *European Economy Economic Papers, European Commission*, no. 468: 1–28.

Hernández Trillo F, Díaz Cayeros A, and Gamboa González R (2002) Determinants and Consequences of Bailing Out States in Mexico. *Eastern Economic Journal*, **28**(3): 365–380.

Holesch A (2018) The Decentralization of Poland 1989–2018: From Partisan Disagreement to a Vehicle for Successful Absorption of EU Cohesion Funding. *Revista d'Estudis Autonòmics i Federals – Journal of Self-Government*, **28**: 47–73.

Inman RP (2003) Transfers and Bailouts: Enforcing Local Fiscal Discipline with Lessons from US Federalism. In JA Rodden and GS Litvack, and JI Eskeland, *Fiscal Decentralization and the Challenge of Hard Budget Constraints*. Cambridge: MIT Press, 213–248.

Karavias Y, Narayan P, and Westerlund J (2021) Structural Breaks in Interactive Effects Panels and the Stock Market Reaction to COVID–19. *arXiv:2111.03035 [econ.EM]*.

Kneller R, Bleaney MF, and Gemmell N (1999) Fiscal policy and Growth: Evidence from OECD Countries. *Journal of Public Economics* **74** (2): 171–190.

Kornai J (1979) Resource-Constrained versus Demand-Constrained Systems. *Econometrica*, **47**(4): 801–819.

Kornai J, Maskin E, and Roland G (2003) Understanding the Soft Budget Constraint. *Journal of Economic Literature*, **41**(4): 1095–1136.

Lago-Peñas S (2005) Evolving Federations and Regional Public Deficits: Testing the Bailout Hypothesis in the Spanish Case. *Environmental and Planning C: Government and Policy*, 23: 437–453.

Lopez-Laborda J, Martínez-Vázquez J, and Monasterio C (2006) The Practice of Fiscal Federalism in Spain. *International Studies Program, Andrew Young School of Policy Studies. Georgia State University*. WP 06–23.

Mello L (2007) Local Government Finances: The Link Between Intergovernmental Transfers and Net Worth. *OECD Economics Department WP*, 41: 1–29.

Molero JC (2001) Analysis of the Decentralization of the Public Spending in Spain. *Public Finance and Management*, 1(4): 500–556.

Monasterio Escudero C and Fernández Llera R (2009) Financiación autonómica y Restricción Presupuestaria Blanda. *XVI Encuentro de Economía Pública Universidad de Granada*: 1–33.

Nicolini JP, Posadas J, Sanguinetti P, and Tommasi M (2002) Decentralization, Fiscal Discipline in Sub-National Governments and the Bailout Problem: The Case of Argentina. *Inter-American Development Bank Research Network Working Paper* (R-467).

Paúl Gutiérrez J, Salinas Jiménez J, and Uxó González J (2010) Análisis y valoración de las medidas discrecionales y de estímulo fiscal aplicadas en España en 2009. *Presupuesto y Gasto Público*, 59: 55–82.

Pettersson-Lidbom P (2010) Dynamic Commitment and the Soft Budget Constraint: An Empirical Test. *American Economic Journal: Economic Policy*, 2(3): 154–179.

Pettersson-Lidbom P and Dahlberg M (2005) *An Empirical Approach for Estimating the Causal Effect of Soft Budget Constraints on Economic Outcomes*. Stockholm: Stockholm University.

Qian Y and Roland G (1998) Federalism and the Soft Budget Constraint. *American Economic Review*, 88(5): 1143–1162.

Robinson JA and Torvik R (2009) A Political Economy Theory of the Soft Budget Constraint. *European Economic Review*, 53: 786–798.

Rodden J (2002) The Dilemma of Fiscal Federalism: Grants and Fiscal Performance Around the World. *American Journal of Political Science*, 46(3): 670–687.

Rodden J, Eskenland GS, and Litvack J (2003) *Decentralization and the Challenge of Hard Budget Constraints*. Cambridge: MIT Press.

Rodríguez-Pose A and Krøijer A (2009) Fiscal Decentralization and Economic Growth in Central and Eastern Europe. *Growth and Change*, 40: 387–417.

Sorribas-Navarro P (2008) (When) are Intergovernmental Transfers Used to Bail Out Regional Governments? Evidence from Spain 1986–2001. Institut d'Economia de Barcelona Document de Treball (2006/7).

Sorribas-Navarro P (2011) Bailouts in a Fiscal Federal System: Evidence from Spain. *European Journal of Political Economy*, 27(1): 154–170.

Vallés J (2002) Un modelo explicativo de las causas del endeudamiento autonómico. El impacto de los límites de la Ley Orgánica de Financiación de las Comunidades Autónomas. *Revista Galega de Economía*, 11(1): 1–36.

Vigneault M (2005) Intergovernmental Fiscal Relations and the Soft Budget Constraint Problem. *IIGR Queen's University Working Paper* no. 2: 1–30.

Von Hagen J, Bordignon M, Dahlberg M, Grewal BS, Petterson P and Seitz H (2000) Subnational Governments Bailouts in OECD Countries: Four Case Studies. *Inter-American Development Bank Research Network Working Paper* (R-399).

Wildasin DE (1997) Externalities and Bailouts. Hard and Soft Budgets Constraints in Intergovernmental Fiscal Relations. *World Bank Policy Research Working Paper* 1843: 1–38.

Wooldridge JM (2002) *Econometric Analysis of Cross Section and Panel Data*. Cambridge: MIT Press.

Zabalza A and Lopez-Laborda J (2011) The New Spanish System of Intergovernmental Transfers. *International Tax and Public Finance*, 18(6): 750–786.

Appendix A. Main determinants of SBC in Spanish regional governments: time evolution.

This Appendix expands the information reported in Table 5 by analysing the evolution of the factors that previous studies have identified as determinants of SBC. One of the more relevant factors is the relative size of jurisdictions. When regions are "too big to fail", the central government may be politically and financially compromised by a default (Hernández-Trillo et al. (2002) provide empirical evidence in this respect). Nevertheless, the lower financial cost of the bailout of smaller regions may also be considered a clashing force (Fernández-Llera et al. 2012).

Figure 2 illustrates the relative size of Spanish regions in comparison to other countries in its economic environment. The relative size of North Rhine-Westphalia, in Germany, Île-de-France, in France, Lombardy, in Italy, or Mazowieckie, in Poland is slightly larger than the relative importance of the Catalan economy to Spain. In all cases, we compared the largest region of each country with regard to the share of GDP. In terms of population, the average size of Spanish regions lies around 2.4 million inhabitants, which is slightly below most countries, with the exception of Germany (with an average regional population size of 5.4 million).

☐ Population in larger region (thousands inhabitants; left axis)

● Larger, Average and Smaller region (% national GDP)
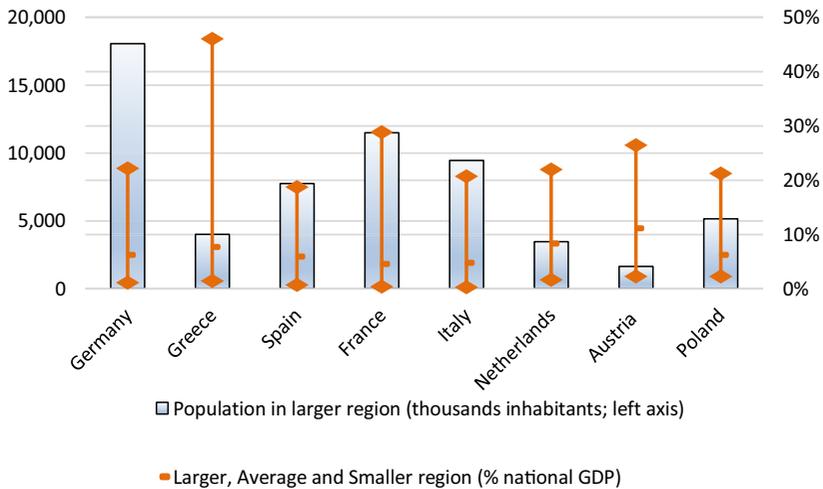
Figure 2. Size of the largest region (thousand inhabitants) and size of the largest, average, and smaller region (% national GDP; right axis).
Source: Eurostat

The size of the regional administration

Another dimension to take into consideration when analysing relative size is the importance of the regional administration in the public sector. Figure 3 shows how the relative size of the Spanish regional administration has increased in recent decades (see Molero 2001). It now lies above other federal states, such as Germany and Switzerland.
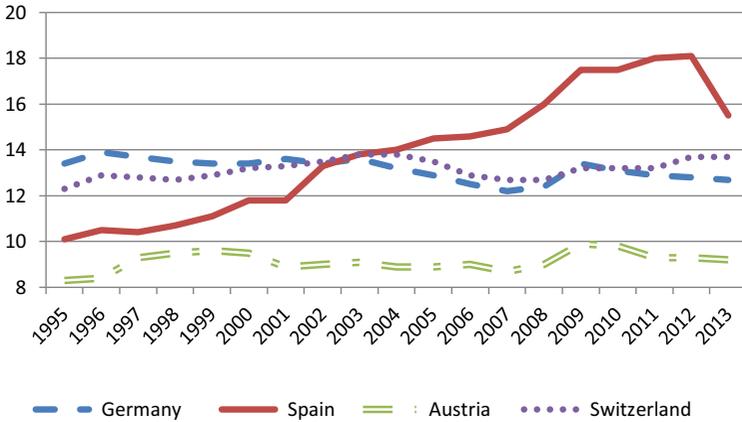
Figure 3. Evolution of regional/state expenditure in decentralised countries (% GDP).
Source: Eurostat

Budget flexibility and vertical fiscal imbalance

The lack of flexibility of financing sources (Vigneault 2005) and the discretionary nature of intergovernmental transfers (Rodden 2002) are identified as determinants of SBC. In fact, most studies of the Spanish regional financing system recognise the existence of a vertical fiscal imbalance toward the central government as the primary anomaly (see, for example, Garcia-Mila et al. 2002; Fernández-Llera et al. 2012)). It should be noted that the system has experienced subsequent reforms since its creation in the 1980s. These reforms have been exhaustively described (Atienza and Hierro 2005; De la Fuente and Gundin 2008; Zabalza and Lopez-Laborda 2011; Bassols et al. 2010). Since 1993, when Spain's regions begin to participate in the collection of the major taxes, and subsequent reforms in 1997, 2002, and 2010, there have been increases in both regional participation in national tax collection (see Figure 4) and normative capacity over those taxes (González González 2000; Durán 2007).

Figure 4. Evolution of public revenues at the regional level. Tax revenues versus other sources. (Excluding Basque Country and Navarre).
Source: Eurostat

Although tax autonomy depends not only on the volume of tax revenue managed by each jurisdiction, but also on normative capacity over tax rates, Atienza and Hierro (2005) constructed an indicator of tax autonomy that describes the rising leeway available to Spanish regions to alter taxes.
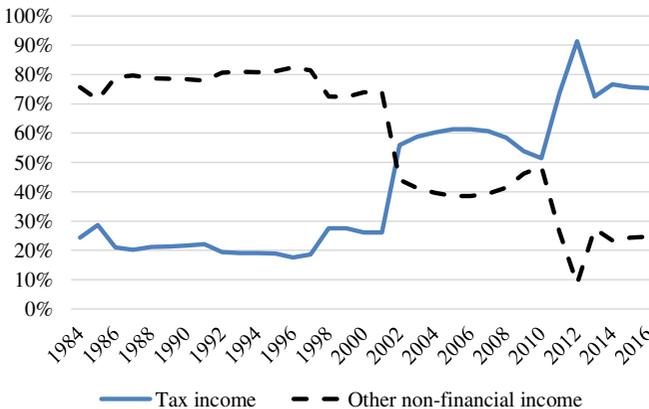
Cycle synchronisation

Some studies (Fernández-Llera et al. 2012) consider that the degree of asymmetry in how episodes of financial crisis affect different jurisdictions could affect regional budget constraint. When a jurisdiction is only one among many to suffer an insolvency that the central government can afford, the likelihood of a bailout is greater.

Figure 5 illustrates the evolution of business cycle synchronisation modeled as the standard deviation of the GDP growth rate. Except for years with more volatile behavior, the data are compatible with the hypothesis of more synchronised cycles across Spanish regions over time.
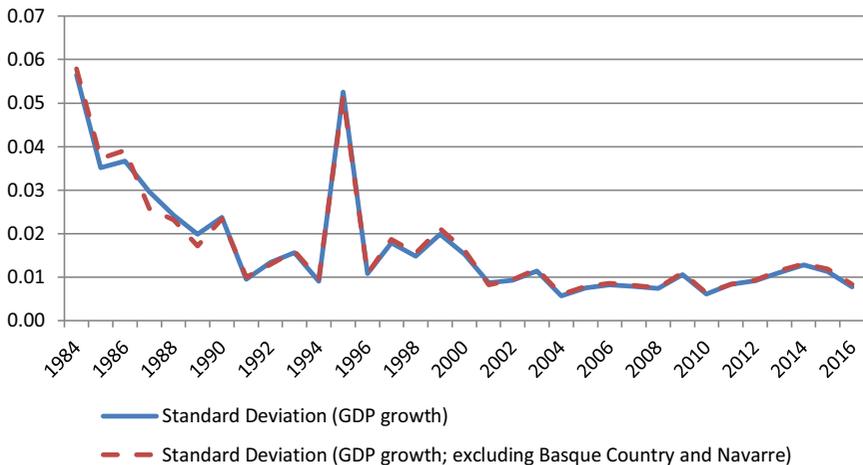
Figure 5. Cycle Synchronisation.
Source: Eurostat

Electoral cycle

Some studies suggest that the electoral cycle and the political alignment and strength of the government can affect the distribution of the public budget and increase the deficit. However, none of the studies we consulted that analyse these relationships in the context of the Spanish regions found evidence to support this (Sorribas-Navarro 2008; Lago-Peñas 2005; Monasterio-Escudero and Fernández-Llera 2009). With the exception of three terms (1996–2000, 2004–2008, and from 2016 to the present), the central government has been supported by an absolute majority. The evolution of regional imbalances does not seem to be affected by this. Prior to the mid-1990s, the electoral cycle seemed to be slightly correlated with regional deficits. However, at the end of the sample, this also seems to be unrelated to regional budgets (See Figure 6).
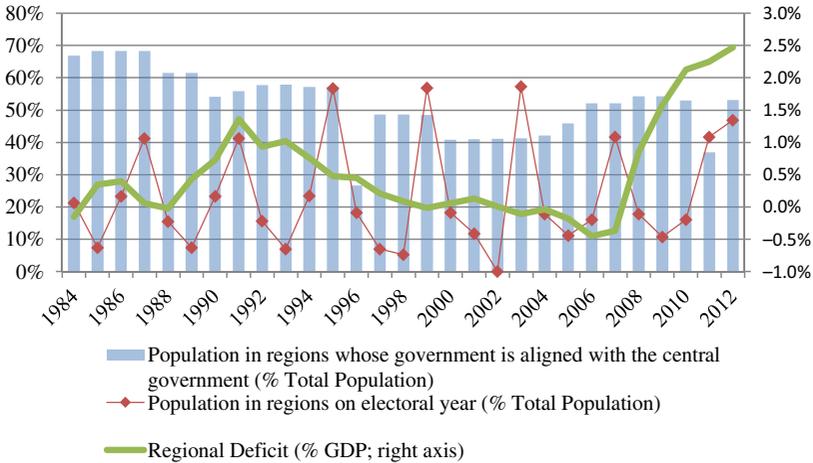
Figure 6. Electoral cycle and regional budgetary balance.
Source: Eurostat

Policy areas administrated

Some studies (see Rodden et al. 2003) point to the types of policies under the control of regional administrations as determinants of the likelihood of a bailout and, consequently, the existence of SBC. This situation can be aggravated when the central government sets a minimum level of provision of certain services and when the provision of these services generates externalities in other regions. In this respect, the general assumption of the provision of public health and education from 1999 onwards, represents the most noticeable milestone. Until that point, only five regions administered these policies (Garcia-Mila et al. 2002).

Debt and financial autonomy

Since 1980, the capacity for Spanish local and regional governments to become indebted has been heavily limited. The General Law of Budgetary Stability, approved in 2001, prevents these administrations from having a deficit in normal times. However, reform in 2006 softened the rigidity of the previous law by imposing a multi-annual balance and allowing for further exemptions (Paúl-Gutiérrez et al. 2010). Finally, the reform of Article 135 of the Spanish Constitution, developed in the Organic Law of Budgetary Stability and Financial Sustainability, introduces additional restrictions to the deficit at all levels of public administration, conditioned to European Union forecasts (Carrasco Durán 2013).

In sum, with the exception of the 2006 reform, all previous legislative changes were intended to limit the capacity of Spanish regions to accumulate budgetary deficits. Nevertheless, Argimon and Hernández de Cos (2012) and, more recently, Delgado-Téllez et al. (2016) concluded that these reforms have no significant impact on the evolution of regional fiscal imbalances. In fact, as we can see in Figure 7, in practice, regional governments have, in recent years, had no limitations to becoming indebted.

Figure 7. Debt of the Spanish regional governments (% GDP).
Source: Eurostat

Appendix B

Joint analysis of regional governments not included in the standard financing system
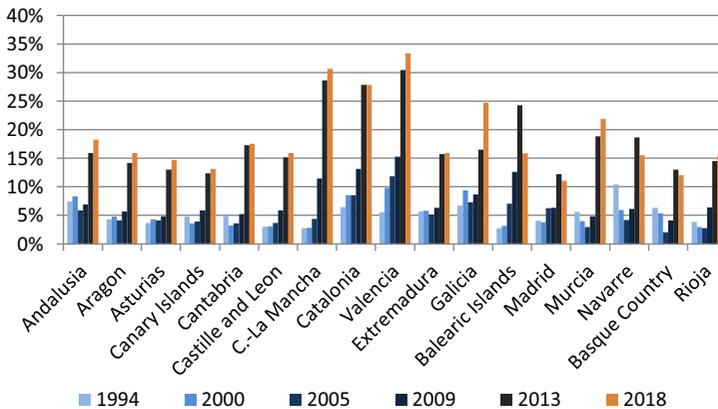
Table 6 shows the results of the regressions which include all 17 Spanish Autonomous regions. Two of these, Basque Country and Navarre, are the so-called "historic regions" and are subject to a different financing system that remained unchanged following the 2002 reform. The models include the interaction of a dummy variable called *hist*, which identifies the historic regions, with the fiscal variables included in our study. Moreover, we also interacted this dummy with the interaction term *Post reform × current expenditure*, which we analysed in Table 4. The latter three-term interaction variable indicates differences in the transmission of expenditure to deficit between the two historic regions and the other 15 regions in the post-reform period.

Given that the "group" of historic regions is limited to two, we must be cautious when interpreting the results in Table 6. Despite being aware of this limitation, we proceed here to treat them as our control group.

Models [1], [2], and [2b] omit current transfers. Model [2b] includes the interaction term between *hist* and last-period deficit (*Deficit (t−1)*). The introduction of the latter variable does not produce relevant variations in other coefficients, and it is only significant at the 10% level. Models from [3] to [4c] omit tax revenues, [3b] and [4b] omit the dummy variable *Post reform* but retain the interaction term with current expenditure. Finally, model [4c] includes, again, the interaction *hist × Deficit (t−1)*.

The sign and significance of variables already present in Table 4 are maintained here. The first result to highlight is the non-significance of the interaction term *Post reform × hist × current expenditure*.[5] This supports the use of this group of regions as the control, as it sustains that this group did not experience a breakpoint during the time-period when the financing system reform entered into force. Second, the interaction term *hist × tax revenues* is negative and significant, meaning that equal size increases in tax revenues translate into larger deficit reductions in the historic regions compared to the other regions in the entire analysis period. Instead, *hist × current transfers* is non-significant. Finally, *hist × current expenditure* is only (highly) significant when *current transfers* is the omitted variable. When this is the case, the sign is positive, and the coefficient is relatively large. This suggests that, over the entire period under analysis, the historic regions had a stronger budget constraint than the other regions. For instance, in model [1], the entire

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[5]Only in model [4c] it is significant at the 5% confidence level.

Table 6. Determinants of primary deficit before and after the reform of the financing system. Estimation of baseline models including autonomous regions outside the general scheme

	[1]	[2]	[2b]	[3]	[3b]	[4]	[4b]	[4c]
Deficit (t−1)	**.3978***	**.4134***	**.4430***	**.3329***	**.3313****	**.3393***	**.3734******	**.3070****
St. deviation	.038	.035	.038	.038	.038	.035	.035	.040
Hist × Deficit (t−1)			**−.1378***					**.1187**
St. deviation			.078					.073
Current expenditure	**.0699***	**.0652***	**.0632***	**.1800***	**.1754***	**.1832***	**.1725***	**.1931***
St. deviation	.016	.016	.016	.023	.023	.023	.023	.023
Hist × Current exp	**.2542***	**.2242***	**.2560***	**−.0171**	**.0137**	**−.0439**	**−.0108**	**−.0568**
St. deviation	.057	.052	.056	.047	.047	.045	.046	.046
Tax revenues	**−.0064**	**.0045**	**.0024**					
St. deviation	.028	.028	.028					
hist*Tax rev.	**−.2803***	**−.2721***	**−.3005***					
St. deviation	.067	.064	.066					
Current transfers				**−.1354***	**−.1138***	**−.1406***	**−.1167***	**−.1494***
St. deviation				.021	.020	.020	.020	.021
Hist × curr transf.				**.0675**	**.0264**	**.0939**	**.0441**	**.1147***
St. deviation				.067	.067	.061	.062	.062
Post reform	**−.0076****	**−.0096***	**−.0094***	**−.0115***		**−.0122***		**−.0127***
St. deviation	.003	.003	.003	.003		.002		.002
Post reform × curr exp	**.0557***	**.0702***	**.0702***	**.0252**	**−.0419***	**.0296**	**−.0458***	**.0293**
St. deviation	.021	.020	.020	.021	.013	.019	.012	.019
Post reform × hist × curr exp	**−.0153**	**−.0144**	**−.0144**	**.0364***	**.0352***	**.0397***	**.03116**	**.0447****
St. deviation	.022	.022	.022	.021	.021	.020	.021	.021
Agriculture intensity	**−.0589****			**−.0285**	**−.0539****			
St. deviation	.027			.026	.025			
Growth	**−.0951***	**−.1054***	**−.1020***	**−.0991***	**−.0958***	**−.1032***	**−.1054***	**−.1048***
St. deviation	.015	.015	.015	.014	.015	.014	.014	.014
Pop>64	**−.0807***	**−.0767***	**−.0812***	**−.0943***	**−.1041***	**−.0912***	**−.0905***	**−.0949***
St. deviation	.030	.029	.029	.029	.029	.028	.029	.028
Pop<16	**.0393***	**.0328**	**.0308**	**.0184**	**.0244**	**.0118**	**.0276**	**.0097**

(Continued)

Table 6. (*Continued*)

	[1]	[2]	[2b]	[3]	[3b]	[4]	[4b]	[4c]
St. deviation	.023	.021	.021	.022	.022	.020	.020	.020
Employment rate	−**.0068**			−.0027	−**.0241****			
St. deviation	.012			.012	.011			
AB[1] (p-value)	.90 (.37)	−1.39(.17)	.84(.40)	.	.	.98(.33)	−.16(.87)	.88(.38)
AB[2] (p-value)	.	−.02(.98)	.74(.46)	.	−.34(.73)	.58(.56)	.002(.99)	.60(.55)
Sargan test(p-value)	566.62(.28)	571.86(.25)	566.46(.29)	600.72(.06)	601.08(.06)	611.26(.04)	594.53(.10)	613.64(.03)
Obs (groups)	561(17)	578(17)	578(17)	561(17)	561(17)	578(17)	578(17)	578(17)

*, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

coefficient of current expenditure for the historic regions is .3241 (i.e. .2542+.0699), compared to .0699 for the other regions.

Estimation results reveal that both fiscal variables, current expenditures, and tax revenues were significantly larger in absolute value in the historic regions before the reform of the financing system, but there was no statistically significant difference in the post-reform period. There is no relevant gap, however, in the lag of the dependent variable.

These results are fully compatible with our main hypothesis. The two historic regions collect taxes in their territories, but under the same regulation used by the central government in the rest of the country. The income of the historic regions does not depend on the financing system applied to the other 15 regions, but mostly depends on the evolution of tax revenue. This explains the stronger impact of the *current expenditures* variable during the first period, as it was unlikely that unexpected expenditure needs would be covered by discretional transfers from the central government. This gap, however, fades out in the second period, when the revenues of the other regions also depended more strongly on a methodic procedure based on tax revenues and socioeconomic variables rather than on makeshift distribution criteria.

Spatial dependence

Alternatively, a different methodological approach examines the persistence of the results to the introduction of spatial dependence between the variables. This involves some degree of "contagion" between regions with fiscal variables that may depend both on the value of the control variables of the reference region and on the evolution of the same fiscal variables in other regions. Based on the results of preliminary estimates and their specification tests, we used the Spatial Autoregressive model (SAR) in which a spatial lag of the dependent variable is introduced into the set of explanatory variables. Otherwise, the model conserved the assumed dynamics and the control variables are identical to the model in Equation (1):

$$deficit_{it} = dW \, deficit_{jt} + \beta_1 current\_expenditure_{it} + \beta_2 income_{it} + \gamma \, m_{it} + \mu_i + \varepsilon_i \qquad (2)$$

The coefficient δ represents the indirect effect on region "i" of alterations to the dependent variable in other regions "j", in addition to the direct effect caused by the remaining control variables. The weighting matrix W represents the distance, or the relative importance, of these contagion effect across regions. In this model, the matrix W is constructed using the physical distance between the capital cities of each region.[6] The effects analysed in equation (2) are called indirect global effects,[7] and are propagated between all units (regions) even if the value of w_{ij} is zero (see Elhorst 2012).

Results

Table 7 reports the outcome of the estimation of the spatial model described by equation (2), using a distance matrix constructed from the inverse of the great circle distance between the capital cities of each region. Here, the value of the dependent variable in a given region depends on the value of the control variables in that region and on the value of the dependent variable (deficit) in the other regions weighted by the distance separating them.[8] This is the Spatial Autoregressive model (SAR) which captures imitation between regions as well as shocks for which the intensity is related to their geographical situation. These estimates were obtained using the same GMM Arellano-Bond estimator used in previous sections, under identical assumptions regarding endogeneity and dynamics.

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[6]As in Dall'erba and Le Gallo (2008), the use of physical distance guarantees the exogeneity of the criterion in contrast to other alternatives based on demographic, cultural, or economic indicators. Each element (wij) in the matrix represents the inverse of the distance between the two capitals of regions "i" and "j", and the diagonal is composed of zeroes. A preliminary version of the paper also considered a binary weighting matrix in which the value was 1 for regions sharing a common border and 0 otherwise. Results remain basically unaltered and have been omitted here for the sake of brevity.

[7]In contrast to the indirect local effect that characterize the Spatial Durbin Model, which is only propagated among neighboring regions.

[8]Row-normalized, so that the sum of the distance of one capital to all other capitals adds up to one.

Table 7. Determinants of primary deficit. Spatial dynamic panel data

	[1]	[2]	[3]	[4]
Deficit (t−1)	.3148***	.2804***	.2536****	.2131***
St. deviation	.038	.040	.037	.038
Current expenditure	.0512***	.0873***	.1117****	.1610***
St. deviation	.013	.016	.019	.021
Tax revenues	−.0529**	−.0421*		
St. deviation	.013	.025		
Current transfers			−.0784***	−.1081***
St. deviation			.018	.020
Post reform	−.0082***		−.0143***	−.0125***
St. deviation	.003		.002	.002
Post reform × curr exp	.0554***	.0431**	.0444***	.0363**
St. deviation	.017	.019	.017	.018
Agriculture intensity		−.0408*		−.0088
St. deviation		.024		.023
Growth	−.0110	−.0012	−.0220	−.0129
St. deviation	.015	.015	.014	.014
Population		.0029**		.0004
St. deviation		.001		.001
Pop>64		−.0990***		−.1611***
St. deviation		.030		.001
Pop<16		.0200		−.0226
St. deviation		.022		.021
Employment rate	−.0051	−.0061	.0089	.0000
St. deviation	.010	.012	.010	.011
w × Deficit	.5979***	.5677***	.5162***	.5134***
St. deviation	.051	.054	.051	.051
LM[1]	6.02(.01)	7.31(.01)	.32(.57)	1.58(.21)
AIC[2]	−10.10	−10.11	−10.12	−10.16
F-test (p val)	119.28 (.00)	81.58 (.00)	133.37 (.00)	95.09 (.00)
R^2	.65	.67	.67	.70
Obs (groups)	525(15)	495(15)	525(15)	495(15)

*, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

The main conclusions regarding the variable of interest remain unchanged, since the size and significance of the coefficients for current expenditure are similar to those in Table 4. This is also valid for the other two fiscal variables, while the coefficient for the dynamic component is slightly smaller. The impact of current expenditure on fiscal deficit is, therefore, stronger after the financing system reform.

Regarding other control variables, the situation is similar to that of Table 4, with the exception of the variables *agriculture intensity* and *growth*, which become statistically insignificant in this table, but which exhibit remarkable levels of significance in Table 4.

Finally, the coefficient for the spatially lagged value of the dependent variable is statistically significant and of similar size in all versions of the model. This reveals the existence of a strong imitation effect or regional contagion of shocks affecting the dependent variable. There is no possible interpretation, however, for the size of this coefficient, as it is affected by the weighted matrix and its row-normalisation process.

Deficit and debt per capita as dependent variables

Tables 8 and 9

Table 8. Determinants of primary deficit per capita before and after the reform of the financing system. Dynamic panel data estimates

	[1]	[2]	[3]	[4]
Deficit$_{cap}$ (t−1)	**.4152*****	**.5015*****	**.3333*****	**.4213*****
St. deviation	*.041*	*.036*	*.041*	*.037*
Current expenditure$_{cap}$	**.1476*****	**.0995*****	**.1602*****	**.1026*****
St. deviation	*.036*	*.035*	*.034*	*.032*
Tax revenues$_{cap}$	**−.0560*****	**−.0651*****		
St. deviation	*.108*	*.021*		
Current transfers$_{cap}$			**−.0828*****	**−.0855*****
St. deviation			*.018*	*.018*
Post reform	**−.1055*****	**−.1651*****	**−.1460*****	**−.2235*****
St. deviation	*.051*	*.049*	*.047*	*.045*
Post reform × Curr exp$_{cap}$	**.0318**	**.0612***	**.0205**	**.0596***
St. deviation	*.037*	*.035*	*.035*	*.033*
Agriculture intensity	**.2396**		**−.1528**	
St. deviation	*.464*		*.436*	
Growth	**−1.0888*****	**−1.1492*****	**−1.0434*****	**−1.1715*****
St. deviation	*.273*	*.273*	*.256*	*.257*
Pop>64	**−3.0611*****	**−1.9702*****	**−4.4132*****	**−3.4177*****
St. deviation	*.657*	*.609*	*.610*	*.581*
Pop<16	**.3945**	**−.0951**	**−1.6163*****	**−1.4469*****
St. deviation	*.521*	*.494*	*.491*	*.473*
Employment rate	**−9673*****		**−1.0274*****	
St. deviation	*.248*		*.230*	
AB[1] (p-value)	*−.07 (.94)*	*−2.51 (.01)*	*−1.73 (.08)*	*−2.94 (.01)*
AB[2] (p-value)	*1.13 (.26)*	*2.07 (.04)*	*1.56 (.12)*	*2.34 (.02)*
Sargan test stat(p-value)	*454.62 (.84)*	*443.42 (.91)*	*503.70 (.27)*	*486.19 (.47)*
Obs(groups)	*495(15)*	*510(15)*	*495(15)*	*510(15)*

*, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

Current expenditure and current transfers per capita as dependent variables

Dumitrescu–Hurlin tests for causality in panel data determine a two-way causality between our variables. In all tests for current transfers and primary deficit, and for current expenditure and primary deficit, the null hypothesis that x does not Grange-cause y is rejected at 5% level of confidence. The test also rejects the null hypothesis for debt and current expenditure, although the rejection is only at the 10% level of confidence when x is current expenditure and y is debt, all in per capita terms. As we explain in "Modelling", all our regression models have been designed with this in mind and control for endogeneity. Nevertheless, as a robustness check, this section reports the results for what we called the "reverse" models.

Table 10 shows the results of the regressions when we use regional governments' current expenditure (Models [1] to [5]) and current transfers from the central government to the regional governments (Models [6] and [7]) as the dependent variable. These alternative dependent variables and the fiscal accounts used as regressors are all in per capita terms.

Table 9. Determinants of regional public debt per capita at constant prices. Dynamic panel data estimates

	[1]	[2]	[3]	[4]
Debt$_{cap}$ (t−1)	**.9858*****	**.9859*****	**.9858*****	**.9849*****
St. deviation	*.010*	*.001*	*.001*	*.001*
Current expenditure$_{cap}$	**.3054*****	**.3110*****	**.2303*****	**.2322*****
St. deviation	*.056*	*.055*	*.048*	*.048*
Tax revenues$_{cap}$	**.0238**	**.0213**		
St. deviation	*.040*	*.040*		
Current transfers$_{cap}$			**−.2545*****	**−.2476*****
St. deviation			*.033*	*.032*
Post reform	**.1787****	**.1715****	**−.1163***	**−.1045***
St. deviation	*.075*	*.075*	*.065*	*.063*
Post reform × Curr exp$_{cap}$	**−.1260****	**−.1200****	**−.0035**	**−.0076**
St. deviation	*.055*	*.054*	*.050*	*.050*
Agriculture intensity	**−.6123**			
St. deviation	*.910*			
Growth	**−2.3323*****	**−2.3633*****	**−3.3421*****	**−3.3443*****
St. deviation	*.497*	*.495*	*.441*	*.440*
Pop>64	**−3.5396*****	**−3.7459*****	**−3.4493*****	**−3.1360*****
St. deviation	*1.203*	*1.163*	*1.092*	*.975*
Pop<16	**1.4203**	**1.2266**	**−.8019**	
St. deviation	*1.352*	*1.320*	*1.253*	
Employment rate	**−3.5970*****	**−3.6206*****		
St. deviation	*.402*	*.400*		
AB[1] (p-value)	−2.212 (.03)	−2.221 (.03)	−2.507 (.01)	−2.772 (.01)
AB[2] (p-value)	2.110 (.04)	2.243 (.02)	2.086 (.04)	2.132 (.03)
Sargan test stat(p-value)	387.29 (.08)	388.31 (.08)	466.80 (.00)	468.49 (.00)
Obs(groups)	360(15)	360(15)	360(15)	360(15)

*, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.

In "Modelling", we argued one must be cautious when relying on the results in Table 10. This said, we conclude that the estimated coefficients sustain our main result: the budget constraint is harder in the post-reform period. Specifically, the increase of current transfers per capita after the reform imply a smaller increase in current expenditure compared to the pre-reform period. Moreover, a larger deficit or debt at t-1 implies a reduction of the current expenditures at t (See Models [1], [2], and [3]). Model [4] shows how increases in tax revenues are used to increase public expenditures much less after the reform. Hence, they are used to contain the deficit.

In Model [6], current expenditure and the interaction term between it and the post-reform dummy are the regressors. We see that, after the reform, the increase of current expenditure motivates a smaller increase in current transfers. Finally, Model [7] regresses current transfers on tax revenues and lagged primary deficit and their interaction terms with the post reform dummy variable. It seems that, after 2001, increases in tax revenue translate into decreases in current expenditure. Most probably, the extra income is used to contain deficit. Indeed, although the coefficient is not significant, last period increases of deficit imply reductions in today's current transfers.

Table 10. Determinants of regional current expenditures and transfers per capita at constant prices. Dynamic panel data estimates

Dependent variable:	Current expenditure$_{cap}$					Curr. Transfers$_{cap}$	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Dependent var$_{cap}$ (t−1)	.7320***	.7912***	.8978***	.8872***	.9254***	.8035***	.7895***
St. deviation	.025	.023	.016	.016	.014	.025	.024
Current expenditure$_{cap}$						.1151***	
St. deviation						.041	
Post reform × Curr exp$_{cap}$						−.0982***	
St. deviation						.032	
Tax revenues$_{cap}$		.4116***		.5242***			.2306
St. deviation		.147		.101			.153
Post reform × tax rev$_{cap}$		−.2021		−.4307***			−.3380**
St. deviation		.147		.101			.157
Current transfers$_{cap}$	.3132***		.2447***				
St. deviation	.068		.039				
Post reform × Curr trans$_{cap}$	−.1519***		−.2129***				
St. deviation	.056		.036				
Deficit$_{cap}$ (t−1)			.2079	.5375**	.4522*		.1468
St. deviation			.2405	.230	.243		.353
Post reform × deficit$_{cap}$ (t−1)			−.5704**	−.9835***	−.8215***		−.3660
St. deviation			.242	.230	.244		.354
Debt$_{cap}$ (t−1)	.0393	.1098**					
St. deviation	.057	.053					
Post reform × Debt$_{cap}$ (t−1)	.0041	−.1263**					
St. deviation	.057	.052					
Post reform	.3681***	.2749***	.4106***	.3260***	.2258***		.3126***
St. deviation	.0569	.063	.041	.042	.029		.068
Growth	−.7047**	1.3877***	−.0192	−.0073	.1527	1.3669***	.5198
St. deviation	.335	.412	.265	.256	.270	.373	.392
Pop>64	1.8392*	−.5631	1.4558**	−.1485	1.3044**	−.3215	1.5432*
St. deviation	1.058	1.045	.621	.561	.615	.915	.856
Pop<16	1.4236	−1.978	1.044**	−.2494	−.3834	−1.3864**	−.7429
St. deviation	1.223	1.281	.459	.475	.395	.640	.737

(*Continued*)

Table 10. (*Continued*)

Dependent variable:	Current expenditure$_{cap}$					Curr. Transfers$_{cap}$	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Employment rate	**1.9877******		.4577***		.7962***	**1.0375*****	
St. deviation	*.343*		*.233*		*.234*	*.292*	
AB[1] (p-value)	−2.877 (.00)	−2.675 (.01)	−2.944 (.00)	−2.905 (.00)	−2.978 (.00)	−3.003 (.00)	−3.382 (.00)
AB[2] (p-value)	1.579 (.11)	1.617 (.11)	1.051 (.29)	1.106 (.27)	1.098 (.27)	−3.381 (.00)	−3.211 (.00)
Sargan test stat(p-value)	284.73 (.99)	341.43 (.63)	455.35 (.86)	498.66 (.28)	471.17 (.67)	561.52 (.01)	545.57 (.02)
Obs(groups)	360(15)	360 (15)	510 (15)	510 (15)	510 (15)	510 (15)	510 (15)

*, **, and *** indicate statistical significance at the ten, five, and one percent levels, respectively.