Fiscal equalisation schemes and sub-central government borrowing

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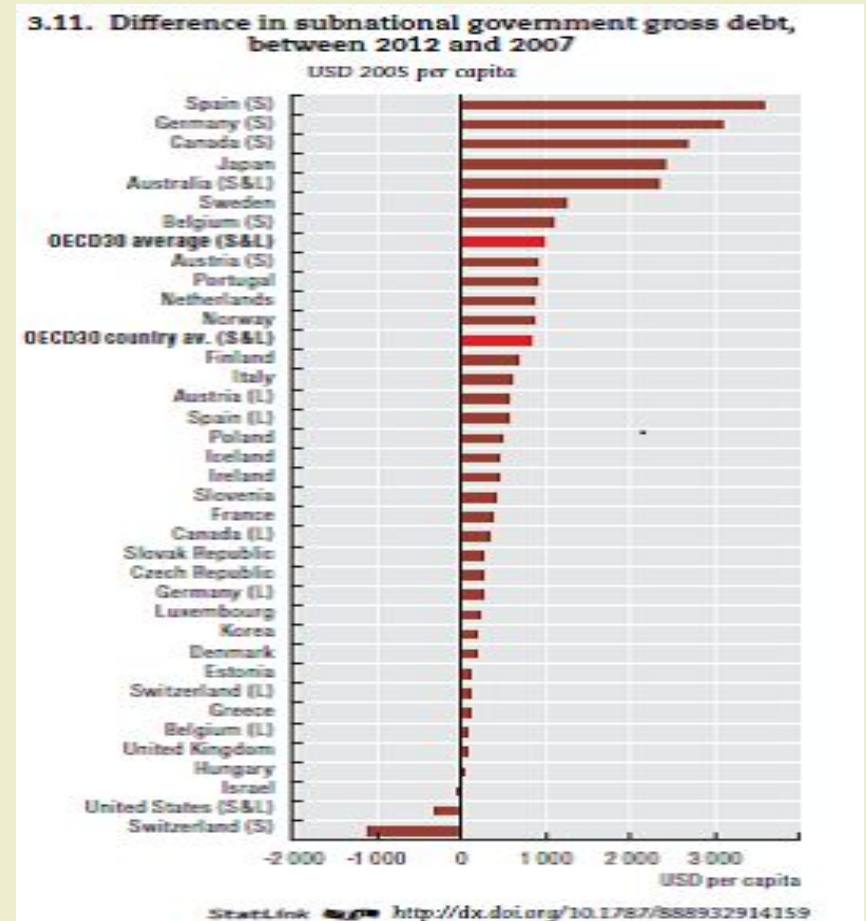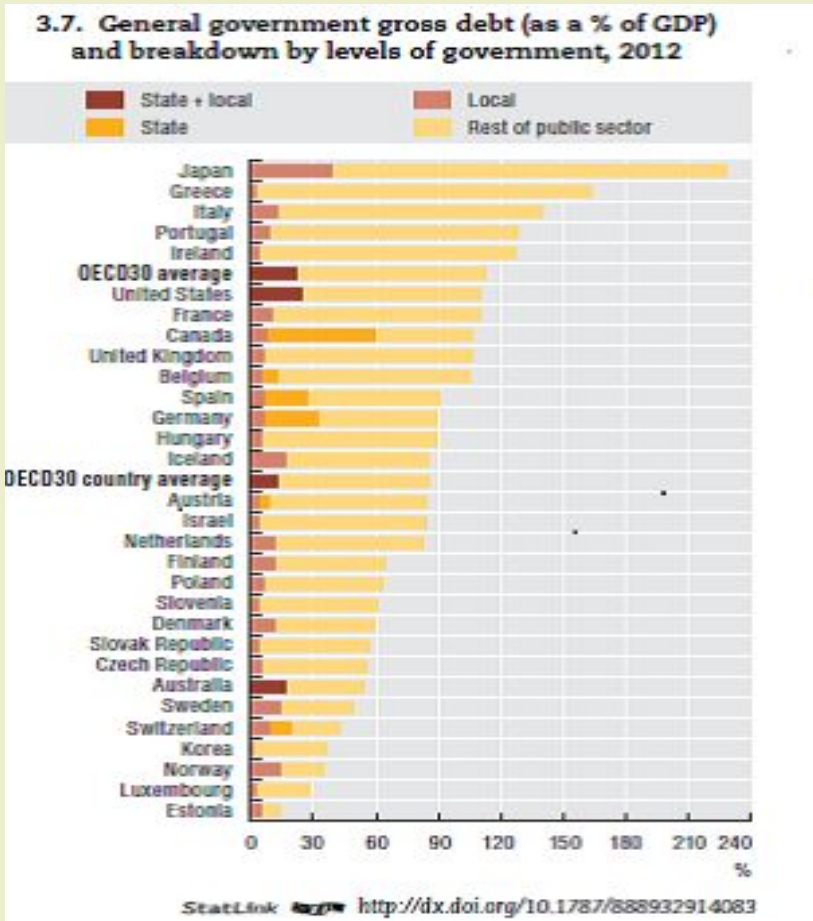** Pablo Olavide University at Seville (Spain)

Outline

1. Motivation and introduction

2. Econometric results

3. How to explain this? A simple theoretical model and some numerical simulations

4. Concluding remarks with policy implications

Motivation and introduction

Some previous ideas:

- Sub-central government public finances have sharply deteriorated and regional public debts account for important shares of GDP in some OECD economies since the start of the global financial crisis

3.7. **General government gross debt (as a % of GDP) and breakdown by levels of government, 2012**

StatLink http://dx.doi.org/10.1787/888932914083

3.11. **Difference in subnational government gross debt, between 2012 and 2007**

USD 2005 per capita

StatLink http://dx.doi.org/10.1787/888932914159

Motivation and introduction

Some previous ideas:

- The problem is that achieving fiscal consolidation objectives at sub-national level is not so straightforward as at federal level:

- Regional heterogeneity means differences in fiscal capacities and in spending needs, more evident than at national level

- Regions usually have only a loose control over their own fiscal policy. In some cases a large share of their revenues stems from central-governments, either through grants or shared taxes over which they ordinarily have little discretionary control

- Regions typically face long-lasting income differentials which make some of them largely dependent on intergovernmental grants to ensure a sufficient access to public goods and services according to nationally-set standards

Motivation and introduction

Some previous ideas:

- In this context,

• The incentives to undertake structural reforms and/or to avoid budgetary slippages are notoriously low in the presence of permanent fiscal transfers (Duval and Elmeskov, 2006)

• And the fiscal equalisation scheme may not provide appropriate mechanisms to reduce excessive regional fiscal imbalances (Rodden, 2006)

• Regional fiscal policy decisions might thus be more distorted than, say, country-level fiscal policy decisions, since regions naturally set their fiscal policy objectives by anticipating the resources stemming from the central government (Padovano, 2014)

• Likewise, in countries where vertical fiscal imbalances are high, public deficits also tend to be large, see Eyraud and Lusinyan (2013)

Motivation and introduction

Some previous ideas:

- We also know that a number of factors have been put forward in the literature explaining how the <u>level</u> of fiscal decentralisation could influence regional borrowing: soft-budget constraint and misperception on the cost of public services, the size and age structure of the population, the degree of political fragmentation (Buettner and Wildasin (2006), Velasco (2000), Alt and Lowry (1994), Egger et al. (2010)).

In this paper we argue that, in addition to the <u>level</u> of fiscal decentralisation, the <u>design</u> of fiscal equalisation payments may also matter by deciding on borrowing.

To show that, we focus on three decentralised countries in order to see whether the fiscal decisions taken by rich/poor regions depend on the particular design of the equalisation grant system.

Motivation and introduction

Indeed, our three countries show remarkable cross-country differences in their fiscal federalism model

	Public expenditure *(% of general gov. exp,)*		Tax revenues *(% of general gov. tax rev.)*		Intergov. Transf. Rev. *(% 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	37.1	38.9
Germany	18.74	21.41	21.64	21.16	17.20	18.05	21.6	22.9
Spain	21.60	34.42	4.8	18.24	73.3	49.0	4.8	22.3

The key issue here is how important are intergovernmental transfers for financing regional public expenditures:

- High degree of tax revenues decentralisation in Canada.

  Spain and Germany, the opposite

- Vertical fiscal gap is still the highest in Spain

- Consequently, the relative share of intergov. transfers is high in Spain

Motivation and introduction

Additionally, there are differences in the design and implementation of vertical transfers:

- Canada: formula-based grants from the federal government and clearly linked to provincial fiscal capacities. But also substantial funds to ensure healthcare and social services

- Germany: Horizontal redistribution depending on fiscal capacities and financial needs. Vertical grants to reinforce solidarity, especially for the Eastern Lander

- Spain: Vertical grants strongly based on relative regional spending needs, aimed at guaranteeing similar per capita funds. Fiscal effort not very important to determine regional financing

Motivation and introduction

## Figure 1: Federal grants vs. GDP per capita across Canadian, German and Spanish regions
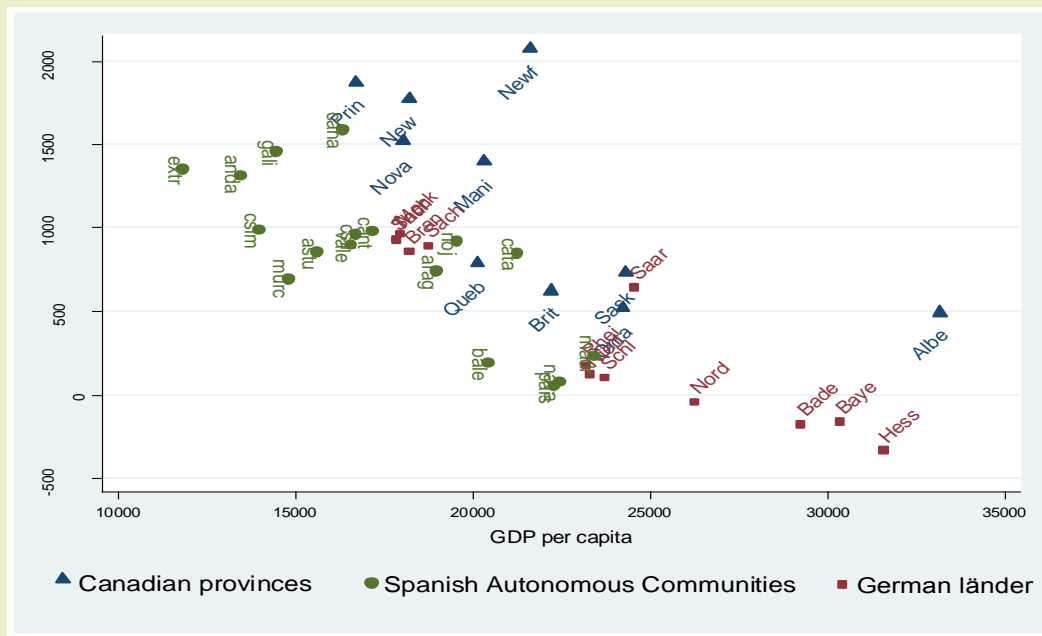
Despite cross-countries differences, equalisation grants share a common (and reasonable) feature: the negative relationship between the regional redistribution (i.e., grants per capita) and the regional level of GDP per capita

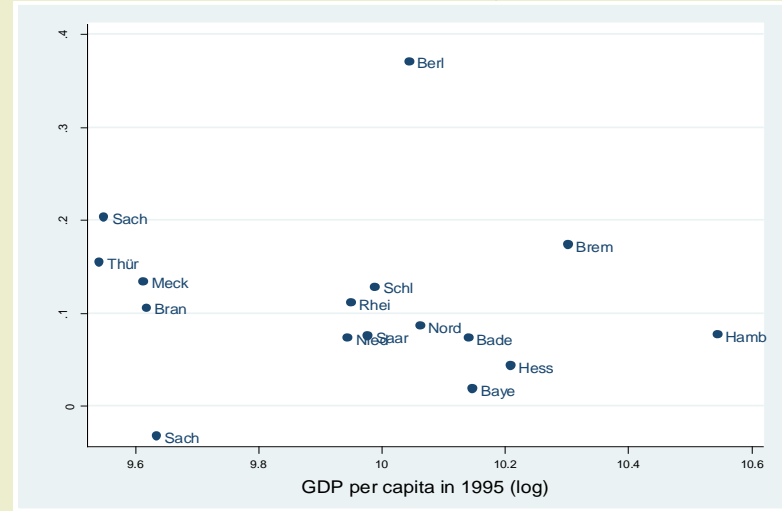# Motivation and introduction

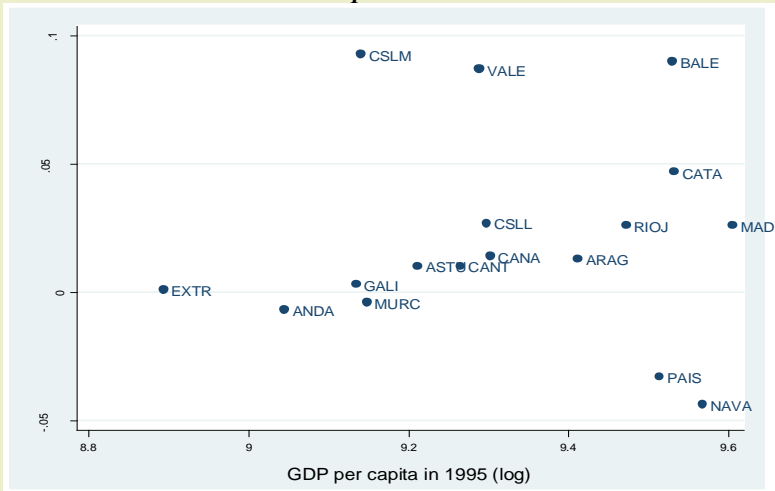**Figure 4: Regional debt variation between 1995 and 2011 vs. level of GDP per capita in 1995**
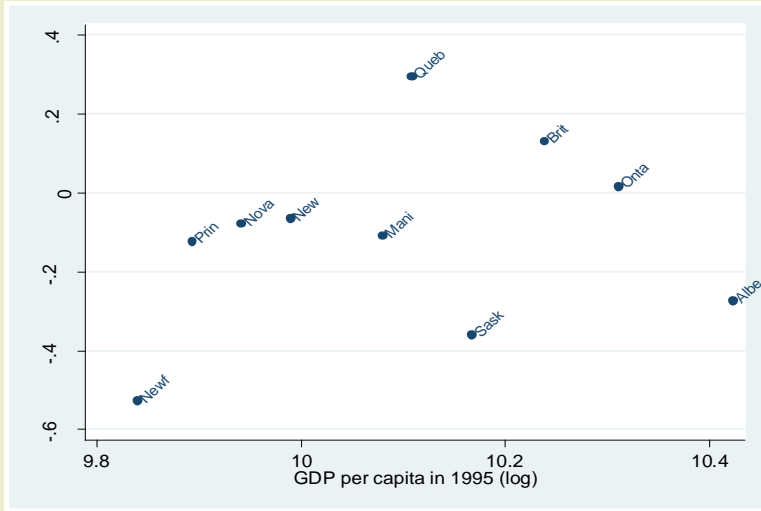
But the relationship between the GDP per capita and the changes in the regional public debt seems to be country-specific

Motivation and introduction

In this context, there are several questions on the table:

- to what extent the design and implementation of fiscal equalisation systems in federal countries may affect regional behaviour when borrowing?

- how relevant is the intensity of equalisation by deciding the level of public debt at regional level?

- equalisation systems more prone to equalise fiscal capacities vs financial needs (on a per capita basis?) are likely to stimulate borrowing in rich regions? Or the relationship is the opposite?

- broadly speaking, are poor regions more inclined to borrow, given the institutional features of the country and, particularly, its territorial redistribution system?

Econometric results

Estimation of fiscal reaction functions (Bohn, 1998) using panel data for Canada, Spain and Germany over late nineties and 2000s

$$pb_{i,t} = \beta_1 + \beta_2 \, pb_{i,t-1} + \beta_3 D_{i,t-1} + \beta_4 OG_{i,t} + \beta_5 Ycap_{i,t} + \boldsymbol{\beta_6 X_{i,t}} + \varepsilon_{i,t}$$

where *pb* is primary balance (net lending minus interest payments as % of GDP), *D* is public debt level, *OG* is output gap (obtained using HP filter), *Ycap* is the GDP per capita, and X a vector of control variables

$\beta_3 > 0$: Fiscal policy is sustainable

$\beta_4 < 0$: Fiscal policy is pro-cyclical

$\beta_5 < 0$: Rich regions tend to borrow more. As the GDP per capita is inversely correlated with grants, we can infer that equalisation may impact positively public deficit in rich regions, and vice versa

Econometric results

Error $\varepsilon_{i,t}$ is made of two components: an i.i.d. term $\phi_{i,t}$ with the classical statistical properties and a panel-specific (or fixed) effect μ_i which is assumed to be region-specific and invariant. Panel fixed effect estimation

Potential endogeneity bias (dependent variable with lags among the regressors). Dynamic panel data estimator based on Blundell and Bond (1998) system estimator which allows us to account for both endogeneity and region-specific fixed effects (the so-called GMM system estimator)

OLS estimates also reported for information only

Control variables: the share of each region in the total population of the country, a dummy variable indicating whether in a given year regional elections took place, another dummy for controlling when the regional election year coincides with a general election year, grants received during the period (t-1).

Statistical sources: for Spain, from the National Statistics Institute and the Ministry of Finance; for Germany, from the Ministry of Finance and DeStatis; for Canada, from STATCAN, the Department of Finance and the Royal Bank of Canada

Econometric results

Table 3: Econometric results for Canada. Dependent variable: Provincial primary balance net of federal grants (1994-2008)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Fixed-effects	Fixed-effects	Fixed-effects	GMM-system	GMM-system	GMM-system	OLS
Primary balance (t-1)	0.800***	0.668***	0.671***	0.967***	0.852***	0.851***	0.812***
	(0.0822)	(0.0974)	(0.0966)	(0.0455)	(0.0600)	(0.0461)	(0.0818)
GDP per capita (t-1)	-0.00493	-0.00751	-0.00739	-0.00860	-0.0113	-0.0111	0.00121
	(0.00664)	(0.00660)	(0.00667)	(0.00634)	(0.00802)	(0.00891)	(0.00561)
Output gap (t-1)	-1.263**	-1.185**	-1.133**	-1.350**	-1.189**	-1.125*	-1.343**
	(0.561)	(0.551)	(0.547)	(0.562)	(0.588)	(0.594)	(0.532)
Public debt (t-1)	-0.0258	-0.0170	-0.0204	-0.0234	-0.0199	-0.0228	0.00128
	(0.0162)	(0.0163)	(0.0166)	(0.0241)	(0.0280)	(0.0281)	(0.00817)
Grants (t-1)		-0.246**	-0.216**		-0.178	-0.150	-0.126*
		(0.101)	(0.102)		(0.120)	(0.115)	(0.0755)
Regional elections year (t)			-0.00393			-0.00434	-0.00366
			(0.00239)			(0.00277)	(0.00246)
Congruence regional/general elections (t)			-0.000746			-0.000649	-0.00236
			(0.00522)			(0.00665)	(0.00520)
Population share (t-1)			-0.516			-0.479	0.000837
			(0.366)			(0.361)	(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-effets ($\mu i = 0$)	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	

Canada: rich regions tend to borrow more but not statistically significant. Inconclusive result

Econometric results

Table 4: Econometric results for Germany. Dependent variable: Länder primary balance net of federal grants (1994-2011)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Fixed-effects	Fixed-effects	Fixed-effects	GMM-system	GMM-system	GMM-system	OLS
Primary balance (t-1)	0.424***	0.535***	0.491***	0.572***	0.677***	0.633***	0.755***
	(0.0622)	(0.0663)	(0.0660)	(0.0641)	(0.0534)	(0.0508)	(0.0609)
GDP per capita (t-1)	0.0361***	0.0325***	0.0359***	0.0283***	0.0273***	0.0302***	0.0308***
	(0.00705)	(0.00687)	(0.00663)	(0.00925)	(0.0104)	(0.00994)	(0.00489)
Output gap (t-1)	-1.508***	-1.237***	-1.086***	-1.463***	-1.175***	-1.065***	-2.149***
	(0.389)	(0.381)	(0.369)	(0.315)	(0.326)	(0.313)	(0.368)
Public debt (t-1)	-0.00591	-0.0129	-0.0214	-0.00923	-0.0182	-0.0237	-0.0178**
	(0.0193)	(0.0187)	(0.0180)	(0.0228)	(0.0245)	(0.0234)	(0.00881)
Grants (t-1)		0.255***	0.215***		0.253***	0.212***	0.0716
		(0.0643)	(0.0635)		(0.0902)	(0.0787)	(0.0520)
Regional elections year (t)			-0.000102			-0.000393	0.000399
			(0.00143)			(0.00224)	(0.00160)
Congruence regional/general elections (t)			-0.00695***			-0.00682**	-0.00769***
			(0.00233)			(0.00286)	(0.00258)
Population share (t-1)			-1.279***			-0.998**	0.0192
			(0.421)			(0.400)	(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-effets ($\mu i = 0$)	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

Germany: rich regions tend to borrow less. Robustness checks with changes in the sample, dummies for city states, bail-outs and others, keep the bulk of the results.

Econometric results

Table 5: Econometric results for Spain. Dependent variable: regions primary balance net of central government grants (1994-2009)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Fixed-effects	Fixed-effects	Fixed-effects	GMM-system	GMM-system	GMM-system	OLS
Primary balance (t-1)	0.756***	0.943***	0.933***	0.921***	1.019***	1.044***	0.951***
	(0.0633)	(0.139)	(0.141)	(0.0375)	(0.0348)	(0.0280)	(0.138)
GDP per capita (t-1)	-0.0245***	-0.0255***	-0.0258***	-0.0180**	-0.0177***	-0.0176***	-0.00622
	(0.00604)	(0.00606)	(0.00614)	(0.00771)	(0.00624)	(0.00673)	(0.00517)
Output gap (t-1)	-7.646***	-7.075***	-7.053***	-7.219***	-6.478***	-6.570***	-9.342***
	(2.038)	(2.067)	(2.088)	(2.466)	(2.218)	(2.238)	(2.098)
Public debt (t-1)	-0.247**	-0.219**	-0.238*	-0.169	-0.152	-0.177	-0.0125
	(0.106)	(0.107)	(0.124)	(0.150)	(0.126)	(0.139)	(0.0711)
Grants (t-1)		0.236	0.233		0.271***	0.286***	-0.0268
		(0.157)	(0.159)		(0.0758)	(0.0649)	(0.139)
Regional elections year (t)			0.00150			0.00140	0.000776
			(0.00316)			(0.00414)	(0.00326)
Congruence regional/general elections (t)			0.00356			0.00462	0.00260
			(0.0119)			(0.0146)	(0.0113)
Population share (t-1)			0.261			0.377	0.0340
			(0.789)			(0.734)	(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-effets ($\mu_i = 0$)	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

Spain: rich regions tend to borrow more. Robustness checks with Foral regions, dummy for 2002, etc., keep practically unchanged the results.

How to explain this? A simple theoretical model and some numerical simulations

Two regions with different productivities, populated by a representative household with preferences and budget constraints as follows:

$$U = \log(x_1^j) + \gamma \log(L - l) + \eta \log(g_1^j) + \beta\left[\log(x_2^j) + \eta \log(g_2^j)\right].$$

$$x_1^j = w^j l (1 - \tau_l) - S^j$$

$$x_2^j = S^j (1 + r(1 - \tau_S))$$

Two periods: production & consumption in 1, consumption in 2

Two production factors: **L**, taxed by CG and SCG (at **t** and **T),** while **K** only taxed by CG

Regions provide a local public good; central government (CG) collects taxes and redistributes

How to explain this? A simple theoretical model and some numerical simulations

Each region maximises utility function subject to the regional budget constraint:

$$g_1^j - N^j t_l^j w^j l - D^j = 0$$

$$g_2^j - Z^j + D^j (1+r) = 0$$

where Z^j is an equalisation transfer from the federal to the regional government:

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

Optimal values for g_1^j, g_2^j, t_l^j and D^j are then obtained.

Particularly, we are interested in regional borrowing: $D^j = D^j(T, \Omega, r)$

where $\mathbf{T} = (\alpha, \bar{w}, \bar{t}, T_l^j)$ and $\mathbf{\Omega} = (N^A, N^B, L, \beta, \gamma, \eta)$

How to explain this? A simple theoretical model and some numerical simulations

It is not straightforward to determine the sign of regional borrowing. But simple comparative statics gives us some interesting results:

- Regional public debt is positively affected by the standard wage rate $\bar{w}$ because it is a guarantee of more resources for equalisation, even for the rich regions.

- Regional public debt is positively affected by the normative fiscal effort $\bar{t}$ in the case of poor region; more borrowing in period 1 on the basis of larger revenues from equalisation in period 2. The opposite holds for the rich region.

- The impact of changes in the degree of equalisation α is not unambiguous

Therefore, given the ambiguities in the analytical expressions, we have performed a battery of numerical simulations

How to explain this? A simple theoretical model and some numerical simulations

We have carried out a number of numerical simulations taking the analytical expressions of the model as basis. Parameters chosen do not aim at replicating *strictu sensu* real life cases but only to illustrate how two polar cases (Spain and Germany) behave under our theoretical framework

Reminder of German case: strong horizontal redistribution (relatively high α), no explicit normative fiscal effort and very little tax autonomy at regional level (identical $\bar{t}$ across the Lander), very much focussed on fiscal capacities (w set at relatively high level)

Reminder of Spanish case: especially focussed on spending needs (substantial differences in population N) and very low fiscal effort ($\bar{t}$)

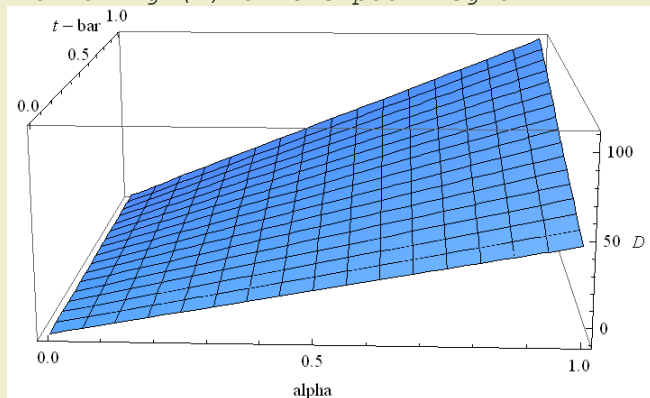# How to explain this? A simple theoretical model and some numerical simulations

Table A2: Results of numerical simulations of the theoretical model

	General case	Spanish case	German case
L	1	1	1
w^A	1	1	1
w^B	3	2	2
$\bar{w}$	2	1.5	1.8
N^A	120	85	100
N^B	80	115	100
$\bar{t_l}$	0.3	0.05	0.3
α	0.9	0.9	0.9
β	0.9	0.9	0.9
r	0.11	0.11	0.11
γ	0.8	0.8	0.8
η	0.5	0.5	0.5
$0 \leq T_l^i = T_l^j \leq 1$	0.3	0.3	0.3
D^A	57.124	19.075	37.893
D^B	-8.348	25.879	15.701

How to explain this? A simple theoretical model and some numerical simulations

Illustration of the German case

Borrowing (D) of the poor region
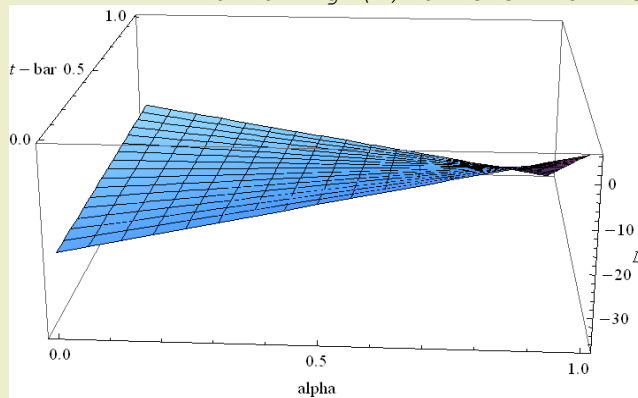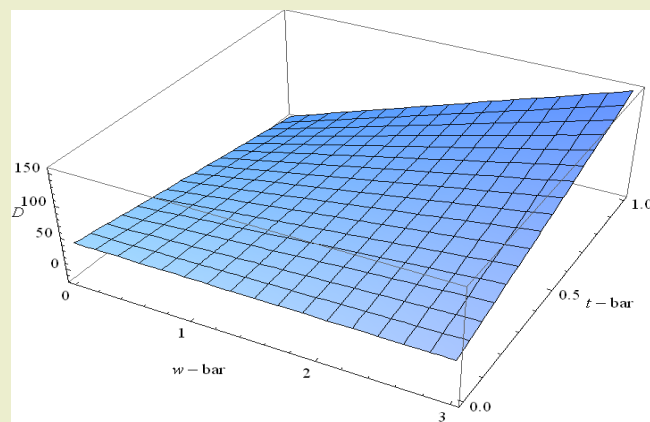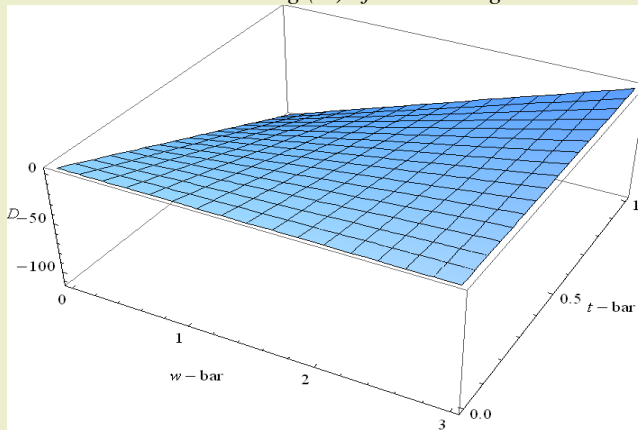

Borrowing (D) of the rich region

Illustration of the Spanish case

Borrowing (D) of the poor region

Borrowing (D) of the rich region

How to explain this? A simple theoretical model and some numerical simulations

<u>Germany: poor regions tend to borrow more</u>

Interpretation: with a strong equalisation in terms of fiscal capacities, poor regions receive significant resources in the second period, encouraging borrowing in the first one

<u>Spain: rich regions tend to borrow more</u>

Interpretation: with equalization focused on spending needs (with relatively high standard living conditions) and underestimating the real tax effort, rich regions do not fully use their fiscal capacity and over-borrow.

<u>Canada: rich regions tend to borrow more but not significant</u>

Interpretation: with a mix of equalisation based on fiscal capacity and spending needs, and not applied to all regions, net result is unclear.

Concluding remarks with policy implications

Fiscal framework influences the relationship between regional GDP per capita and regional public borrowing.

The sign of the relationship between regional borrowing and GDP per capita clearly depends on the institutional design of equalisation system in terms of fiscal effort, degree of equalisation and standard fiscal capacity.

Some policy implications:

First, regarding that the standard fiscal capacity $\bar{w}$ has a positive impact on the variation of regional public borrowing, the government should therefore reduce the standard fiscal capacity offered by the equalisation grants when the territorial financing systems lead to excessive regional borrowing. Ex.: Canada in 2007-2009.

Concluding remarks with policy implications

Generally speaking, 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 equalisation system.

Second, the effect of changes in the normative fiscal effort $\bar{t}$ on regional public borrowing is pretty sensitive to whether the region is poor or rich: positive relationship when poor regions are involved, and vice versa.

A common-sense recommendation: fixing a benchmark value for the standard tax rate as close as possible to its average value, even leaving aside extreme values for its computation. The rationale for this: to promote more homogenous public borrowing across regions

Concluding remarks with policy implications

However, reforms affecting $\bar{t}$ are likely to have negligible effects when its real impact on the equalisation payments is low, as in the Spanish case.

Third, the degree of fiscal equalisation α, that is, the percentage of the differences in the relative fiscal capacities of regions covered by the equalisation system, also plays an important role in regional borrowing.

A value for α above 100 per cent would involve over-equalising the fiscal capacity of regions and reducing their incentives for an efficient use of tax revenues. Existing vertical grant systems may sometimes result in over-equalisation. Nevertheless, this effect usually does not come from the equalisation system per se but from the confluence of a set of vertical grants (Spain, Germany).

Concluding remarks with policy implications

On the other side, the 2007 Canadian reform of the equalisation scheme: any equalisation-receiving region (which includes all revenue sources and the equalization payment) could not exceed the fiscal capacity of the poorest non-equalization-receiving region

A further point not directly studied in the paper:
- An additional source of complexity stems from the non-formula-based intergovernmental transfers. The political bias in the territorial allocation of grants across regions is particularly strong the weaker and less transparent the equalisation system is. Empirical evidence supporting these facts is provided in Pitlik et al (2006) for Germany and in Simon-Cosano et al (2013) for Spain

Thank you!