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The effects of capital grants to subnational governments under fiscal stress: evidence from the Spanish regions

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Abstract

Purpose – This paper aims to examine the impact of capital grants on the fiscal choices of Spanish regional governments from 1984 to 2021.

Design/methodology/approach – After running a battery of tests to verify the integration order of variables, joint cointegration and causality direction, the authors estimate a series of vector autoregressive models.

Findings – The results show that capital grants were highly effective until 2007, boosting capital expenditure and generating a significant crowding-in effect on capital expenditure in the long run. Then, the authors specifically analyze structural changes due to the deep impact of the Great Recession in Spain since 2008. However, the crowding-in effect still holds. Conditionality and matching rates are relevant elements of a sound definition of grant programs to subcentral governments.

JEL classification – H70, R58

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Originality/value – The findings contribute significantly to the existing literature on fiscal federalism and regional economics.

Keywords Intergovernmental grants, Regional policy, Crowding-out effect, Capital expenditure

Paper type Research paper

1. Introduction

Capital grants play a pivotal role in shaping the fiscal choices of subcentral governments, and they are a relevant instrument for the implementation of regional policies worldwide. This duality involves the convergence of two research lines. On the one hand, analyzing the effect of grants has been a key topic of fiscal federalism literature from its very beginning, generating a huge theoretical and empirical literature. On the other hand, regional economics is interested in the success of capital grants as a regional policy tool, particularly in their effectiveness in boosting capital accumulation. This paper relates the two strands of literature, trying to estimate and compare the net effects of capital grants on the subcentral fiscal choices of beneficiaries of strong regional policies under different economic scenarios. This is a point often overlooked in analyses and which we consider fundamental: comparing the reactions of governments facing different budgetary situations.

Of course, capital grants are always conditioned to be spent on investment projects. Furthermore, in the case of matching-rate grants, such as those commonly provided by the European Union (EU), regional governments must contribute to financing the project. Hence, the total investment must always be equal to or higher than the capital grants. However, this is true only from a partial accounting perspective. From a global economic standpoint, regional governments have a greater margin of maneuverability. If grant funding of half is received, the government can implement the project using the full grant and half of its originally planned own resources. While the regional government meets the criteria (conditionality and matching rate), it could use the remaining resources to finance current expenditures or reduce taxes. Ceteris paribus, the probability of this reassignment of resources would be higher under fiscal stress. Alternatively, the regional government can use the extra resources to fund an additional investment project, complementing it with its own revenues. In this case, the grant could involve a crowding-in effect of public expenditure. Empirical research is the only way to answer the question about the dominating final effect.

Our choice of Spain as a case study is threefold. First, the devolution of spending powers to the Spanish regions ("*Comunidades Autonomas*" in Spanish) began in the early 1980s, making Spain one of the most decentralized countries in the world in terms of expenditure nowadays. The share of regional expenditure in total public spending ranks in the world's top five, with figures like those of Canada and Switzerland. Therefore, regional governments play a key role in capital expenditure, and long-time series are already available. Second, both national and European regional policies have been strong in many Spanish regions since the early 1990s, and those policies have mostly been based on capital grants to regional governments. Third, the impact of the so-called Great Recession was particularly intense in Spain, deeply affecting regional governments [1]. Between 2008 and 2015, Spain was where the regional public debt increased the most, coming second in the international ranking, behind only Canada (Lago-Peñas, 2023). Hence, it allows us to compare results in both ordinary times and stressed fiscal scenarios.

Our results show that conditional (and matching in many cases) grants have been highly effective in promoting public capital accumulation in lagging regions from 1980 to 2007, involving a crowding-in effect in the long run. Moreover, this result hold after 2007, which

could be interpreted as an endorsement of the effectiveness of European regional policy even in turbulent times.

The article is organized as follows. Section 2 offers a concise survey of the earlier empirical literature. Section 3 presents the main data on regional fiscal choices involving capital expenditure. The econometric analysis is performed in Section 4. Section 5 discusses the results and their policy implications.

2. Related literature

Intergovernmental grants have long been a central topic in economic research because of their importance in financing subnational governments. Oates (1999) outlined several key purposes for these transfers, including funding public services and investments at the subnational level, addressing externalities and equalizing the capacity of different jurisdictions to provide comparable public services with similar fiscal efforts, all in the interest of promoting regional equity. In recent decades, research has offered significant insights into the actual effects of intergovernmental transfers, which are largely shaped by their design and implementation (Gramlich, 1977; Hines and Thaler, 1995; Inman, 2008).

Empirical findings on the impact of intergovernmental grants are not always consistent, leading to some variation in conclusions, as shown in a recent and comprehensive literature survey by Lago *et al.* (2024). These differences can be largely attributed to the specific country contexts, periods examined, models and estimation methods used. In this section, we set aside the huge literature on other kinds of effects boosted by grants, to focus on the analysis of crowding-in and crowding-out effects.

Capital transfers can generate both effects. It depends on how subnational governments respond to fiscal incentives. Crowding-in occurs when capital transfers motivate subnational governments to increase their tax effort, i.e. to raise their own revenues to complement investments funded by the transfers or to divert resources from other spending policies. This can happen due to the need for co-financing projects or the corresponding reduction in the cost of investments for the subcentral government. On the other hand, crowding-out involves subnational governments increasing current expenditures, reducing taxes or reducing deficit.

Empirical studies present mixed evidence. In most cases, findings from developed countries indicate that transfers discourage fiscal effort (Shah, 1994; Zhuravskaya, 2000; Baretti *et al.*, 2002; Knight, 2002; Buettner and Wildasin, 2006; Liu and Zhao, 2011; Mogues and Benin, 2012; Dash and Raja, 2013; Mohanty *et al.*, 2019). However, other studies suggest a positive effect on subnational fiscal efforts, such as Dahlby and Warren (2003), Buettner (2006) and Miyazaki (2020). The crowding-in effect has been documented in several countries when grants are designed based on revenue potential or fiscal capacity rather than actual revenue collection (Skidmore, 1999; Lago-Peñas, 2006; Litschig and Morrison, 2013; Zhang, 2013; Caldeira and Rota-Graziosi, 2014; Brun and El Khdari, 2016; Troland, 2016; Lewis and Smoke, 2017; Masaki, 2018; Miyazaki, 2020). Moreover, conditionality and co-financing rates are important elements in determining the impact of capital transfers on the fiscal decisions of regional governments. Our main contribution to the literature is testing the net effects of capital transfers on subcentral fiscal decisions in different macroeconomic scenarios.

3. The dynamics of capital expenditure and its funding in Spanish regions

3.1 Fiscal federalism and regional policy in Spain

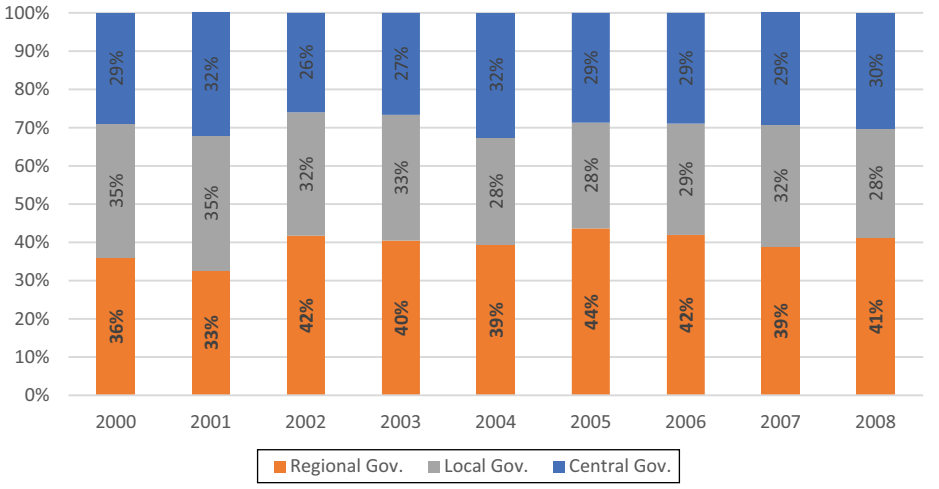
The following three features are relevant to understanding the institutional context and the subsequent choices made in the empirical analysis. First, some grants from the EU finance current spending; the central government makes other kinds of efforts to correct differences

in regional levels of development, such as tax incentives and direct investment, and not all capital grants are implemented to boost economic growth in poor regions (Lago-Peñas, 2006). However, the regional policy in Spain is mostly based on financing public investment made by regional governments.

Second, since the early 1990s, European and Spanish regional policies have been complementary and oriented toward the poorest regions. The main financial instruments are the *European Structural Funds* (ESF) and the so-called *Fondo de Compensación Interterritorial* (FCI) funded by the central government (Fernández-Llera and Delgado, 2009).

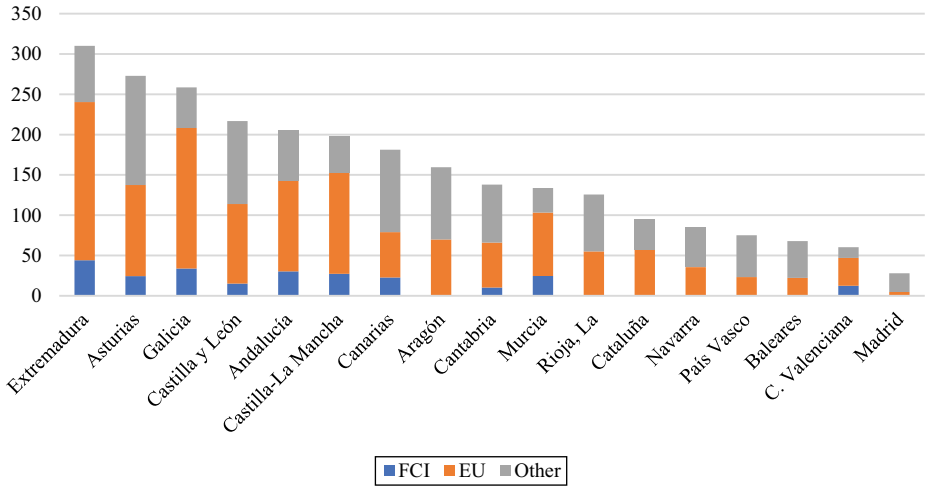
The key role played by regional governments in capital expenditure in Spain exposed in the introduction is shown in Figure 1. Moreover, Figure 2 provides the shares of EU funding, the FCI and the remaining components in the total capital grants received by the 17 Spanish regions from 2002 to 2021 [2].

Third, one asymmetry in Spanish fiscal federalism should be considered [3]. While two regions (Navarra and País Vasco) enjoy the so-called *chartered* regime, the remaining 15 are subject to the *common* regime. The former has a much higher tax autonomy and greater per capita revenues at similar tax rates. Both are rich regions for the Spanish standard, involving tax bases over the average. However, due to the absence of equalization by the formal regions, their contribution to the strong national equalization implemented in Spain is much lower than the corresponding contribution to regions with a similar per capita GDP but under the common regime, such as Cataluña. Chartered regions collect most of the taxes levied in their jurisdictions, and they grant an amount to the central government for funding non-decentralized public services. By contrast, the tax autonomy of the remaining regional governments is still limited. Hence, the dynamics of their saving mostly depend on the evolution of current grants and current expenditures.



Source: Authors elaboration based on BBVA and IVIE (2011)

Figure 1. Central, regional and local shares of public capital expenditures



Note: Figures in constant per capita euros
Source: Authors' own creation

Figure 2. Regional policy as the main driver of capital grants. Averages for the period 2020–2021.

Unfortunately, disaggregated long-time series data for matching and non-matching grants is unavailable. However, Lago-Peñas *et al.* (2015) provide information on the share of European grants over total capital grants for 2002–2012: on average, half of the total received funds. Moreover, EU grants are mostly conditional, with matching rates for recipient governments between 20% and 50%. While conditional non-matching rates are more common in the case of grants from the central government, the total share of matching rate transfers over total capital grants received by regional governments would exceed 50% on average.

3.2 Some stylized facts

Our analysis departs from the analysis of the budget constraint ruling capital expenditure (KE). Capital expenditure is financed by public savings (S), computed as the difference between current revenues and current expenditures, capital grants (KG) and the fiscal deficit (DEF), to be financed mostly by debt [4]. Hence, the basic identity is the following:

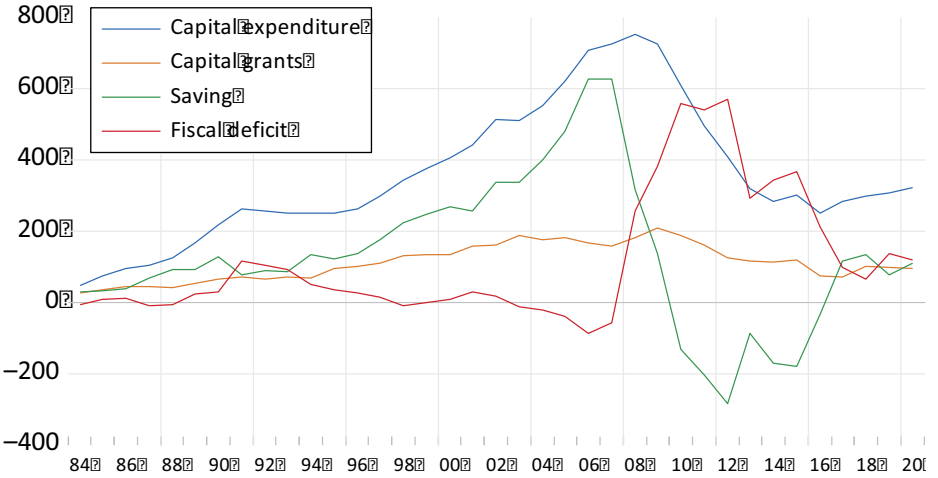
$$KE = S + KG + DEF \tag{1}$$

Definitions of variables and data sources are reported in Table 1. Figure 3 summarizes the dynamics of the cross-section means of the four components over the period 1984–2021. There is a clear structural break in 2007. The Great Recession deeply affected regional governments' accounts. Public savings plunged, and the fiscal deficit dramatically increased. Capital grants are the more stable component, but the underlying trend changes from positive to negative. Capital expenditure, strongly affected by expenditure cuts due to the ruling fiscal stability framework, is reduced by half. Table 2 reports the main descriptive statistics,

Table 1. Variables and data sources

Acronym	Variable	Definition	Source
KE	Capital expenditure	Net capital expenditure of regional governments. Values in constant per capita €	Budget data: Ministry of Finance and Civil Service Population data: National Statistical Institute (INE) GDP deflator: World Bank
KG	Capital grants	Capital grants received by regional governments. Values in constant per capita €	
S	Public savings	Difference between current revenues and expenses of regional governments. Values in constant per capita €	
DEF	Deficit	Total fiscal imbalance of regional governments (negative values correspond to surpluses). Values in constant per capita €	
D	Dummy	A dummy variable coded 1 for observations corresponding to 2008–2021, and 0 otherwise	Own elaboration

Source: Authors' own creation



Source: Authors' own creation

Figure 3. Evolution of cross-section means of capital expenditure, capital grants, public saving and fiscal deficit over the period 1984–2021

splitting the sample into two. Public saving and fiscal deficit interchange their roles between periods.

Figure 4 complements this general picture by providing individual data for each region. The upper panel shows the average values of the four variables for 1984–2007. The lower

Table 2. Main descriptive statistics

	Mean		SD		Maximum		Minimum	
Acronym	1984–2007	2008–2021	1984–2007	2008–2021	1984–2007	2008–2021	1984–2007	2008–2021
KE	464	405	258	241	1,673	1,586	61	32
KG	149	136	98	104	469	614	0	−8
S	288	−2	279	297	2,100	871	−68	−1,175
DEF	27	271	148	283	936	1,636	−947	−655

Note: Figures in constant per capita euros
Source: Authors' own creation

panel focuses on the period 2008–2021. Regions are ranked according to the capital grants received. First, the data for the first interval show that the two chartered regions (Navarra and Pais Vasco) rely on savings to finance an important level of public investment. Second, capital grants are the main driver of higher regional public investment in the so-called Objective-1 regions (using the EU terminology) [5]. Third, some non-Objective 1 regions reach high per capita expenditures, thanks to higher fiscal deficits and or savings. The situation is hugely different in the second period. With some exceptions, savings drop dramatically and are replaced by the deficit.

In summary, our sample is rich and diverse for three reasons. First, the period includes strong economic booms and deep and long recessions. Second, the amount of grants received by regional governments varies substantially. Third, the level of capital expenditure and the financing structure also differ across regions.

4. Econometric analysis

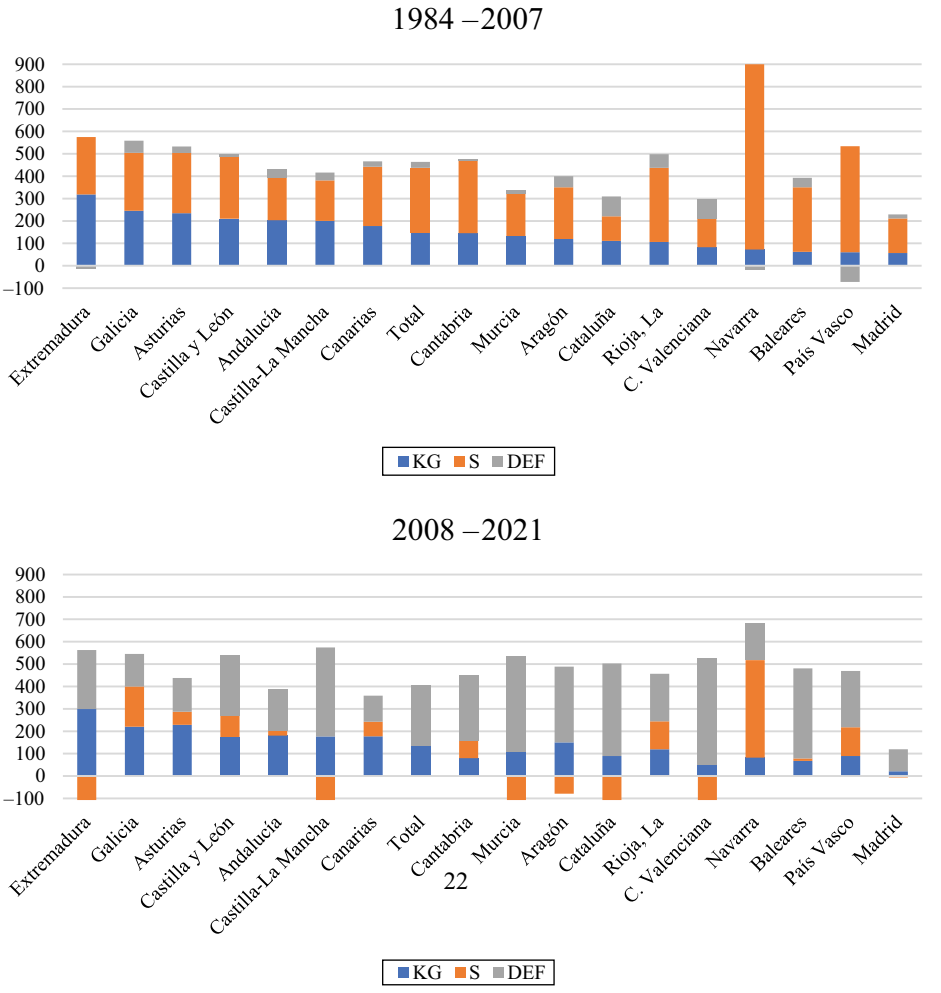
4.1 Specification and econometric methodology

Departing from equation (1), regional governments choose KE, S and DEF holding the budget constraint identity. Fiscal rules potentially constraining regional governments' choices have been implemented weakly and softly during the analyzed period. Non-compliance has been the norm rather than the exception, and the consequences have been irrelevant for incumbents (Lago-Peñas *et al.*, 2017a, 2017b; Lago-Peñas *et al.*, 2019). Figure 4 demonstrates the different combinations chosen by regions and, implicitly, the limited role played by fiscal rules.

Second, we treat KG as an exogenous variable in this optimization process. In Simon-Cosano *et al.* (2014), we showed that expectations on upcoming elections in each region are drivers of the territorial assignment of grants in Spain. On the contrary, the paper dismissed the influence of ideological affinity between central and regional governments as a relevant factor. Consequently, we assume that KG is not determined by regional governments and disregard the influence of choices regarding S, KE and DEF on the dynamics of KG. In any case, this hypothesis is empirically evaluated using two causality tests and a Hausman test on the null hypothesis of the exogeneity of KG.

In summary, our model has three endogenous variables and one exogenous variable. Following the suggestion by Lago-Peñas *et al.* (2015), we estimate the coefficients for the relationships using vector autoregressive (VAR) models.

The empirical analysis is deployed in three steps. First, we run several unit root tests on the four variables to verify their integration order, joint cointegration and causality direction to avoid specification problems. Second, we run a VAR model using data for 1984–2007. The VAR includes individual fixed effects to control time-invariant characteristics of regions



Notes: Regional averages for the periods 1984–2007 and 2008–2021; figures in constant per capita euros

Source: Authors' own creation

Figure 4. Capital expenditure, capital grants, public saving and fiscal deficit

and time-fixed effects to control common shocks. The VAR equations include only one lag of variables as the second lags were statistically non-significant [6], and residual AR(1) autocorrelation was not a problem.

Departing from equation (1), the equations in this first VAR model are the following:

$$KE_{it} = \alpha_i + \beta KE_{it-1} + \gamma S_{it-1} + \delta KG_{it-1} + \theta DEF_{t-1} + \lambda_t + \epsilon_{it} \quad (2)$$

$$S_{it} = \alpha_i + \beta KE_{it-1} + \gamma S_{it-1} + \delta KG_{it-1} + \theta DEF_{t-1} + \lambda_t + \epsilon_{it} \quad (3)$$

$$DEF_{it} = \alpha_i + \beta KE_{it-1} + \gamma S_{it-1} + \delta KG_{it-1} + \theta DEF_{t-1} + \lambda_t + \epsilon_{it} \quad (4)$$

Subindex *i* refers to region and subindex *t* to time. Finally, we expand the sample until 2021 using splines on the coefficients to check for structural breaks affecting those relationships. To this end, we created a dummy variable (D), coded 0 for the years 1984–2007, and 1 for the years 2008–2021. The expanded VAR model is the following:

$$KE_{it} = \alpha_i + \beta KE_{it-1} + \gamma S_{it-1} + \delta KG_{it-1} + \theta DEF_{t-1} + \alpha_i' D_t + \beta' D_t \cdot KE_{it-1} + \gamma' D_t \cdot S_{it-1} + \delta' D_t \cdot KG_{it-1} + \theta' D_t \cdot DEF_{t-1} + \lambda_t + \epsilon_{it} \quad (5)$$

$$S_{it} = \alpha_i + \beta KE_{it-1} + \gamma S_{it-1} + \delta KG_{it-1} + \theta DEF_{t-1} + \alpha_i' D_t + \beta' D_t \cdot KE_{it-1} + \gamma' D_t S_{it-1} + \delta' D_t \cdot KG_{it-1} + \theta' D_t \cdot DEF_{t-1} + \lambda_t + \epsilon_{it} \quad (6)$$

$$DEF_{it} = \alpha_i + \beta KE_{it-1} + \gamma S_{it-1} + \delta KG_{it-1} + \theta DEF_{t-1} + \alpha_i' D_t + \beta' D_t \cdot KE_{it-1} + \gamma' D_t \cdot S_{it-1} + \delta' D_t \cdot KG_{it-1} + \theta' D_t \cdot DEF_{t-1} + \lambda_t + \epsilon_{it} \quad (7)$$

By construction, the effect of each variable in the second period is calculated by adding the coefficient with an apostrophe to the original one, corresponding to the first period. For instance, the average effect of S would be γ in the first period and $\gamma + \gamma'$ in the second. The individual effects would be α_i in the first period and $\alpha_i + \alpha_i'$ in the second one.

Both VAR models are estimated by ordinary least squares (OLS). While the simultaneous inclusion of individual fixed effects and the lagged endogenous variable trigger the so-called Nickell bias (Nickell, 1981), this bias is of order 1/T, where T is the time dimension of the sample. As T is 24 or 37, its relevance is small and we can hold OLS (Beck and Katz, 2011) [7]. Finally, we replace OLS standard residuals with robust errors correcting for heteroskedasticity and contemporaneous correlation between cross-sections, detected by the Breusch–Pagan LM test on the null hypothesis of no cross-sectional dependence [8].

4.2 Unit root and cointegration tests

Three panel unit root tests on the null hypothesis of presence are applied. The first two assume cross-sectional independence: the Levin, Lin and Chu (LLC) test and the ADF–Fischer test. The first assumes common unit roots and the second allows for individual processes. Finally, the *Panel Analysis of Nonstationary in Idiosyncratic and Common Components* (PANIC) test allows for cross-sectional dependence. Table 3 summarizes the main conclusions. The results for the variables DEF and KG are convergent across rows and show that both series are stationary or I(0). On the contrary, the results for KE and S change significantly from I(0) to I(1) depending on the test. Fortunately, the results from the cointegration tests are much clearer. Both the Pedroni and the Kao extension of the Engle–Granger framework reject the null hypothesis of no cointegration, with *p*-values < 0.0001. Spurious relationships among the four variables can be discarded.

Table 3. Unit root tests (*p*-values). Period 1984–2007

Test	KE	S	DEF	KG
LLC	0.077	0.71	0.0001	0.0000
ADF	0.13	0.012	0.0006	0.0000
PANIC	0.37	0.020	0.0000	0.0026

Notes: The presence of unit root is the null hypothesis. Individual intercepts and trends are included. The PANIC test is performed by choosing the MQF test statistic and the Ahn and Horenstein factor selection procedure
Source: Authors' own creation

4.3 Causality tests

Table 4 presents the main results of the classical Granger causality test, which assumes parametric homogeneity, and the Dimitrescu–Hurlin (DH) test, which allows for different coefficients for each region. Considering the Schwarz information criterion and the extremely low statistical significance of the coefficients for second lags, we include only the first one. The results confirm that public savings, deficits and capital expenditure do not cause capital transfers. The corresponding *p*-values are remarkably high in all cases, supporting the treatment of KG as an exogenous variable in later VAR models.

4.4 Vector autoregressive estimates for the period 1984–2007

Table 5 presents the econometric results corresponding to equations (2) to (4). As explained above, all of them incorporate regional and time-fixed effects. The main results are the following [9].

Capital transfers increase capital expenditure and reduce the deficit in the short run. Conversely, the dynamics of government savings are not related to capital grants. Only capital expenditure has a significant positive impact on S.

Moreover, the high values for the lagged endogenous in equations (2) and (5) imply that short-run and long-run multipliers differ. In the short run, an extra granted euros led, on average, to an increase in expenditure of around 54 cents and a deficit reduction of 42 cents. The most usual methodology to compute long-run effects in VAR models is estimating impulse–response functions (IRF). While this approach allows for fully capturing the interactions among the endogenous variables, it hides the channels through which these effects are produced. Moreover, the high share of non-significant coefficients simplifies the mentioned interactions and opens the door to using a simpler and more intuitive approach to interpret long-run effects. In what follows, we rely upon both methodologies.

In an autoregressive distributed lag (ARDL) model like ours ($y_t = \propto + \rho y_{t-1} + \beta_1 x_{t-1} + \varepsilon_t$), parameter β captures the short-run effect of the corresponding variable. However, the long-

Table 4. Causality Granger and Dimitri–Hurlin (DH) tests. Period 1984–2007

Null hypothesis	Granger (*p*-value)	DH (*p*-value)
KE does not Granger cause KG	0.70	0.93
DEF does not Granger cause KG	0.34	0.41
S does not Granger cause KG	0.39	0.60

Note: One lag is included in all cases
Source: Authors' own creation

Table 5. VAR estimates. Period 1984–2007

Acronym	KE	S	DEF
KE_{-1}	0.63*** (6.55)	0.22* (1.70)	0.40*** (2.63)
S_{-1}	0.17 (1.47)	0.16 (0.79)	0.0066 (0.03)
DEF_{-1}	0.013 (0.12)	−0.26 (1.52)	0.27 (1.50)
KG	0.54*** (5.57)	−0.03 (0.26)	−0.42*** (2.73)
Observations (17 regions)	391	391	391
R^2	0.939	0.833	0.440
H_0: No cross-correlation (p-value Breusch-Pagan LM)	0.0093	0.0000	0.0169
H_0: exogeneity of KG (p-value Hausman test)	0.45	0.33	0.11
H_0: $\alpha_i = 0$ (p-value F-test)	0.0034	0.0000	0.0002
H_0: $\lambda_i = 0$ (p-value F-test)	0.0000	0.0000	0.0000

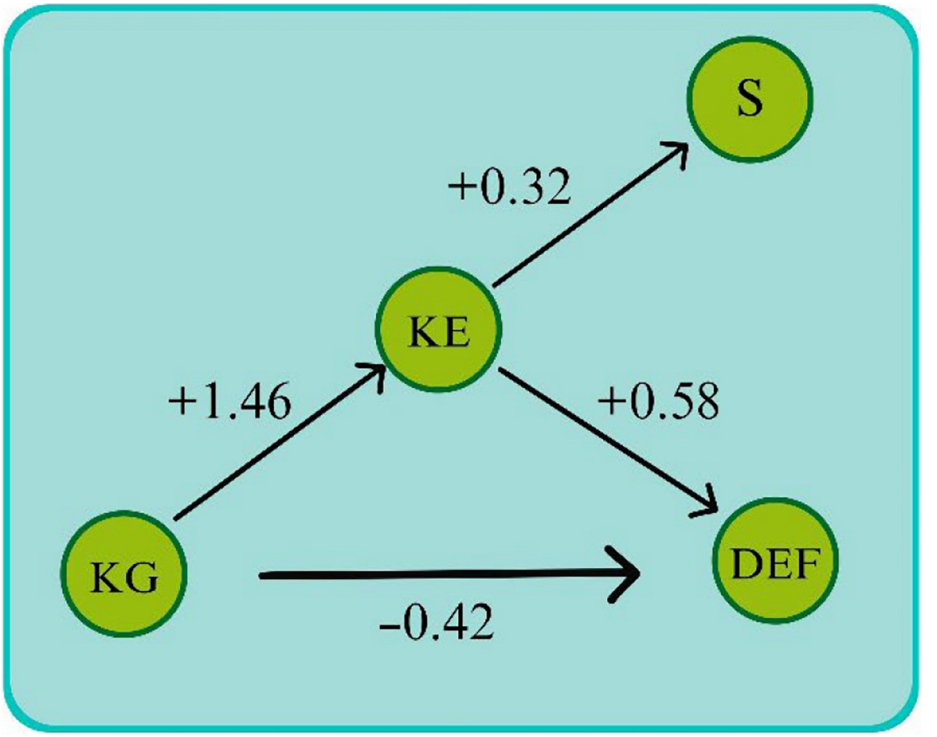
Notes: *** and * indicate statistical significance at 1 and 10% levels, respectively. All estimates include both regional and time fixed-effects. PCSE robust t-statistics in parenthesis
Source: Authors' own creation

run effect is different. Changes in values in year t in variable x involve effects on year t + 1 because of the intertemporal dependence of the explained variable. It is easy to prove that this long-run effect can be computed as $\frac{\beta_1}{1-\rho}$ [10]. Therefore, the average long-run effect of grants on capital expenditure would be $\frac{0.54}{1-0.63} = 1.46$. By contrast, the lagged endogenous variable is not significant in the equation for DEF: the short-run and long-run multipliers are the same (–0.42). The impact of this long-run increase in KE on DEF must also be considered. It can be computed as the product of the long-run increase in KE and the short-run increase in KG on DEF (1.46□0.40 = 0.58). Hence, while capital grants reduce the deficit in the short run, the average net impact in the long run would be positive (0.58–0.42 = 0.16). In the long run, capital grants have generated a crowding-in effect on expenditure partially financed by debt. Finally, there is a gap between the total net estimated long-run effects on the two sides of the budgetary constraint. A €1 increase in KG boosts KE by €1.46, but the net increase in the deficit would be just 16 cents. The budgetary constraint means that the remaining component S should increase by 30 cents. The effect of KG_{-1} on S in Column 2 of Table 5 is 0.22 and significant at the 10% level. Accepting this estimate, the long-run increase in KG would involve higher public savings in the long run by 1.46·0.22 = €0.32. In the end, the increase in grants would also boost savings. Figure 5 summarizes all those relationships.

The IRF analysis combining the three estimates in Table 5 drives similar results. In particular, we have simulated the accumulated response over 10 years of the three endogenous variables to a positive 1 per capita euro shock on KG. Figure 6 shows both the one-period responses and the accumulated response. The coefficient of the accumulated effect of the shock on KG is greater than 1, involving a crowding-in effect.

4.5 Vector autoregressive estimates for the period 1984–2021

Table 6 summarizes the results corresponding to equations (5) to (7). They replicate the estimates in Table 5. While most of the spline coefficients are far from significant, the statistical significance of two of the coefficients on KG deserves some discussion. The spline is statistically marginally significant in the equation for KE (p-value = 0.14), and it is significant only at the 10% level in the equation explaining DEF. We have computed a Wald test on the null hypothesis of the long-run multiplier of KG on KE estimated in the previous



Source: Authors' elaboration based on Table 5

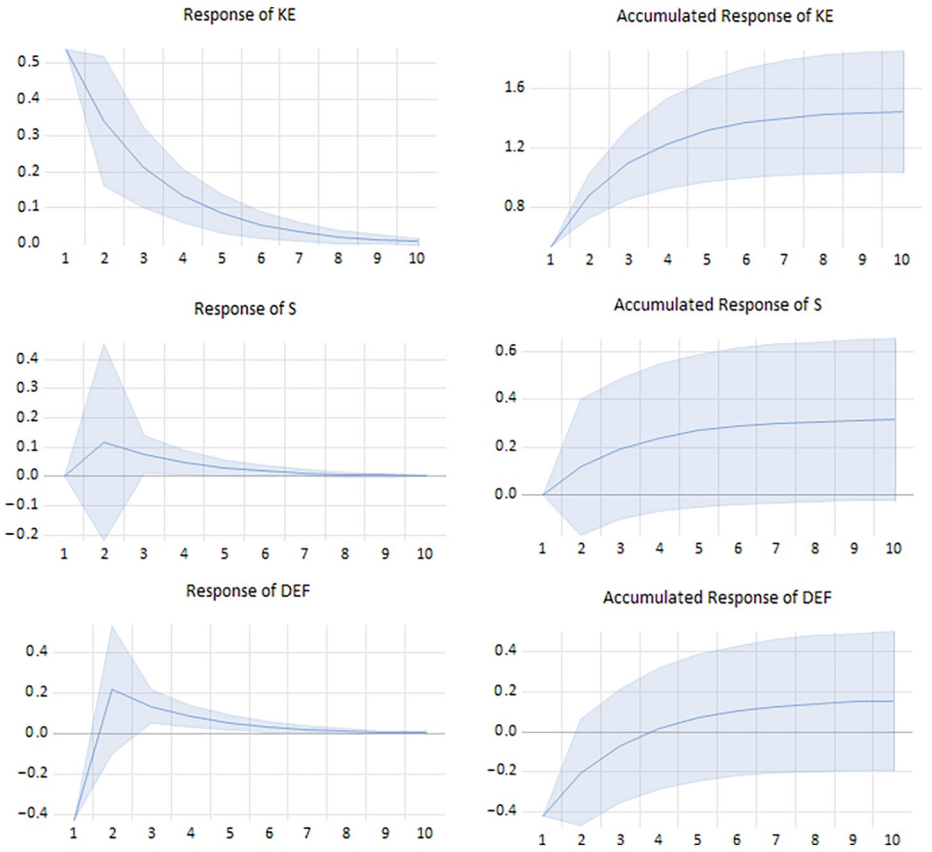
Figure 5. Direct and indirect impacts of KG on KE, S and DEF. Period 1984–2007

Section (1.46). The corresponding *p*-value is still very high: 0.53. The crowding-in effect of capital grants holds [11].

4.6 Vector autoregressive estimates for Objective-1 regions

Finally, the analysis focuses on the Objective-1 regions, which are those leading the amount of capital grants. Table 7 replicates Table 5 for 1984–2007, but it is constrained to the regions and samples explained in Section 3. The results do not change for the equations explaining KE and DEF. Concerning S, the coefficients are similar, but the statistical significances rise, except in the case of KG. The dynamics of government savings is more clearly defined for Objective-1 regions, but the main interpretation holds as far as the short-run effect of KG is null. In summary, the results confirm the robustness of the previous estimates [12].

When the sample includes the subperiod 2008–2021 (Table 8), the four added regions that lost the condition of an Objective-1 region in 2007 are also excluded. Hence, only six are included in the sample. The most relevant difference is that the marginal effect of KG on KE and DEF in the second period, previously reported in Table 6, fades in Table 8. Moreover, the impact of KG on S becomes positive and significant at the 10% level. Regional policy grants would not lose the capacity to meet their target in turbulent times.



Notes: Short-run responses and accumulated responses to a 1 per capita euro shock on KG in Year 1; 95% confidence intervals
Source: Authors' elaboration based on Table 5. 95% confidence intervals

Figure 6. Impulse–responses functions (IRF) analysis

5. Policy implications and concluding remarks

This paper shows the essential role of capital grants in shaping the fiscal decisions of subcentral governments, emphasizing their significance as a tool for implementing regional policies worldwide. In the context of Spain, a highly decentralized country where regions are beneficiaries of strong regional policies, this research provides valuable insights into the dynamics of regional fiscal choices. The study's relevance is amplified by Spain's experience during the Great Recession, which challenged subcentral governments' resilience.

The observed long-run crowding-in effect of capital grants suggests that conditional grants were effective in promoting public capital accumulation from 1984 to 2007. Those results are more positive than those previously obtained by Lago-Peñas (2006) for Spain and the period 1984–1999. The main reason behind the difference is that VAR models are a better methodological option to capture the direct effect from KG to KE and the cross-effects between the various variables integrating the government's budget constraint. The deep

Table 6. VAR estimates. Period 1984–2021

Acronym	KE	S	DEF
KE_{-1}	0.63*** (6.17)	0.22 (1.38)	0.40** (2.15)
S_{-1}	0.17 (1.43)	0.26 (0.77)	0.0066 (0.03)
DEF_{-1}	0.013 (0.11)	−0.26 (1.37)	0.27 (1.29)
KG	0.54*** (5.23)	−0.03 (0.21)	−0.42** (2.24)
$D{\cdot}KE_{-1}$	−0.04 (0.25)	0.22 (0.79)	−0.26 (0.89)
$D{\cdot}S_{-1}$	−0.11 (0.62)	−0.009 (0.25)	−0.022 (0.06)
$D{\cdot}DEF_{-1}$	0.01 (0.07)	0.16 (0.51)	−0.15 (0.47)
D·KG	−0.22 (1.49)	0.23 (0.95)	−0.45* (1.69)
Observations (17 regions)	629	629	629
R^2	0.927	0.833	0.770

Notes: ***, ** and * indicate statistical significance at 1, 5 and 10% levels, respectively. All estimates include both regional and time fixed-effects. PCSE robust *t*-statistics in parenthesis
Source: Authors' own creation

Table 7. VAR estimates. Period 1984–2007. Objective-1 regions

Acronym	KE	S	DEF
KE_{-1}	0.62*** (6.26)	0.25*** (2.74)	0.37*** (2.97)
S_{-1}	0.16 (1.30)	0.24** (2.06)	−0.077 (0.50)
DEF_{-1}	−0.0059 (0.51)	−0.21** (2.06)	0.15 (1.07)
KG	0.52*** (5.20)	−0.02 (0.27)	−0.45*** (3.59)
Observations (10 regions)	217	217	217
R^2	0.939	0.908	0.582

Notes: *** and ** indicate statistical significance at 1 and 5% levels, respectively. All estimates include both regional and time fixed-effects. PCSE robust *t*-statistics in parenthesis
Source: Authors' own creation

Table 8. VAR estimates. Period 1984–2021. Objetive-1 regions after 2006

Acronym	KE	S	DEF
KE_{-1}	0.57*** (4.32)	0.13 (0.71)	0.44** (2.01)
S_{-1}	0.06 (0.38)	0.44* (1.89)	−0.38 (1.36)
DEF_{-1}	−0.14 (1.01)	−0.15 (0.74)	0.0043 (0.02)
KG	0.45*** (3.51)	−0.12 (0.68)	−0.43** (2.02)
$D{\cdot}KE_{-1}$	−0.18 (0.76)	0.0071 (0.02)	−0.18 (0.51)
$D{\cdot}S_{-1}$	−0.72*** (2.68)	−0.0047 (0.01)	−0.72 (1.64)
$D{\cdot}DEF_{-1}$	−0.43* (1.76)	0.31 (0.92)	−0.73* (1.93)
D·KG	0.10 (0.49)	0.48* (1.74)	−0.37 (1.13)
Observations (6 regions)	206	206	206
R^2	0.933	0.913	0.823

Notes: ***, ** and * indicate statistical significance at 1, 5 and 10% levels, respectively. All estimates include both regional and time fixed-effects. PCSE robust *t*-statistics in parenthesis
Source: Authors' own creation

economic and financial shock provoked by the Great Recession in Spain does not significantly change this effect. Regional policy has also been successful in turbulent times. Furthermore, our estimates are in the upper band of estimates in the literature.

Our interpretation of the results is that matching-rate grants are a key feature. Hence, further research should focus on comparing results for matching and non-matching conditional grants. Another implication for future research is the need to control the macro scenario when evaluating the effects of transfer programs.

On the policy ground, we should be aware that if conditionality and matching rates are key to shielding public investment, especially in fiscal stress episodes, this capacity could be strengthened (if required) by applying dynamic elements in the grants formula. For instance, reductions in capital expenditure above a predefined threshold could trigger increases in matching rates in subsequent years. This sort of "price effect" would disincentive cuts in public investment, which is one of the solutions most often implemented in fiscal consolidation strategies. Alternatively, those cuts in public investment could involve future cuts in grants, causing a negative "income effect," which would condition present regional fiscal choices.

The preceding findings also provide insights into designing and implementing fiscal rules in decentralized frameworks. National fiscal governance frameworks must anticipate that potential adjustments at various levels of government can affect not only the volume of resources transferred to subnational governments for regional policy implementation but also the decisions made by these subnational governments. The diverse instruments used to ensure the sustainability of regional finances should be designed to discourage adjustments in the investment component, a recurrently validated outcome in the existing literature [13].

Finally, while this paper does not discuss the social welfare effects of boosted investment or its efficiency, both dimensions are highly relevant and claim for further analysis based on alternative methodological approaches.

Appendix: Robustness checks.

Notes

1. The impact of the COVID-19 pandemic was also particularly intense in the case of the Spanish economy in 2020–2021. However, the huge volume of current resources transferred by the central tier to the subcentral governments allowed the regional deficit and debt to remain unaffected. See Lago-Peñas (2021) for a detailed analysis of this result.
2. The homogenous database provided by the Ministry of Finance and Civil Service starts in 2002.
3. Lago-Peñas *et al.* (2017a) provide an in-depth analysis of fiscal federalism in Spain.
4. There is also a minor component included as revenue corresponding to the sale or transfer of nonfinancial assets. Because its quantitative relevance is marginal in our case (summing up to around 1% of the total capital expenditure made by regions over the period 1984–2021) and its dynamic is quite erratic, we decided to subtract it from the total capital expenditure instead of treating it as an additional revenue source.
5. In this paper, we refer to Objective-1 regions as those which were Objective-1 regions from 1989 to 2006; convergence and phasing-out areas from 2007 to 2013; and less-developed regions and transition regions from 2014. For the years 1984–1988, we extrapolate the Objective-1 regions' condition in 1989 to maximize the sample. Therefore, the Objective-1 regions in Spain include Andalucia, Castilla-La Mancha, Murcia and Extremadura for the whole period, 1984–2021, the regions of Asturias and Galicia for the period 1984–2013, and finally Canarias, Cantabria, Castilla y León and Comunidad Valenciana for the period 1984–2006. To identify the corresponding observations in the empirical analysis, we define a dummy variable coded 1 for the

regions and years to be considered Objective-1 regions, and 0 otherwise. However, we check the robustness of the econometric results below by narrowing the sample and starting in 1990 to include a lag in estimates.

6. Moreover, the Schwartz information criterion was marginally higher with two lags.
7. Furthermore, Moral-Benito *et al.* (2019) demonstrated the poor finite properties of panel GMM estimators in the case of small values of *N* (cross-section size).
8. All the computations in this section were performed using *Eviews* 13. See www.eviews.com for further methodological details on the several tests applied, including tests and estimators.
9. In Table A1 in the Appendix, we confirm the robustness of the results when the two chartered regions are excluded.
10. Blackburne and Frank (2007) offered a detailed technical discussion on this formula.
11. Following the suggestion of one of the reviewers of the journal, we checked that dropping years affected by the COVID-19 pandemic (2020 and 2021) did not significantly change results.
12. In Table A2 in the Appendix, we replicate Table 6 excluding observations before 1990 as the strict concept of Objective-1 regions was implemented in 1989.
13. The EU fiscal rules exhibit a pronounced focus on fiscal stability at the member state level, being concise in addressing internal governance within countries. Their primary emphasis lies in ensuring fiscal stability at the national scale, leaving a gap in the detailed consideration of internal governance mechanisms.

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Appendix. Robustness checks

Table A1. VAR estimates. Period 1984–2007. Replication of Table 5 excluding chartered regions

Acronym	KE	S	DEF
KE_{-1}	0.63*** (6.47)	0.25*** (2.61)	0.38*** (3.01)
S_{-1}	0.23* (1.95)	0.21 (1.38)	0.024 (0.15)
DEF_{-1}	0.0010 (0.01)	−0.11 (1.07)	0.11 (0.81)
KG	0.49*** (4.92)	−0.070 (0.07)	−0.50*** (3.92)
Observations (15 regions)	345	345	345
R^2	0.928	0.844	0.467
Breusch–Pagan LM (*p*-value)	0.0082	0.0009	0.0726
H_0: $\alpha_i = 0$ (*p*-value *F*-test)	0.3662	0.0000	0.0213
H_0: $\lambda_i = 0$ (*p*-value *F*-test)	0.0000	0.0000	0.0000

Notes: *** and * indicate statistical significance at 1 and 10% levels, respectively. All estimates include both regional and time fixed-effects. PCSE robust *t*-statistics in parenthesis
Source: Authors' own creation

Table A2. VAR estimates. Period 1990–2007. Objective-1 regions. Replication of Table 7 excluding observations for the subperiod 1984–1989

Acronym	KE	S	DEF
KE_{-1}	0.65*** (5.65)	0.22** (2.17)	0.42*** (2.90)
S_{-1}	0.15 (0.99)	0.25* (1.83)	−0.11 (0.58)
DEF_{-1}	−0.081 (0.57)	−0.17 (1.41)	0.09 (0.52)
KG	0.53*** (4.49)	−0.059 (0.56)	−0.41*** (2.78)
Observations (10 regions)	172	172	172
R^2	0.926	0.907	0.619

Notes: *** and ** indicate statistical significance at 1 and 5% levels, respectively. All estimates include both regional and time fixed-effects. PCSE robust *t*-statistics in parenthesis
Source: Authors' own creation

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