

# Institutional and economic determinants of the Sub-national public debt in Spain\*

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## Abstract

We analyze the evolution and the determinants of sub-sovereign public debt in Spain, focusing on regional governments' debt determinants, including of liabilities accounted for outside the extant definition of EDP public debt. Spain offers an interesting case study for a number of reasons. First, the country has witnessed successive waves of fiscal decentralization that have increased the amount of public services provided directly by sub-national governments together with increased fiscal co-responsibility (tax autonomy). Second, this decentralization process took place in a period in which a number of supra-national and national fiscal rules were put in place in the country. Third, while fiscal rules provide some explicit coordination among the different levels of government, there is also a high degree of market-imposed discipline, as most regional government's debt is regularly scrutinized by rating agencies.

**Keywords:** Sub-sovereign public debt; fiscal rules; fiscal federalism; market discipline.

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# 1 Introduction

The analysis of sub-national public debt developments has been growing in importance, given the rising share of sub-national finance in the overall financing needs of the general government sector in a number of countries, and given the rising trend towards fiscal decentralization (towards lower levels of government) all over the world (Canuto and Liu, 2010, European Commission, 2012). Within this framework, the analysis of the Spanish case is of relevance for a number of reasons.

First, since the late 1970s Spain has become a highly decentralized country. The current Spanish Constitution (voted in 1978), in its second article, recognizes the rights to self-government of “regions and nationalities”, within the Spanish nation. The 17 regional governments (“Comunidades Autónomas”, CCAA henceforth) currently manage, among other competencies, education (including universities), health and social services. In order to develop the Constitutional mandate, the country has been subject over the past few decades to successive waves of fiscal decentralization that have led to one of the strongest processes of fiscal decentralization witnessed in the recent history in any developed country. Thus, in 2015, sub-national governments (CCAA plus municipalities, AATT henceforth) managed some 50% of total government expenditure, up from 35% in 1995 and a share below 20% in the early 1980s. In parallel to expenditure decentralization, there has also been a process of increased fiscal co-responsibility (fiscal autonomy).

Secondly, this decentralization process took place in a period in which a number of supra-national and national fiscal rules were put in place in the country. In particular, under the current legislation sub-national governments need prior authorization by the central government on all its borrowing operations, while borrowing is banned on sub-national governments that do not comply with their public deficit targets and do not present – and commit to – fiscal adjustment (*re-balancing*) plans. Over the last years these rules should have had to be applied strictly in several occasions, thus providing a natural experiment framework suitable for empirical testing.<sup>1</sup> In addition, while there is some explicit coordination among the dif-

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<sup>1</sup>As signalled in IMF (2011), in the decade leading up to the financial crisis, the fiscal framework in Spain appeared broadly adequate. In this respect, Spain scored in the top 5% group of countries covered by the European Commission’s index of fiscal rules’ institutional strength. The institutional design included a

ferent levels of government on the application of fiscal rules affecting debt issuance, there is also a high degree of market-imposed discipline, as central and most regional government's debt levels are regularly scrutinized by rating agencies. In this regard, an important element of the fiscal rules is the existence of a no-bail out clause.

Third, Spain is the sixth sub-sovereign bond issuer world-wide, after the US, Germany, Japan, China and Canada (see Canuto and Liu, 2013, Romeu, 2011). In the third quarter of 2016 total outstanding regional and local public debt amounted to some 307 bn euro (about 28% of Spanish GDP), of which some 17% was in the form of securities (other than shares) that is significantly smaller than its 35% weight in 2011. This weight fell sharply during the economic crisis due to a partial closure of financial markets for the Autonomous Communities and the rising financing cost.<sup>2</sup> Current debt levels are at historical highs, after sub-sovereign debt decreased steadily up to 2007Q4 to some 8% of GDP since its previous peak at 10.6% in 1997Q2. Thus, in the period 2007Q4 to 2016Q3, regional and local debt as a percent of GDP tripled, even though its share of total public debt increased less than 20%. Given this sharp increase in the financing needs of these levels of government, an understanding of these developments' determinants is warranted.

Fourth, Spain is the fourth biggest euro area economy by GDP weight, and is within the group that has been affected to a greater extent by the sovereign-sovereign contagion induced by the so-called euro area public debt crisis. Among other factors, it is now widely recognized that idiosyncratic fiscal fundamentals have played and are still playing a role. In the latter respect, given the sizeable share of public spending in the hands of CCAA and

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combination of EU-wide fiscal rules with national fiscal rules constraining public deficits and public debt for all the levels of the general government sector. The most relevant legislative change was the Fiscal Stability Law approval in 2012 which establishes for stability criteria for every level of government. It includes targets of annual deficit, debt and expenditure increase, as well a maximum delay of suppliers payments of 30 days. Nevertheless, such a framework was not able to prevent the strong deterioration of public finances for all levels of the general government witnessed since the end of 2007 – see Bank of Spain (2011) for a more general discussion on these issues-. One may wonder if irrespective of the recent failure, the framework of national fiscal rules did exert a positive role in public debt control, i.e. if in the absence of rules public finance outcomes would have been better or worse than envisaged.

<sup>2</sup>The Government created two financial facilities to cope with this situation that transformed some of the sub-national debt into loans with the Central Government. (Delgado et al. (2015)

local governments (two-thirds of overall public employment, 50% of total spending in 2015), mainly linked to the provision of basic services, the later levels of government have been signalled as being a potential obstacle to the successful achievement of the ambitious fiscal consolidation targets the Spanish government is currently committed to comply.

Finally, Spain's credibility in the sub-national bond markets has deeply suffered over the past 5 years. The existence of debt that was not accounted for in the EDP concept<sup>3</sup> has damaged the rating of several CCAA and therefore their ability to finance themselves. It mainly comprises, on the one hand, debt issued by companies controlled by local and sub-national governments and, on the other hand, accounts payable outstanding and commercial obligations. It would be worth checking if these types of instruments have or have not been used by sub-national governments to circumvent the constraints on debt issuance they are subject to (and that only apply to conventional channels of financing) as some political economy arguments would suggest.

Against this framework, we study in this paper the evolution and the determinants of sub-national's debt net financing needs (measured by the change in public debt). While we provide a descriptive and institutional analysis of the aggregate of sub-national governments as a whole, we constraint ourselves in the main empirical part of the paper to the study of the determinants of CCAA debt due to data constraints. We do so by estimating empirical models in which we exploit the pool structure of our data (17 regions over the period starting in 1995). Among the set of determinants we pay special attention to: (i) institutional factors, such as fiscal decentralization and fiscal rules, including self-correcting mechanisms like the reaction to past debt and past deviations from targets; (ii) market-discipline indicators, such as the change in the implicit interest rate and the structure of debt itself; (iii) non-EDP debt, focusing on public corporations controlled by CCAA and its role in the determination of CCAA's EDP debt. We find that self-correcting mechanisms and market-induced discipline,

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<sup>3</sup> EDP stands for *Excessive Deficit Procedure*. Public debt not considered with the EDP concept Public debt is defined in the Protocol No. 12 on the excessive deficit procedure (EDP) annexed to the Treaty on the Functioning of the European Union as “[...] total gross debt at nominal value outstanding at the end of the year and consolidated between and within the sectors of general government”. Article 1(3) of Council Regulation (EC) No 479/2009 specifies the definition of Maastricht debt and deficit in statistical terms including the treatment of trade credits.

and to a lesser extent deeper fiscal decentralization, have been associated in the sample under study with heightened fiscal discipline. We also find a link between CCAA's EDP debt and CCAA's public corporations debt.

In this paper we move beyond the available literature that analyzes the role of fiscal federalism variables in the determination of regional public debt. First, because a part of this literature adopts mainly a theoretical approach. Second, because we explore a more up-to-date period of time and include a number of additional variables, mainly related to the structure and composition of public debt, a deep analysis of fiscal rules' impact, and the interaction between EDP and non-EDP debt along the dimension of public enterprises corporations. Some papers that precede in certain respects our work are Vallés (2002), that also includes an excellent survey of pre-2002 papers on the issue, Lago-Peñas (2005), Argimón and Hernández de Cos (2012) or Simón-Cosano et al. (2012), among others.<sup>4</sup>

Our paper is organized as follows. In Section 2 we provide some stylized facts on sub-sovereign public debt in Spain. In Section 3 first we focus on two relevant institutional issues. First we describe the process of fiscal decentralization since the early 1980s, as well as the changes in the financing arrangements between the Central government and the regional and local governments, and next we describe the evolution of fiscal rules affecting sub-national levels of government in Spain. In Section 6, in turn, we perform the main empirical analysis of the paper, covering first the standard approach of papers on fiscal federalism, and moving next to a deeper look at the role of fiscal rules and market discipline indicators, to end up with some results on the link between regional EDP debt and regional public corporations' debt. Finally, in Section 7 we provide some conclusions.

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<sup>4</sup>The institutional determinants of local governments' indebtedness has been more widely analyzed in the literature, mainly from a less aggregated-macro perspective than the standard in papers looking at the determinants of CCAAs debt. See for example Cabasés et al. (2007) or Bastida et al. (2013), and the references quoted therein.

## 2 Some stylized facts on sub-sovereign public debt in Spain

### 2.1 Some trends

Spanish General Government EDP debt increased in the period 2007-2015 near than 65 points of GDP<sup>5</sup>. As can be seen in Figure 1 the increase in debt was visible in all the subsectors of the General Government. In particular consolidated Central Government (AC) and Regional Government EDP debt (CCAA) moved from the pre-crisis values of 29.5 and 5.7 percent of GDP, respectively, at the end of 2007, to 87.4% and 24.4% of GDP in 2015, multiplying by 3 and 4 its amount respectively. Local governments (CCLL) in turn, suffered an increase in their aggregate debt at the beginning of the crisis, but soon were able to stabilize their levels of debt as a percent of GDP, maybe due to market or institutional constraints that prevented them from following the rising trend of the other public administrations.<sup>6</sup> From a longer-term perspective, only the AC reduced substantially its debt before the crisis, with a decreased of 23pp of GDP between 1995 and 2007.

The increase in EDP public debt came hand-in-hand with increases in other liabilities not covered by the extant definition of EDP debt, but that are close complements, namely the aggregates of public corporations' debt and other accounts payable<sup>7</sup>, also by subsectors of the General Government. This is clear from Figure 2. Information on public corporations' debt is publicly available for the period starting in 1995, for each regional government but only for

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<sup>5</sup>For the sake of consistency the figures mentioned in this paper will refer to the sample covering the period that starts in 1995 and ends in 2015 (2016 in some charts).

<sup>6</sup>Public debt for the subsectors of the General Government is consolidated debt within the General Government sector.

<sup>7</sup>The statistical category other accounts payable consists of financial claims which are created as a counterpart of a financial or a non-financial transaction in cases where there is a timing difference between this transaction and the corresponding payment. This category includes transactions in financial claims which stem from the early or late payment for transactions in goods or services, distributive transactions or secondary trade in financial assets. They consist of the counterpart transactions in case payment is due and not yet paid. Debts arising from income accruing over time and arrears are also classified under this category.

the aggregate of CCLL (and the AC), while data on Other Accounts Payable is available only for the aggregates of each subsector (AC, CCAA, CCLL). In the case of CCAA the accounts non-payable increased steeply up to the end of 2011 beginning of 2012, to decreased then shaply up to 2016. Nevertheless, its levels is still higher than the pre-crisis one. Despite the sharp increase that is apparent from the figures, these non-EDP are not higher in Spain than in other European Union countries as a fraction of GDP (see Aspachs and Pina, 2012).

## 2.2 A standard decomposition of debt changes

It is worth looking at the evolution of debt in the period under scrutiny through the lens of the government budget constraint. Let  $Y_t$  be real GDP at  $t$  and let  $D_t$  be the real value of government debt. The government budget constraint accounts for how a nominal interest rate  $i_t$ , net inflation  $\pi_t$ , net growth in real GDP,  $gdp_t$ , the net-of-interest deficit as a percent of  $Y_t$ ,  $def_t$ , and the deficit-debt adjustment,  $DDA_t$  combine to determine the evolution of the government debt-to-GDP-ratio,

$$\frac{D_t}{Y_t} = \frac{1 + i_t}{(1 + \pi_t)(gdp_t)} \frac{D_{t-1}}{Y_{t-1}} + def_t + \frac{DDA_t}{Y_t} \quad (1)$$

were the nominal yield  $i_t$  and the real stock of debt  $D_t$  are averages of pertinent objects across terms to maturity. Its linearized version, suitable for accounting decomposition of the fundamental determinants of debt, takes the standard form

$$\frac{D_t}{Y_t} = (i_t - \pi_t - gdp_t) \frac{D_{t-1}}{Y_{t-1}} + \frac{D_{t-1}}{Y_{t-1}} + def_t + \frac{DDA_t}{Y_t} \quad (2)$$

With this decomposition at hand it is possible to analyze the determinants of changes in the debt-to-GDP ratio. In Figure 3 we decompose these determinants for each year over the period 1997-2015 for the General Government sector as a whole, for the aggregates of CCAA and CCLL and, as a residual, for the aggregate of AC and Social Security. Focusing in a first stage in the period 1997-2007, the General Government primary balance contributed to an average debt reduction of 2.3 percentage points per year, an amount similar in size to the average contribution of real GDP (2.0 percentage points per year on average) and inflation (1.8 points per year on average). These three factors were partly compensated by an average

0.6 points per year debt-increasing contribution stemming from deficit-debt adjustments, and the interest payments, that amounted to some 2.7% of GDP per year on average.

As regards the 2008-2014 period, the debt boom was driven by an average contribution of 5.8% of the primary balance, a 2.5% of interest payments and a 0,6% of real GDP and deficit-debt adjustments. The debt decrease slightly for first time after the crisis beginning of the crisis in 2015. This evolution of the General Government aggregate factors hides a differentiated behavior by subsectors, where the AC debt growth was on average three times the one of the CCAA during 2008-2015. The primary balance contribution was 1pp higher for the AC than for the CCAA. But the most significant difference comes from the interest payments and the deficit-debt adjustments with a higher contribution of 1.8 and 2 pp respectively. In both cases, the difference may be explained by the effect of the new financial facilities created in 2012 <sup>8</sup>. These funds moved the interest charge from the CCAA to the AC while made the AC increased its debt for financing this new funds.

Figure 4, in turn, shows the same information as before, but cumulated, i.e. calculated by means of equation:

$$\frac{D_t}{Y_t} = \sum_{s=0}^{\tau-1} \left[ (i_{t-s} - \pi_{t-s} - gdp_{t-s}) \frac{D_{t-s-1}}{Y_{t-s-1}} + def_{t-s} + \frac{DDA_{t-s}}{Y_{t-s}} \right] + \frac{D_{t+\tau}}{Y_{t+\tau}} \quad (3)$$

which can be obtained easily starting from (2). Between 1997 and 2007, the 30.1 percentage points of General Government debt reduction can be break down as follows: (i) 24.8 percentage points of reduction due to the adjustment of the primary balance; (ii) 22.3 points of reduction due to favorable real GDP growth; (iii) 19.5 percentage points of reduction due to inflation; (iv) these three factors more than compensated the increase by 29.9 points due to the interest payments effected during the period, and the 6.5 percentage points due to the deficit-debt adjustments.

As apparent from the chart, the substantial debt reduction process carried out since the mid-1990s allowed to cushion the substantial increase of debt due to the recent crisis, insofar as the cumulated change in debt since 1995 only turned out to be positive (increased of debt) in 2010. In fact, the AC debt burdens were still in 2010 below the mid-1990s levels,

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<sup>8</sup> The Suppliers Payment Fund and the Liquidity Autonomous Facility. See Delgado et al. (2015) for a description.

and CCLL debt burden was only higher than the 1990s level in 2012-2013. The case of the regional governments is completely different. Indeed, from an aggregate point of view, the CCAAs reduced only marginally their stock of debt in the period till 2007, with positive factors (real GDP growth and inflation) broadly compensating the debt-increasing effect of interest payments and, to a much lesser extent, primary deficits. With the burst of the most recent crisis, though, the latter equilibrium was broken and a significant contribution of public deficits pushed public debt upwards.

Beyond the interest of the descriptive analysis in itself, one lesson that can be drawn from the previous discussion is that changes in debt can be a preferred object of study vs budget balances, as the former turned out to be a broader measure of net financing needs and debt accumulation, and also because deficit-debt adjustments (stock-flow reconciliation) can be arbitrarily large as in the period 2012-2013 – see also Campos et al., 2006 for an international perspective on this issue.

### **3 The process of fiscal decentralization in Spain**

As mentioned in the Introduction, Spain is currently one of the most decentralized countries in the European Union. In particular, as described before, in 2015, 50% of general government expenditure was carried out by subnational governments, with about 36% and 14% in the hands of regional governments and local governments, respectively (see Figure 5, left panel). This is the result of a gradual transfer of responsibilities for the management of specific services from the Central Government to the CCAAs since the beginning of the 1980s. In particular, subnational governments were responsible for 92% of public expenditure on health care and education in 2015, and they manage a significant part of other expenditure functions.

The transfer of expenditure responsibilities from the Central Government to the CCAAs has, however, neither come about at the same pace, nor have they been on the same scale in all CCAAs.<sup>9</sup> The main differences concern the time at which the various CCAAs took over education and health competencies. On the one hand, the regions that gained autonomy

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<sup>9</sup>See Gordo and Hernández de Cos (2003) for a review.

through article 143 of the Spanish Constitution did not assume the respective management of educational and health services until the 1990s and early twenty-first century. On the other, Andalusia, the Canary Islands, Catalonia, Galicia and the Valencia Community, along with the Basque Country and Navarre, namely the regions that gained autonomy through article 151 of the Constitution and those with their own specific status due to their historical jurisdiction (the so-called “Régimen Foral”), assumed health and education responsibilities practically from the beginning of the 1980s.

In parallel to this process of devolution of expenditure responsibilities to the regions, a financing system for the subnational governments was also progressively developed (see Figure 5, right panel, on the extent of revenue decentralization). Again, the process was not completely homogeneous across regions. In particular, a distinction should be drawn between the ordinary-regime CCAAs (all except the Basque Country and Navarre), with limited fiscal autonomy, and the specific-status CCAAs (the Basque Country and Navarre), which have full fiscal autonomy with the exception of customs tariffs.<sup>10</sup>

The financing arrangements for the ordinary-regime CCAAs have developed over time on the basis of five-year agreements. In this regard, the so called Fiscal and Financial Policy Council (*Consejo de Política Fiscal y Financiera*, CPFF, hereafter) played a key role. The Council is composed of the nation-wide ministers of Economy and Finance and of General Government and of the CCAA ministers of Finance, and acts as a consultive and discussion body with wide ranging tasks relating to the co-ordination of the CCAAs financial activity. The agreements reached within the CPFF form the basis for developing the CCAAs financing

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<sup>10</sup>In essence, the Basque country provincial authorities (Álava, Guipúzcoa y Vizcaya) and Navarre’s regional government have the power to maintain, establish and regulate, inside their territory, the tax regime, taking into account some coordinating provisions established with the Central Government, which basically imply that the effective overall tax burden arising from their regulatory power must not be lower than the existing in the rest of the country. Accordingly, they are responsible for collecting all taxes except those included in Customs Revenue and those raised through Fiscal Monopolies. As a consequence of the fact that the taxes collected by these regions include almost all those existing but the State provides some services in these regions (defense, diplomatic representation, etc.), the Basque Country and Navarre transfer some of their resources, by means of the so-called “Cupo”, to the Central Government in order to contribute to the financing of these services.

arrangements.

Initially, until the approval of the autonomy charters, the administrative structures (pre-autonomous entities) of the CCAAs were financed with Central Government transfers. Subsequently, the transition period running from the approval of the respective autonomy charters to the 1986 agreement saw the transfer of most powers and the definition of financing channels, in the main through Central Government transfers – participation of CCAAs in Central Government revenues and the Inter-Territorial Compensation Fund (FCI) – supplemented with various taxes – taxes assigned by the Central Government, own taxes and surcharges on Central Government taxes. In addition, the CCAAs share in Central Government revenue was defined, in terms of the actual cost of the responsibilities assumed, and in February 1982 the method of calculating this actual cost was approved in the CPFF. Until 1984, the calculation was carried out by means of negotiations on committees in which the State and CCAAs were represented on an equal footing. Between 1984 and 1987, the percentage shares were fixed annually by law for the CCAAs as a whole.

In 1987 a new five year agreement on regional financing entered into force that radically changed the method for calculating the share in State revenue. It was now defined as a transfer of resources from the State to finance that part of the general responsibilities assumed, excluding health care and social services responsibilities, not financed through assigned taxes. The distribution system and the rules governing its future evolution were established. This system represented a significant advance in that it was more objective and automatic, and the above-mentioned negotiations between the State and the CCAAs and the ad hoc calculations disappeared. As regards tax revenue, the assignment of taxes was extended to registration duties (*Impuesto sobre Actos Jurídicos Documentados*) and the Canary Islands' Economic-Fiscal Regime (*Régimen Económico Fiscal*) was reformed with the creation of the Canary Islands General Indirect Tax (*Impuesto General Indirecto Canario*). Finally, the criteria for distributing the FCI were modified in 1990 (Law 29/1990 of 16 December 1990), and this fund was adapted to the new EU legislation on structural funds. Expenditure on health care and social responsibilities were financed independently with specific transfers from the Social security Treasury Department<sup>11</sup>.

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<sup>11</sup>The criterion applied when setting the percentage of the State health budget (INSALUD) to be trans-

On 20 January 1992 the regional financing arrangements for the five-year period 1992-1996 were agreed in the CPFF, with the creation of the specific tranche of the share in State revenue, corresponding to the share of 15% of “territorial” personal income tax payments (those arising within each region). In any case, the financing of the CCAAs under the new agreement continued to be based essentially on the share in State revenue. The share in State revenues was calculated as follows. First, the total amount of shared revenues for the initial year was obtained starting from a total volume of resources for the CCAAs as a whole, which was determined mainly by the resources transferred in 1990 under the previous system. This overall volume of financing was divided into two blocks, one for the article 143 CCAAs and the other for the article 151 CCAAs, with the aim of treating regions with the same level of assumable powers equally. The volume included in each of the two blocks was distributed among the CCAAs in accordance with certain weighted socio-economic variables (population, insularity, area, administrative units, relative wealth, fiscal effort and geographical dispersion), following a number of adjustments (among other adjustments, a redistribution of 2.7% of the outcome was made on the basis of the relative poverty of the CCAAs). The amount for each CCAA resulting from this distribution was reduced by an estimate of the revenue from assigned taxes and from the charges for services for which responsibility had been transferred. The resulting amount represented the initial financing obtained by each CCAA from the share in State revenue. Finally, to determine the share in State revenue in the subsequent years of the five-year period, the share in State revenue grew at the same rates as the so-called “structurally adjusted tax revenue” (ITAE), namely State revenue from non-assignable direct and indirect taxes, excluding resources from the EU, plus social security and unemployment insurance contributions, subject to a ceiling determined by the growth rate of GDP and a floor determined by the growth of Equivalent State Expenditure (the latter prevailing over the ceiling). These percentages were only revised in the event of transfers of new services or the assignment of new taxes. Moreover, given the

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ferred is that of resident covered population in the region in question, thus obtaining equality of per capita financing among the CCAAs. Nonetheless, certain health services are usually maintained in State centers, and therefore the cost of such centers is deducted from the INSALUD budget before calculating the fraction to be transferred. The same is the case with the Health Research Fund, own revenue and the health programmes of the Ministry of Health and Consumption.

significant financial problems with the arrangements in place to cover health expenditure by the CCAAs, which basically implied that the CCAAs had to supplement the financing from the Social security Treasury Department with contributions of resources from their own budgets, the CPFF agreed in September 1994 on a new financing model for health assistance for the period 1994-97. This took real spending on health for the year 1994 as its basis and determined the growth of this spending in accordance with the nominal GDP for each year. On 23 September 1996, the Fiscal and Financial Policy Council (CPFF) approved the content of the regional financing arrangements for the period 1997-2000. The core of the reform was as follows:(i) initially, 15% of personal income tax receipts were assigned, but once responsibilities on education had been fully transferred, at the end of the five-year period, 30% of this tax was assigned to the CCAAs; (ii) regulatory powers were granted in respect of the taxes assigned<sup>12</sup> and of the tranche corresponding to the shared personal income tax (regulatory responsibilities for the tax rate schedule, including the tax-free allowance and deductions<sup>13</sup>). The increase in fiscal co-responsibility and in regulatory autonomy for the

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<sup>12</sup>Before the 1997 reform, the taxes assigned were the wealth tax, the inheritance and gift tax, the tax on property transfers and documented legal acts and the tax on gaming. The CCAAs were empowered to administer and levy these taxes, but did not have regulatory powers. The 1997 reform introduced restricted regulatory powers over this assigned taxes. In particular, regulatory responsibilities were established: over the tax-free allowance and the tax rate schedule of the wealth tax (which must be progressive and have the same number of brackets as that of the State, with the amount of the first bracket of the final tax base and the marginal rate also being the same); over the rate structure (necessarily progressive) and, in the case of mortis causa acquisition, over reductions from the tax base for the inheritance and gift tax. In the case of the tax on property transfers and documented legal acts, the CCAAs may regulate the rate charged on property transactions, and on the establishment and assignment of real rights relating thereto, as well as the rate payable on notarial documents. Lastly, in relation to gaming tax, their powers extend to tax exemptions, applicable rates, fixed charges, allowances and accrual, and to management, settlement, tax-collection and inspection matters.

<sup>13</sup>In particular, the CCAAs had the power to regulate the regional tax rate schedule, subject to the constraint that the amount payable as a result of applying the individual or joint regional tax rate schedule to the ordinary final tax base may be neither 20% higher nor 20% lower than the amount payable when the State tax rate schedule is applied to the same tax base. Further, the CCAAs may create their own deductions for individuals and households, non-corporate investment and the application of income, provided that they should not directly or indirectly entail a reduction in the actual tax levied on any category of income.

CCAAs was, however, limited by the simultaneous establishment of a system of guarantees, which meant that the minimum increase in financing received by each CCAA would be equal to GDP growth, unless the amendment of personal income tax rates or the setting of new deductions by the regions were to bring about a loss of revenue in the CCAA tranche<sup>14</sup>. Note that this system of guarantees entailed a significant change with respect to the system in force prior to the reform, since under the previous financing arrangements, the GDP growth rate was the ceiling not the floor for the growth in the general tranche of the share in State revenue. Furthermore, in 1997, a new agreement for the financing of health services for the period 1998-2001 was also reached. With this agreement, the resources earmarked for health financing grew over the period in accordance with the growth rate of nominal GDP, as in the previous agreement. However, health financing was drawn from two funds: a general fund, equivalent to that existing previously, and another, specific fund, aimed at ensuring minimum financing to the CCAAs whose population shrinks, at covering needs relating to medical training and research, and at compensating CCAAs for the assistance provided to non-residents. The share-out to the CCAAs that have assumed these responsibilities was made, in the case of the general fund, following the covered-population criterion, with updated data. And in the case of the specific fund, it was conducted ensuring that no CCAA whose population has shrunk should see the volume of its health financing fall by more than 0.25%, and financing extraordinary expenses relating to training and research and those arising from assistance provided to non-residents.

A new agreement came into force in 2002 that widened the CCAAs' tax resources. The assigned percentage of personal income tax was raised to 33% and, in addition, 35% of net VAT revenues, 40% of excise duties and 100% of the tax on electricity, of a new tax on retail hydrocarbon sales and of the excise duty on specific means of transport were all assigned. Furthermore, the new system extended the regulatory powers of the CCAAs in relation to

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<sup>14</sup>The minimum increase in personal income tax and the share in State revenue guaranteed to each was that of the growth rate of nominal GDP. In addition, a third guarantee ensured the capacity to cover public services assumed (non university education): in the last year of the five-year period, in the event of education services having been transferred, the financing per inhabitant of each region could not be less than 90% of average per capita financing.

assigned taxes.<sup>15</sup> Lastly, Central Government guarantees as to the minimum growth of the financial resources received by each CCAA were eliminated.<sup>16</sup>

The last reform of the financing agreements of the CCAAs was approved at the end of 2009, which resulted in additional resources for the regions. The new system raised the amount of taxes transferred (to 50% in the case of the personal income tax and VAT; to 58% in the case of excise duties on manufactured production of alcohol, tobacco and hydrocarbons)<sup>17</sup> and CCAAs received additional powers to modify their rates in some of these taxes.<sup>18</sup> In addition, the criteria for distributing the different tax revenues and transfers to the regions changed. As a result, and for the base year, each CCAA receive 25% of its tax revenue, plus its participation in the so-called Guarantee Fund plus its share on the so-called Global Sufficiency Fund. In addition, two additional funds were created, of lower quantitative importance, the Competitiveness fund and the Cooperation fund to promote regional income convergence. The Guarantee Fund is formed by the contribution of 75% of the tax revenues assigned to CCAAs plus some additional funds added by the Central Government in the base year; then the fund is distributed among CCAAs on the basis of the weighted average of 7 variables, of which population-related variables are the most relevant. These variables are revised annually and the Central Government contribution to the guarantee Fund is linked to the growth rate of the Central Government's tax revenues. In turn, the Global Sufficiency Fund, for the base year, is calculated for each CCAA as the difference between their overall financing needs and the sum of their tax revenues and the transfer from the Guarantee Fund. In subsequent years, the Guarantee Fund evolves with

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<sup>15</sup>The most significant amendment was in personal income tax, since following this agreement the only constraint on potential rate changes by CCAAs was that such changes had to be progressive and retain the same number of brackets as was the case for the Central Government. Until then, limits were set in terms of the variation in tax payable brought about by the change. Regulatory powers in respect of VAT and excise duties were not granted, however, except in the case of the tax on specific means of transport, where CCAAs have the power to change the rate within certain limits, and that of the new tax on hydrocarbons.

<sup>16</sup>With the exceptions of health spending in the first three years in which the agreement was in force and certain revenue-modulating rules.

<sup>17</sup>CCAAs keep the 100% collection of the hydrocarbon-oil retail sales, electricity tax, property and stamp duty tax, tax of registration of motor vehicles, taxes on gaming, wealth tax and inheritance and gift tax.

<sup>18</sup>With the exception of the VAT, excise duties and electricity tax.

the growth rate of the Central Governments tax revenues.

In the case of local governments, the spending responsibilities assigned to them are regulated by the Local Government Act of 1985, which establishes a minimum list of services to be provided by them (the so-called compulsory services): the list of “compulsory services” increases with population size.<sup>19</sup> As a result, the financing system of local governments also changes with size. In particular, under the current system that entered into force in 2004, local governments revenues come from own taxes, property, fees and surcharges on central and regional taxes, subsidies, regulated prices, fines and sanctions. In the case of local governments that are capitals of a province or CCAA, or which have over 75,000 inhabitants, they are also assigned a part of the personal income tax, VAT and taxes on alcohol, hydrocarbons and tobacco.<sup>20</sup>

## 4 The fiscal rules framework affecting sub-national governments in Spain

From the outset, sub-national governments were subject to some constraints and limitations on their capacity to borrow and/or generate budget deficits.

In the case of the CCAAs, they were empowered to take on debt, albeit subject to certain limits. Specifically, credit operations at less than one year were to be used to cover temporary treasury requirements, while credit operations at over one year, should meet the following requirements: (i) that the total amount of the credit is earmarked for financing investment spending; and (ii) that the annual amount of debt repayments plus interest does

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<sup>19</sup>In particular, all local governments provide public lighting, street cleaning, refuse collection, water supply, paving of local roads, food and drink control. Local governments with population above 5,000 provide parks, libraries, marketplace, solid waste treatment. Local governments with population above 20,000 provide fire protection and emergencies, social services, sport facilities, slaughterhouse. Finally, local governments with population above 50,000 include urban passenger transport, environmental protection under their spending responsibilities. In any case, in most cases, local governments intervene voluntarily in the provision of services even if they do not have the population size required (see Solé-Ollé and Bosch, 2007).

<sup>20</sup>Between 1% and 2% depending on the tax and whether it is a municipal or provincial one.

not exceed twenty five percent of the CCAAs' current revenues. For the arrangement of credit operations abroad and for debt issuance and any other resort to public credit, the CCAAs require the authorization of the Central Government.

In the same vein, local governments can finance current expenditure considered as necessary and urgent but with certain limits; among others, these credits should be lower than 5% of current budgetary revenues and interest payments should not be higher than 25% of current revenues. Moreover, temporary treasury requirements of local governments can be financed with short-term debt, but with the limit of 30% of current revenues. As in the case of CCAAs, credit operations at over one year should be earmarked for financing investment spending and interest payments cannot exceed twenty five percent of current revenues of the local government.<sup>21</sup>

CCAAs' credit operations should be coordinated among the CCAAs themselves and in keeping with the Central Governments debt policy, with the CCAAs obliged to submit an annual debt programme to the central government. Once the programme has been agreed, it entails the automatic authorization of all the operations contained therein. The application of the programme may be changed by a CCAA following a new proposal to the government. Further, the Central Government itself may suspend the programme on a precautionary basis should there be exceptional circumstances that might hamper the Treasury's financial policy or involve imbalances in the relationship between the level of external and domestic debt. Again, in the case of local governments certain credit operation at over one year require authorization by the Central Government.

From 1992, following the publication in March of Spain's Convergence Programme, the so-called Budgetary Consolidation Scenarios (BCS) were signed by the Central Government and each of the CCAAs, further to bilateral negotiations, in which an specific maximum deficit and debt allowed for each CCAA were determined. In March 1995, further to the revision of the Convergence Programme in July 1994, the commitments contained in the BCS were also revised, and the ceilings for the period 1995-1997 were specified. These were

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<sup>21</sup>Latter in 1999 this limit was defined as total debt over one year not being allowed to be higher than 110% of total revenues. In 2010, and only for that year this percentage was increased to 125%, and in 2011 was reduced to 75%.

changed once again following the approval of the first Stability and Growth Programme in December 1998.

The adoption by Spain of the Maastricht Treaty did not have any specific bearing on sub-national governments' fiscal rules. The subsequent milestone in the definition of the framework of national fiscal rules took place in 2002. The budgetary stability law that came into force in 2002 set a single limit for all CCAAs, though not in terms of debt but only in terms of the budget balance. According to that law, CCAAs and local governments had to meet the principle of budgetary stability, defined as the obligation to post a budget outturn that is in balance or surplus. This law also defined the scheme of sanctions that may be imposed in the event of non-compliance to the CCAAs.<sup>22</sup> The law also provided that, in authorizing the arrangement of credit operations abroad and the issuance of debt and any other resort to public credit, the Central Government shall bear in mind compliance with the principle of budgetary stability.

A reform of the budgetary stability law was approved in May 2006, which entered into force on 1 January 2008, enabling the Central Government and CCAAs to adapt their deficit and surplus targets to the economy's cyclical position. Specifically, it allowed the CCAAs (local governments<sup>23</sup>) to run a deficit of 0.75 (0.05) percent of GDP if economic growth was below a certain threshold<sup>24</sup>, to which a further 0.25 (0.05) percent of GDP might be added to finance increases in productive investment, including that earmarked for research,

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<sup>22</sup>Specifically, it states that if the CCAAs do not meet the obligations established under the law and if this leads, in turn, to non-compliance with the obligations of the Stability and Growth Pact, the CCAAs shall assume, in the portion attributable to them, the responsibilities arising from their conduct.

<sup>23</sup>Specifically, those that are provincial or regional capitals, or that have a population equal to or higher than 75,000 inhabitants. The rest of local governments should keep a balance or surplus position in any case.

<sup>24</sup>These growth thresholds that determine the possibility of attaining a budget in deficit, in balance or in surplus were set, for a period of three years, by the Council of Ministers, on the proposal of the Minister of Economy and Finance and further to a report by the Council of Fiscal and Financial Policy of the Regional Governments and the National Local Government Board. In particular, during this period if economic growth of less than 2% was projected, the general government deficit could not exceed 1% of GDP (breaking down into a ceiling of 0.2% of GDP for central government, 0.75% of GDP for the regional governments as a whole and 0.05% of GDP for large municipalities). If economic growth was between 2% and 3%, general government should show a budget in balance and, if growth exceeds 3%, a surplus should be run.

development and innovation<sup>25</sup>. It likewise established that a significant portion (in no case less than thirty percent) of investment programmes shall be financed with gross saving of the CCAA in question, with only partial resort to debt being permitted. In addition to the extension of the fiscal rules to the lower tiers of government, the BSL had a clause saying that the State shall not take responsibility for the financing of the deficits or public debt of the lower levels of government (no bail-out clause). As to the monitoring procedure, the Ministry of Economy and Finance was required to submit a report to the government before 1 October each year on the degree of compliance with the targets, and on real cyclical developments during the year and deviations from the initial forecast. Should a risk of non-compliance be discerned, a warning may be made to the government agent responsible. If such non-compliance involved a higher-than-targeted deficit, the level of government in question was also required to draw up an economic and financial rebalancing plan over a maximum term of three years. Lastly, it stipulated that, if a deviation from targets prompts a breach of the Stability and Growth Pact, the tier of government involved shall assume the attendant proportion of the responsibilities that should arise from the breach. In addition, in the case of the regional governments and municipalities, compliance shall be taken into account in the States authorization of credit operations and debt issues. Specifically, if the failure to meet the stability target takes the form of a greater-than targeted deficit, all the regional governments debt operations shall require Central government authorization<sup>26</sup>.

Finally, a constitutional reform was approved in September 2011 that enshrined in the Constitution the obligation for all levels of government to adjust their conduct to the principle

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<sup>25</sup>In terms of the target-setting procedure, a report was first drawn up assessing the cyclical phase for the following three years. On this basis, the BSL obliged the government to set, first, the budgetary stability target for the three following years in the first half of each year, both for the general government sector as a whole and for each of the agents comprising it; and, second, the State spending limit. Both should be approved by Parliament. Once approved, the individual fiscal target for each regional government was set by means of bilateral negotiations between the Ministry of Economy and Finance and the representatives of each regional government on the Fiscal and Financial Policy Council.

<sup>26</sup> However, if the regional government had submitted the economic and financial plan to the Fiscal and Financial Policy Council and the measures contained therein had been declared suitable by the Council, State authorization for short-term credit operations that were not deemed to be external financing was not required.

of budgetary stability. The reform was followed by the approval of a new Law in 2012<sup>27</sup> that details that the general government deficit in structural terms cannot exceed 0.4% of GDP, sets a limit on government debt of 60% of GDP<sup>28</sup> and an expenditure rule<sup>29</sup>. The 60% debt to GDP limit is distributed as follows: 44% of GDP for the Central Government, 13% for all and each one of the CCAAs, and 3% of local governments. Moreover, in 2014 a new law added a maximum delay period for suppliers payments of 30 days as a stability target.

Local governments should keep a balance or surplus position and it is not allowed a deficit in structural terms. The limits on the structural deficit and the volume of public debt may only be exceeded in the event of natural disasters, economic recession or exceptional emergency situations beyond the control of the State and which considerably impair the financial situation or the economic or social sustainability of the State. An absolute majority in Parliament would be required in this situation. The law specifies the procedure for preventing and sanctioning target non-compliance, but despite the almost generalized non-compliance, no sanctions have yet been applied.<sup>30</sup>

## 5 Summary of institutional issues and implications for the empirical analysis

From the extensive discussion of Section 3 it should be now clear that there has been a gradual increase in CCAAs' fiscal co-responsibility, meaning a progressive increase in the capacity of the CCAAs to depend on their own tax and a parallel reduction in their dependence from State transfers. This change is apparent as of the mid nineties and, in particular, from the 2002 financing agreement, which entailed an effective increase in the CCAAs' regulatory

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<sup>27</sup>The budgetary stability and financial sustainability law (LOEFSP), for a more general description and analysis of the 2012 budgetary stability law see Hernández de Cos and Pérez (2013).

<sup>28</sup>Both of which should be achieved following a transition period up to 2020.

<sup>29</sup>This is an important novelty of the new rule. The expenditure rule has been defined in a similar manner as the one incorporated in the 2011 reform of the Stability and Growth Pact. In general terms the growth rate of public spending should not exceed medium-term GDP growth unless it is accompanied by discretionary increases in public revenue. The rule is applied not only to the Central Government but also to regions.

<sup>30</sup>For a further analysis of the CCAA non-compliance see Delgado et al (2016)

power of their assigned taxes and the elimination of the State guarantees for revenue growth. Accordingly, the CCAAs came to assume the risks of revenue losses associated with the assigned taxes. A similar comment applies to expenditure decentralization, that being gradual over the past three decades, gained pace and scope since the second half of the nineties and in particular since 2002.

The parallel built up of a framework of national fiscal rules also gained strength as of the mid 1990s, first with the establishment of a framework that would ensure convergence to EMU, and then with an upgrade of national rules to make them fit for the needs of the Stability and Growth Pact. Again, in the latter respect, 2002 signals a structural change with the approval of the first budgetary stability law, followed by subsequent reforms in 2006 (2008) and 2011 (2012).

In the next, empirical sections we will focus on the sample 1995-2015. As of 1995 the quality of the available data is clearly superior to that of the pre-1995, and some datasets, in particular those related to individual CCAAs public debt (EDP and non-EDP) data are only available since that date. Nevertheless, we restrict ourselves to that sample period also on purpose, given the sequence of institutional changes described in the previous paragraphs. The period since 1995 conforms a more stable institutional set up from the point of view of the homogeneity of revenue and expenditure competencies adopted by CCAAs, when compared with the inclusion of the 1980s. Still there were significant legal reforms over the period that allow for testing a number of relevant hypothesis, as will become clear in the next Section of the paper. Moreover, there is

The extensive descriptive analysis of empirical stylized facts and the institutional framework of the previous Section allow us to move in the next Section to the second contribution of our paper, namely the study of the determinants of the evolution of sub-national's debt net financing needs (measured by the change in public debt). As mentioned in the Introduction, we constraint ourselves in this Section to the study of the determinants of CCAAs' debt due to data constraints. We do so by estimating empirical models in which we exploit the pool structure of our data (17 regions over the period starting in 1995). Thus, it take into account the full crisis period that includes a bail-out for certain CCAAs from 2012 onwards. We exploit the rich structure of institutional changes that happened over 1995-2015 to pose

testable hypothesis on the impact of fiscal decentralization and fiscal rules. In addition, we include in the analysis market-discipline indicators, such as the change in the implicit cost of debt and the structure of debt itself and, non-EDP debt, focusing on public corporations controlled by CCAA and its role in the determination of CCAA's EDP debt.

## 6 Empirical analysis

### 6.1 Data and hypotheses to be tested

In line with the extant literature, we include in our analysis economic, political and institutional variables that may be instrumental in explaining the change in CCAAs over time. We also include a number of less conventional variables linked to the structure of public debt and market discipline measurement.

**Economic variables used as controls** As regards the economic factors, we follow closely the definitions and variables of Argimón and Hernández de Cos (2012). Economic theory has highlighted the economic cycle as a fundamental determinant of budget balances and, as a consequence, of changes in public debt. In economic downturns budget deficits increase, either through the operation of automatic stabilizers or through the impact of countercyclical discretionary fiscal policies designed to stabilize the economy, while the opposite occurs in expansions<sup>31</sup>. In addition to this channel, economic growth erodes the stock of public debt when measured as a percent of GDP. Indeed, even high debt ratios can be sustainable in a framework of healthy economic growth, while in a situation of low or negative growth even low debt ratios can turn out to be non-sustainable. We include in our analysis the yearly growth rate of each CCAA GDP as a measure of the economic cycle (variable *Economic cycle*), taken from the Annual Regional Accounts published by the Spanish Statistical Office (INE). Among the set of economic factors, we also include as control variable a measure of

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<sup>31</sup> Some authors point out, however, that the higher revenues in economic boom periods may generally entail pressure on the growth of public spending, in such a way that the relationship between the economic cycle and the budget deficit may be altered or, at least, evidence asymmetrical behavior over the course of the cycle. See Morris and Shuknecht (2007), on related grounds.

the degree of economic development, as measured by per capita income.

Another relevant economic factor behind debt accumulation is the evolution of prices, as prescribed by the government budget constraint. Here the literature usually emphasizes the role of asset prices that may affect fiscal outcomes basically through the tax system (taxes on capital gains and losses, taxes on transaction, and tax relief, in particular, in the Spanish case, for house purchases). In the case of Spain, financial and nonfinancial assets form the basis of certain taxes managed and collected by CCAAs. Available information for variables that could capture asset prices at the regional level is scarce. Because of its relevance in the boom period (1995-2007) and its availability, housing prices might be a good proxy to capture the incidence of assets on regional public finances. We define a variable as follows: deviation of the change in each region's index of housing prices with respect to the national mean.

More generally, overall inflation is a factor typically advocated to have an impact on debt, both indirectly through its effect on tax revenues and directly through its deflating effect on the debt-to-GDP ratio<sup>32</sup>. The incidence of price changes (measured by the changes in the CPI) will be captured by a variable defined as the deviation of each region's inflation in relation with the national mean, in such a way that possible common trends are taken care of.

**Political and institutional factors** The literature has proved that it is necessary to include political and institutional factors in the standard analysis (typically focused on the study of budget balances) to be able to explain the persistence of budget deficits and the accumulation of debt in advanced economies. In our analysis we include a number of political variables: (i) ideology, measured, first, by the % of left-wing MPs over the total seats of regional parliaments, and second, by the percent of regionalist parties' MPs (parties that only operate in a given region, and do not form part explicitly or implicitly, of a national

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<sup>32</sup>Apart from the impact on nominal GDP (the denominator of the debt ratio), higher inflation may increase the budget deficit through higher nominal interest rates and a higher real cost of purchases of goods and services or investment and, in general, of those items of public spending that can be indexed (e.g., pensions and wages). In the presence of non-indexed taxes, inflation may also generate higher revenues if, for instance, the tax rates are progressive.

party) over the total number of seats of the regional parliament; the first variable aims at capturing potential pro-spending biases depending on the ideological orientation of the regional government, while the second could be instrumental for testing the existence of different attitudes towards public debt accumulation depending on the scope of the objective function of the regional government; (ii) dummy to measure the political concordance of the center and the periphery (region), a measure of political alignment between the government of a given region and the central government; (iii) electoral cycle<sup>33</sup>: instead of the standard election dummy that display a value of one in an election year and a zero otherwise, we use a transformation of the original variable to measure proximity to elections, computed as a continuous variable as the distance to elections (see Franzese, 2000, 2002, Mink and de Haan, 2005).

Most importantly, we consider a number of variables that measure the strength of fiscal rules. Public debt developments may be affected by the presence of different types of fiscal rules insofar as they supposedly pose a permanent constraint on fiscal policy. In addition to their role in enhancing fiscal discipline, such fiscal rules may further contribute to the reduction of uncertainty about future fiscal policy developments (see Singh and Plekhanov, 2005, for a discussion of rules-based controls on sub-national borrowing compared to other alternatives). In particular, we try the following measures of sub-national rules in the empirical model: (i) European Commission Fiscal Rules Index<sup>34</sup>: we use the index for sub-national rules; (ii) dummy variables for the different regimes of rules, more specifically the above-mentioned Budgetary Consolidation Scenarios (BCS) and Budgetary Stability Law (BSL) of 2002, leaving aside the most recent BSL because it only entered into force in 2012. It should be noted that the literature highlights certain characteristics of the fiscal rules that increase their effectiveness in terms of the objective of keeping the budgets of the regions to which they apply in balance. Key factors that may determine the success of fiscal rules include transparency, the possibility of imposing sanctions in the event of noncompliance, and the existence of independent bodies responsible for monitoring compliance. In this re-

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<sup>33</sup>On electoral cycles and budgetary outcomes see, for example, von Hagen (2010) or Mink and de Haan (2005).

<sup>34</sup>See [http://ec.europa.eu/economy\\_finance/db\\_indicators/fiscal\\_governance/fiscal\\_rules/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm).

gard, as previously described, the successive reforms of fiscal rules have generally introduced improvements as compared to the previous existing ones and thus we would expect a higher positive influence on fiscal balances of the most recent fiscal rules as compared to previous versions.

**Fiscal federalism-related control variables** The territorial organization of a country has also been signalled by the extant literature as a further determinant of the fiscal situation, either measured by the fiscal balance or by the stock of debt. In particular, the responsibilities assumed by the regions, the instruments for financing them, and the relationships between regional and central governments are all factors that certainly affect the aggregate fiscal outcomes of a given country and, more specifically, the distribution of fiscal outcomes among the different layers of government. In particular, the literature has devoted some effort to the existence of a so-called *soft budget constraint problem* whereby a sub-national government may have incentives to conduct an undisciplined fiscal policy under the expectation that the central government will intervene in case of trouble (see Qian and Roland, 1998; Kornai et al., 2003; Sorribas, 2012; Delgado et al., 2016).

Following the literature we include in our analysis some alternative measures of fiscal co-responsibility, measured: (i) the ratio of taxes over which the regions do have normative power, over their total non-financial revenues in NA terms <sup>35</sup>; (ii) by means of dummy variables that would represent the financing arrangements between the center and the regions that took place over the period, as described above (1992-1996, 1997-2001, 2002-2009).<sup>36</sup> The literature argues that there should be correspondence between the extent of a given region's spending responsibilities and its fiscal autonomy (fiscal co-responsibility), the latter being understood as the ability of the regions to generate income to finance that spending. Otherwise, a so-called vertical fiscal imbalance in the regions could emerge that is usually

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<sup>35</sup>The period 1995-1999 is obtained as a linear extrapolation with the execution data, as the NA accounts only cover the period 2000-2015

<sup>36</sup>We also included in the analysis dummies to account for the different degrees of devolution of each regional ("forales" and article 151 vs the rest). Nevertheless, this type of time-invariant dummies turned out to be immaterial for the econometric estimation insofar as the latter will be carried out in first differences, as will be explained below.

filled by federal transfers. These transfers distort the relationship that should exist between the level of taxes and the benefits obtained by citizens, creating a common pool problem. As regards the impact of own revenue decentralization on fiscal balances, Governatori and Yim (2012) discuss that theory does not provide clear predictions. On the one hand, a high value of a fiscal co-responsibility variable means that regional governments have more own resources to cover a given amount of expenditures, leading to better fiscal balances. On the other hand, one has to acknowledge that this type of variable conveys no information on the relative size of sub-national own revenues compared to their expenditures, which is probably a better way to capture regional governments incentives to behave in a financially responsible way. In addition, the impact of revenue decentralization may also differ depending on the share of transfers/taxes in CCAAs' revenues.

**Control variables: market discipline and endogenous control mechanisms** Beyond the factors analyzed in the previous paragraphs, the ability to increase debt by a given level of administration is fully determined by its ability to raise the necessary funds. In addition to increasing taxes or decreasing expenditure, the latter necessarily entails finding (national or international) investors willing to buy the debt of a given administration. Thus one may conjecture that market pressure might be a key determinant of the change in public debt. The case of Spain is not one in which there is full reliance on capital markets to contain sub-national borrowing, as in the cases of Canada, Switzerland, and the United States. The latter are cases in which the central government does not set any limits on sub-national government's borrowing, so that these levels of government are free to decide the form of borrowing, and may decide by themselves to adopt a fiscal rule in an attempt to enhance their credit standing in the market. In the Spanish framework sub-national governments are constrained by upper-level rules, as described above, while at the same time are subject to strict market scrutiny.

To approach the influence of market discipline, either directly or through the induced effect on the endogenous reaction of governments to built up the sufficient credibility not to lose market access, we explore the following control variables: (i) budgetary deviation in the previous period - one may expect that under market pressure, a given deviation

from the budgetary target in year  $t-1$  tends to be at least partially corrected in year  $t$ ; in this respect we include a variable defined as the difference between the projected budget balance (initial budget) and the observed balance, both as a ratio of total (projected and observed, respectively) revenues; (ii) change in the implicit interest rate, as a measure of market pressure; (iii) a number of variables linked to the composition of debt, as follows. On the one hand, the ratio of short-to-long run debt. Short-term debt could be associated with the reaction to sudden changes in market sentiment.<sup>37</sup> In a framework of worsened perception about a given sovereign, though, increased reliance on short-term debt can lead to a heightened vulnerabilities, as worsening perceptions of a given region's creditworthiness can quickly feed into higher interest costs (see also IMF, 2004). On the other hand, the ratio of securities to loans, with the prior in mind that loans could be more easily obtained in somewhat "captive" markets vs open competition to capture investors in securities. In the particular case of the regions of Spain, regional Savings Banks ("Cajas de ahorros") typically assumed a role as CCAAs bankers. Finally, the ratio of debt held by non-resident vs that held by residents, might be also a measure of stress in the markets as, a priori, in the case of undisciplined governments that are perceived as pursuing unsustainable fiscal policies, non-residents tend to react more quickly and shift portfolios towards more secure assets than residents.

**Additional control variables: pressure from units accounted for outside the boundaries of the General Government sector** In particular, within this group, we consider the dynamics of the debt of public corporations owned by a given region (non-EDP) over the EDP debt of that very region. Indeed, the related literature would suggest that: (i) under tight budgetary rules a government may try to circumvent the constraints by cutting transfers public corporations that, in turn, can finance the same spending by issuing debt that is not computed by means of the same accounting standards used to define the rule (typically as in National Accounts); (ii) an excessive level of non-EDP debt may end up

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<sup>37</sup>Some papers have found short-term debt to be an indicator of vulnerability to international financial crises: Borensztein et al. (2004), Rodrick and Velasco (1999), Bussière and Mulder (1999).

creating pressure on the government to bail-out the external indebtedness vehicle.<sup>38</sup>

## 6.2 The empirical model

The empirical analysis is carried out using the available annual data for the period 1995-2015. The incidence of the different determinants on the changes in public debt mentioned in the previous section will be tested by means of a standard econometric model that can be specified in quite general terms as:

$$\Delta \frac{D_{it}}{Y_{it}} = \alpha_i + \sum_{j=1}^N \beta_j \Omega_{jit} + \epsilon_{it} \quad (4)$$

Under the proposed approach, the change in public debt of each regional government,  $i$ , at time  $t$ ,  $\Delta \frac{D_{it}}{Y_{it}}$ , depends on a set of control variables,  $\Omega$ , encompassing the economic, political, institutional, market-induced and non-EDP factors mentioned above. Following the traditional fixed-effects model,  $\alpha_i$  in equation (4) aims at capturing all the unobservable CCAA effects that are time-invarying, while  $\epsilon_{it}$  is an error term assumed to be white noise. As for the estimation method, and in order to avoid any biases stemming from the possible correlation between the individual effects and the regressors, we estimate model (4) in first differences. Moreover, given the possible simultaneity of some of the control variables and the dependent variable, the estimation is carried out by the Generalized Method of Moments (Arellano and Bond, 1991), using as instruments lagged regressors.

## 6.3 Results

The results are shown in tables 1, 2, 3 and 4.

In Table 1 we explore the role of more traditional factors, namely fiscal federalism variables and standard measures of fiscal rules, controlling for economic and political determinants. In Table 2, in turn, we expand the analysis of the role of fiscal rules by focusing on a number of interactions of fiscal rules' variables with "vulnerability" or market-pressure

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<sup>38</sup>On a discussion about the role of public sector enterprises in Spain see Fernández-Llera and García-Valiñas (2011).

variables. As regards, Table 3, we study in detail the effect of different measures of market discipline, while in Table 4 we consider the bi-directional influence between the debt (non-EDP) of public corporations controlled by CCAA and CCAA’s EDP debt.

As regards a detailed reading of Table 1, we show the estimations of four models, in which the main macroeconomic and political factors are considered, as well as the persistence of changes in debt (“lagged dependent variable”), the level of debt in the previous period<sup>39</sup>, and the budgetary deviation incurred in  $t - 1$  with respect to the initial budget. The four columns differ, though, on some of the fiscal co-responsibility proxies used and/or the type of proxy for fiscal rules used. The following results of Table 1 are worth highlighting: (i) As regards the impact of the economic cycle, the estimations in columns [1], [2] and [3] point to a debt-reducing effect of real GDP increases. (ii) The variable measuring inflation deviations presents a negative but non significant sign. Therefore we cannot confirm the expected deflating effect on the stock of debt. (iii) Within the political variables, none turned out to be significant in a robust way. (iv) The fiscal co-responsibility index doesn’t presents the expected (negative) sign, but it is not significant in any of the empirical specifications; neither do the set of dummies measuring the different financing arrangements that are not represented on the tables because of simplicity. (vi) Finally, it is worth mentioning that the “endogenous” stress variables, namely, the lagged level of debt (in one specification) and the budgetary deviations incurred in the previous year (known in the current year) are both conducive to increase debt in the subsequent year. It is also noteworthy that despite the fact that higher levels of debt in the previous year appear to increase the growth of debt ratio, the growth of debt in the previous year has a negative impact on the current year, reducing the probability of an explosive debt path.

The measures of fiscal rules in Table 1 is very significant and show (model [2]) “right” sign. Therefore, the fiscal rule strength has a significant deterring effect, because it seems that the stronger the fiscal rules the smaller the debt growth. Moreover, in Table 2 we further explore the role of fiscal rules, by interacting FRI with a number of variables. The interactions of FRI with a number of ratios of the debt structure can be interpreted as indicators of fiscal

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<sup>39</sup>One may expect that the larger the level of debt, the more difficult would be to increase debt in a subsequent period.

vulnerabilities. Nevertheless, only the interaction with the interest rates evolution seems to have a significant effect. Regarding the interaction of FRI with the implicit interest rate, the sign is negative and strongly significant, a result consistent with the expected debt-controlling role of this variable; Indeed, this variable represents the market discipline, therefore, a negative sign would signal indirect effect stemming from market discipline would dominate the direct impact on the interest burden of the changes in interest rates at issuance. In any case, it is fair to mention that the implicit interest rate is far from being an ideal indicator of cost-push market pressures, as it presents a high degree of inertia. The lack of data on interest rates of new debt issued reduces the possibilities of exploiting this “market discipline” channel in our empirical framework. We would also have expected a positive coefficient of the ratio of short-to-long term debt: an increase in the reliance on short term debt vs long-term debt can indicate, according with the theoretical arguments outlined in a previous section, that a government committed to living-up to the rules (interaction with FRI) can keep market access through the short-end of the portfolio available. Nevertheless, this variable is neither significant nor has the correct sign. As regards the FRI times securities over loans ratio, the negative, though not significant sign, may indicate that a government with more market (competitive) access (i.e. with an increase in the ratio of securities to loans) tend to be more stability-oriented. The same reasoning would apply to the interaction of FRI with the ratio of loans by non-resident vs loans by resident.

As regards the macroeconomic controls, the main results of Table 1 broadly apply when reading Table 2, as regards the size and sign of the economic cycle, and the sign of inflation, though the latter is not estimated with enough precision. The level of development (measured by GDP per capita deviations of each region with respect to the national mean) seems to be also associated, on average, with less accumulation of debt. The impact of the electoral cycle, in turn, loses significance; interestingly, though, the variable that measures the fraction of regionalist parties’ MPs is significant in a robust way, and may indicate that regions with more regionally-oriented political rules tend to accumulate more debt, maybe because of the need to finance extra goods and services for their citizens, related to a higher preference for autonomy. This result was only visible in one of the specifications of Table 1. Finally, the variable on fiscal co-responsibility presents again a negative sign in all the specifications, as

it would be expected, but it is not significant at the standard significance levels.

Table 3 digs deeper in the role of market-discipline-related variables, not necessarily linked to their interaction with FRI. The following additional results in this table can be underlined: (i) the proxy to the cost of financing, the implicit interest rate, does result relevant in the regressions run over the sample 1995-2015, meaning as mention before, that debt decreases despite an increase of interest payments and viceversa; (ii) The ratio of short to long term debt appear to have negative effect on debt growth. Therefore, regional governments, tend to finance more their debt with long term debt, as it happened during the crisis due to the bail-out program; (iii) the ratio of securities over loans presents a negative sign but not significant. This ratio would imply that regional governments with better access to less “captive” investors (those buying securities) tend to be more disciplined from the fiscal point of view. The same reasoning applies to the ratio of loans by non-residents vs by residents, that presents the expected sign even though the variable is not significant a the standard confidence levels in any of the empirical specifications.

Finally, in Table 4 we show some estimated models to assess the linkages between regional governments’ EDP debt and their public corporations’ (EEPP) debt. Columns [1] to [3] show a non significant effect of lagged level of public corporations’ (EEPP) debt as a percent of nominal GDP, and the only significant result is the contrary as the one expected. Our hypothesis is that when the level of debt of public corporations increases, at some point regional governments have to act either by increasing transfers to their corporations (thus increasing their deficit and as a consequence their debt) or by assuming part of the debt of those entities. Columns [4] to [6], in turn, present models for the change in EEPP debt. In these cases regional governments’ debt seem to contain information of the future evolution of EEPP debt, but on the opposite sign than expected.

## 7 Conclusions

In this paper we study the evolution and the determinants of sub-national’s debt net financing needs (measured by the change in public debt). While we provide a descriptive and institutional analysis of the aggregate of sub-national governments as a whole, we constraint

ourselves in the main empirical part of the paper to the study of the determinants of CCAA debt due to data constraints.

The main results of the empirical models in which we exploit the pool structure of our data are as follows. First, institutional factors, such as fiscal decentralization and fiscal rules play a limited role, even though standard results in the literature are confirmed. Second, market-discipline indicators, such as changes in the structure of debt itself and measures of induced self-discipline, play a significant role in disciplining regional governments attitude towards increasing debt. Third, the debt (non-EDP) of public corporations controlled by CCAA influences CCAA's EDP debt.

The results on the impact of fiscal rules, i.e. the fact that they do not appear to have had a significant effect on the fiscal balances of the autonomous regions, should be read in relation to the findings of the economic literature that emphasizes that a set of features are crucial to achieve a certain incidence of any fiscal rule on the behavior of governments. In this regard, issues such as transparency, the possibility of penalties for noncompliance, and the existence of independent institutions responsible for monitoring compliance appear as determinants of the success of the fiscal rules. In the case of the rules that have been implemented in the context of regional governments in Spain, these features have not always been met, in particular given a relatively weak monitoring and sanctioning regime. The Constitutional rule and the associated new budgetary law correct in principle some of the shortcomings of the previous budget rules, although strict implementation of the monitoring and sanctioning regimes set in the new law will be crucial for its success. Moreover, one could also argue that the weak implementation of the fiscal rules could also be related to the existence of permanent negotiations between the regions and the central government on the financing system of the former, which caused obvious perverse incentives to increase the level of indebtedness and even exceed the limits previously established with the aim of obtaining a higher allowed level of financing in the following negotiation round. This perverse effect of having permanent negotiation rounds could also explain the weak evidence found in this paper in favor of a positive impact of the degree of fiscal co-responsibility on fiscal discipline of the regions.

All in all, we find that market-induced discipline have been associated in the sample

under study with heightened fiscal discipline.

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**Table 1: The determinants of regional governments' debt changes (changes as a percent of GDP): baseline models. 1995-2015 sample.**

Dependent variable: $\Delta$ EDP debt	[1]	[2]	[3]	[4]
Lagged dependent variable	-0.82*** (0.16)	-0.78*** (0.15)	-0.80*** (0.16)	-0.80*** (0.15)
Economic cycle	-1.14*** (0.27)	-1.12*** (0.28)	-1.13*** (0.27)	-1.09*** (0.25)
Inflation deviation	-0.36 (0.52)	-0.37 (0.50)	- -	- -
GDP per capita deviation	1.68** (0.73)	1.67** (0.74)	1.66** (0.73)	1.59** (0.70)
Housing inflation deviation	-0.04 (0.06)	-0.04 (0.06)	- -	- -
% Left-wing parties MPs	- -	0.02 (0.03)	0.02 (0.03)	- -
% Regionalist parties' MPs	- -	-0.03 (0.03)	-0.02 (0.02)	- -
Concordance centre-periphery	-0.13 (0.33)	-0.19 (0.35)	- -	- -
Elections	0.08 (0.34)	0.06 (0.33)	0.09 (0.33)	0.08 (0.31)
Fiscal corresponsibility	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)
Fiscal rules: BCS	- -	- -	- -	0.05 (0.37)
Fiscal rules: BSL	- -	- -	- -	0.29 (0.72)
Fiscal rules index (FRI)	-0.16** (0.07)	-0.15** (0.07)	-0.15** (0.07)	-0.16* (0.10)
Budgetary deviation (t-1)	0.06** (0.03)	0.06** (0.03)	0.06** (0.03)	0.06** (0.03)
EDP debt (t-1)	0.33** (0.14)	0.31** (0.13)	0.32** (0.14)	0.31** (0.15)
Number of observations	323	323	323	323
Hansen	0.67	0.65	0.61	0.31
m1	0.00	0.00	0.00	0.00
m2	0.59	0.60	0.71	0.63

\*\*\*, \*\*, \*: significance at the 1%, 5% and 10% levels. Instrument set in all models includes the second and third lag of the explanatory variables. Hansen is the p-value of the test of the over-identifying restrictions (see Hansen, 1982), which is asymptotically distributed chi square under the null hypothesis that these moment conditions are valid. A p-value equal or higher than 0.05 indicates that the instrument set is valid, which is confirmed under all models m1 and m2 are the p-values of serial correlation tests of order 1 and 2, respectively.

**Table 2: The determinants of regional governments' debt changes (changes as a percent of GDP): fiscal rules. 1995-2015 sample.**

Dependent variable: $\Delta$ EDP debt	[1]	[2]	[4]	[5]	[5]	[6]
Lagged dependent variable	-0.66*** (0.20)	-0.68*** (0.09)	-0.61*** (0.08)	-0.61*** (0.08)	-0.61*** (0.08)	-0.63*** (0.09)
Economic cycle	-0.95*** (0.24)	-1.01*** (0.19)	-0.87*** (0.14)	-0.88*** (0.15)	-0.85*** (0.12)	-0.92*** (0.14)
Inflation deviation	-0.33 (0.38)	-0.33 (0.40)	-0.30 (0.41)	-0.31 (0.43)	-0.30 (0.40)	-0.29 (0.43)
GDP per capita deviation	1.31** (0.60)	1.38** (0.58)	1.20** (0.47)	1.21** (0.48)	1.18*** (0.46)	1.25*** (0.47)
% Regionalist parties' MPs	-0.02 (0.01)	-0.02* (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Elections	-0.19 (0.24)	-0.17 (0.24)	-0.03 (0.23)	-0.03 (0.23)	-0.05 (0.23)	-0.01 (0.24)
Fiscal corresponsibility	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)
Fiscal rules index (FRI)	-0.01 (0.09)	-	-	-	-	-
Fiscal rules: BCS	-	0.15 (0.36)	0.20 (0.31)	0.20 (0.31)	0.20 (0.31)	0.16 (0.31)
Fiscal rules: BSL	-	-0.35 (0.45)	-0.53 (0.44)	-0.53 (0.44)	-0.53 (0.47)	-0.41 (0.45)
Budgetary deviation (t-1)	0.07*** (0.02)	0.07*** (0.02)	-	-	-	-
EDP debt (t-1)	0.18 (0.15)	0.19*** (0.06)	0.15*** (0.05)	0.15*** (0.05)	0.15*** (0.05)	0.17*** (0.05)
FRI x Budgetary deviation	0.00 (0.00)	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
FRI x Short/long	-0.00 (0.00)	-0.00 (0.00)	-	-0.00 (0.00)	-	-
FRI x Securities / Loans	-0.00 (0.00)	-0.00 (0.00)	-	-	0.00 (0.00)	-
FRI x Non-residents/residents	-0.00 (0.00)	-0.00 (0.00)	-	-	-	-0.00 (0.00)
FRI x Implicit interest rate	-0.01* (0.01)	-0.01* (0.01)	-0.01** (0.01)	-0.01** (0.01)	-0.01** (0.01)	-0.01** (0.01)
Number of observations	323	323	323	323	323	323
Hansen	0.25	0.31	0.24	0.27	0.24	0.28
m1	0.00	0.00	0.00	0.00	0.00	0.00
m2	0.44	0.39	0.82	0.84	0.79	0.87

\*\*\*, \*\*, \*: significance at the 1%, 5% and 10% levels. Instrument set in all models includes the second and third lag of the explanatory variables. Hansen is the p-value of the test of the over-identifying restrictions (see Hansen, 1982), which is asymptotically distributed chi square under the null hypothesis that these moment conditions are valid. A p-value equal or higher than 0.05 indicates that the instrument set is valid, which is confirmed under all models m1 and m2 are the p-values of serial correlation tests of order 1 and 2, respectively.

**Table 3: The determinants of regional governments' debt changes (changes as a percent of GDP): market discipline. 1995-2015 sample.**

Dependent variable: $\Delta$ EDP debt	[1]	[2]	[3]	[4]	[5]	[6]
Lagged dependent variable	-0.59*** (0.09)	-0.51*** (0.10)	-0.56*** (0.09)	-0.44*** (0.12)	-0.63*** (0.09)	-0.38*** (0.12)
Economic cycle	-0.63*** (0.07)	-0.62*** (0.06)	-0.62*** (0.08)	-0.65*** (0.07)	-0.70*** (0.09)	-0.60*** (0.06)
Inflation deviation	-0.28 (0.25)	-0.30 (0.26)	-0.28 (0.27)	-0.27 (0.25)	-0.25 (0.29)	-0.29 (0.25)
GDP per capita deviation	0.73** (0.29)	0.80*** (0.28)	0.84*** (0.31)	0.85*** (0.28)	0.92*** (0.33)	0.77*** (0.27)
EDP debt (t-1)	- -	- -	0.07** (0.03)	- -	0.09*** (0.03)	- -
Implicit interest rate	-0.21* (0.12)	-0.17** (0.08)	-0.13* (0.07)	- -	- -	- -
$\Delta$ Implicit interest rate	0.10 (0.07)	0.05 (0.06)	0.04 (0.06)	- -	- -	- -
Ratio short/long term debt	-0.02 (0.01)	- -	- -	-0.02** (0.01)	-0.02 (0.01)	- -
$\Delta$ Ratio short/long term debt	0.01 (0.01)	- -	- -	0.02* (0.01)	0.01 (0.01)	- -
Ratio Securities / Loans	-0.01 (0.01)	- -	- -	- -	- -	-0.01 (0.01)
$\Delta$ Ratio Securities / Loans	0.00 (0.01)	- -	- -	- -	- -	-0.01 (0.01)
Ratio debt non-residents / residents	-0.00 (0.01)	- -	- -	-0.00 (0.01)	-0.00 (0.01)	- -
$\Delta$ Ratio non-residents / residents	0.00 (0.00)	- -	- -	-0.00 (0.00)	0.00 (0.00)	- -
Number of observations	323	323	323	323	323	323
Hansen	0.22	0.31	0.33	0.23	0.57	0.23
m1	0.00	0.00	0.00	0.00	0.00	0.00
m2	0.53	0.36	0.32	0.19	0.71	0.24

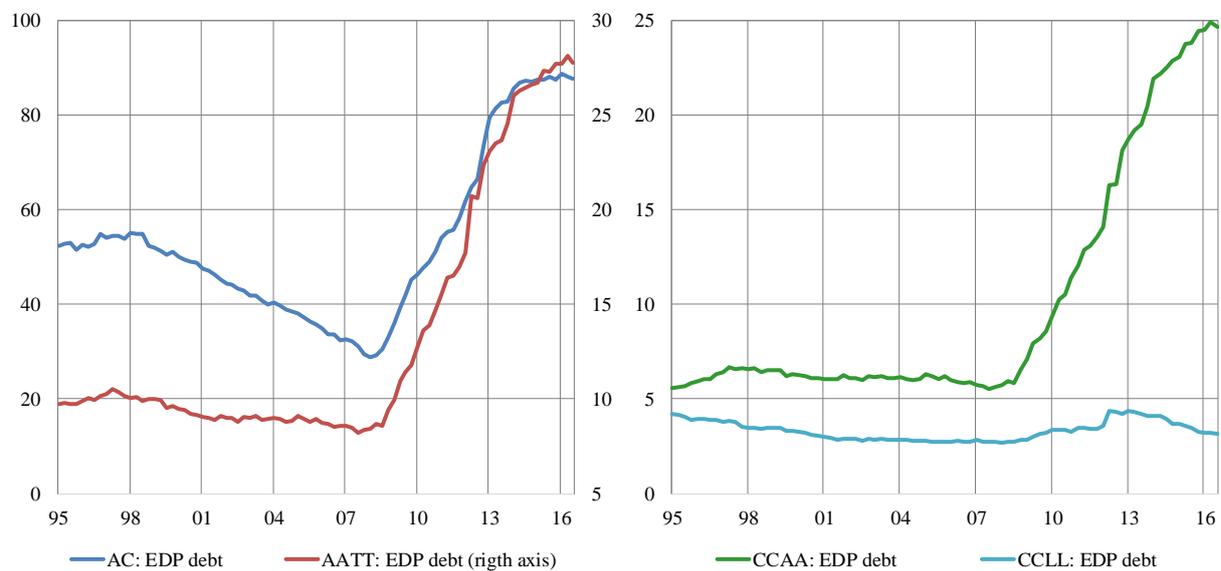
\*\*\*, \*\*, \*: significance at the 1%, 5% and 10% levels. Instrument set in all models includes the second and third lag of the explanatory variables. Hansen is the p-value of the test of the over-identifying restrictions (see Hansen, 1982), which is asymptotically distributed chi square under the null hypothesis that these moment conditions are valid. A p-value equal or higher than 0.05 indicates that the instrument set is valid, which is confirmed under all models m1 and m2 are the p-values of serial correlation tests of order 1 and 2, respectively.

**Table 4: The determinants of regional governments' debt changes (changes as a percent of GDP): public corporations owned by regional governments. 1995-2015 sample.**

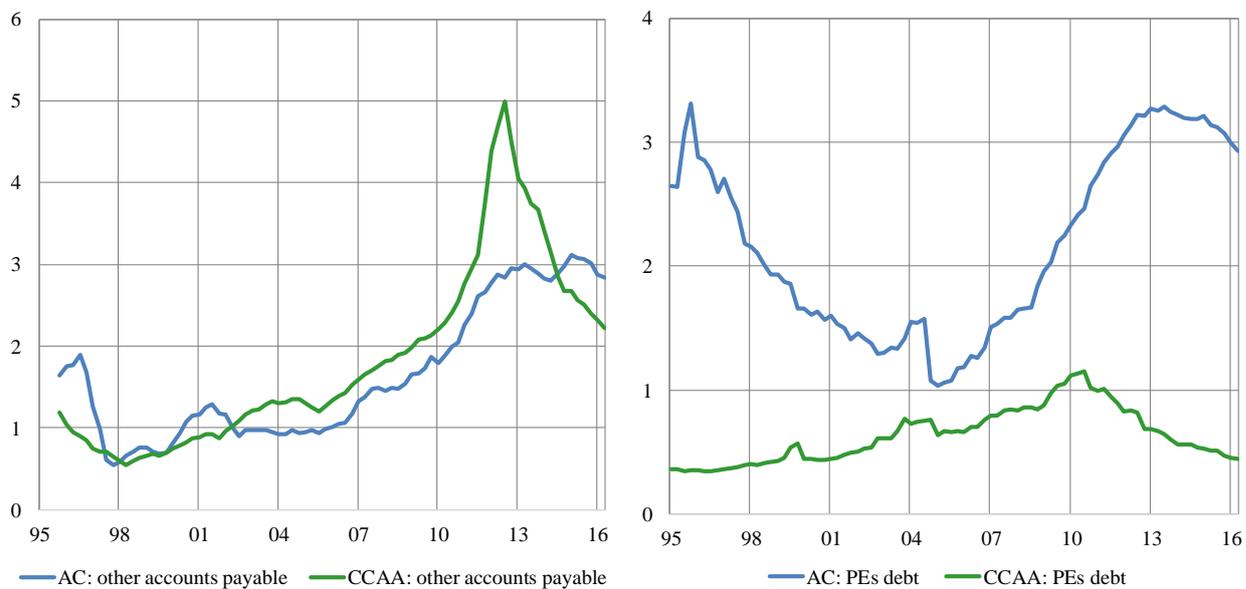
	Dependent variable: $\Delta$ EDP debt			Dependent variable: $\Delta$ EEPP debt		
	[1]	[2]	[3]	[4]	[5]	[6]
Lagged dependent variable	-0.65*** (0.06)	-0.49** (0.21)	-0.65*** (0.07)	-0.08 (0.80)	-0.38 (0.33)	-0.21 (0.79)
Economic cycle	-0.64*** (0.07)	-0.91*** (0.16)	-0.74*** (0.09)	-0.04 (0.08)	0.04 (0.05)	-0.06 (0.08)
Elections	-0.13 (0.22)	0.33 (0.34)	-0.04 (0.26)	0.10 (0.06)	0.04 (0.06)	0.08 (0.06)
EDP debt (t-1)	0.10*** (0.02)	- -	0.09*** (0.03)	-0.02*** (0.01)	-0.02** (0.01)	-0.02* (0.01)
EEPP debt (t-1)	0.58 (0.46)	-4.28** (1.81)	-0.56 (0.55)	-0.83 (0.69)	- -	-0.70 (0.69)
$\Delta$ EEPP debt	- -	-4.33** (1.96)	-0.61 (0.52)	- -	- -	- -
$\Delta$ EEPP debt (t-1)	- -	1.05 (0.67)	0.71 (0.53)	- -	- -	- -
$\Delta$ EDP debt	- -	- -	- -	- -	-0.00 (0.05)	-0.04* (0.02)
$\Delta$ EDP debt (t-1)	- -	- -	- -	- -	0.00 (0.04)	-0.03 (0.03)
Number of observations	323	306	306	306	306	306
Hansen	0.63	0.26	0.82	0.08	0.40	0.13
m1	0.00	0.00	0.00	0.68	0.48	0.48
m2	0.71	0.50	0.55	0.84	0.36	0.72

\*\*\*, \*\*, \*: significance at the 1%, 5% and 10% levels. Instrument set in all models includes the second and third lag of the explanatory variables. Hansen is the p-value of the test of the over-identifying restrictions (see Hansen, 1982), which is asymptotically distributed chi square under the null hypothesis that these moment conditions are valid. A p-value equal or higher than 0.05 indicates that the instrument set is valid, which is confirmed under all models m1 and m2 are the p-values of serial correlation tests of order 1 and 2, respectively.

Figure 1: The evolution of General Government EDP debt in Spain, by subsectors of the General Government. Variables expressed as a percent of GDP.



**Figure 2: Other liabilities not included in the extant definition of Government EDP debt, by subsectors of the General Government. Variables expressed as a percent of GDP.**



**Figure 3: The determinants of changes in General Government EDP debt (changes as a percent of GDP) in the period 1995-2015, by subsectors of the General Government: year-by-year changes.**

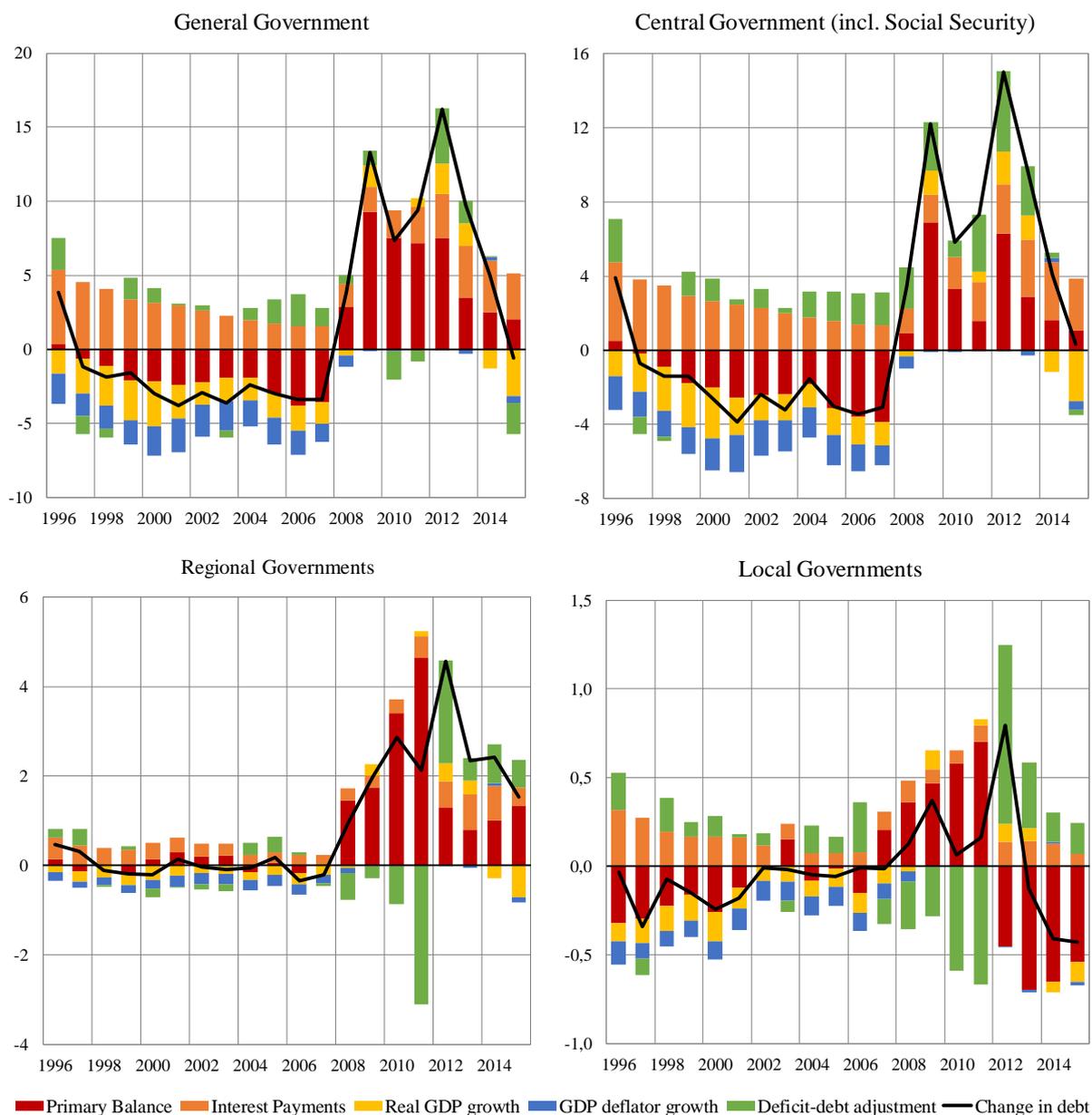


Figure 4: The determinants of changes in General Government EDP debt (as a percent of GDP) in the period 1995-2015, by subsectors of the General Government: cumulative changes.

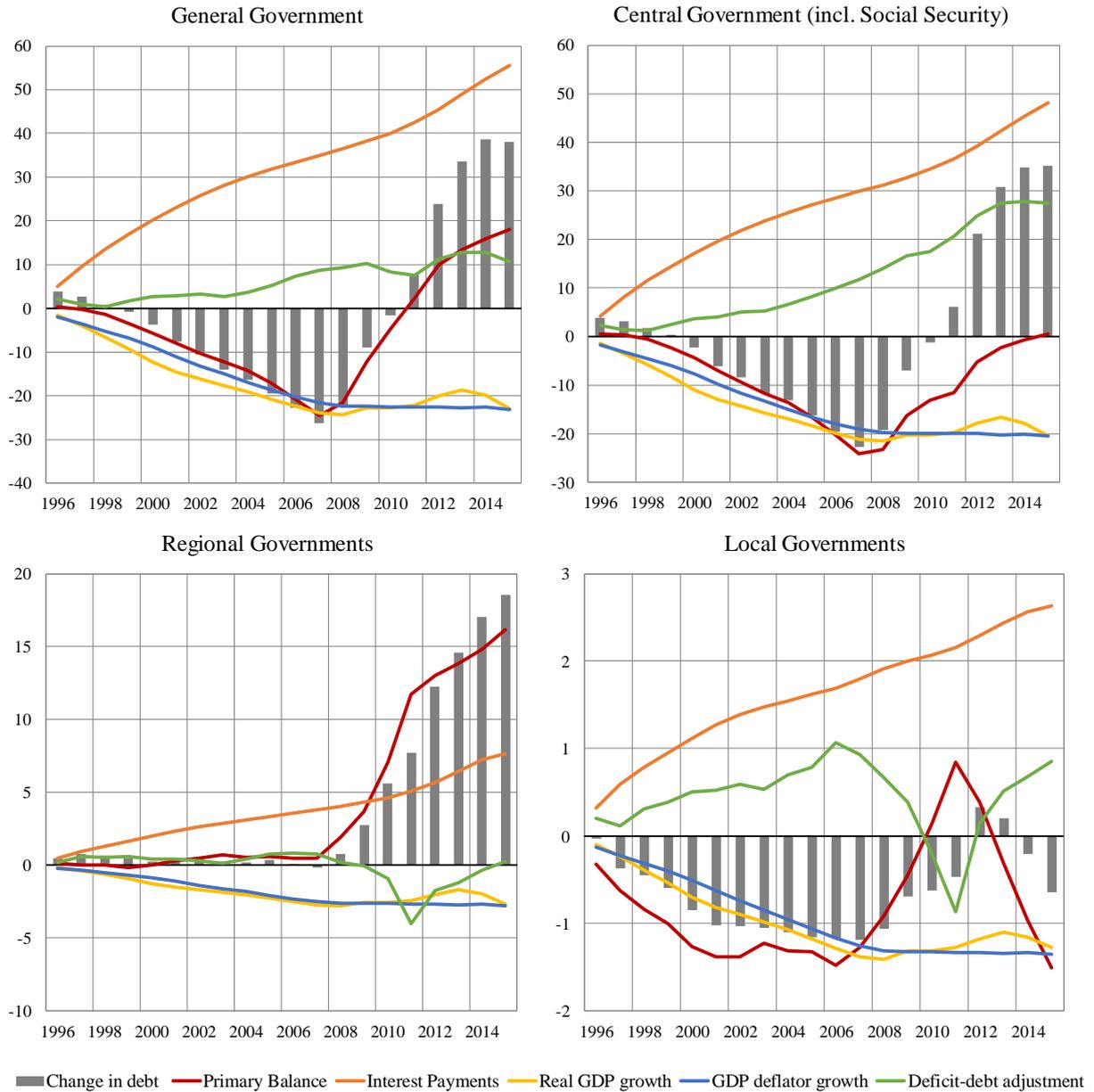


Figure 5: Subnational government revenues and expenditures. Percentage of general government revenues and expenditure, respectively, in 2015. Source: European Commission.

