Fiscal policy responses to changes in the cyclical position of the Autonomous Communities: an empirical analysis[1]

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Joan Maria Mussons Olivella

Generalitat de Catalunya & Universitat de Barcelona

Abstract

This paper analyses the responsiveness of Spanish ACs (Autonomous Communities) fiscal policy to changes in the cyclical position as well as to other determinants such as institutional and political economy features. ACs fiscal policy is countercyclical despite surpluses in expansions do not offset deficits in downturns. However, we cannot infer an asymmetric reaction of Spanish ACs fiscal policy to the cycle. Results also suggest that as education and health were devolved ACs primary budget balance (PBB) worsened, which may be indicative of underfunded responsibilities. We also identify a significant effect of relative fiscal resources of ACs financing system on PBB, which should be taken into account as there have been great disparities. In addition, there is a strong inertial component in ACs PBB, and legislative fiscal rules and fiscal corresponsibility present a positive effect on PBB until the latest global financial crisis. Lastly, it should also be noted that the fiscal stance of ACs worsens the year before elections.

Keywords: fiscal policy rules; fiscal federalism; effects of economic cycles; asymmetries.

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1. Introduction

The stability of public finances throughout the economic cycle (the stabilisation function of the public sector) is a central question in the study of public economics, and it has been stressed after the recent international financial crisis. From an institutional point of view, there is an increasing relevance of stability in the context of The Stability and Growth Pact, which determines a rule-based framework for the coordination of national fiscal policies. However, sub-national fiscal policies have received much less attention in the literature. To the best of our knowledge only Claeys et alt (2008), Rodden & Wibbels (2010) and Argimón & Hernández de Cos (2012) have dealt empirically with fiscal reaction functions at regional level. Therefore, this work contributes in expanding the evidence around the reaction to the cycle of sub-national fiscal policies.

The principal objective of this paper is to analyse the responsiveness of ACs (Autonomous Communities) fiscal policy to cyclical position[2], as well as to other determinants such as institutional and political economy features. In the present situation, the striking deterioration of Spain's fiscal position (as well as of the ACs) makes this area of research especially attractive. One of the main challenges is to test an asymmetric reaction of Spanish ACs fiscal policy to changes in the cyclical conditions. ACs fiscal policy may be countercyclical but surpluses in expansions may not offset deficits in downturns. As we shall see, the empirical evidence provides no clear support this hypothesis. Another contribution is the inclusion of a wide range of political economy and institutional variables. In this regard, we provide several institutional variables which have not been included in the literature when estimating fiscal reaction functions. For instance, we control for expenditure responsibilities, fiscal corresponsibility as well as relative fiscal resources.[3] Results suggest that as education and health were devolved ACs primary budget balance (PBB) worsened, which may be indicative of underfunded responsibilities. Another interesting finding is that fiscal corresponsibility presents a positive effect on the PBB until the latest global financial crisis. As for relative fiscal resources we also identify a significant effect on PBB, which should be taken into account as there have been great disparities in terms of relative resources between ACs.

The article is structured in six sections. After this introduction we discuss the institutional background in which the ACs develop their activity, and in particular fiscal decentralization issues as well as a brief summary of fiscal rules in Spain regarding debt and budget deficits. In

[2] According to Galí, economic cycles can be defined as those recurrent fluctuations in the economic activity that affect the overall economy, and which are reflected in changes of growth rates of aggregated and recurrent variables but this does not mean that their periodicity remains constant.

[3] Argimón and Hernández de Cos (2012) included a proxy to fiscal corresponsibility which differs substantially from ours. We consider only revenues subject to change, while their indicator captures the proportion of tax revenues with respect to non financial revenues.

section 3 we review some empirical studies that have focused on fiscal policy rules. Next, we discuss data issues and summarize the evolution of debt and budget balance for the ACs. In section 5 we present panel data estimates of the primary budget balance reaction function. As determinants of the primary budget balance we test the change in cyclical position, political economy variables related to the institutional background of the ACs, a debt stabilization measure as well as the inertia in budgetary policy. We restricted our analysis to period 1987-2010. Before 1987, the central government provided the funding of the transferred services according to the effective cost (the cost before decentralization) which included the direct and indirect costs, as well as investment outlays. Thus, we exclude of our analysis the previous period, as ACs had little incidence on the evolution of budget balances. Finally, section 6 concludes.

2. Institutional background

In the past 30 years Spain has moved from a highly centralized public sector to a distribution of revenues and expenditures similar to federal countries like Australia, Germany or Switzerland (see Molina and Mussons, 2010).[4] The 1978 Spanish Constitution organises the present territorial structure into municipalities and provinces at the local level, and 17 autonomous communities (ACs) at the intermediate level and recognizes their autonomy to manage their own interests. The decentralization process in Spain has been very fast regarding expenditures, in contrast with the revenue side. Figure A1 reflects the Spanish territorial decentralization from the expenditure side.[5] All the ACs have assumed responsibilities in fundamental areas of the welfare state such as education, health and social services. ACs represent one third of non financial public expenditures in Spain according to 2010 data (see Table A1). However, ACs non financial revenues are just below 20 % of the public sector (Table A2). Therefore, despite these institutional changes, vertical fiscal imbalance is still important at the intermediate level in Spain. It should be highlighted that dependence on central government transfers is generally associated with lower subnational fiscal performance (e.g. Rodden, 2002).

This decentralization process is one of the main issues to bear in mind in order to ensure an appropriate evaluation of ACs budgetary policy. There are some asymmetries that should be noted for the Spanish case. On the one hand, there are two regimes with important differences regarding authority to raise taxes and regarding per capita public resources: the foral regime and the common regime. The Foral regime, which refers to the Basque Country and Navarra ACs, is characterised by a high level of fiscal autonomy, low interregional solidarity and a higher

[4] Canada and United States could be also included in this group, but the intermediate level in these countries presents a higher relative weight concerning the distribution of non financial revenues.

[5] It should be taken into account that data represented in Figure A1 include financial expenditures, and therefore it differs from data presented in Table A1 which refers to non financial expenditures.

(per capita) public resources with respect to common system ACs. On the other hand, another fundamental asymmetry is related to the devolution process of spending responsibilities. There were a fast and a low path to assume the ACs responsibilities. The high responsibility regions (Andalusia, Canary Islands, Catalonia, Valencian Community and Galicia) were responsible, in general, for health and education since the 80s. Instead, the rest of ACs completed the decentralization process in 2002. Health and education account for the largest part of the budget, representing 65.7 percent in 2007 of the total spent by ACs (Molina and Mussons, 2010). Nevertheless, we should keep in mind that central government is also able to establish the basic legislation on these areas, and therefore it can condition ACs expenditure.

Furthermore, among the Common regime we must point out the main changes in the regional financing agreements of our period of reference, as it conditions the responsiveness of ACs fiscal policy to cyclical conditions. There have been five financing agreements since 1987, that cover these periods: 1987-1991, 1992-1996, 1997-2001, 2002-2008 and 2009- which is the current agreement in force. Along this period, ACs have been mainly financed through central government transfers. Initially the Common regime was characterized by having a fair amount of expenditure responsibility, but very little revenue autonomy. The regions in this regime were mainly financed by central government transfers until 2001. The 2001 agreement increased responsibility of the regions. It increased the number of ceded taxes as well as the tax power of the ACs in order to improve their fiscal responsibility. In fact, it pretended to be the definitive agreement but it could not cope with unexpected population increase which was uneven across regions. Finally, the current model, which has been applied since 2009, represents an improvement in terms of autonomy and financial sufficiency, at the same time as introducing explicit mechanisms of levelling and solidarity. Therefore, as fiscal autonomy has increased over the last 30 years we expect ACs to be more responsive to cyclical conditions.

Another important issue to ensure an appropriate evaluation of ACs budgetary policy is the legislative fiscal rules in force at any time. In fact, budgetary activity of the ACs is limited by a group of fiscal rules that condition their performance, in particular, LOFCA (the Organic Law on the financing of ACs), Budgetary Consolidation Scenarios (BCS) as well as recent budgetary stability legislation. LOFCA distinguishes between short term credit operations, to cover transitional financial needs, and long term operations, that have to fulfil the following requirements: a) the total amount of the credit has to be devoted to fund investment expenses b) amortizations and interests cannot exceed of 25% of current revenues. Besides, the permission of the central government is necessary for external operations.

The strong increase of regional debt in the early nineties and the signing of the Maastricht Treaty, which establish some requirements regarding the sustainability of the public finances, are the origin of the BCS between the State and each AC. These scenarios fixed deficit and debt ceiling for each AC by means of bilateral negotiations. This frame of bilateral negotiation

takes place since 1992 until the year 2001. Despite some weaknesses of design and repeated breaches by some ACs, it is necessary to recognize that the BCS introduced the culture of budgetary stability and achieved to brake the increasing trend of regional debt.

In 2001 it came into force a stability law with stringent legal requirements (i.e. annual equilibrium) as, in practical terms, it excluded debt as a source to fund investment expenses. Next, a reform of the Budgetary Stability Act was passed in 2006, which made more flexible the budgetary stability principle. This reform enabled central and regional government to adapt its fiscal stance to cyclical conditions. It enabled ACs to run a deficit of 0.75% of GDP if economic growth situates underneath a determinate threshold. Besides, under special circumstances, it was possible a 0.25% additional deficit to fund increases on productive investments. In addition, since 2002 it has been more common public-private partnerships to fund infrastructure funding. In fact, there are some authors, like Fernandez Llera (2011), who suggest that ACs have been using public sector enterprises and these public-private partnerships as a mechanism to elude legal restrictions on public deficit.

3. Fiscal policy rules: an empirical review

Our empirical analysis of the behaviour of fiscal policy over the cycle is based on the estimation of fiscal reaction functions where measures of the fiscal stance are regressed against a series of possible factors explaining the behaviour of fiscal authorities, notably the past level of deficit, debt and a measure of cyclical conditions. This is the main framework although the literature differs in the specification of these functions (see next box). Among other issues we highlight some elements that may guide our research.

- Type of rule. Do we base our policy rule on the expectation of the output gap (forward-looking rule) or on the past values of the output gap (backward-looking rule)? The potential autocorrelation of budget decisions should also be considered, that is, by including the lagged dependent variable as a regressor (for instance, by specifying a partial-adjustment model). Non-linear issues related to debt and related to switching models are also interesting extensions to the baseline model.

- Dependent variables. The choice of the dependent variable is not neutral. In fact there are various elements that might be addressed. Firstly, we should choose the specification in levels or in first differences. Secondly, it is also of great relevance to adjust (or not to adjust) the fiscal variables. If we cyclically adjust our data we are dealing with discretionary measures, whereas if we don't adjust we are analysing the whole effect on fiscal policy (automatic as well as discretionary measures). In addition, it seems of particular interest to extend the analysis for revenues and expenditures, as they might show a different behaviour.

- Independent variables. The baseline model includes variables that capture the debt stabilisation motive (a test of the government solvency) as well as the output gap stabilization motive (a test of the government response to the cyclical conditions). "*The choice of the output gap in levels focuses on whether the position of the economy is above or below its trend and on its distance from it, while the reference to growth measures focuses on whether the economy is in an upturn or in a downturn and its intensity*" (Golinelli and Momigliano, 2008, p.4).

Moreover, the role of monetary policy variables (e.g. a potential interaction with fiscal policy variables, see Claeys, 2005) as well as political economy issues may be considered. Argimon and Hernández de Cos (2012) build variables that capture "*the number of members of parliament that can be associated with left-wing parties and pro-autonomy parties over the total number of regional members of parliament*". The authors also consider "*the level of political influence of the central parliament over the regional budget balance by constructing a dummy variable that takes value 1 if the party with more representation in the regional parliament is the same as the one with more representatives in the national parliament*". Solé-Ollé & Sorribas-Navarro (2008) and Sorribas-Navarro (2011) also evaluated the fiscal behaviour of politically-aligned regions but as determinants of central government bailouts (where the dependent variable was discretionary or *a priori* non-discretionary grants).

Concerning the so-called electoral-cycle models, Argimon and Hernández de Cos (2012) remark that these models "*combine two basic features: a certain short-sightedness among electors, who are not capable of clearly perceiving the government's intertemporal budget constraint (i.e., that the current deficit will necessarily have to be financed by future surpluses or that voters do not take future generations into consideration), and the motives of rulers that depart from the benevolence assumed in the initial theoretical models, so that the main objective of government action is reelection. One of the essential prescriptions of these models is growth of the budget deficit in the run-up to elections*".

Specification issues. Fiscal Policy Rules

	Bohn (1998)	Taylor (2001)	Ballabriga & Martinez-Mongay (2002)	Galí & Perotti (2003)	Claeys (2005)	Claeys (2008)	Turrini (2008)	Golinelli & Momigliano (2009)	Argimón & Hernández de Cos (2012)
Type of rule									
Fiscal / Monetary Policy Rules	FPR	FPR	MPR / FPR	FPR	FPR	FPR	FPR	FPR	FPR
backward looking (BL) / forward looking (FL)	BL		FL	FL	FL	FL		BL	BL
Dynamic specification: no adjustment (NA) / partial	NA	NA	PA	PA	PA	PA	PA	3 specifications (CAPB; CAPB/PB	PA
non-linear specification			deficit and debt targets			Markov switching model (debt and surplus, 2 regimes)			
Period	1916-1995	1960.1 - 1999.3	1979-1998	1980-2002		1970.1-2006.4	1980-2005	1988-2006	1984-2004
Territorial scope	US	US	EMU + Denmark, Sweden and UK	EMU, EU3 + OECD5	forme EMS countries + Japan and USA	Sweden + small open economies (Finland, Norway, Denmark and Netherlands)	EU11	11 EMU countries	Spanish AC
Descriptive analysis	primary surplus (and adjusted surplus) vs. initial debt	actual versus target rates	actual versus target primary surplus	deficit / gdp [mean] debt / gdp [mean] cumulative change in structural deficit / change in og [over the recession periods]	debt / GDP; primary surplus vs output gap and interest rates vs inflation	debt / GDP; surplus / GDP and output gap; spending and revenue ratio to GDP	change in CAPB / CA revenues / CA expenditures vs OG; in good / bad times; change in CAPB 1980-1991, 1992-1998, 1999-2005	size of subsamples across data sources, in good and bad times (extensions to the core model)	
Dependent variable	primary budget surplus / GDP	(structural / cyclical / total surplus) / GDP	primary surplus / GDP	normalized by potential output	primary surplus / potential GDP	primary surplus / GDP; surplus / GDP ; primary surplus / potential GDP	change in the CAPB	change in the CAPB / PB	budget balance in cash terms
- level / 1st differences (L / 1dif)	L	L	L	L	L	L	1dif	1dif	L / 1dif
- cyclically adjusted (CA) / non cyclicacly adjusted (NCA)	NCA	CA / NCA	CA / NCA	CA	NCA / CA	NCA	CA	CA / NA	NCA
- separate analysis for revenues and expenditure				YES	YES	YES + fiscal rules for spending items	YES		
Independent variables									
- debt stabilization motive (government solvency)	YES		YES	YES	YES	YES	YES	YES	YES
	debt / GDP		debt / GDP	debt / potential GDP	debt and squared debt ratio	rule with debt policy shift		debt	EDP debt / GDP
- output gap stabilization motive	YES	YES	YES	YES	YES	YES	YES	YES	YES
	ratio of actual to potential GDP	(real - potential GDP) / potential GDP	og as % of potential output	(real - potential GDP) / potential GDP	og OECD	og OECD	og(-1)	og and og(-1)	real gdp growth
- interaction with monetary policy			YES; correlation between residuals of estimated policy rules	YES; introduction of the deviation from a Taylor rule interest rate	YES; interest rates and response to inflation deviations from target		YES	YES; real interest rates	
- political economy variables							weak / strong expenditure rules parliamentary elections	YES; regular and snap elections	YES; political variables, indicator of fiscal corresponsibility, partisan alignement
- others	temporary government spending (see Barro, 1986)			dummie before and after Maastricht			US output gap (rather than including time dummies) og dummies dummies after 1992 / 1999	comparision between diferent data sources	dummies for fiscal rules, financing autonomous agreement

Specification issues. Fiscal Policy Rules

	Bohn (1998)	Taylor (2001)	Ballabriga & Martinez-Mongay (2002)	Galí & Perotti (2003)	Claeys (2005)	Claeys (2008)	Turrini (2008)	Golinelli & Momigliano (2009)	Argimón & Hernández de Cos (2012)
Robustness analysis									
- alternatives measures of OG					measures of real marginal costs (Galí et			real time data	
- stability analysis	YES	YES			Andrews Quandt breakdates in target fiscal policy rule	recursive Andrews Quandt LR test statistics for stability of fiscal rule	good / bad times	good / bad times; estimates in rolling samples;	
Method of estimation	OLS	OLS	GMM instruments: one lag, short run interest rates in fp rule equation, effective real exchange rate and a commodity price indicator	IV instrument og: one lag and the lagged value of the US output gap (the lagged EU15 og for the US)	GMM	GMM; instrument: lags of the og and debt, unit labour costs, growth in labour productivity and the NAIRU, broad money aggregate and international monetary conditions	OLS / GMM / IV / probit regression instrument: own lag and the lag of a measure of foreign og on the basis of export shares towards the biggest three export markets	GMM-sys; instruments: t-2 and t-3 lags of the debt, og and primary balance	GMM using as instruments regressors lagged two periods.
Panel approach				YES; country fixed effects			YES; country fixed effects	YES; country fixed effects; time effects	YES
Others	nonlinearities in the surplus-debt relationship		CABD equation is not considered a policy instrument of fiscal authorities		rolling 5-year window of the volatility of the fiscal policy shock	debt stabilising surplus	fp pro-cyclicality at the margin / on average / pro-cyclical bias of fp / risk of pro-cyclicality	2-sample approach and 2-parameter approach when testing for fiscal asymmetries	
Results	US fiscal policy is satisfying an intertemporal budget constraint	countercyclical fiscal policy should focus on the automatic stabilizers rather than discretionary actions; discretionary fiscal policy should focus on long run issues such as tax reform and social security reform	monetary dominance regime in pre-EMU and EMU economic policy although non-systematic fp appears as a more active policy tool than non-systematic mp; Spain weaker response to the og	after EMU less procyclicality although EMU countries had experienced (till 2003) few real recessions during the post-Maastricht period	there is substancial interaction between fiscal and monetary policy via the debt channel. Sustainability is achieved with a stop-go cycle of consolidation. Consolidation does not come at the cost of less cyclical stabilisation unless debt ratios are high	spending increases have greatly contributed to the explosion of debt; distintion between periods of debt explosion and consolidation	expansionary bias of expenditure in good times; expost og were much more closely correlated with capacity utilisation rates than with real-time og	Ex post data suggest either a-cyclicality or weak counter-cyclicality. Real-time information gives clearer indications of counter-cyclical behaviour. As for asymmetry, it depends on the sources of data and periods. Whenever is present it entails shifts in all the parameters of the fiscal rule	A higher level of fiscal autonomy leads to a more disciplined behaviour by ACs. Increasing dependency of fiscal performance on the economic cycle. Strong inertial component in the implementation of AC fiscal policy.

- Robustness analysis. It is a central issue in these studies to assess the robustness of the main results. Accordingly, it is interesting to account for alternative measures of the output gap (for instance, real time data in case it is available), a stability analysis as well as comparing results using different data sources (see Golinelli and Momigliano, 2009).

- Method of estimation. If we consider that fiscal policy could have real effects (that is, it is endogenous) we should use instrumental variables or GMM methods. However, if we consider that fiscal policy is exogenous we could use OLS. Besides, it seems interesting to assess differences between single equation and panel data results. In the present case, we estimate our fiscal reaction functions using instrumental variables (and also using OLS to check the main differences). As an instrument, we take the output gap of the biggest five Spanish export market weighted by its exports shares, in line with Galí and Perotti (2003) empirical strategy.

4. Data

Before the econometric analysis we provide some remarks concerning our dependent variable in the econometric analysis (i.e. primary budget balance) and related to the co-movement between cyclical conditions and primary budget balance. Appendix A2 provides some descriptive statistics of the variables used in the following section and Appendix A3 deals with the definition of the variables and the data sources.

To start with, primary budget balance of each AC is computed according to budgetary criteria both regarding to the institutional scope covered as well as to the accounting rules. On the one hand, this data relates to all the public units included in the consolidated budget of each AC. On the other hand, the use of budgetary accounting criteria differs with National Accounts methodology. A scatter plot (see Figure A3) immediately reveals a high correlation and it also highlights more deficitary values of national accounts data in relation to budgetary data. Notwithstanding these limitations, budgetary data allows us to analyse 1987-2010 period whereas national account data adapted to ACs is available only since 2003 (to the best of our knowledge). These issues will be discussed in turn.

Then, our focus turns to the co-movement between cyclical conditions and primary budget balance, i.e., our dependent variable. In this article, cyclical conditions are captured by changes in regional unemployment gap (ug) or by changes in regional output gap (og). On the one hand, unemployment gap is obtained as the deviation of observed unemployment rate from the mean of this rate for the period 1977-2011. On the other hand, output gap refers to the deviation of real GDP from the trend, which is estimated using a Hodrick-Prescott (HP) filter with lambda

100. Homogeneous series of gross valued added at constant prices, constructed by de la Fuente (2010), are used in order to overcome statistical problems related to statistical methodological changes of national accounts bases. In addition, we use official forecasts for the Spanish economy until 2016 (from European Commission and International Monetary Fund), in order to minimize the end-point bias related to HP filter. Figure A2 provides compelling evidence of a failure of HP filter to capture the intensity of the most recent crisis. Instead, unemployment gap properly captures the key features of Spanish economic cycle.

The model fit to data is much better in first differences than in levels. This result is probably related to the great dependence of ACs financial resources to the evolution of real-state sector, which may be more responsive to growth measures. As mentioned above, the choice of the cyclical position in levels focuses on whether the position of the economy is above or below its trend and on its distance from it, while the reference to growth measures focuses on whether the economy is in an upturn or in a downturn and its intensity.

According to changes in the unemployment gap we can identify different subperiods; two upturn periods (1987-1990 and 1995-2007) and two downturn periods (1991-1994 and 2008-2010). For each AC and subperiod, we compute the mean of the changes in the unemployment gap and the mean of the primary budget balance as a share of GDP. These statistics are shown in Table A7, which also reports the ratio between both variables. The latter ratio can be interpreted as a simple statistic that captures the sign and intensity of the discretionary fiscal response. Thus, a negative (positive) sign for the ratio indicates countercyclical (procyclical) fiscal stance, whereas the size of the ratio captures the strength of that response.[6] According to this ratio ACs fiscal policy has been, in general terms, increasingly countercyclical. Nevertheless, we should make some cautionary remarks. Despite ACs fiscal policy has been countercyclical, the size of ACs budget surpluses during the last cyclical upturn was not enough to avoid pro-cyclicality stance at present, i.e., 2012. In order to check this result, we obtained the correlation coefficient between primary budget balance and changes in the unemployment gap (-0.43). This estimate confirms countercyclicallity, as PBB is positive (negative) in upturns (downturns). The following section examines the determinants of AC primary budget balances, with special attention given to the sensitivity of primary budget balance to changes in cyclical conditions.

5. Evidence from the estimation of fiscal reaction functions for ACs

In this section we deal with the econometric estimation of fiscal reaction functions for ACs, that is, we attempt to control the main factors that affect their fiscal stance. In other words, we isolate the impact of factors that have an influence on the stance of ACs fiscal policy. Our baseline specification (A1) takes the primary balance to GDP ratio (**pbb**) of each AC as the policy

[6] This approach is similar to Galí and Perotti (2003).

instrument and set its target for that instrument as a function of changes in the unemployment gap (***d (ug)***), the lagged dependent variable, an index of expenditure responsibilities (**ires**) and an electoral cycle variable (**ecycle**). We do not include debt (**debt**) in our baseline specification as data is only available from 1992.

In some specifications (A2) we allow for asymmetric reactions to the cycle, by including two variables which capture the change in the unemployment gap in upturns (***d(ug) negative***) and downturns (**d(ug) positive**). Other extensions (A3) of this fiscal rule are also considered, by including institutional and political economy variables. Concerning political economy variables, we should distinguish between variables related to the incumbents and the incidence of the institutional framework.

(A1) $$PBB_{it} = \phi_{const} + \phi_{og}\Delta UG_{it} + \phi_{pbb}PBB_{it-1} + \phi_{ires}IRES_{it} + \phi_{ecycle}ECYCLE_{it-1} + u_{it}$$

(A2) $$PBB_{it} = \phi_{const} + \phi_{ogpos}\Delta UG\_pos_{it} + \phi_{ogneg}\Delta UG\_neg_{it} + \phi_{pbb}PBB_{it-1} + \phi_{ires}IRES_{it} + \\ + \phi_{ecycle}ECYCLE_{it-1} + u_{it}$$

(A3) $$PBB_{it} = \phi_{const} + \phi_{inst}INST_{A} + \phi_{og}\Delta UG_{it} + \phi_{og\_inst}\Delta UG_{it} * INST_{B} + \phi_{ires}IRES_{it} + \\ + \phi_{ecycle}ECYCLE_{it-1} + \phi_{pbb}PBB_{it-1} + u_{it}$$

Ideology of the incumbents is a significant factor that lies behind primary budget balance determinants. We address this factor by two means: first, in terms of the number of seats corresponding to the concerned ideology (**% of left-wing seats and % of nationalist seats**), and second, we capture the ideology of the incumbent president with a dummy (**left-wing president and nationalist president**).[7] In addition, we include a political alignment variable (**aligned**) indicating if the incumbent party (or the party leading the incumbent coalition) in the regional government is the same as the incumbent party in the central government (or the party leading the incumbent coalition).

The incidence of the institutional framework is complex, especially in Spain with its decentralized government. Therefore we have included a wide range of variables to capture variation in AC responsibilities (**index of expenditure responsibilities**, which tracks the increase in regional expenditures needs due to the assignment of the provision of health and/or

[7] The effect of a single dummy independent variable is equivalent to an intercept shift. So the three independent political party variables measure the difference in terms of primary budget balance between the variable concerned and the benchmark group (PP). The base or benchmark group is governments where its president belong to right-wing parties which are not nationalists, i.e., to Partido Popular.

education)[8], fiscal corresponsibility (**fiscal corresponsibility 1997-2001 and fiscal corresponsibility 2002-2010**, which captures the % of AC fiscal resources subject to change)[9], relative resources from the autonomous financing system (**index of relative fiscal resources**), legislative fiscal rules (**Budget Consolidation Scenarios**, a dummy variable which takes the value 1 in the period 1992-2001; **Budget Stability Act 2001**, a dummy variable which takes the value 1 in the period 2002-2006; and **Budget Stability Act 2006**, a dummy variable which takes the value 1 in the period 2007-2010), foral ACs (**foral AC** takes a value of 1 for the Chartered Community of Navarra and the Basque Country) and uniprovincial ACs (**uniprovincial AC** takes a value of 1 for the Community of Madrid, the Chartered Community of Navarra, Balearic Islands, La Rioja, Cantabria, the Principality of Asturias and the Region of Murcia).[10] Ultimately, these institutional features could condition the ACs fiscal reaction to the cycle. Before presenting our empirical specifications we remind that Appendix A3 provides a detailed definition of the mentioned variables and their corresponding data sources.

The estimation method used is seemingly unrelated regressions (Zellner, 1962), which considers the possibility that the error terms may be correlated across the equations of the system.[11] This system consists of all the ACs. For instance, we might expect that a central government measure which affects the primary budget balance in one AC would simultaneously affect the primary budget balance in other ACs as well. According to Davidson and Mackinnon (2004, p. 502), to allow for this possibility, the assumption that is usually made about the error terms in the model is:

$E(u_{it}, u_{jt}) = \sigma_{ij}$ for all t, $E(u_{it}, u_{js}) = 0$ for all $t \neq s$

In addition, it is necessary to bear in mind that fiscal policy could have real effects, and accordingly unemployment gap may be endogenous. In other words, fiscal policy does not only react to the cycle but it can also influence it. Therefore, we also estimate our fiscal reaction functions using instrumental variables. In line with Galí and Perotti (2003) we need to instrument the unemployment gap of each AC with that of another country (or group of countries) with which it is likely to be correlated for reasons other than the existence of coordinated fiscal policies. So, we take as an instrument the output gap of the biggest five Spanish export markets

[8] The index of expenditure responsibilities is defined following Sorribas (2011). See Appendix A3.
[9] The fiscal corresponsibility indicator is splitted into two variables which take the value of the mentioned indicator for the corresponding period (1997-2001 and 2002-2010), and 0 otherwise. This separation is necessary as changes in expenditure responsibilities make this indicator not homogenous across the sample.
[10] In these uniprovincial ACs, the regional government also assumes the functions of provincial local governments.
[11] Cross-section fixed effects are also included.

weighted by its exports shares. This variable is much less volatile than Spanish unemployment gap as we can see in the Figure A2.

We also take into account the strong inertia related to policy processes. As Ballabriga and Martínez-Mongay (2002, p.9) states "*inertia is to a large extent explained by the political difficulty of changing past spending commitments and carrying out regular and recurrent drastic adjustments in tax codes*". Hence, we include the lagged dependent variable as a regressor.

Dependent variable: Primary budget balance / GDP

	all ACs								common regime ACs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant term	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**-0.02**	**-0.02**	**-0.02**	**-0.01**
	(0.91)	(-0.32)	(4.8)***	(-0.69)	(2.91)***	(3.4)***	(-6.18)***	(-6.25)***	(-6.45)***	(-4.93)***
d (ug)	**-0.12**	**-0.17**			**-0.17**	**-0.15**	**-0.18**	**-0.14**	**-0.11**	**-0.14**
	(-15.56)***	(-12.72)***			(-9.52)***	(-13.46)***	(-8.51)***	(-6.88)***	(-5.04)***	(-5.82)***
d (ug) positive			**-0.16**	**-0.15**						
			(-14.00)***	(-3.73)***						
d (ug) negative			**-0.04**	**-0.22**						
			(-3.78)***	(-2.57)**						
d(ug) * foral AC					**-0.92**					
					(-8.33)***					
d(ug) * uniprovincial AC					**0.15**					
					(9.7)***					
d(ug) * left-wing president					**-0.03**					
					(-2.03)**					
Primary Budget Balance / GDP (-1)	**0.51**	**0.50**	**0.50**	**0.50**	**0.39**	**0.54**	**0.51**	**0.43**	**0.54**	**0.37**
	(16.6)***	(17.08)***	(16.46)***	(15.31)***	(11.92)***	(29.1)***	(16.66)***	(13.22)***	(14.54)***	(9.25)***
Index of expenditure responsibilities (x 1000)	**-1.39**	**-1.03**	**-1.61**	**-0.84**	**-1.63**	**-2.13**	**-0.68**	**-3.00**	**-1.13**	**-1.50**
	(-7.26)***	(-5.85)***	**(-8.67)*** **	(-2.58)**	(-6.28)***	(-15.36)***	(-2.47)**	(-7.03)***	(-2.69)***	(-4.26)***
Electoral Cycle (-1) (dummy) (x1000)	**-0.62**	**-0.55**	**-0.72**	**-0.39**	**-0.94**	**-1.15**	**-0.60**	**-0.53**	**-0.84**	**-0.98**
	(-2.98)***	(-2.68)***	(-3.55)***	(-1.43)	(-3.67)***	(-6.65)***	(-2.49)**	(-1.92)*	(-3.18)***	(-3.22)***
Aligned (dummy) (x1000)							**-0.19**	**-0.51**		
							(-0.75)	(-1.74)*		
Debt (-1)						**-0.01**				
						(-0.75)				
% of left-wing seats (x1000)							**1.45**	**2.18**	**2.99**	**-2.35**
							(0.49)	(0.64)	(0.92)	(-0.64)
% of nationalist seats (x1000)							**18.53**	**14.00**	**22.18**	**26.40**
							(4.69)***	(3.54)***	(4.7)***	(5.67)***
Nationalist president (dummy) (x1000)					**-1.69**					
					(-4.52)***					
Left-wing president (dummy) (x1000)					**-1.05**					
					(-2.22)**					
Fiscal corresponsibility 1987-2001 (x1000)									**-1.21**	**-0.62**
									(-1.81)*	(-0.97)
Fiscal corresponsibility 2002- (x1000)									**-0.19**	**7.04**
									(-0.12)	(5.47)***
Index of relative fiscal resources (x1000)							**0.12**	**0.13**	**0.13**	**0.12**
							(4.92)***	(5.54)***	(5.36)***	(4.56)***
Budget Consolidation Scenarios (dummy) (X1000)								**3.00**		
								(3.7)***		
Budget Stability Act 2001 (dummy) (X1000)								**7.90**		
								(6.67)***		
Budget Stability Act 2006 (dummy) (X1000)								**-0.35**		
								(-0.25)		
Number of observations	408	408	408	408	408	306	408	408	360	330
Sample	1987-2010	1987-2010	1987-2010	1987-2010	1987-2010	1993-2010	1987-2010	1987-2010	1987-2010	1987-2008
Adjusted R2	0.74	0.77	0.72	0.71	0.66	0.94	0.75	0.80	0.68	0.60
Estimation method	OLS	IV	OLS	IV	IV	IV	IV	IV	IV	IV
Redundant fixed effects test	2.68		3.86							
Cross-section F (p-value)	(0.00)		(0.00)							
Hausman exogeneity test		10.39		127.35						
Chi2 (5) (p-value)		(0.06)		(0.00)						
Shea partial R2										
d (ug)		0.34								
d (ug) positive				0.08						
d (ug) negative				0.01						

Notes: all regressions are estimated by Panel EGLS (Cross-section SUR weights). Cross-section fixed effects are included.
*** signification at 99% & ** 95% & * 90%. t-statistics are reported between parentheses.
Shea R-square above 0.10 is generally regarded as support of predictive power.
Output gap of the biggest 5 Spanish export markets - weighted by their export shares- is used as an instrument of ACs unemployment gap.

The main results are discussed below. First, ACs fiscal policy has been countercyclical as we have measured the cyclical conditions, that is, in first differences. This result is similar to Argimon and Hernández de Cos (2012), but contrasts with Rodden and Wibbels (2010) who analyse sub-national fiscal policies for seven federations. Endogeneity of cyclical conditions has been checked with Hausman test and, as we reject the null hypothesis, we instrument the unemployment gap of each AC. Regarding instrument weakness we provide the partial Shea-Godfrey R-squared. We computed the latter statistic according to Godfrey procedure (1999), and results do not indicate weakness of our instrumental variables.

Overall, ACs fiscal policy is countercyclical as primary budget balance reaction to changes in the unemployment gap is negative. When asymmetries are allowed we cannot infer an asymmetric reaction of Spanish ACs fiscal policy to the cycle (see specifications 3 and 4).[12]

In connection with cyclical sensitivity we have also tested if the reaction to the cycle differs depending on AC political and institutional status (see specification 8). Therefore, we have interacted dummy variables with changes in the unemployment gap to allow for differences in slopes. The results suggest that foral ACs and left-wing governments are more responsible to changes in cyclical conditions; in fact, their fiscal behavior is more countercyclical. Conversely, uniprovincial AC exhibit a more procyclical pattern.

Concerning political economy variables, as we have previously stated, we should distinguish between the effect of variables related to the incumbents and the incidence of the institutional framework. Ideology of the incumbents is a significant factor that lies behind primary budget balance determinants. Nationalist parties present a more prudent fiscal policy than right-wing non nationalist parties (PP) according to the % of seats, but when considering president ideology the opposite result was found. Left-wing governments present an ambiguous pattern as their response also differs depending on the definition used. President ideology indicates a negative correlation with respect to right-wing non nationalist parties, whereas proportion of left-wing seats in the parliament does not present a significant effect. Another interesting finding is the growth of the budget deficit just before elections, in line with electoral-cycle hypothesis. However, it must be remarked that this variable is only significant when using one lag. This means that the fiscal stance of ACs worsens the year before the elections. Lastly, we do not find robust evidence regarding the effect of political alignment on ACs primary budget balance.

The incidence of the institutional framework is complex, especially in Spain with its decentralized government. Therefore we have included a wide range of variables to capture

[12] We have estimated again our specifications with ACs output gap as the cyclical conditions variable. (see Table A8). Results are very similar, although we found an asymmetric reaction to the cycle. Nevertheless, the failure of HP filter to capture the intensity of the most recent crisis (see Figure A2) does not enable us to infer valid conclusions from Table A8.

variation in AC responsibilities, fiscal corresponsibility, relative resources from the autonomous financing system and fiscal rules.[13] First, as AC had more responsibilities (that is, when education and health responsibilities were devolved) their accounts presented a worse fiscal stance. This result is captured by the negative expenditure responsibility index coefficient.

Second, fiscal corresponsibility, measured as the proportion of ACs Funding System resources which can be changed, presents different results according to the period under consideration. These estimates refer only to the subset of ACs belonging to the common regime, as our fiscal corresponsibility indicator does not capture properly the higher fiscal corresponsibility of "foral territories". Turning to results, we observe a mild negative reaction of this indicator with respect to ACs primary budget balance for the period 1997-2001.[14] This result may be related to a lower fiscal corresponsibility of common regime ACs until 2001. The 2001 and 2009 ACs fiscal agreements increased their corresponsibility. It increased the number of ceded taxes as well as the tax power of the ACs in order to improve their fiscal responsibility. In fact, we obtain a positive association for the period 2002-2008, although we get a non-significant effect when we include the last two observations (2009 and 2010). In this regard, we should be cautious with this result as last observations are extremely influential on the estimated coefficient for fiscal corresponsibility index, which increases in 2009 as a result of the last AC financial arrangement. Third, we have also introduced in the fiscal reaction function the relative resources of the autonomous financing system. This variable is significant, indicating that more financial resources lead to a better fiscal stance. However, foral regime variable loses its significance when introducing this variable. We should bear in mind that there has been a great disparity in the relative resources among AC. A first disparity is between the foral and the common systems. In this regard, Zubiri (2011, p. 112) states that "*the Basque Country and Navarre obtain about 50% more per capita resources than the average Common Regime*". In second place, among the common system there are also significant differences in per capita financing. Furthermore, concerning institutional framework, we must turn to fiscal rules, which have improved significantly the primary budget balances until 2006, as we can appreciate in specification (9). Therefore, in terms of budgetary stability we can provide a positive assessment of the Budgetary Consolidation Scenarios (1992-2001) as well as of the Budgetary Stability Law approved in 2001, in contrast with the reform passed in 2006 which does not take a significant value.

The results also show that there is a great inertia in the budgetary process, as the lagged dependent variable is very significant, with an estimated coefficient around 0.51. This inertia has recently increased as a result of the last international financial crisis. In this regard, estimations

[13] At this point we must acknowledge the collaboration of the General Directorate of Economic Affairs (Generalitat de Catalunya), and in particular of M. Bassols.
[14] However, this variable (fiscal corresponsibility 1987-2001) loses its significance when we restrict our estimation sample to 1987-2008.

of the baseline specification until 2004 lead to an estimated coefficient of 0.42, in line with Argimón and Hernández de Cos (2012) estimates.

Finally, with regard to responses to debt accumulation we do not obtain the expected sign. A positive reaction of primary surpluses to debt accumulation would guarantee fiscal solvency. However, budgetary data does not reveal a significant reaction to high levels of indebtedness. In addition, as we have mentioned below (in section 4), ACs primary budget balance (PBB) according to national accounting criteria is generally more negative. Then, when we estimate our fiscal reaction function (see next box) with national accounts data, which only cover 2003-2010, an unsustainable pattern is displayed: a negative reaction of PBB to debt accumulation. Besides, this systematic pattern may have strengthened in recent times, as more indebted ACs have run larger budget deficits. Thus, this upward trend in government indebtedness is one of the challenges that deserve further attention in the near future.

Dependent variable: Primary budget balance / GDP
all ACs

	national accounts data				budgetary data			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant term	**-0,01**	**-0,01**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
	(-6.94)***	(-6.77)***	(0.7)	(0.66)	(-0.76)	(-0.74)	(0.46)	(0.47)
d (ug)	**-0,19**	**-0,17**	**-0,20**	**-0,19142**	**-0,15**	**-0,15**	**-0,15**	**-0,15282**
	(-6.2)***	(-4.11)***	(-7.04)***	(-5.12)***	(-6.56)***	(-4.91)***	(-6.58)***	(-5.01)***
Primary Budget Balance / GDP (-1)	**0,70**	**0,72**	**0,65**	**0,66**	**0,85**	**0,85**	**0,83**	**0,83**
	(8.3)***	(7.8)***	(8.16)***	(7.74)***	(11.63)***	(10.96)***	(11.23)***	(10.53)***
Electoral Cycle (-1) (dummy) (x1000)	**-2,19**	**-2,27**	**-2,56**	**-2,59**	**-2,91**	**0,00**	**0,00**	**0,00**
	(-1.43)	(-1.48)	(-1.75)*	(-1.76)*	(-2.29)**	(-2.29)**	(-2.35)**	(-2.35)**
Debt (-1)			**-0,12**	**-0,12**			**-0,02**	**-0,02**
			(-4.76)***	(-4.77)***			(-0.89)	(-0.9)
Number of observations	136	136	136	136	136	136	136	136
Sample	2003-2010	2003-2010	2003-2010	2003-2010	2003-2010	2003-2010	2003-2010	2003-2010
Adjusted R2	0,59	0,59	0,65	0,65	0,68	0,68	0,68	0,68
Estimation method	OLS	IV	OLS	IV	OLS	IV	OLS	IV

Notes: all regressions are estimated by Panel EGLS (Cross-section weights).
*** signification at 99% & ** 95% & * 90%. t-statistics are reported between parentheses.
Output gap of the biggest 5 Spanish export markets - weighted by their export shares- is used as an instrument of ACs unemployment gap.

6. Conclusions

One of the main objectives of this paper is to analyse the responsiveness of ACs (Autonomous Communities) fiscal policy to the cyclical position of regional government. Overall, ACs fiscal policy is countercyclical as primary budget balance reaction to changes in the unemployment gap is negative. In addition, we cannot infer an asymmetric reaction of Spanish ACs fiscal policy to the cycle.

To ensure an adequate evaluation of the fiscal position of ACs we also deal with other key determinants that make up our fiscal reaction functions: institutional features related to the Spanish decentralization process, legislative fiscal rules, political economy variables and responses to debt accumulation. In connection with institutional features we provide several variables which have not been included in the literature when estimating fiscal reaction

functions (to the best of our knowledge). For instance, we control for expenditure responsibilities, fiscal corresponsibility as well as relative fiscal resources. Results suggest that as education and health were devolved ACs primary budget balance (PBB) worsened, which may be indicative of underfunded responsibilities. As for relative fiscal resources we also identify a significant effect on PBB, which should be taken into account as there have been great disparities in terms of relative resources between ACs. Therefore the next revision of ACs financing system (envisaged for 2014) should evaluate the current distribution of public resources to ensure horizontal (between ACs) and vertical equity (between levels of government).

Another interesting finding is that fiscal corresponsibility presents a positive effect on the PBB until the latest global financial crisis. We would note at this point that the uneven decentralization process in Spain –when regarding both the revenue and the expenditure side- may have not fostered a fiscally responsible behavior among ACs. This situation is becoming increasingly evident with the striking deterioration of regional public finances. Accordingly, ACs fiscal behaviour may improve by increasing revenue autonomy and decreasing dependence on central government transfers and tax sharing (as is the case of VAT and excise taxes).

Legislative fiscal rules have been also a key determinant of ACs fiscal position. These rules have improved significantly the primary budget balances of the ACs until 2006, that is, the Budget Consolidation Scenarios (in force between 1992 and 2001) and the Budget Stability Act passed in 2001 (in force between 2002 and 2006). Instead, the Budget Stabilty Act approved in 2006 could not cope with the recent deterioration of regional public finances. This field deserves further attention, and in particular it seems very interesting to monitor the incidence on all levels of government of the recent organic law on budgetary stability and financial sustainability of public administrations.

Political economy variables offer some interesting results, which are ambiguous in some fields. To start with solid results we found that the fiscal stance of ACs worsens the year before the elections, in line with the electoral-cycle hypothesis. We also find that foral ACs have been more responsible to changes in cyclical conditions. Regarding ideology of incumbents we obtained mixed results. Nationalist parties present a more prudent fiscal policy than right-wing non nationalist parties (PP) according to the % of seats, but when considering president ideology the opposite result was found. Furthermore, left-wing governments present an ambiguous pattern as their response differs depending on the definition used. In addition, we do not find clear evidence as for the effect of political alignment on ACs PBB. After all, it seems advisable to design a fiscal policy rule for ACs which guarantees fiscal sustainability, regardless of political economy issues. As for the degree of countercyclicality, it is not a technical issue but political, as long as it does not jeopardize the sustainability of public finances.

Lastly, concerning debt accumulation our estimates indicate that ACs fiscal adjustment do not guarantee fiscal sustainability. This systematic pattern may have strengthened in recent times as more indebted ACs have run larger budget deficits. Thus, this upward trend in government indebtedness is one of the challenges that deserve further attention in the near future.

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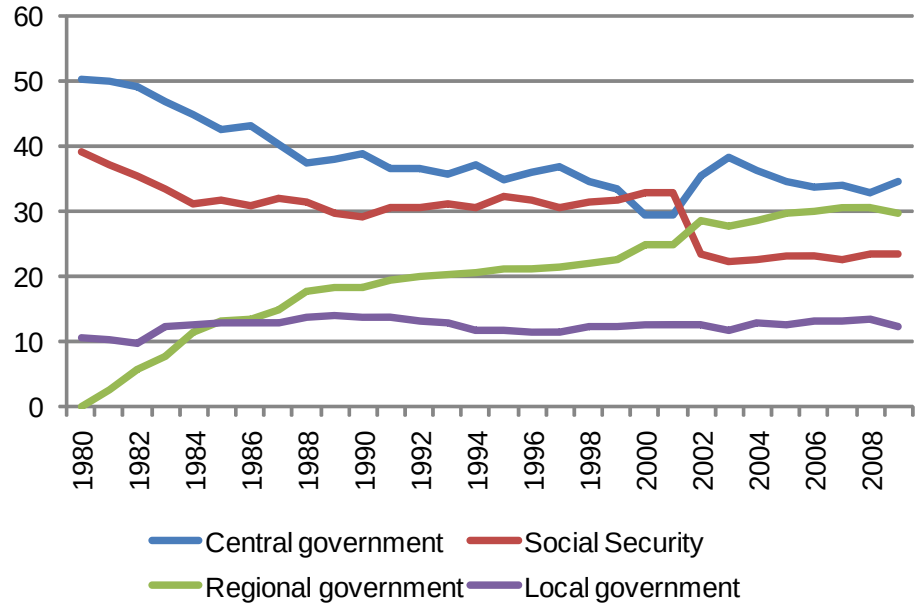
A2. Descriptive analysis

Figure A1. Distribution of public expenditures by levels of government*

% of total



Source: Informe económico-financiero de les administraciones territoriales. Spanish Ministry of Finance and Public Administration.
* total expenditures (including financial expenditures).

Table A1. Distribution of non financial public expenditures by levels of government

% of total

	Central government	Social Security	Regional goverment	Local government
2001	24.8	29.3	33.0	12.8
2002	24.4	30.3	32.3	13.1
2003	23.5	29.2	34.0	13.3
2004	24.4	28.8	34.2	12.5
2005	22.4	28.8	35.7	13.0
2006	22.2	28.5	35.9	13.4
2007	21.7	28.3	35.9	14.1
2008	21.4	28.6	36.4	13.6
2009	20.7	29.7	35.7	13.8
2010	20.4	31.6	34.6	13.4

Source: Actuación económica y financiera de las administraciones públicas (2005). Avance de la actuación económica y financiera de las administraciones públicas (2009 and 2010). IGAE. Spanish Ministry of Finance and Public Administration.

Table A2. Distribution of non financial public revenues by levels of government

% of total

	Central government	Social Security	Regional goverment	Local government
2001	48.7	31.5	9.5	10.3
2002	39.5	31.1	19.3	10.1
2003	37.7	31.3	21.2	9.8
2004	36.6	31.0	22.2	10.2
2005	36.9	30.2	22.6	10.3
2006	37.5	29.7	22.5	10.3
2007	38.5	29.4	21.8	10.2
2008	33.5	33.0	22.8	10.7
2009	29.8	34.9	24.2	11.1
2010	36.6	33.4	19.1	10.9

Source: Actuación económica y financiera de las administraciones públicas (2005). Avance de la actuación económica y financiera de las administraciones públicas (2009 and 2010). IGAE. Spanish Ministry of Finance and Public Administration.

Table A3. Descriptive statistics

Sample: 1987 2010

Mean by AC	primary bb / gdp	og	dog	ug	dug	og_ue5	dog_ue5	debt*	foral	uni
and	-0,07	0,76	0,17	0,79	-0,04	-0,06	-0,03	7,2	0	0
ara	-0,29	0,68	0,17	-0,47	0,00	-0,06	-0,03	4,7	0	0
ast	-0,16	0,35	0,14	0,62	-0,03	-0,06	-0,03	4,2	0	100
bal	-0,41	0,48	0,06	0,02	0,28	-0,06	-0,03	5,3	0	100
can	-0,13	0,52	0,07	0,13	0,17	-0,06	-0,03	4,3	0	0
cant	0,06	0,52	0,14	0,97	-0,11	-0,06	-0,03	4,0	0	100
cat	-0,25	0,64	0,19	-0,66	-0,14	-0,06	-0,03	8,6	0	0
cll	-0,12	0,64	0,15	0,70	-0,05	-0,06	-0,03	3,6	0	0
clm	-0,57	0,87	0,19	0,18	0,29	-0,06	-0,03	4,5	0	0
ext	0,07	0,87	0,20	0,84	-0,08	-0,06	-0,03	5,9	0	0
gal	-0,14	0,55	0,20	1,54	0,11	-0,06	-0,03	8,3	0	0
mad	0,03	0,67	0,17	-0,75	-0,07	-0,06	-0,03	5,0	0	100
mur	-0,10	0,84	0,15	0,58	0,18	-0,06	-0,03	4,4	0	100
nav	0,20	0,59	0,12	-0,96	-0,23	-0,06	-0,03	6,4	100	100
pb	0,22	0,65	0,14	0,69	0,02	-0,06	-0,03	4,6	100	0
rio	-0,34	0,55	0,14	-0,08	-0,02	-0,06	-0,03	3,8	0	100
val	-0,32	0,71	0,13	0,36	0,18	-0,06	-0,03	9,7	0	0
mean (unw eighted)	-0,14	0,64	0,15	0,26	0,03	-0,06	-0,03	5,5	12	41
median	0,04	0,21	0,22	0,28	-0,37	1,05	0,15	4,80	0,00	0,00
maximum	4,76	7,41	4,74	10,82	9,13	2,74	1,06	18,60	100,00	100,00
minimum	-5,39	-4,95	-6,51	-10,08	-4,91	-5,42	-1,96	1,00	0,00	0,00
std. dev.	1,08	2,50	1,91	4,14	2,21	2,45	0,76	2,70	32,26	49,28
skew ness	-0,90	0,39	-0,65	0,05	1,23	-0,78	-0,77	1,41	2,37	0,36
kurtosis	7,25	2,46	3,79	2,23	5,23	2,29	2,92	5,96	6,63	1,13
jarque-bera	361,52	15,56	39,64	10,26	187,40	49,77	40,77	224,93	607,49	68,28
probability	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

* Sample: 1992-2010.

Notes: bb (budget balance); og (output gap); dog (first difference of og); ug (unemployment gap); dug (first difference of ug); uni (uniprovincial).

Table A4. Descripte statistics. Political economy and institutional variables

Sample: 1987 2010

Mean by AC	expenditure responsib. index	fcor_8796	fcor_9701	fcor_0208	fcor_0910	relative resources index	nacionalist president	left-wing president	% nationalist seats	% left-wing seats	electoral cycle	aligned	budget consolid. scenarios	budget stability act 2001	budget stability act 2006
and	140	0	19	26	39	100	0	100	4	65	25	67	42	21	17
ara	60	0	58	37	52	116	29	54	24	47	25	46	42	21	17
ast	58	0	73	32	47	102	0	83	2	57	25	75	42	21	17
bal	63	0	66	46	52	89	0	33	16	45	25	33	42	21	17
can	117	0	32	28	40	108	71	13	38	36	25	8	42	21	17
cant	60	0	51	31	48	111	63	0	26	34	25	33	42	21	17
cat	140	0	58	52	63	96	71	29	57	47	29	0	42	21	17
cll	58	0	45	27	41	122	0	0	2	39	25	33	42	21	17
clm	58	0	25	23	38	112	0	100	0	56	25	67	42	21	17
ext	58	0	17	16	28	124	0	100	1	59	25	67	42	21	17
gal	127	0	26	25	38	111	0	29	18	45	25	63	42	21	17
mad	60	0	89	71	81	85	0	33	0	49	25	67	42	21	17
mur	60	0	65	29	41	87	0	33	0	46	25	67	42	21	17
nav	130	50	50	50	50	165	75	25	66	51	25	21	42	21	17
pb	140	50	50	50	50	165	92	8	59	42	25	8	42	21	17
rio	60	0	52	33	46	120	0	17	6	43	25	50	42	21	17
val	137	0	49	40	49	88	0	33	11	53	25	67	42	21	17
mean (unweighted)	90	6	49	36	47	112	24	41	19	48	25	45	42	21	17
median	140	0	0	0	0	110	0	0	10	47	0	0	0	0	0
maximum	140	50	113	73	83	165	100	100	72	76	100	100	100	100	100
minimum	0	0	0	0	0	66	0	0	0	26	0	0	0	0	0
std. dev.	64	11	22	18	13	24	42	49	22	10	43	50	49	41	37
skewness	-1	4	2	1	3	1	1	0	1	0	1	0	0	1	2
kurtosis	1	18	8	4	14	3	3	1	3	3	2	1	1	3	4
jarque-bera	63	5245	693	175	2768	62	109	68	73	4	97	68	68	140	242
probability	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes: mean of fcor (fiscal corresponsibility index) corresponds to indicated periods.

Table A5. Fiscal corresponsibility indicator (% of AC fiscal resources subject to change)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
and	0	0	0	0	0	0	0	0	0	0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4
ara	0	0	0	0	0	0	0	0	0	0	0.8	0.8	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.5
ast	0	0	0	0	0	0	0	0	0	0	0.8	0.8	0.8	0.8	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.4
bal	0	0	0	0	0	0	0	0	0	0	0.9	0.5	0.6	0.6	0.6	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.5
can	0	0	0	0	0	0	0	0	0	0	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4
cant	0	0	0	0	0	0	0	0	0	0	0.6	0.6	0.6	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.4
cat	0	0	0	0	0	0	0	0	0	0	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.6
cll	0	0	0	0	0	0	0	0	0	0	0.6	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4
clm	0	0	0	0	0	0	0	0	0	0	0.3	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4
ext	0	0	0	0	0	0	0	0	0	0	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
gal	0	0	0	0	0	0	0	0	0	0	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4
mad	0	0	0	0	0	0	0	0	0	0	1.1	1.1	1.1	0.7	0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8
mur	0	0	0	0	0	0	0	0	0	0	0.7	0.8	0.7	0.3	0.7	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4
nav	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
pb	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
rio	0	0	0	0	0	0	0	0	0	0	0.7	0.7	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.4
val	0	0	0	0	0	0	0	0	0	0	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5

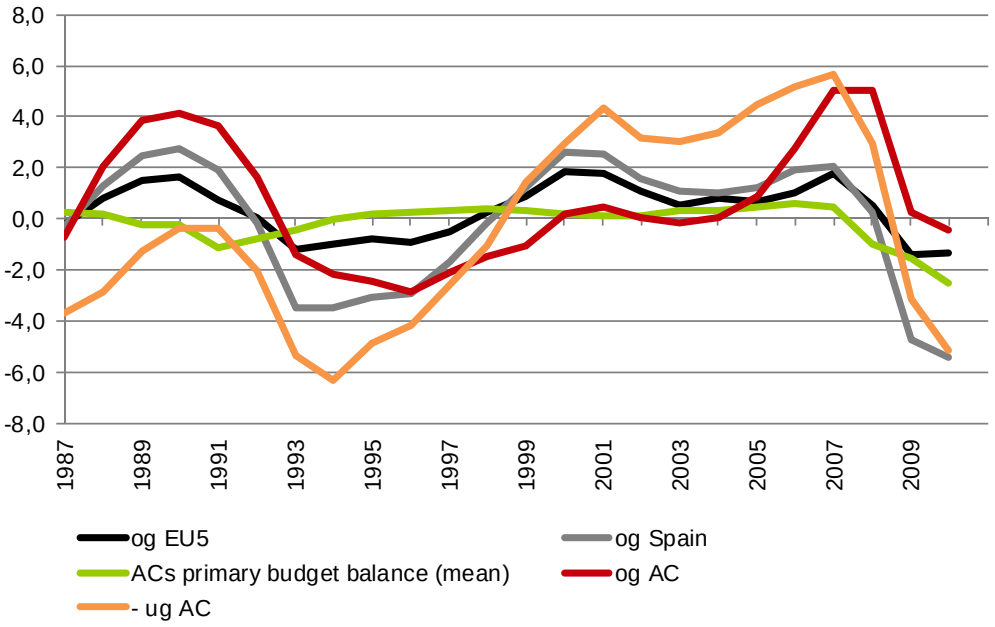
Source: own elaboration from definitive data of ACs financing system.

Table A6. Relative resources index from AC financing system (per capita index)

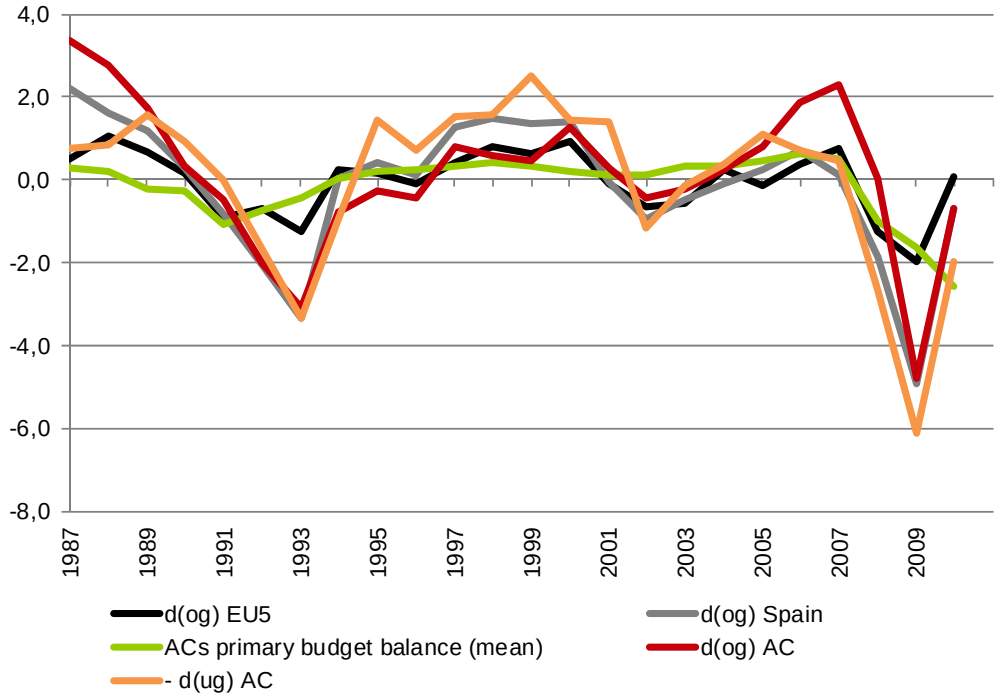
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
and	103	103	101	102	102	102	102	98	100	102	100	97	96	95	94	100	101	101	102	102	102	100	92	95
ara	116	115	116	113	113	126	123	121	122	121	119	119	109	115	110	113	115	115	115	116	115	115	110	113
ast	101	99	99	98	100	90	92	98	96	97	94	94	97	87	99	111	113	113	113	113	115	117	109	113
bal	100	101	103	102	100	77	83	92	90	78	87	100	83	86	89	86	85	85	82	81	79	77	99	100
can	119	119	117	115	114	120	121	120	116	115	114	116	113	113	111	98	97	96	95	96	97	94	87	89
cant	110	119	108	107	106	103	103	133	104	83	103	102	106	111	106	115	116	116	117	117	117	117	118	123
cat	88	90	92	90	90	97	96	96	98	97	100	101	102	102	103	97	96	96	95	94	94	96	102	99
cll	118	117	117	118	118	133	130	130	130	130	127	128	133	127	123	116	118	118	119	119	120	120	112	117
clm	121	117	120	121	120	128	127	124	124	101	105	104	107	99	110	109	110	109	109	109	109	106	102	104
ext	129	120	124	128	127	135	135	134	134	120	116	117	120	115	123	121	123	123	124	125	126	124	112	119
gal	96	101	102	107	108	110	110	111	111	111	110	112	116	117	119	111	112	113	114	114	115	115	107	112
mad	92	90	89	90	90	70	71	66	71	86	84	83	83	84	82	88	87	87	87	89	89	93	102	94
mur	95	97	100	99	99	67	72	78	74	77	75	73	75	97	91	92	92	91	92	91	91	89	94	93
nav	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165
pb	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165
rio	118	116	114	119	119	141	133	140	130	106	122	121	114	122	116	119	119	119	117	117	117	118	111	118
val	82	84	82	80	79	87	88	93	89	89	88	88	89	89	89	92	91	91	91	90	89	87	93	94

Source: own elaboration from definitive data of AC financing system.

Figure A2. ACs primary budget balance and Spanish / EU5 cyclical position
in levels



in first differences



Source:
og Spain: European Commission.
og EU5: own elaboration from European Commission.
og AC: own elaboration from De la Fuente (2010; data used in the empirical analysis).
ug AC: own elaboration from INE (data used in the empirical analysis).

Notes: output gap of the biggest 5 Spanish export markets - weighted by their export shares- is used as an instrument of Acs unemployment and output gap.

Table A7. Descripte statistics by subperiods

	1987-1990			1991-1994				1995-2007				2008-2010			
	d(ug)	primary bb	primary bb / d(ug)	d(ug)	primary bb	debt	primary bb / d(ug)	d(ug)	primary bb	debt	primary bb / d(ug)	d(ug)	primary bb	debt	primary bb / d(ug)
and	-1,2	-0,9	0,70	2,0	-0,9	6,4	-0,42	-1,5	0,7	7,4	-0,47	5,1	-1,3	6,9	-0,26
ara	-1,6	0,2	-0,15	1,8	-1,1	3,5	-0,61	-0,8	0,1	4,5	-0,09	3,2	-1,5	6,4	-0,48
ast	-0,4	-0,3	0,67	0,8	-0,3	3,3	-0,42	-0,7	0,1	4,2	-0,15	2,5	-0,9	5,1	-0,37
bal	-0,9	-0,3	0,29	1,7	-0,2	2,8	-0,11	-0,8	0,1	4,3	-0,12	4,5	-3,0	12,3	-0,68
can	-0,8	0,1	-0,13	0,7	-0,4	3,8	-0,63	-1,1	0,1	4,0	-0,12	6,1	-1,2	6,0	-0,19
cant	-0,3	-1,0	2,93	1,4	1,3	5,8	0,93	-1,2	0,4	3,3	-0,34	2,7	-1,7	5,3	-0,62
cat	-2,2	-0,2	0,07	2,1	-0,7	5,1	-0,32	-1,1	0,3	8,4	-0,25	3,7	-2,1	12,8	-0,55
cll	-0,7	0,2	-0,30	1,3	-0,5	2,3	-0,36	-0,9	0,2	3,3	-0,17	2,9	-1,3	5,9	-0,45
clm	-0,6	0,4	-0,72	1,3	-0,5	2,3	-0,37	-0,7	-0,2	3,4	0,21	4,5	-3,9	11,4	-0,86
ext	-0,9	0,5	-0,52	1,2	-0,9	5,1	-0,76	-1,0	0,6	5,8	-0,61	3,3	-1,5	6,9	-0,45
gal	-0,4	-0,5	1,32	1,7	-1,3	7,3	-0,77	-0,8	0,5	8,4	-0,58	2,6	-0,8	8,9	-0,30
mad	-1,8	-0,3	0,16	1,7	-0,2	3,1	-0,13	-0,8	0,3	5,2	-0,35	3,3	-0,4	6,2	-0,11
mur	-1,0	-0,3	0,31	2,2	-0,1	5,7	-0,02	-1,3	0,5	3,9	-0,38	5,3	-2,4	5,1	-0,46
nav	-1,6	1,8	-1,14	0,6	-2,7	7,1	-4,44	-0,7	1,1	6,2	-1,64	2,4	-1,9	6,6	-0,82
pb	0,1	0,1	1,07	0,7	-0,1	5,2	-0,10	-0,6	1,0	4,5	-1,75	1,5	-2,6	4,2	-1,73
rio	-1,9	0,1	-0,05	1,7	-0,3	3,9	-0,15	-0,7	-0,2	3,1	0,27	2,9	-1,7	6,9	-0,60
val	-1,4	0,1	-0,11	2,4	-0,9	5,2	-0,37	-1,1	-0,1	9,6	0,07	4,8	-1,3	14,8	-0,27
mean (unweighted)	-1,0	0,0	-0,00	1,5	-0,6	4,6	-0,38	-0,9	0,3	5,3	-0,35	3,6	-1,7	7,8	-0,48

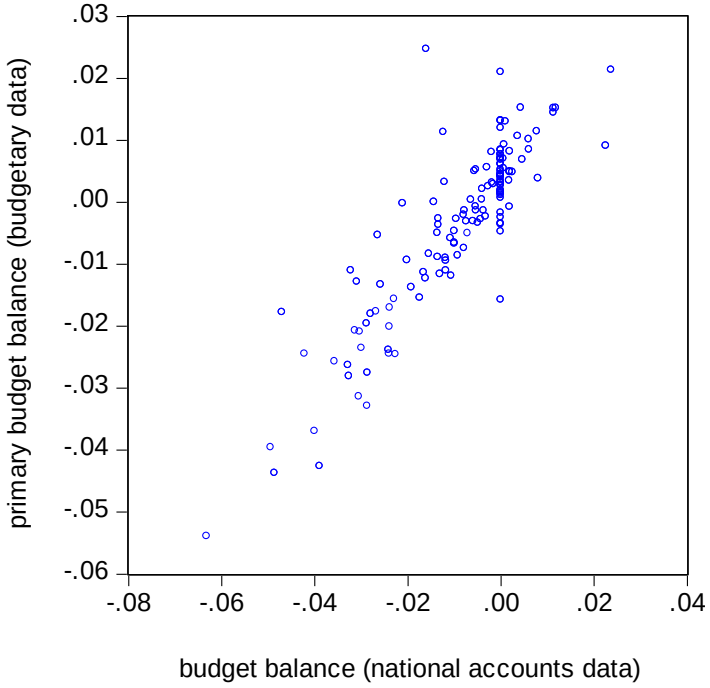
	1987-1990			1991-1996				1997-2007				2008-2010			
	d(og)	primary bb	primary bb / d(og)	d(og)	primary bb	debt	primary bb / d(og)	d(og)	primary bb	debt	primary bb / d(og)	d(og)	primary bb	debt	primary bb / d(og)
and	2,8	-0,9	-0,31	-1,7	-0,5	7,1	0,31	0,8	0,8	7,3	0,96	-2,0	-1,3	6,9	0,64
ara	2,1	0,2	0,11	-1,0	-0,7	3,9	0,71	0,7	0,1	4,5	0,11	-2,0	-1,5	6,4	0,76
ast	1,4	-0,3	-0,20	-0,7	-0,1	3,5	0,19	0,7	0,1	4,3	0,13	-1,9	-0,9	5,1	0,48
bal	1,6	-0,3	-0,17	-1,1	-0,0	3,0	0,00	0,6	0,0	4,4	0,06	-1,7	-3,0	12,3	1,76
can	1,5	0,1	0,07	-1,0	-0,5	4,3	0,50	0,7	0,3	3,8	0,36	-2,1	-1,2	6,0	0,56
cant	1,8	-1,0	-0,54	-1,1	1,2	4,8	-1,17	0,7	0,3	3,3	0,35	-1,8	-1,7	5,3	0,92
cat	2,3	-0,2	-0,07	-0,9	-0,4	6,5	0,44	0,6	0,3	8,3	0,52	-1,8	-2,1	12,8	1,13
cll	1,5	0,2	0,14	-0,6	-0,3	2,6	0,53	0,5	0,2	3,4	0,39	-1,4	-1,3	5,9	0,89
clm	2,6	0,4	0,17	-1,3	-0,4	2,5	0,29	0,7	-0,2	3,5	-0,23	-2,0	-3,9	11,4	1,94
ext	2,1	0,5	0,23	-1,3	-0,4	5,5	0,34	0,8	0,6	5,7	0,78	-1,5	-1,5	6,9	0,97
gal	1,9	-0,5	-0,25	-0,7	-0,8	7,9	1,19	0,6	0,5	8,3	0,96	-1,5	-0,8	8,9	0,51
mad	2,4	-0,3	-0,12	-1,5	-0,2	3,4	0,10	0,8	0,4	5,4	0,45	-1,6	-0,4	6,2	0,23
mur	2,9	-0,3	-0,10	-2,0	0,1	5,5	-0,07	1,0	0,5	3,7	0,49	-2,0	-2,4	5,1	1,18
nav	1,5	1,8	1,26	-0,9	-1,5	8,3	1,63	0,6	1,1	5,5	1,83	-1,4	-1,9	6,6	1,43
pb	2,1	0,1	0,06	-1,5	0,1	6,2	-0,04	0,8	1,1	3,9	1,37	-1,6	-2,6	4,2	1,59
rio	1,9	0,1	0,05	-1,0	-0,0	3,8	0,01	0,7	-0,3	3,0	-0,41	-1,9	-1,7	6,9	0,88
val	2,6	0,1	0,06	-1,7	-0,8	5,9	0,43	1,0	0,0	10,1	0,00	-2,4	-1,3	14,8	0,54
mean (unweighted)	2,0	0,0	0,00	-1,2	-0,3	5,0	0,26	0,7	0,3	5,2	0,47	-1,8	-1,7	7,8	0,95

Table A8. ACs fiscal reaction function with output gap as cyclical conditions variable
Dependent variable: Primary budget balance / GDP

	all ACs								common regime ACs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant term	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**-0,01**	**-0,01**	**-0,01**	**-0,01**
	(-0.09)	(-1.18)	(0.64)	(1.70)*	(-0.02)	(1.99)**	(-3.24)***	(-5.09)***	(-2.75)***	(-3.43)***
d (og)	**0,06**	**0,19**			**0,18**	**0,18**	**0,19**	**0,19**	**0,13**	**0,20**
	(4.1)***	(7.07)***			(6.03)***	(8.65)***	(6.38)***	(8.34)***	(3.68)***	(5.45)***
d (og) positive			**0,04**	**0,07**						
			(1.73)*	(1.10)						
d (og) negative			**0,08**	**0,29**						
			(3.30)***	(5.30)***						
d(og) * foral AC					**0,35**					
					(8.24)***					
d(og) * uniprovincial AC					**-0,14**					
					(-9.98)***					
d(og) * left-wing president					**0,04**					
					(1.89)*					
Primary Budget Balance / GDP (-1)	**0,55**	**0,51**	**0,55**	**0,52**	**0,50**	**0,62**	**0,50**	**0,47**	**0,59**	**0,33**
	(13.73)***	(13.8)***	(13.72)***	(13.77)***	(17.25)***	(26.95)***	(13.10)***	(13.19)***	(13.92)***	(6.98)***
Index of expenditure responsibilities (x 1000)	**-0,91**	**-0,83**	**-0,91**	**-0,90**	**-1,23**	**-2,44**	**-1,35**	**-1,54**	**-0,85**	**-1,01**
	(-4.23)***	(-4.31)***	(-4.16)***	(-4.31)***	(-6.18)***	(-7.97)***	(-5.01)***	(-5.3)***	(-2.35)**	(-3.18)***
Electoral Cycle (-1) (dummy) (x1000)	**-0,91**	**-0,96**	**-0,95**	**-1,13**	**-1,14**	**-1,95**	**-0,95**	**-0,89**	**-1,20**	**-1,39**
	(-3.08)***	(-3.29)***	(-3.20)***	(-3.67)***	(-3.97)***	(-7.17)***	(-3.11)***	(-2.72)***	(-3.04)***	(-3.66)***
Aligned (dummy) (x1000)							**0,01**	**-0,06**		
							(0.02)	(-0.14)		
Debt (-1)						**0,03**				
						(6.72)***				
% of left-wing seats (x1000)							**6,00**	**5,97**	**6,19**	**4,45**
							(2.87)***	(2.96)***	(2.50)**	(2.16)**
% of nationalist seats (x1000)							**3,88**	**3,79**	**3,45**	**3,02**
							(4.25)***	(4.35)***	(3.25)***	(3.11)***
Nationalist president (dummy) (x1000)					**0,55**					
					(1.56)					
Left-wing president (dummy) (x1000)					**-1,21**					
					(-3.35)***					
Fiscal corresponsibility 1987-2001 (x1000)									**-0,05**	**1,01**
									(-0.05)	(1.22)
Fiscal corresponsibility 2002- (x1000)									**-3,12**	**4,12**
									(-2.37)**	(3.17)***
Index of relative fiscal resources (x1000)							**0,02**	**0,02**	**0,03**	**0,04**
							(2.08)**	(2.33)**	(1.81)*	(2.50)**
Budget Consolidation Scenarios (dummy) (X1000)								**6,38**		
								(6.92)***		
Budget Stability Act 2001 (dummy) (X1000)								**7,38**		
								(7.17)***		
Budget Stability Act 2006 (dummy) (X1000)								**-1,19**		
								(-1.03)		
Number of observations	408	408	408	408	306	408	408	408	360	330
Sample	87-10	87-10	87-10	87-10	93-10	87-10	87-10	87-10	87-10	87-08
Adjusted R2	0,47	0,51	0,46	0,48	0,73	0,81	0,53	0,65	0,44	0,37
Estimation method	OLS	IV	OLS	IV	IV	IV	IV	IV	IV	IV
Hausman exogeneity test Chi2 (5) (p-value)		-3,09		-35,69						
Shea partial R2										
d (og)		0,28								
d (og) positive				0,14						
d (og) negative				0,19						

Notes: all regressions are estimated by Panel EGLS (Cross-section SUR weights).
*** signification at 99% & ** 95% & * 90%. t-statistics are reported between parentheses.
Shea R-square above 0.10 is generally regarded as support of predictive power.
Output gap of the biggest 5 Spanish export markets - weighted by their export shares- is used as an instrument of ACs output gap.

Figure A3. Budget balance (national accounts data) versus primary budget balance (budgetary data)
Sample: 2003 2010



Source: Spanish Ministry of Finance and Public Administration.

A3. Definition of the variables and data source

Aligned$_{it}$ = 1 if the incumbent party (or the party leading the incumbent coalition) in the regional government is the same as the incumbent party in the central government (or the party leading the incumbent coalition), and 0 otherwise.
Source: own calculation from http://www.pre.gva.es/argos/archivo/index.html

Budget Consolidation Scenarios$_{it}$ = 1 for period 1992-2001 and 0 otherwise.

Budget Stability Act 2001$_{it}$ = 1 for period 2002-2006 and 0 otherwise.

Budget Stability Act 2006$_{it}$ = 1 for period 2007-2011 and 0 otherwise.

Debt$_{it}$ = Regional public debt pc of region i in period t. Source: Bank of Spain.

Electoral cycle$_{it}$ = 1 if t is an election year in region i and 0 otherwise.
Source: Ministerio del Interior.
http://www.infoelectoral.mir.es/OtraInformacion/listado_elecciones_fe.html

Foral$_{it}$ = 1 for Basque Country and Navarra and 0 otherwise.

Index of expenditure responsibilities$_{it}$ = Increase in regional expenditures needs due to the assignment of the provision of health and/or education. Source: Sorribas (2011) "*The main difference across regions in expenditure responsibilities is in responsibility for the provision of health care and education at different points in time. These differences are captured by an Expenditure responsibility$_{it}$ index that proxies the increase in regional expenditure needs due to the assignment of the provision of health care and/or education. This index is computed on the basis of two dummy variables, health care$_{it}$ and education$_{it}$, which are equal to one if a region$_i$ is responsible for providing health care and/or education in year t and zero otherwise. This index is computed as follows:*

$IER_{it} = (H_{it}EH + ED_{it}EEd)/ CE$

where H_{it} and ED_{it} are dummy variables that are equal to one if the region$_i$ has been assigned the provision of health or education, respectively, in period t; EH=564.67€; EEd=428.05€; CE=714.48€ is the average per capita expenditure, at 2001 constant prices, during the period 1986–2001 on health, education, and on the provision of the public goods and services that are assigned to all regions, respectively. Hence, IER_{it} is equal to 0 if the region has not been assigned health neither education; is equal to 0.8 (0.6) if it is responsible for providing health (education); and, is equal to 1.4 if it is responsible for providing health and education".

Fiscal corresponsibility$_{it}$ = proportion of ACs Funding System resources which can be changed. Therefore, we exclude VAT and the main excise taxes. Foral Regime fiscal corresponsibility is supposed to be constant across the period. Our estimates for the Foral System (based on 2005 and 2006 data) suggest that this ratio is around 0.5. Source: own elaboration based on definitive data of ACs Funding System. Ministerio de Hacienda y Administraciones Públicas.

The fiscal corresponsibility indicator is splitted into two variables which take the value of the mentioned indicator for the corresponding period (1997-2001 and 2002-2010), and 0 otherwise. This separation is necessary as changes in expenditure responsibilities make this indicator not homogenous across the sample.

Index of relative fiscal resources$_{it}$ = index of ACs relative resources from ACs Funding System. We use Zubiri (2003) and De la Fuente (2010) estimates to infer Basque Country and Navarra relative resources. As an approximation we suppose that Foral Regime ACs obtain 65% more per capita resources than the average Common Regime AC. Source: own elaboration based on definitive data of ACs Funding System. Ministerio de Hacienda y Administraciones Públicas.

Left president$_{it}$ = 1 if the president of the region i in period t belongs to a left-wing party and 0 otherwise. If t is an election year and there is a change in the executive power in region i we assign that year to the party which has spent more time as an incumbent.
Source: own elaboration based on http://www.terra.es/personal2/monolith/spain2.htm

Left-wing seats$_{it}$ = number of left-wing seats / total seats. Source: own calculation from http://www.pre.gva.es/argos/archivo/index.html

Nationalist president$_{it}$ = 1 if the president of the region i in period t belongs to a nationalist party and 0 otherwise. Our definition of nationalist parties captures those parliamentary groups that do not contest the elections in all ACs.
Source: own elaboration based on http://www.terra.es/personal2/monolith/spain2.htm

Nationalist seats$_{it}$ = number of nationalist seats / total seats. Our definition of nationalist party captures those parliamentary groups that do not contest the elections in all ACs.
Source: own calculation from http://www.pre.gva.es/argos/archivo/index.html

Output gap$_{it}$ = output gap is the deviation of the actual from the trend real GDP, which is estimated using a Hodrick-Prescott filter with lambda 100. Homogeneous series of gross valued added at constant prices constructed by de la Fuente (2010) are used in order to overcome statistical problems related to statistical methodological changes of national accounts bases. In addition, we use official forecasts for the Spanish economy until 2016 (from European Commission and International Monetary Fund), in order to minimize the end-point bias related to HP filter.

Primary budget balance$_{it}$ = (non financial revenue – non financial primary expenditure) / GDP. Source: Liquidación de Presupuestos de las Comunidades y Ciudades Autónomas. Ministerio de Economía y Hacienda.

Unemployment gap$_{it}$ = unemployment gap is the deviation of the actual unemployment rate from the average unemployment rate over the period 1977-2011. Source: EPA. INE.

Uniprovincial$_{it}$ = 1 for uniprovincial ACs and 0 otherwise.