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The determinants of macroeconomic forecasts and the Stability and Growth Pact

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Abstract

This paper identifies the determinants of macroeconomic forecasts (budget balance, public debt and real GDP growth), of the governments of the 15 EU countries. We have used the forecasts of the Stability and Convergence Programmes submitted between 1998/99 and 2008/09 and the European Commission's. Results show that, in general, economic growth forecasts submitted by European governments are more optimistic than those published by the European Commission. The lack of accuracy of government forecasts is due to "misinformation" regarding the economic situation at the time of their publication. The differences between observed and forecast changes of budget balance and public debt are explained by the output growth forecast errors and the forecasts of the changes in the two fiscal indicators. These forecast changes tend to revise downwards the changes submitted in the previous Program. Therefore, the governments' "bad intention" seems to result from their lack of commitment to the objectives of previous programs and it explains the recurrent delays in the implementation of their fiscal consolidation plans.

Keywords: European Union, Stability and Growth Pact, forecast errors

JEL Classification: E62; H6

Policy points

- With respect to budget balance and public debt forecasts presented in the Stability and Convergence Programmes (SCPs), it seems there was a lack of commitment to the fiscal objectives that had been established in SCPs submitted in the previous year. This result accounts for the recurrent delays in the implementation of the fiscal consolidation plans.
- Forecast errors of real GDP growth are explained mainly by problems of "misinformation" regarding the economic situation at the time the forecasts were elaborated, but when one considers information from SCPs, it becomes clear that forecast errors are greater than when data from the European Commission were used. That points to there being relevant differences between the forecasts and the estimates generated by the two sources.
- Countries with better domestic institutional frameworks publish more prudent GDP growth forecasts and have smaller fiscal deviations.
- The changes that have been introduced in the 2011 SGP reform may overcome some of the problems of the empirical analysis carried out in this paper.

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I. Introduction

The current sovereign debt crisis plaguing some countries of the Euro Area provides eloquent proof that the Stability and Growth Pact (SGP) has been unable to accomplish the objective for which it was designed: that of enforcing fiscal discipline in the Member States of the European Union (EU).

The preventive arm of the SGP requires countries to achieve medium-term budgetary objectives. The fiscal adjustment process to achieve those objectives is defined by governments in the Stability or Convergence Programmes (SCPs). Medium-term budgetary objectives should ensure the sustainability of public debt and give room for the stabilization of the economy in a recession context without violating the budget deficit limit.

The existence of budget deficits above 3% of GDP in several European Monetary Union (EMU) countries in a persistent way between 1999 and 2011 shows the ineffectiveness of the preventive arm. This seems to have resulted from a systematic failure to implement the fiscal adjustment processes defined by some countries in their SCPs. Until the 2011 reform of the SGP, this arm had been an ex-ante fiscal rule. There was neither an ex-post verification of compliance with the medium-term fiscal plans nor sanction procedures in the case of unjustified deviations between observed and predicted values. Thus, governments may have overestimated the economic and fiscal forecasts presented in SCPs to ensure compliance with the ex ante required criteria. This strategy is described by the European Commission (2005) as “window dressing”.

In this context, the study of macroeconomic forecast determinants (namely budget balance, public debt and real GDP growth) and of the corresponding forecast errors becomes relevant and is the major goal of this paper. In our analysis we have used the SCPs forecasts submitted between 1998/99 and 2008/09 by the governments of the 15 EU state members (before the 2004 enlargement) as well as the forecasts of the European Commission (EC). The econometric analysis aims to identify the main economic, political and institutional determinants of those macroeconomics forecasts and their corresponding deviations with recourse to panel data models with country and time fixed effects.

Our paper contributes to the literature in three different aspects. The first aspect regards the analysis of public debt. As far as we know, nothing has been published on public debt forecasts determinants and their corresponding errors. In view of the current context of the sovereign debt crisis and the causal relationship between the budget balance and the public debt variation, though, this analysis becomes particularly relevant and results for the public debt can be interpreted as a robust test of the conclusions drawn in relation to budget balance. Public debt forecast errors do not necessarily equal budget balance's, due to a set of measures that are only considered in the calculation of public debt, but the existence of different determinants may ensue from the use of budget-debt adjustments (in some cases, to ensure apparent compliance of the budget balance rule).

The second major contribution of this paper is the use of real time data from two different sources to verify the robustness of the econometric results. We have used the estimates published in the autumn of year t by the EC and governments' estimates inscribed in SCPs at the end of year t and/or at the beginning of year $t+1$. EC's estimates have two advantages. The first is that they are published regularly in October or November and are known by all governments at the same time, unlike what happened between 1998 and 2010, when dates for SCPs submission varied from country to country and from year to year, usually occurring between October and February of the following year. The second advantage has to do with estimates' reliability. Because they are published by an independent institution, their quality is not expected to be inferior to official governments' since the EC has no incentive to publish biased indicators.

Finally, another important contribution of this paper concerns the real GDP growth forecasts. We have looked into the determinants of real GDP growth forecasts and those of

their respective errors, given their importance in explaining the fiscal forecasts and their corresponding deviations. Moreover, in view of the fact that some governments are likely to have deliberately biased real GDP growth forecasts, we have also used the EC's autumn forecasts.

The remainder of this paper is structured as follows: section two reviews the related literature; section three describes the dependent variables and methods; section four presents and discusses the results of the econometric analysis; and section five presents the conclusions.

II. Literature review

In what concerns the relationship between economic and fiscal forecasts, some authors have drawn the attention to the possibility of governments having used a “window dressing” strategy, meaning they may have presented rosy output growth forecasts as a means to overestimate the expected revenue and forecast a greater volume of public expenditure (EC, 2005).¹

The “window dressing” strategy is also convenient because underestimation of the output gap implies considering a larger share of the budget deficit as cyclical, which expedites the adjustment toward the medium-term objective (EC, 2008).²

Empirical results confirm that observed levels of budget balance are below the predicted ones in the face of negative growth surprises (Brück and Stephan, 2006; Beetsma *et al.*, 2009; Pina and Venes, 2011) and that more ambitious budget balance forecasts translate to bigger and negative forecast errors (Beetsma *et al.* 2009).

Some studies have examined the contribution of political variables related to the partisan electoral cycles as well as to the degree of political system fragmentation. Brück and Stephan (2006), along with other authors (Giuliodori and Beetsma, 2008; von Hagen, 2010), have concluded that the bias of budget balance forecasts is related to electoral cycles. In pre-election periods, for example, forecasts are usually more optimistic. Contrarily, according to Strauch *et al.* (2004) and von Hagen (2010), electoral motivation has no significant bearing on the explanation of real GDP growth forecast errors.

Beetsma *et al.* (2009) conclude that political variables have a limited role in explaining the budget forecasts and their respective errors. Nevertheless, two important outcomes follow from this work. The budget balance forecasts are more optimistic when they are done by a recently elected government, probably because policy makers intend to signal the government's commitment to the consolidation plans. Moreover, political instability and ideological changes, from right-wing to leftist government, leads to largest and negative budget balance forecast errors.

The literature has also analysed the influence of the institutional framework on the quality of forecasts and their corresponding forecast errors. Concerning the supranational fiscal rules, governments running deficits above the limit of 3% of GDP usually plan a further fiscal adjustment, probably as a result of the implementation of restrictive fiscal measures (Beetsma and Giuliodori, 2008; Beetsma *et al.*, 2009).

The budget process can be centralized by two forms of fiscal governance: delegation and contracts. The governments operating under contracts have stronger incentives to publish prudent forecasts than governments operating under delegation, since surprises in terms of output growth and fiscal balance increase the need to renegotiate coalition contracts (Strauch *et al.*, 2004; von Hagen, 2010).

¹The causal relationship may be in the opposite direction. Countries running higher deficits are more likely to deliberately present optimistic output growth forecasts in order to subvert the fiscal rules (Milesi-Ferretti and Moriyama, 2006; van den Noord, 2007).

²Morris *et al.* (2006) claim incentives to underestimate the output gap in real time increased with the 2005 SGP reform, because the budgetary effort has become dependent on the business cycle's situation.

More appropriate medium-term budgetary frameworks and domestic fiscal rules imply smaller budget deviations. Budget forecasts are more optimistic, but forecast errors are lower, though, because of an effective implementation of the predicted policy measures (Beetsma *et al.*, 2009).

Independent fiscal institutions may produce macroeconomic forecasts.³ However, with the exception of Belgium, Austria, Netherlands and Germany, EU governments are free to use their own GDP growth forecasts and are not obliged to justify the deviations between their forecasts and those elaborated by an independent institution. Several authors advocate the use of GDP growth forecasts made by independent institutions in the preparation of budgets because not only are the thereof ensuing forecast errors smaller (Annett, 2006) but also optimist biases are not often found in the independent institutions' forecasts (Jonung and Larch, 2006).

III. Methodology

We aim to explain the following variables: budget balance and public debt forecast changes; forecast errors of budget balance and public debt changes; real GDP growth forecasts and their corresponding forecast errors.

Budget balance ($\Delta B_{i,t}^{t-1}$) and public debt forecast change ($\Delta Debt_{i,t}^{t-1}$) for country i in year t is the difference between the forecast for year t done by the government in the SCP (usually submitted at the end of year $t-1$) and the government's or the EC's estimate for the year $t-1$, published at the end of the same year.⁴

The forecast error in budget balance and public debt change ($EB_{i,t}^{t,t-1}$ and $EDebt_{i,t}^{t,t-1}$, respectively) for country i in year t corresponds to the observed change in year t minus the forecast change in year $t-1$.

Finally, real GDP growth forecast error ($Ey_{i,t}^{t,t-1}$) is the difference between the estimate published in year t and the forecast presented in year $t-1$.

We have used two sources of statistical information – the EC and the SCPs – for the estimates of the three macroeconomic variables and for real GDP growth forecasts. Thus, there are two different ways of calculating the forecast changes of budget balance and public debt and their respective forecast errors and three different ways of computing the GDP growth forecast errors. Table 1 presents a summary of descriptive statistics of these variables for the 15 EU countries over the 1998-2009 period.

Concerning the forecast errors of the three macroeconomic variables, we have looked into their bias by estimating the following equation:

$$(1) \quad E_{i,t}^{t,t-1} = \alpha + \varepsilon_{i,t}^{t,t-1}, \text{ where } E = EB_{i,t}^{t,t-1}, EDebt_{i,t}^{t,t-1}, Ey_{i,t}^{t,t-1}.$$

When the estimated coefficient α (corresponding to the average forecast error) is not statistically different from zero, the forecasts do not have a systematic bias. The estimated values of α and their statistical significance are also given in Table 1.

³ In Luxembourg, Portugal and Spain the independent fiscal institutions do not elaborate forecasts.

⁴ Throughout this paper, the lower index refers to country and to year of statistical data whereas the upper index indicates the date of publication.

TABLE 1
Descriptive statistics, 1998-2009

Dependent variable	Sources	Variable description	Variable	Number	Mean	Standard Deviation
Budget balance	SCPs' estimates	Estimated change	$\Delta B_{i,t}^t$	165	-0.69	1.92
		Forecast change	$\Delta B_{i,t}^{t-1}$	165	-0.13	0.97
		Forecast error of change	$EB_{i,t}^{t,t-1,PECE}$	165	-0.56 ***	1.35
	EC's estimates	Estimated change	$\Delta B_{i,t}^t$	165	-0.66	1.97
		Forecast change	$\Delta B_{i,t}^{t-1}$	165	-0.22	1.18
		Forecast error of change	$EB_{i,t}^{t,t-1,CE}$	165	-0.45 ***	1.28
Public debt	SCPs' estimates	Estimated change	$\Delta Debt_{i,t}^t$	163	0.19	5.22
		Forecast change	$\Delta Debt_{i,t}^{t-1}$	162	-1.21	2.64
		Forecast error of change	$EDebt_{i,t}^{t,t-1,PECE}$	162	1.40 ***	3.67
	EC's estimates	Estimated change	$\Delta Debt_{i,t}^t$	165	-0.27	4.20
		Forecast change	$\Delta Debt_{i,t}^{t-1}$	162	-1.01	3.57
		Forecast error of change	$EDebt_{i,t}^{t,t-1,CE}$	162	0.74 ***	2.62
Real GDP growth	SCPs' estimates and forecasts	Estimate	$y_{i,t}^t$	165	1.87	2.60
		Forecast	$y_{i,t}^{t-1}$	165	2.43	1.63
		Forecast error	$Ey_{i,t}^{t,t-1,PECE,PECE}$	165	-0.56 ***	1.55
	EC's estimates and SCPs' forecasts	Estimate	$y_{i,t}^t$	165	1.84	2.54
		Forecast	$y_{i,t}^{t-1}$	165	2.43	1.63
		Forecast error	$Ey_{i,t}^{t,t-1,CE,PECE}$	165	-0.59 ***	1.52
	EC's estimates and forecasts	Estimate	$y_{i,t}^t$	165	1.84	2.54
		Forecast	$y_{i,t}^{t-1}$	165	2.51	1.41
		Forecast error	$Ey_{i,t}^{t,t-1,CE,CE}$	165	-0.67 ***	1.69

Note: *** indicates a statistical significance at 1% level. The mean and standard deviation are expressed in percentage of GDP. Mean forecast error estimates correspond to coefficient α in equation (1).

According to Table 1, it is possible to draw two main conclusions: the estimated coefficients α are statistically significant, therefore the forecast errors are systematically different from zero; and the mean of forecast errors depends on the data source, mainly as regards public debt.

On average, the forecast errors of the budget balance change are negative and near to 0.5 per cent of GDP as a result of the observed decrease in the budget balance having been much higher on average than the forecast reduction, regardless of the source used.

As concerns public debt, forecast errors mean is positive, but its value diverges considerably depending on the source. When using the information from SCPs, the mean of observed change is 0.2 per cent of GDP, meaning that the positive forecast errors reflect an increase in the debt while the forecasts suggested a reduction. Considering the EC's estimates, the positive mean of the forecast errors reveal a debt reduction lower than expected.

Finally, the forecast errors mean of real GDP growth is negative by about 0.6 per cent of GDP, indicating a situation of effective growth which is systematically lower than what had been predicted, regardless of the data source.

This study includes six models, one for each dependent variable. Since two different data sources have been used, the models are estimated according to three different specifications presented as follows: specification A, consisting of the definition and construction of variables based on estimates by SCPs; specification B, showing results obtained with recourse to EC's estimates; and specification C, referring to the use of EC's estimates and EC's real GDP growth forecast or its corresponding forecast errors. The only exception here is the model concerning real GDP growth forecasts in which there are only two specifications based on governments' and EC's forecasts, respectively.

As a starting hypothesis, we have considered a model with country (v_i) and time (z_t) fixed effects. The alternative of a random effects model was ruled out based on a Breusch-Pagan test⁵; the utilization of a *pooled OLS* was considered inappropriate both in the case of budget balance and public debt forecast changes and of real GDP forecasts since the country fixed effects have statistical significance. Thus, we have decided to apply a fixed effects model for all dependent variables.⁶

In order to ascertain the need for instrumental variables, we have analysed the endogeneity of the "real GDP growth forecast" variable in the case of budget balance and public debt forecast changes and of "forecast error of real GDP growth" in the models used to explain the fiscal variables forecast errors.⁷ Under the null hypothesis of the endogeneity test, the endogenous explanatory variable can be considered as exogenous. This hypothesis is rejected only for the budget balance forecast change and, therefore, we have opted for a model with instrumental variables just in this case.

In order to examine the contribution of institutional variables related to domestic fiscal frameworks we have followed the procedure postulated by Beetsma *et al.* (2009), which consists of three steps. First, for each institutional variable we have computed the mean over time by country. Then, for each of the dependent variables, we have estimated the fixed effects by country of the regressions, including the significant economic and political variables. Finally, we have tried to establish whether the mean of each institutional variable is significant in the explanation of those fixed effects.

IV. Empirical results and discussion

In this section we proceed to present the models used to study the macroeconomic determinants of forecasts and forecast errors and analyse the results. As mentioned before, economic and political variables were first taken into account and only then have we moved on to assessing the effect of the institutional ones.

A. Economic and political determinants and supranational fiscal rules

To explain budget balance and public debt forecast change we have used the following two models:

$$(2) \quad \Delta B_{i,t}^{t-1} = v_i + z_t + \beta_1 y_{i,t}^{t-1} + \beta_2 B_{i,t-1}^{t-1} + \beta_3 Debt_{i,t-1}^{t-1} + \beta_4 PECb_{i,t-1}^{t-1} + \beta_5 OPFb_{i,t}^{t-1} + \beta_6 \Delta B_{i,t}^{t-2} + \beta_7 Pol + u_{i,t}$$

$$(3) \quad \Delta Debt_{i,t}^{t-1} = v_i + z_t + \beta_1 y_{i,t}^{t-1} + \beta_2 B_{i,t-1}^{t-1} + \beta_3 Debt_{i,t-1}^{t-1} + \beta_4 PECdebt_{i,t-1}^{t-1} + \beta_5 OPFdebt_{i,t}^{t-1} + \beta_6 \Delta Debt_{i,t}^{t-2} + \beta_7 Pol + u_{i,t}.$$

⁵ Hausman tests also suggest that the random effects estimator is inconsistent. However, this kind of test is sensitive to the heteroscedasticity problems identified.

⁶ For real GDP growth forecast errors the pooled OLS model results are also presented since the fixed effects for countries have no statistical significance; moreover, the estimated coefficients from the fixed effects model suggested that all the explanatory variables in specification C were statistically insignificant.

⁷ The endogeneity test statistics is numerically equal to the Hausman test statistics under the assumption of homogeneity, although the first test is robust to violations of this hypothesis.

The models include country (v_i) and time (z_t) fixed effects. The first three explanatory variables are common to both models and are, by order in which they appear in equations (2) and (3), "real GDP growth forecast for year t ", "budget balance estimates for year $t-1$ " and "public debt estimates for year $t-1$ ".

The next three explanatory variables concern the fiscal variable in study and are designated as "excessive budget deficit or excessive public debt", "optimism indicator of budget balance or debt forecasts from SCPs" and "budget balance or public debt forecast change regarding programmes submitted in year $t-2$ ".

Finally, the political variables are divided into three groups, depending on whether or not they lend themselves to examining the importance of opportunistic or ideological motivations and the degree of political system fragmentation.⁸ As far as opportunistic motivations are concerned, this section deals only with variable "regular elections" insofar as it includes elections that, at the time of SCPs submission, policy makers know will take place in year t . The other political variables regard the year when forecasts are published.

Columns A, B and C of Table 2 present the coefficients for the statistically significant variables for each of the three specifications considered as regards the explanation of budget balance and public debt forecast changes.

TABLE 2
Budget balance and public debt forecast changes

	$\Delta B_{i,t}^{t-1}$				$\Delta Debt_{i,t}^{t-1}$		
	A	B	C		A	B	C
$y_{i,t}^{t-1}$	0.392* (0.198)	0.478*** (0.148)	0.638*** (0.178)	$y_{i,t}^{t-1}$		-0.514*** (0.135)	-0.670** (0.266)
$B_{i,t-1}^{t-1}$	-0.255** (0.095)	-0.340*** (0.077)	-0.355*** (0.062)	$B_{i,t-1}^{t-1}$	-0.730*** (0.128)	-0.759*** (0.112)	-0.698*** (0.138)
$Debt_{i,t-1}^{t-1}$				$Debt_{i,t-1}^{t-1}$		-0.079*** (0.021)	-0.072*** (0.019)
$PECb_{i,t-1}^{t-1}$	0.199** (0.084)			$PECdebt_{i,t-1}^{t-1}$			
$OPFb_{i,t}^{t-1}$		0.446** (0.163)	0.668*** (0.100)	$OPFdebt_{i,t}^{t-1}$	-0.214*** (0.060)	-0.692*** (0.134)	-0.725*** (0.125)
$\Delta B_{i,t}^{t-2}$	0.355*** (0.117)	0.400*** (0.117)	0.320*** (0.127)	$\Delta Debt_{i,t}^{t-2}$	0.463*** (0.149)	0.468* (0.223)	0.547** (0.222)
$gov_new_{i,t-1}$	0.253*** (0.071)	0.265** (0.096)	0.248*** (0.109)	$gov_party_{i,t-1}$	0.170** (0.079)		
R²	0.80	0.84	0.86	R²	0.81	0.89	0.89
N	150	150	150	N	146	146	146

Notes: *, **, ***, indicate statistical significance at 10%, 5% and 1% levels, respectively.

As regards budget balance forecast change, models comprise instrumental variables with country and time fixed effects. The "real GDP growth forecast" is instrumented by the "real GDP growth estimate for the year $t-1$ ", published at the end of year $t-1$ by national governments in specification A and by the EC in specifications B and C.

Panel data models with country and time fixed effects for public debt forecast change do not include instrumental variables. Standard errors corrected by the jackknife method are given in parentheses.

As expected, improvements in the economic growth perspectives ($y_{i,t}^{t-1}$) reflect themselves on more favourable budget balance and also public debt forecast changes when EC's estimates are taken into account.

A worsening of 1 per cent of GDP in the budget balance estimate for the year in which the forecasts are published ($B_{i,t-1}^{t-1}$) leads to a further fiscal adjustment of about 0.3 per cent of GDP in year t ; the remaining 2/3 result in an increase of the public debt forecasts for year t .

⁸See Appendix.

The "public debt estimates for year $t-1$ " ($Debt_{i,t-1}^{t-1}$) are not statistically significant in explaining budget balance forecast change. In the case of public debt, its estimated coefficient is statistically significant when one considers EC's estimates despite its low absolute value. These results are an indication of governments' little concern for restraining the growth of public debt ratios.

The "excessive budget deficit and excessive public debt" are used only for EMU countries. The variables have a positive value when the estimate of the fiscal variable published by the EC at the time of the forecasts elaboration indicates a violation of the respective Maastricht Treaty limit in year $t-1$.

In specification A, the estimated coefficient of the "excessive budget deficit" ($PECb_{i,t-1}^{t-1}$) is positive and statistically significant, showing that the more excessive the amount of the deficit, the greater the forecast adjustment of the budget balance. However, when the source data is the EC, this variable loses statistical significance. This difference between specifications may reveal an intentional behaviour from EMU governments in excessive deficit situation wanting to signal their commitment to the deficit rule.

The estimated coefficient of "excessive public debt" ($PECdebt_{i,t-1}^{t-1}$) has no statistical significance in any of the specifications. This seems to confirm governments', EC's and ECOFIN's less attention to situations of excessive debt as compared to excessive budget deficits.

The "optimism indicator of budget balance or debt forecasts from SCPs" corresponds to the difference between the forecasts inscribed in SGPs and those produced by the EC. The variables have a positive sign when the situation of public finances predicted by national governments is more favourable than the one predicted by the EC. The size and significance of the corresponding coefficients depend on the source of the statistical information. This outcome indicates there are differences between forecasts and also between the estimates produced by governments and by the EC which affect the size of budget balance and the public debt forecast change.⁹

As regards the fiscal variable under study, and considering that SCPs are rolling and flexible multiannual budgetary frameworks, the variable "forecast change in the programmes submitted in year $t-2$ " aims to examine the relationship between the forecast change in year $t-2$ and the one in year $t-1$. The interpretation of estimated coefficients suggests a downward revision of forecast changes inscribed in SCPs that had been submitted in the previous year. The lack of commitment is greater for budget balance, probably because those plans are more ambitious in view of European institutions' greater scrutiny.

Most political variables are not significant, with two exceptions. Changes of party composition of cabinet in the year in which the budget balance forecasts are published determine greater fiscal consolidations plans ($gov_new_{i,t-1}$). In the case of public debt, when one uses estimates from SCPs, leftist parties tend to present more pessimistic public debt forecast changes than the right wing and centre parties ($gov_party_{i,t-1}$).

The study of determinants of forecast errors of budget balance and public debt changes is based on the following models:

$$(4) \quad EB_{i,t}^{t,t-1} = v_i + z_t + \beta_1 EB_{i,t-1}^{t-1,t-2} + \beta_2 Ey_{i,t}^{t,t-1} + \beta_3 \Delta B_{i,t}^{t-1} + \beta_4 DPECb_{i,t-1}^{t,t-1} + \beta_5 Pol + u_{i,t}$$

$$(5) \quad EDebt_{i,t}^{t,t-1} = v_i + z_t + \beta_1 EDebt_{i,t-1}^{t-1,t-2} + \beta_2 Ey_{i,t}^{t,t-1} + \beta_3 \Delta Debt_{i,t}^{t-1} + \beta_4 DPECdebt_{i,t-1}^{t,t-1} + \beta_5 Pol + u_{i,t}$$

⁹ Castro *et al.* (2011) have analysed the government's revisions of fiscal balance estimates and have concluded that the information published first is not only biased but also inefficient while budget balance estimates tend to be revised upwards.

Besides the "forecast error of real GDP growth" ($Ey_{i,t}^{t,t-1}$), which is common to both models, three explanatory variables are considered for the fiscal variable under study: the "lagged forecast error" ($EB_{i,t-1}^{t-1,t-2}; EDebt_{i,t-1}^{t-1,t-2}$), the "forecast change" ($\Delta B_{i,t}^{t-1}; \Delta Debt_{i,t}^{t-1}$) and the "revision of the excessive budget deficit and public debt" ($DPECb_{i,t-1}^{t,t-1}; DPECdebt_{i,t-1}^{t,t-1}$).¹⁰

In order to understand whether changes in the political context are likely to explain the forecast errors, we have examined the political variables describing the governments' behaviour in the year following the publication of forecasts. In the case of opportunistic motivations, the variables "elections" and "early elections" have been considered. The estimated coefficients for specifications A, B and C are shown in Table 3.

TABLE 3

Forecast errors of budget balance and public debt changes

	$EB_{i,t}^{t,t-1}$				$EDebt_{i,t}^{t,t-1}$		
	A	B	C		A	B	C
$EB_{i,t-1}^{t-1,t-2}$	0.306*** (0.103)			$EDebt_{i,t-1}^{t-1,t-2}$			
$Ey_{i,t}^{t,t-1}$	0.490*** (0.093)	0.452*** (0.096)	0.349** (0.132)	$Ey_{i,t}^{t,t-1}$	-0.989** (0.409)	-0.710** (0.301)	-0.771* (0.366)
$\Delta B_{i,t}^{t-1}$		-0.247** (0.090)	-0.277** (0.106)	$\Delta Debt_{i,t}^{t-1}$		-0.319*** (0.094)	-0.374*** (0.093)
$DPECb_{i,t-1}^{t,t-1}$	1.079* (0.565)	0.959*** (0.242)	1.111*** (0.235)	$DPECdebt_{i,t-1}^{t,t-1}$			
$elect_{i,t}$	-0.418* (0.207)			$snap_{i,t}$	1.728* (0.934)	1.583** (0.730)	1.264* (0.658)
$gov_party_{i,t}$		-0.135** (0.058)		$gov_new_{i,t}$	0.679* (0.375)		0.837* (0.456)
$gov_gap_{i,t}$			-0.210* (0.104)				
$gov_type_{i,t}$	-0.309* (0.159)						
$gov_chan_{i,t}$		-0.383** (0.153)	-0.411** (0.166)				
R²	0.60	0.65	0.60	R²	0.58	0.49	0.50
N	150	165	165	N	162	162	162

Notes: *, **, ***, indicate statistical significance at 10%, 5% and 1% levels, respectively. The models are estimated with country and time fixed effects. Standard errors corrected by the jackknife method are given in parentheses.

Negative "forecast errors of output growth" ($Ey_{i,t}^{t,t-1}$) affect the implementation of planned budget balance and public debt changes, with most unfavourable consequences in the case of public debt.

The "lagged forecast error" ($EB_{i,t-1}^{t-1,t-2}$) has only significance in explaining the forecast error of the budget balance changes when the estimates used are inscribed in SCPs. Therefore, only in this case does some persistence seem to occur. On the contrary, "forecast budget balance and public debt changes" ($\Delta B_{i,t}^{t-1}; \Delta Debt_{i,t}^{t-1}$) are only significant when estimates provided by the EC have been used. Their joint analysis suggests that, in the case of budget balance, negative lagged forecast errors partly account for negative forecasts when statistical information from SCPs is used. However, when the analysis is carried out with recourse to EC estimates, optimistic forecast changes imply negative forecast errors. In both situations, the absolute value of the estimated coefficient is between 0.2 and 0.3. The inverse relationship

¹⁰We have also included the "estimate for the year t-1" and the "difference between estimates for year t-1 and published in years t and t-1" for budget balance and public debt, respectively; nevertheless, these variables were removed due to their lack of statistical significance.

between the optimism of the forecast changes and their effective implementation justifies that the study of forecast error determinants also comprises the analysis of forecasts' explanatory variables.

The "revision of excessive budget deficit and public debt" ($DPECb_{i,t-1}^{t,t-1}$ and $DPECdebt_{i,t-1}^{t,t-1}$) shows positive signs when an unfavourable revision of estimates of deficit and debt occurs, and negative signs, when the excessive situation is more favourable than that thought to exist at the date of forecasts publication. For budget balance, the estimated coefficient is high, positive and has statistical significance in the explanation of the forecast errors. Its interpretation suggests that identifying a situation of excessive deficit which proves to be worse than initially estimated impels governments to undertake additional fiscal adjustment measures, resulting in an improvement of the budget balance that is higher than the one planned.¹¹ Again, the same does not apply when there are unfavourable revisions of public debt estimates above 60% of GDP.

The political variables with statistical significance depend on the data source, but in any case, the opportunistic and ideological motivations along with the political system fragmentation undermine the implementation of forecast changes of fiscal variables. "Legislative elections at year t " ($elect_{i,t}$) harm budget consolidation plans when estimates from SCPs are used and "early elections" ($snap_{i,t}$), outside the normal calendar, contribute to an increase of forecast errors of public debt changes by at least 1.3 per cent of GDP. When estimates provided by EC are used, the estimated coefficients of political variables concerning ideological motivations ($gov_party_{i,t}$; $gov_gap_{i,t}$) reveal that changes from right-wing parties to leftist ones also harm budget implementation. The increase in the number of parties in government ($gov_type_{i,t}$) and the increase of "changes in government per year" ($gov_chan_{i,t}$) contribute to greater and more negative forecast errors of the budget balance, when SCPs' and EC's estimates, respectively, are used. Finally, a "new party composition of cabinet" ($gov_new_{i,t}$) implies an increase in the forecast errors of public debt change, except in specification B.

In order to explain real GDP growth forecasts, we have considered the following model:

$$(6) \quad y_{i,t}^{t-1} = v_i + z_t + \beta_1 y_{i,t-1}^{t-1} + \beta_2 B_{i,t-1}^{t-1} + \beta_3 PECb_{i,t-1}^{t-1} + \beta_4 OPF y_{i,t}^{t-1} + \beta_5 Pol + u_{i,t}.$$

The explanatory economic variables are, in the order in which they appear in (6), the "real GDP growth estimate", the "budget balance estimate", both for year $t-1$, the "excessive budget deficit" and the "optimism indicator of economic forecasts".

The model for the real GDP growth forecast error is:

$$(7) \quad Ey_{i,t}^{t,t-1} = v_i + z_t + \beta_1 y_{i,t}^{t-1} + \beta_2 Dy_{i,t-1}^{t,t-1} + \beta_3 DB_{i,t-1}^{t,t-1} + \beta_4 DPECb_{i,t-1}^{t,t-1} + \beta_5 Pol + u_{i,t}.$$

Four economic variables have been analysed: "real GDP growth forecast" ($y_{i,t}^{t-1}$), the "difference between real GDP growth estimates for the year $t-1$ " ($Dy_{i,t-1}^{t,t-1}$), the "difference between budget balance estimates for the year $t-1$ " ($DB_{i,t-1}^{t,t-1}$) and "revision of the excessive budget deficit" ($DPECb_{i,t-1}^{t,t-1}$).

Regarding the political determinants of economic forecasts and errors, we have considered the same variables used to account for forecast changes and forecast errors of fiscal variables, respectively.

Taking into account the results presented in Table 4 for specifications A and B, which concern forecasts provided by governments and by the EC, respectively, it is possible to

¹¹Pina (2009) concludes similarly. Inversely, the variable has no statistical significance in Beetsma *et al.* (2009).

conclude that all the variables are statistically significant in explaining the real GDP growth forecasts, with the exception of the " budget balance estimate " ($B_{i,t-1}^{t-1}$). These results do not support the use of a "window dressing" strategy to subvert the fiscal rules, i.e., more negative budget balances do not systematically lead to more optimistic economic growth forecasts.

TABLE 4

Forecasts and forecast errors of real GDP growth

	$y_{i,t}^{t-1}$			$Ey_{i,t}^{t,t-1}$					
	A	B		A	B	C	A'	B'	C'
$y_{i,t-1}^{t-1}$	0.532*** (0.059)	0.522*** (0.036)	$y_{i,t}^{t-1}$	-0.249 (0.274)	-0.275 (0.331)	0.018 (0.373)	-0.091 (0.098)	-0.136 (0.113)	-0.017 (0.083)
$B_{i,t-1}^{t-1}$			$Dy_{i,t-1}^{t,t-1}$	0.792** (0.356)	0.461 (0.378)	0.421 (0.280)	0.827*** (0.245)	0.512* (0.269)	0.378* (0.213)
$PECb_{i,t-1}^{t-1}$	-0.241*** (0.063)	-0.196*** (0.064)	$DB_{i,t-1}^{t,t-1}$	-0.082 (0.213)	-0.008 (0.121)	-0.001 (0.102)	-0.008 (0.131)	0.003 (0.129)	-0.036 (0.105)
$OPFy_{i,t}^{t-1}$	0.763*** (0.054)	-0.131** (0.054)	$DPECb_{i,t-1}^{t,t-1}$	-0.319* (0.166)	-0.481* (0.261)	-0.471 (0.318)	0.107 (0.169)	-0.063 (0.245)	-0.427 (0.536)
$gov_chan_{i,t-1}$	-0.123* (0.058)	-0.101* (0.049)							
R^2	0.94	0.91		0.71	0.69	0.78	0.68	0.66	0.77
N	165	165		165	165	165	165	165	165

Notes: *, **, ***, indicate statistical significance at 10%, 5% and 1% levels, respectively. The models are estimated with country and time fixed effects in the columns A, B and C. Pooled OLS models appear in columns A', B' e C'. Standard errors corrected by the jackknife method are given in parentheses.

More favourable economic estimates for year $t-1$ in one per cent of GDP contribute to an increase of economic growth forecasts by 0.5 per cent of GDP. For EMU countries, however, a worsening of an excessive deficit situation reduces real growth GDP forecasts, probably as a result of the need to implement fiscal consolidation plans.

The "optimism indicator for economic forecasts" ($OPFy_{i,t}^{t-1}$) corresponds to the difference between the real GDP growth forecasts provided by governments and by the EC. This variable has a positive sign when the official government forecasts are relatively more optimistic. Their estimated coefficients report that economic growth forecasts from SCPs tend to be more optimistic than the forecasts done by the EC.

Of all the political variables analysed, only the "number of changes in government" ($gov_chan_{i,t-1}$) was considered to be statistically significant in explaining real GDP growth forecasts. Changes in government in the year of forecasts' publication to contribute to slightly unfavourable forecasts and are likely to be the result of governments' intention to implement restrictive fiscal measures.

With respect to real GDP growth forecast errors, estimated coefficients from models with country and time fixed effects are shown in specifications A, B and C. The "difference between real GDP growth estimates for the year $t-1$ " ($Dy_{i,t-1}^{t,t-1}$) has a positive and significant coefficient in specification A, leading to the conclusion that downward revisions of economic growth estimates imply higher and negative real GDP growth forecast errors. This causality derives from the fact that, as it has already been mentioned, growth forecasts are more optimistic when the economic estimates for year $t-1$ are more favourable. The "revision of excessive budget deficit" ($DPECb_{i,t-1}^{t,t-1}$) has statistical significance in specifications A and B; ergo, an excessive deficit that is actually worse than what had been initially estimated results in an observed growth which is lower than planned. For specification C, none of the variables are statistically significant.

Given these findings and as a result of country fixed effects having no statistical significance in any of the three specifications, a pooled OLS model appeared to be the best option. According to the results for specifications A', B' and C', the "difference between real GDP growth estimates for the year $t-1$ " ($Dy_{i,t-1}^{t,t-1}$) is the only variable with statistical significance and the resulting forecast errors are higher when the estimates and the forecasts from SCPs are used.

Finally, the political variables are not statistically significant in explaining economic growth forecast errors.

B. Institutional determinants

The institutional variables associated to the domestic fiscal frameworks correspond to five indicators; these characterise countries according to: governance (*delegation*), multiannual budgetary frameworks (*MTBF*), national fiscal rules (*rule*), independent domestic fiscal institutions (*institution*) and forecasts produced by independent institutions (*indprev*).¹² Table 5 reports the estimated coefficients for the mean of each institutional variable.¹³

TABLE 5
Institutional variables

	A	B	C	A	B	C	A	B	C
	v_i de $\Delta B_{i,t}^{t-1}$			v_i de $\Delta Debt_{i,t}^{t-1}$			v_i de $y_{i,t}^{t-1}$		
<i>delegation_i</i>	-0.221 (0.06)	-0.545 * (0.23)	-0.436 (0.11)	-1.418 *** (0.46)	0.162 (0.00)	-0.027 (0.00)	-0.102 (0.03)	-0.153 (0.06)	
<i>MTBF_i</i>	0.747 *** (0.44)	1.019 *** (0.50)	1.226 *** (0.56)	0.580 (0.05)	0.415 (0.01)	0.144 (0.00)	-0.493 ** (0.48)	-0.541 ** (0.45)	
<i>rule_i</i>	0.640 (0.18)	0.812 (0.18)	1.019 (0.22)	1.350 (0.15)	-2.270 ** (0.22)	-2.277 ** (0.25)	-0.533 ** (0.31)	-0.540 * (0.25)	
<i>institution_i</i>	0.151 (0.01)	-0.025 (0.00)	0.079 (0.00)	-0.788 (0.05)	-1.116 (0.06)	-1.174 (0.07)	-0.421 * (0.21)	-0.443 * (0.18)	
<i>indprev_i</i>	0.451 ** (0.07)	0.551 ** (0.06)	0.527 * (0.05)	-0.547 (0.02)	1.540 (0.08)	1.420 (0.08)	-0.313 * (0.08)	-0.324 * (0.07)	
	v_i de $EB_{i,t}^{t,t-1}$			v_i de $EDebt_{i,t}^{t,t-1}$			v_i de $Ey_{i,t}^{t,t-1}$		
<i>delegation_i</i>	-0.297 (0.07)	0.240 (0.11)	0.116 (0.04)	0.112 (0.00)	0.969 * (0.24)	1.088 ** (0.30)	-0.154 (0.05)	-0.142 (0.04)	0.158 (0.09)
<i>MTBF_i</i>	0.912 *** (0.43)	0.439 (0.23)	0.405 ** (0.33)	-1.331 (0.26)	-1.157 ** (0.22)	-1.203 ** (0.23)	-0.393 (0.19)	-0.319 (0.13)	0.030 (0.00)
<i>rule_i</i>	0.392 (0.04)	0.29 (0.06)	0.190 (0.04)	-2.061 * (0.35)	-1.420 (0.18)	-1.376 (0.17)	-0.050 (0.00)	-0.017 (0.00)	0.191 (0.05)
<i>institution_i</i>	-0.331 (0.03)	0.114 (0.01)	0.203 (0.05)	-0.973 (0.08)	0.501 (0.02)	0.415 (0.02)	0.030 (0.00)	0.003 (0.00)	0.260 (0.10)
<i>indprev_i</i>	0.150 (0.01)	0.270 * (0.04)	0.419 *** (0.16)	0.183 (0.00)	0.334 (0.01)	0.060 (0.00)	-0.093 (0.00)	-0.017 (0.00)	0.028 (0.00)

Notes: *, **, ***, indicate statistical significance at 10%, 5% and 1% levels, respectively. OLS models present robust standard errors. R² are given in parentheses.

¹² Indices regarding multiannual budgetary frameworks, national fiscal rules, independent fiscal institutions and independent forecasts were normalized to the [0, 1] interval.

¹³ Statistical significance of institutional variables mean values cannot be looked into simultaneously, because of multicollinearity problems which affect the sign and significance of their respective coefficients.

In what concerns institutional determinants, we wish to highlight the following conclusions:

- Countries with qualitatively superior multiannual budgetary frameworks and independent forecasts report more optimistic budget balance forecasts, but their effective implementation is higher. For public debt, the quality of the multiannual budgetary frameworks is not relevant in explaining the forecast changes, but it reduces the size of forecast errors in regressions with information provided by the EC.
- Stronger national fiscal rules lead to forecasts of further reduction of the public debt when EC's estimates are used and reduce the size of forecast error of public debt changes when the official government estimates are taken into consideration.
- Governments operating under delegation publish more conservative budget balance forecasts in specification B and more optimistic public debt forecasts in specification A than those operating under contracts; conversely, they present higher forecast errors of public debt change in specifications B and C.
- Except for the variable "*delegation*", all the institutional variables reduce the economic growth forecasts. Hence, the domestic institutional framework quality decreases the output growth forecasts optimism. Nevertheless, these variables are not statistically significant in explaining economic growth forecast errors.
- The "multiannual budgetary frameworks" stands out for the size of the determination coefficient (R^2) in the regressions concerning budget balance forecast change and real GDP growth forecasts. The change of its respective index explains about half of the estimated country fixed effects.

V. Conclusions

This paper has explored the determinants of budget balance, public debt and real GDP growth forecasts and the corresponding forecast errors. The results from the empirical analysis allow us to make a preliminary evaluation of the 2011 SGP reform.

Budget deviations are accounted for by the forecast errors of economic growth and by the respective forecast changes when EC's estimates have been used. Budget balance and public debt forecast changes review the changes inscribed in the SCPs submitted in the previous year in a very unfavourable light. Therefore, the governments' "bad intention" seems to have been the result of their lack of commitment to the fiscal objectives established in the previous SCPs. This fact is responsible for the recurrent delays in the implementation of fiscal consolidation plans.

The 2011 SGP reform introduced financial sanctions in its preventive arm in case of deviations from the expenditure rule. It now states that public expenditure growth should not exceed the potential output growth. Since control of public expenditure is essential for an appropriate fiscal consolidation process, in the future this change may help minimise problems of implementation that may occur during that process.

The optimism of budget balance and public debt forecasts done by some governments, as compared to EC's forecasts, explains the forecast changes of the corresponding variables. The size and significance of the estimated coefficients vary according to data sources; this indicates there are relevant differences between forecasts and estimates originated by the two sources. On the other hand, real GDP growth forecast errors seem to be mainly the result of "misinformation" problems regarding the economic situation at the time the forecasts were elaborated. However, forecast errors are greater when the estimates and the forecasts of real growth of GDP from SCPs have been used.

In the 2011 SGP's reform, there was an intention of improving the transparency of the statistical information used in multilateral surveillance. The principle of statistical independence was introduced along with the possibility of applying fines to EMU countries which misrepresent deficit and debt data relevant to SPG. These changes should reduce the

size of budget deviations, since known estimates in real time determine forecasts and their revision significantly influences the size of economic growth forecast errors.

Our results support the conclusion that governments' economic growth forecasts were more optimistic than the EC's and also that governments may have resorted to the "window dressing" strategy. Some authors argue that governments should be required to use EC's forecasts or even forecasts done by an independent domestic institution. This option was neither adopted in the original version of SGP nor in its 2005 and 2011 revisions. Governments can still use their own forecasts although, since 2011, more transparency has been required concerning methodologies, assumptions and relevant parameters on which forecasts are based.

With respect to the influence of supranational fiscal rules, the empirical analysis carried out leads to two conclusions. An excessive deficit at the time of forecasts elaboration contributes to more prudent economic forecasts, probably to meet the need for more restrictive fiscal policy measures. Moreover, the fact that excessive deficit proves to outgrow the first estimates encourages governments to carry out further fiscal adjustments which provides an improvement of budget balance higher than it had been planned. On the contrary, situations of excessive public debt were not object of concern. However, since 2011 the debt rule has become stronger, i.e., it is possible to open an excessive deficit procedure on the basis of debt criterion.

As far as institutional variables are concerned, our findings point to better domestic institutional frameworks contributing to more prudent GDP growth forecasts and smaller fiscal deviations. Therefore, as long as Member States ensure that their budgetary frameworks are in line, with, at least, the minimum quality standards established in the latest SGP reform, one can expect smaller forecast errors.

Overall, the findings of this paper are in line with the relevant changes introduced in the 2011 SGP reform. Future work could tackle...

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Appendix - Data description and sources

A. Expressions for calculating the variables

$$\Delta B_{i,t}^{t-1} = B_{i,t}^{t-1} - B_{i,t-1}^{t-1}$$

$$\Delta Debt_{i,t}^{t-1} = Debt_{i,t}^{t-1} - Debt_{i,t-1}^{t-1}$$

$$EB_{i,t}^{t,t-1} = \Delta B_{i,t}^t - \Delta B_{i,t}^{t-1} = (B_{i,t}^t - B_{i,t-1}^t) - (B_{i,t}^{t-1} - B_{i,t-1}^{t-1})$$

$$EDebt_{i,t}^{t,t-1} = \Delta Debt_{i,t}^t - \Delta Debt_{i,t}^{t-1} = (Debt_{i,t}^t - Debt_{i,t-1}^t) - (Debt_{i,t}^{t-1} - Debt_{i,t-1}^{t-1})$$

$$Ey_{i,t}^{t,t-1} = y_{i,t}^t - y_{i,t}^{t-1}$$

$$OPFb_{i,t}^{t-1} = B_{i,t}^{t-1,PECE} - B_{i,t}^{t-1,CE}$$

$$OPFdebt_{i,t}^{t-1} = -(Debt_{i,t}^{t-1,PECE} - Debt_{i,t}^{t-1,CE})$$

$$\Delta B_{i,t}^{t-2} = B_{i,t}^{t-2} - B_{i,t-1}^{t-2}$$

$$\Delta Debt_{i,t}^{t-2} = Debt_{i,t}^{t-2} - Debt_{i,t-1}^{t-2}$$

$$PECb_{i,t-1}^{t-1} = (-B_{i,t-1}^{t-1} - 3), \text{ if } B_{i,t-1}^{t-1} < -3\%$$

$$PECdebt_{i,t-1}^{t-1} = (Debt_{i,t-1}^{t-1} - 60), \text{ if } Debt_{i,t-1}^{t-1} > 60\%$$

$$DPECb_{i,t-1}^{t,t-1} = (-B_{i,t-1}^t - 3) - (-B_{i,t-1}^{t-1} - 3), \text{ if } B_{i,t-1}^t < -3$$

$$DPECdebt_{i,t-1}^{t,t-1} = (Debt_{i,t-1}^t - 60) - (Debt_{i,t-1}^{t-1} - 60), \text{ if } Debt_{i,t-1}^t > 60$$

B. Political variables: description and data sources

- Opportunistic motivations: “legislative elections” ($elect_{i,t}$); “regular elections” ($regular_{i,t}$) and “early elections” ($snap_{i,t}$).

- Ideological motivations: “cabinet composition” ($gov_party_{i,t}$) and “ideological gap between the new and the old cabinet” ($gov_gap_{i,t}$).

- Degree of political system fragmentation: “type of government” ($gov_type_{i,t}$) – size fragmentation; “number of changes in government per year” ($gov_chan_{i,t}$) and “new party composition of cabinet” ($gov_new_{i,t}$) - time fragmentation.

The political variables were collected from the database published by Armingeon *et al.* (2009), except for the elections related variables. Such variables as “regular elections” and “early elections” are dummy variables taking the value 1 in the years in which elections happen regularly and early, respectively. Elections are considered regular when they occur in the year in which the mandate ends or when the anticipation not exceed six months. Otherwise, they are considered early. For these variables, we have used Golinelli and Momigliano (2009) database, which we have completed in this empirical study.

C. Institutional variables (domestic framework): description and data sources

- “Delegation countries” ($delegation_{i,t}$) – is a dummy variable that takes the value 1 for countries operating under delegation and zero for countries operating under contracts. The countries classified as “delegation countries” are: Austria, Germany, Greece, Spain, France, Italy, Portugal and the United Kingdom.

- “Multiannual budgetary frameworks” ($MTBF_{i,t}$) – corresponds to the quality of medium term budgetary framework index by EC.
- “National fiscal rules” ($rule_{i,t}$) – corresponds to the fiscal rule index by EC.
- “Independent fiscal institutions” ($institution_{i,t}$) and “independent forecast” ($indprev_{i,t}$) – the independent fiscal institutions index was computed according to Kumar and Debrun (2008). This index is a simple average of the following criteria: 1) legal influence of the institution in the budget process; 2) independence from political power; 3) independent forecasts’ usefulness; and 4) perception of its effective contribution. The criterion on the usefulness of independent forecasts corresponds to the independent forecasts.