Symposium Article

Fiscal Forecasts and Slippages: The Role of the SGP and Domestic Fiscal Frameworks

PATRÍCIA MARTINS & LEONIDA CORREIA

Department of Economics, Sociology and Management (DESG), Centre for Transdisciplinary Development Studies (CETRAD), University of Trás-os-Montes and Alto Douro (UTAD), Escola de Ciências Humanas e Sociais – Polo II, Vila Real 5000-801, Portugal.

This paper studies the determinants of budget balance, public debt, and gross domestic product growth forecasts presented in the Stability and Convergence Programs for 15 European countries and respective forecasting errors for the period 1999–2009. Our results suggest that governments were more engaged in the preparation of budget balance forecasts than public debt forecasts because of the definition and application of the Stability and Growth Pact. Economic forecasts submitted by governments are generally more optimistic than those of the European Commission, but the inaccuracy is because of information problems. Countries with better domestic institutional frameworks publish more prudent economic forecasts.

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INTRODUCTION

The Stability and Growth Pact (SGP) was designed to enforce fiscal discipline in the member states of the European Union (EU). The recent crisis, mainly the sovereign debt crisis in some countries of the euro area, led to a deep reform of the EU's economic governance framework. The 2011 and 2013 SGP reforms aim to deliver longer-term improvements in EU public finances by tightening enforcement and enshrining EU rules at the national level.

The preventive arm of the SGP requires countries to achieve medium-term budgetary objectives, ensuring the sustainability of public debt and providing room for fiscal maneuver in the economic stabilization required in periods of recession without violating the budget deficit limit. In the annually established Stability and Convergence Programs (SCPs), the governments of both euro area and non-euro area member states determine, respectively, what adjustment paths are required to achieve their medium-term budgetary objectives and the economic assumptions that underpin them.

The persistence of budget deficits above 3% of gross domestic product (GDP) in several European Monetary Union (EMU) countries between 1999 and 2011 suggests that some countries may systematically have failed to implement the adjustment paths defined in their SCPs. Until the 2011 SGP reform, the preventive arm functioned as an *ex ante* fiscal rule: there was no *ex post* verification of compliance with the planned adjustment paths, nor did sanctioning procedures exist to punish unjustified slippages. Under these circumstances, governments may have been tempted to present forecasts in their SCPs that overestimated what could in fact be achieved in order to be sure of meeting *ex ante* criteria.

Studies of budgetary slippages can be divided into two groups. In the first, authors have investigated forecasting errors (eg, Strauch *et al.*, 2004; Annett, 2006; Brück and Stephan, 2006; Pina and Venes, 2011), while in the second, they have been more concerned with implementation errors (eg, Moulin and Wierdsma, 2006; EC, 2007; Beetsma and Giuliodori, 2010; Beetsma *et al.*, 2009; Pina, 2009; von Hagen, 2010; Frankel and Schreger, 2013). Both concepts refer to the difference between budgetary outcomes and forecasts. However, when the budgetary slippages are defined as implementation errors, it is stressed that their main cause is a lack of implementation of planned measures. The authors recognize that the forecasts that governments submit in their SCPs may contain a strategic element. It should not be expected that governments will consider all the available information, or that their forecasts will be accurate and unbiased. This means that the implementation of the SGP may aggravate rather than mitigate the problem of time inconsistency identified by Kydland and Prescott (1977). In the annual SCPs, while governments may design their adjustment paths with a view to positively influencing the evaluation of the European Commission (EC), the implementation of expansionary policy measures can exacerbate the problems of large deficits and public debts. Therefore, the second group of studies highlights the importance of investigating at the same time both the determinants of forecasts and subsequent deviations from plans. This paper pursues the type of research undertaken by these studies.

Our main objects of study are the budget balance, public debt, and economic forecasts incorporated into the SCPs submitted between 1998/1999

and 2008/2009 by the governments of the 15 EU member states before the 2004 enlargement. We intend to examine if these forecasts and the corresponding forecast errors are explained by the definition and application of the SGP until the recent crisis.

So far, to our knowledge, no published paper has examined the determinants of public debt forecasts and/or their corresponding errors. The relation between public debt and deficits is to a large extent an identity. However, we are interested in testing whether the governments were more engaged in the preparation of budget balance forecasts than public debt forecasts. This seems a possibility as the public debt rule of the SGP does not seem to have been a matter of great concern until 2011.

Given the importance of real GDP growth forecasts in constituting fiscal forecasts and in explaining any subsequent slippages, and the fact that governments are more likely to make growth forecasts deliberately optimistic if their budget deficits are large, it was thought important also to analyze the determinants of real GDP growth forecasts and their respective errors. Moreover, we drew on both SCP forecasts and EC autumn forecasts because EC forecasts have a prominent role in the SGP.

In addition, we are interested in testing how domestic fiscal frameworks can explain the different performance of EU governments' forecasts. After the onset of the crisis, legislative developments at the EU level recognized the importance of fiscal governance in the member states (EC, 2014). The 2011 reform of the SGP established a collection of new laws, known as the Six Pack, which includes a directive on the requirements for budgetary frameworks of the member states (Directive 2011/85/EU). This directive reinforces the injunction that realistic forecasts should be used for fiscal planning. In 2013, the Two Pack went further and introduced the requirement for national medium-term fiscal plans and draft budgets of the EMU countries to be based on independent and public macroeconomic forecasts. Several authors (Jonung and Larch, 2006; Frankel and Schreger, 2013; Debrun and Kinda, 2014) have highlighted that the independent fiscal institutions, usually termed fiscal councils, involved in the provision or assessment of forecasts, contribute to less biased macroeconomic and budgetary forecasts.

In this study, we focus on forecasts published in SCPs for the years 1999–2009. In the period between 1998 and 2010, dates for the submission of SCPs varied from country to country and from year to year, usually falling between the October and February following the year to which they referred. Thus, for example, forecasts for the year 2009 were published at the end of year 2008 or in the first quarter of 2009 and so to compute the respective forecast errors, we use the estimates from SCPs summited at the end of 2009 or at the beginning of 2010. After 2011, the introduction of the European Semester required member

states to publish their SCPs during the first semester of the year, usually in March. As governments did not publish SCPs at the end of 2010, it is not possible to extend our sample after 2009 with directly comparable data.

The remainder of this paper is structured as follows: The next section reviews the main results in the empirical literature on the determinants of fiscal forecasts and respective forecasting errors; the subsequent section presents the dependent variables, the statistical properties of forecasting errors, and describes the methodology used; the penultimate section presents the models and discusses the results of our econometric analysis; and the final section summarizes our conclusions.

DETERMINANTS OF FISCAL FORECASTS AND FORECASTING ERRORS

The principal variables determining forecasts and forecasting errors have an economic, political, or institutional nature: economic determinants are related to cyclical circumstances and/or to the state of public finances; political determinants are associated with electoral cycles, partisan cycles, and/or whether one or several parties form the government, often collectively referred to as political fragmentation in the literature; and institutional determinants have their origins in the structure and dynamics of domestic institutions.

Economic variables

Until 2011, the SGP had a preventive arm consisting of an *ex ante* fiscal rule and a corrective arm that imposed a 3% limit on the deficit-to-GDP ratio; this may have encouraged biased forecasting on the part of governments, particularly in member states where public finances had attained excessive deficits. As enforcement of the SGP is related to economic variables, in this study we opted to analyze simultaneously both the economic determinants and the contribution of the SGP.

Some research indicate that observed budget deficits are higher than forecasts when growth has been unexpectedly poor (Brück and Stephan, 2006; Beetsma *et al.*, 2009; Pina and Venes, 2011). This suggests that governments often resort to window dressing, that is, they present rosy rather than realistic output growth forecasts in order to boost both their projected revenues and their predicted public expenditure (EC, 2005).¹ This strategy is also convenient for governments because by underestimating the output gap, a larger share of

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

the budget deficit is made to appear cyclical in nature, thereby facilitating adjustment toward medium-term SCP objectives (EC, 2008).²

Large budget deficits at the time the forecasts are made correspond to optimistic fiscal forecasts, and more ambitious budget balance forecasts frequently result in large and negative forecasting errors. With respect to the effect of SGP, Beetsma and Giuliadori (2010) and Beetsma *et al.* (2009) state that governments running deficits above the limit of 3% of GDP have tended to publish less optimistic budget balance forecasts. However, the results of Frankel and Schreger (2013) go in the opposite direction: the relationship between deficits and over-optimism is stronger for euro area countries for which the limits of the SGP are relevant than for countries outside the euro area.

Political variables

The influence of political variables, such as those related to electoral cycles, partisan cycles, and the degree of fragmentation of the political system, have been examined by various authors, several of whom (Brück and Stephan, 2006; Giuliadori and Beetsma, 2008; von Hagen, 2010) have concluded that deviations from the budget balance forecasts are primarily because of the effects of electoral cycles. While government forecasts are generally more optimistic in the run-up to elections, the timing of elections appears to play no statistically significant role in explaining errors in real GDP growth forecasts according to Strauch *et al.* (2004) and von Hagen (2010). The literature nonetheless suggests that the so-called degree of fragmentation of the political system may have two effects: budget deficit forecasts are more optimistic when made by recently elected governments, probably as a means of signaling to European and other international institutions their commitment to the consolidation plans; also, political instability and ideological swings from governments of the right to those of the left tend to produce larger negative errors.

Institutional variables

The influence of the domestic fiscal framework on the quality of forecasts has attracted researchers' attention. According to the EC (2010), the elements constituting that framework include the rules, regulations, and procedures that underlie the planning and implementation of budgetary policies, and its main components consist of national numerical fiscal rules, medium-term budgetary frameworks for multiannual fiscal planning, and the various independent

² Morris *et al.* (2006) claim that incentives to underestimate the output gap in real time increased with the 2005 SGP reform, because the budgetary effort is now dependent on the phase of the business cycle in which the national economy finds itself.

institutions involved in budgetary policy. First, to solve the problems posed by common pool resources, the budgetary process can be centralized by imposing one of two forms of fiscal governance: delegation or contract. Strauch *et al.* (2004) and von Hagen (2010) conclude that governments operating under contracts have stronger incentives to publish prudent forecasts than governments operating under delegation as unexpectedly negative outcomes regarding GDP growth and the budget deficit will almost certainly impose the inconvenience of renegotiating government coalitions. Second, more appropriate national fiscal rules and medium-term budgetary frameworks usually cause smaller budget slippages: while budget forecasts tend to be more optimistic, forecasting errors are smaller, because the proposed policy measures are more effectively implemented (Beetsma *et al.*, 2009). Finally, the size of the budget balance forecast errors can be reduced if governments use GDP growth forecasts provided by independent institutions (Annett, 2006). Frankel and Schreger (2013) state further that EMU governments in an excessive deficit situation and with an independent fiscal institution that prepares budget forecasts publish fiscal forecasts that are less optimistic than governments in the same situation but without such an independent institution.

DATA AND METHODOLOGY

Dependent variables and data

Our research focuses on the determinants of the forecasted changes in the budget balance and public debt presented in SCPs by the governments of the 15 countries that were members of the EU in 1999, and the determinants of any subsequent deviations from those predicted changes. In addition, we study the real GDP growth forecasts prepared by both governments and the EC, and the respective forecasting errors.

Moulin and Wierts (2006) emphasize the advantages of considering forecasted changes and differences between observed and forecasted changes rather than forecasted values and slippages between observed and predicted values, respectively. When forecast errors are computed as the difference between observed and forecasted values, the introduction of methodological changes after the elaboration of the forecasts contributes to higher errors that undermine correct interpretation. In addition, with regard to SCP forecasts, the analysis of forecasted changes in budget balance makes it easier to assess the effort planned by governments to achieve their medium-term budgetary objectives.

Beetsma *et al.* (2009) use the expression implementation errors to stress that deviations from forecasted changes in budget balance result mainly from

failures in the implementation of policy measures underlying the projections. In this study, albeit we compute the forecasting errors in budget balance and public debt in a way similar to that proposed by those authors, we opt to use the expression errors in forecasted changes in preference to implementation errors because we consider it more appropriate when the fiscal variable under scrutiny is public debt.

Therefore, the six dependent variables used in this study are defined as follows:³

- Forecasted changes in budget balance and in public debt for country i in year t , $\Delta B_{i,t}^{t-1}$ and $\Delta Debt_{i,t}^{t-1}$, are the difference between the government forecast for year t , submitted in the SCP usually at the end of year $t-1$, and the estimate for year $t-1$, published at the end of that year;⁴
- Errors in forecasted changes in the budget balance and in the public debt for country i in year t , $EB_{i,t}^{t,t-1}$ and $EDebt_{i,t}^{t,t-1}$, are the observed change in year t minus the forecasted change in year $t-1$;
- Real GDP growth forecasts presented in year $t-1$ by the government or by the EC, $y_{i,t}^{t-1}$.
- Real GDP growth forecast errors, $Ey_{i,t}^{t,t-1}$, are the difference between the estimate published in year t and the forecast presented in year $t-1$.

To compute the dependent variables, we use two sources of statistical information, the SCPs and the EC. We focus on the budget balance, public debt, and GDP growth forecasts published in SCPs for the period 1999–2009. However, we use the GDP forecasts and estimates published by both governments and by the EC to compare the performance of their growth forecasts and to confirm the robustness of the results. EC data have the advantage of being published regularly in October or November each year and therefore are made known to all governments at the same time.⁵

The time covered by our study is the period extending from the launch of the EMU to the beginning of the European economic crisis and consequent economic governance reforms. We use data from SCPs submitted between 1998/1999 and 2009/2010, forecasts for year $t=1999$ and estimates for year

³ The analytical expressions of the variables are presented in the Appendix.

⁴ Throughout this paper, the lower index refers to the country and the year to which the data correspond, whereas the upper index indicates the date of publication. The *forecasts* are published usually at the end of $t-1$, that is, just before the beginning of the year t to which they refer, and *estimates* are published at the end of the year in question and are subject to subsequent revision.

⁵ When governments prepare their forecasts, they have private information not available to international agencies. Merola and Pérez (2013) point out that the fiscal forecasts of the EC and OECD present political biases in terms of governmental forecasts, and Gilbert and de Jong (2014) show that for EMU countries the fiscal forecasts of the EC are over-optimistic when the budget deficit threatens to exceed the limit of 3% of GDP.

$t = 2009$, respectively. We do not extend our sample further because governments did not publish SCPs at the end of 2010 and since 2011 the European Semester has required the publication of SCPs during the first semester of the year, usually in March.

Statistical properties of forecasting errors

We analyze the accuracy of forecasts for the whole sample and by country over the period 1999–2009 using three summary statistics: mean error (ME), mean absolute error (MAE), and root mean square error (RMSE).⁶ The MAE considers negative forecast errors as positive so the errors do not cancel each other out as happens in the calculation of the ME. The RMSE penalizes forecasters that make few but large forecast errors more heavily than forecasters that make many small forecast errors. We also test for unbiasedness and for autocorrelation. For each country, we estimate the autoregressive specification of order 1 [AR(1)] presented below:

$$E_t^{t,t-1} = \alpha + \mu E_{t-1}^{t-1,t-2} + v_t \quad (1)$$

When the estimated coefficient α , corresponding to the average forecasting error, is not statistically different from 0, there is no systematic bias in the forecasts. If the null hypothesis $\mu = 0$ is not rejected, there is no persistence of forecasting errors.⁷ The results are presented in Tables 1–3 for the budget balance, public debt, and real GDP growth forecast errors, respectively.⁸ Because we use two sources of statistical information for estimates and for GDP forecasts, there are two different ways of calculating the fiscal forecasting errors, with SCP estimates or EC estimates, and three different ways of computing the GDP growth forecast errors, with SCP estimates and growth forecasts, EC estimates and SCP growth forecasts, or EC data.

In the period 1999–2009, the average errors in forecasted changes in budget balance were negative in all countries. When the SCP estimates are used, the null hypothesis of no bias is rejected in the case of Italy, Luxembourg, and the United Kingdom, and there is a positive and significant degree of persistence of forecasting errors in Germany, Spain, Luxembourg, and the United Kingdom.

⁶ The MAE and the RMSE are given by $MAE_i = \sum_{t=1}^T |E_{it}|/T$ and $RMSE_i = \sqrt{\sum_{t=1}^T E_{it}^2/T}$, respectively, where $E = EB_{it}^{t,t-1}$, $EDebt_{it}^{t,t-1}$, $Ey_{it}^{t,t-1}$.

⁷ Given the small number of observations per country, we use an AR(1), as do Beetsma and Giuliodori (2010).

⁸ Statistical results by country should be interpreted with caution as the number of observations is limited and the higher volatility of forecasting errors makes it less likely that the null hypothesis of no bias is rejected.

Table 1: Statistical properties of errors in forecasted changes in budget balance (1999–2009)

	$EB_{i,t}^{t-1, SCPs}$					$EB_{i,t}^{t-1, EC}$				
	ME	MAE	RMSE	α	μ	ME	MAE	RMSE	α	μ
AT	-0.06	0.40	0.48	-0.07	0.39	-0.44	0.60	0.87	-0.39	0.25
BE	-0.48	0.59	0.90	-0.18	1.10	-0.06	0.92	1.24	-0.31	-0.17
DE	-0.20	0.74	0.87	-0.06	0.66***	-0.24	1.05	1.21	-0.16	0.22
DK	-0.45	0.80	1.17	-0.41	0.95	-0.17	0.81	0.98	-0.31	0.46
EL	-0.68	1.10	1.71	-0.58	0.96	-0.46	1.01	1.41	-0.50	0.29
ES	-0.77	1.17	2.14	-0.64	0.77***	-0.59	0.85	1.36	-0.50	0.54
FI	-0.31	1.09	1.60	-0.34	-0.47*	-0.21	1.21	1.66	-0.14	-0.63*
FR	-0.60	0.63	1.19	-0.53	0.42	-0.79	0.79	1.36	-0.56	0.65
IE	-0.49	1.62	2.06	-0.53	0.28	-0.82	1.45	1.76	-0.88	0.19
IT	-0.68	0.72	0.91	-0.52*	0.40	-0.66	0.90	1.02	-0.51	0.36
LU	-1.41	1.67	2.08	-1.19**	0.30**	-0.68	1.14	1.56	-0.75	0.14
NL	-0.35	0.66	1.07	-0.43	-0.24	-0.37	0.65	1.07	-0.43	0.11
PT	-0.91	1.07	1.83	-1.15	-0.45	-0.74	0.95	1.53	-0.96	-0.35**
SE	-0.08	0.81	1.11	-0.35	0.90	-0.43	0.97	1.28	-0.36	0.30
UK	-0.89	1.09	1.43	-0.64*	0.64**	-0.04	1.09	1.58	-0.30	0.70
EU15	-0.56	0.94	1.46	-0.50***	0.44***	-0.45	0.96	1.35	-0.48***	0.27**

Notes: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In columns α and μ , the coefficients and the respective level of statistical significance are presented (the robust standard errors are omitted).

Table 2: Statistical properties of errors in forecasted changes in public debt (1999–2009)

	$EDebt_{i,t}^{t-1, SCPs}$					$EDebt_{i,t}^{t-1, EC}$				
	ME	MAE	RMSE	α	μ	ME	MAE	RMSE	α	μ
AT	0.57	1.39	1.92	0.87	-0.56*	-0.46	1.57	2.19	-0.59	-0.20
BE	1.67	2.25	3.37	1.43	0.18	1.26	1.61	2.13	1.28*	0.03
DE	0.81	1.57	1.85	0.69	0.33	0.93	1.44	1.66	0.86	0.09
DK	0.44	2.47	3.70	0.68	0.81***	-1.53	1.80	2.54	-0.77	0.86*
EL	2.45	2.51	4.16	1.70*	0.63	2.64	2.64	3.80	3.62*	-0.45
ES	0.77	1.74	2.94	0.79	1.15***	0.43	1.26	1.92	0.46	0.99***
FI	1.01	2.21	2.85	0.71	0.17	-0.28	2.14	2.58	-0.23	-0.14
FR	1.47	1.93	2.76	0.78	0.86	1.33	1.69	2.12	1.07*	0.39
IE	3.82	5.76	9.79	1.94	1.29**	0.46	2.50	3.44	0.67	-0.10
IT	2.02	2.24	2.70	2.15**	0.06	2.08	2.48	2.83	1.57*	0.21
LU	0.69	1.44	2.66	0.74	0.02	0.49	1.36	2.43	0.61	-0.03
NL	0.61	2.12	2.85	0.68	0.06	1.35	2.70	3.77	1.04	0.98
PT	2.20	2.44	3.28	2.31*	0.06	0.67	1.87	2.48	0.85	0.00
SE	0.52	1.99	2.93	0.86	0.06	0.95	1.95	2.66	1.24	0.01
UK	1.79	2.28	4.05	1.15	0.92***	0.66	2.17	2.96	0.46	0.45
EU15	1.40	2.30	3.92	0.94***	0.70***	0.74	1.96	2.71	0.66***	0.31**

Notes: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In columns α and μ , the coefficients and the respective level of statistical significance are presented (the robust standard errors are omitted).

Table 3: Statistical properties of errors in real GDP growth forecasts (1999–2009)

	$Ey_{i,t}^{t,t-1, SCPs, SCPs}$					$Ey_{i,t}^{t,t-1, EC, SCPs}$					$Ey_{i,t}^{t,t-1, EC, EC}$				
	ME	MAE	RMSE	α	μ	ME	MAE	RMSE	α	μ	ME	MAE	RMSE	α	μ
AT	-0.26	0.75	0.86	-0.25	-0.14	-0.34	0.81	0.94	-0.33	-0.12	-0.65	1.12	1.56	-0.61	0.09
BE	-0.37	0.90	0.96	-0.46	-0.42	-0.29	0.85	0.92	-0.35	-0.43*	-0.58	1.11	1.33	-0.70	-0.37
DE	-0.62	1.03	1.28	-0.61	0.07	-0.54	1.07	1.30	-0.55	0.00	-0.66	1.26	1.81	-0.67	-0.03
DK	-0.55	0.77	1.35	-0.40	0.84	-0.45	0.84	1.43	-0.46	0.27	-0.56	0.95	1.53	-0.56	0.11
EL	-0.35	0.51	0.82	-0.27	0.63	-0.42	0.56	0.81	-0.34	0.36	-0.34	0.61	1.14	-0.34	1.63
ES	-0.38	0.69	0.93	-0.29	0.55	-0.44	0.76	0.96	-0.32	0.53	-0.40	0.82	1.26	-0.35	1.02
FI	-0.94	1.75	2.84	-1.03	-0.12	-0.95	1.71	2.68	-1.03	0.01	-1.03	1.85	2.87	-1.17	0.05
FR	-0.70	0.93	1.20	-0.72**	0.14	-0.82	1.02	1.31	-0.87**	0.06	-0.59	0.86	1.07	-0.72**	-0.19
IE	-0.36	1.85	2.26	-0.56	0.23	-0.67	1.87	2.30	-0.78	0.18	-1.05	2.07	2.94	-0.94	0.36
IT	-1.09	1.33	1.55	-1.03*	0.06	-1.05	1.33	1.51	-1.00**	0.03	-0.99	1.25	1.72	-0.90**	0.15
LU	-0.18	2.11	2.54	-0.37	0.22	-0.17	1.85	2.29	-0.37	0.26	-0.45	1.95	2.29	-0.61	0.48
NL	-0.50	1.13	1.46	-0.59	0.01	-0.70	1.33	1.70	-0.85	0.00	-0.82	1.40	1.90	-1.02	-0.21
PT	-0.92	0.98	1.27	-1.15**	-0.21	-0.99	1.06	1.34	-1.33**	-0.33	-0.88	1.06	1.37	-1.05**	-0.17
SE	-0.67	1.53	2.25	-0.83	0.57	-0.67	1.62	2.2	-0.80	0.57	-0.56	1.29	1.77	-0.66	0.30
UK	-0.45	0.88	1.28	-0.47	0.70	-0.4	0.88	1.24	-0.46	0.57	-0.53	0.87	1.27	-0.55	0.39
EU15	-0.56	1.14	1.64	-0.57***	0.19	-0.60	1.17	1.63	-0.60***	0.18	-0.67	1.23	1.81	-0.66***	0.23

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

In columns α and μ , the coefficients and the respective level of statistical significance are presented (the robust standard errors are omitted).

The errors in forecasted changes in public debt are, on average, positive, meaning that the observed changes were greater than expected, except in Austria, Denmark, and Finland when EC estimates are used. The results suggest underestimation of public debt in the case of Greece, Italy, and Portugal, when the SCP estimates are used, and in the case of Belgium, Greece, France, and Italy when the EC estimates are used. There are also problems of positive and high autocorrelation in Denmark and Spain, regardless of the source of data used, and in Ireland and the United Kingdom, when we use the estimated changes from SCPs.

The average errors in real GDP growth forecasts are negative in all countries. Irrespective of the data source used, there is a systematic bias in the output growth forecasts in France, Italy, and Portugal.

As expected, the analysis of the results for the EU15 suggests optimistic forecasts: overestimation of the observed change in the budget balance and of the output growth, and underestimation of the observed change in the public debt. In the case of fiscal variables, the estimated coefficients μ are positive and statistically significant, and thus there are systematic patterns of demeaned forecast errors over time, which account for the recurrent delays in the implementation of fiscal consolidation plans. In addition, the estimated coefficients of bias and autocorrelation are higher, mainly in the case of public debt, when data from the SCPs are used than when using EC estimates. We investigate if these results for the EU15 are explained by the definition and application of the SGP until the recent crisis.

Methodology

Our study provides six models, one for each dependent variable: (1) forecasted changes in budget balance, (2) forecasted changes in public debt, (3) errors in forecasted changes in budget balance, (4) errors in forecasted changes in public debt, (5) forecasts of real GDP growth, and (6) forecast errors of real GDP growth. As we use two different data sources, each model is estimated according to different specifications, depending on the source of information used in the definition and the construction of the variables. The model for real GDP growth forecasts is estimated for two specifications, using government and EC forecasts, respectively. In case of the other five models, we have three specifications: Specification A uses SCP data, Specification B uses government forecasts and EC estimates, and Specification C employs estimates and GDP growth forecasts published by the EC.

The aim of the econometric analysis is to identify the main economic and political determinants of each dependent variable, using panel data models with country and time fixed effects. We use country fixed effects to control for

heterogeneity and time fixed effects to control for any time-varying biases that are common across all countries.

The results of the Hausman test, reported in Tables 4–6, reject the alternative of a random effects estimator in the models used to explain the forecasted changes in budget balance and public debt, and models of GDP growth forecasts. With respect to models of errors in fiscal forecasted changes, the results are mixed. Thus, we decided to apply fixed effects estimators to all specifications because the random effects estimator is inconsistent in the case of errors in forecasted changes in budget balance when SCP estimates are used, and because the same estimation technique should be used to compare the respective estimated coefficients.

To explain the GDP growth forecast errors, the results of pooled ordinary least squares (OLS) models are also presented. In this case, the country fixed effects have no statistical significance, the estimated coefficients from the fixed effects model suggest that all explanatory variables are statistically insignificant in Specifications B and C, and the null hypothesis of the Breusch–Pagan LM test is not rejected in all specifications.

In the two models used to explain forecasted changes in fiscal variables, we tested for endogeneity in the real GDP growth forecasts variable. In the case of models of errors in forecasted changes in budget balance and public debt, we repeated this test for the variable forecast errors of real GDP growth. Under the null hypothesis of the endogeneity test, the endogenous explanatory variable can be considered exogenous. This hypothesis was rejected only for the budget balance forecasted changes. Therefore, we opted for a model with instrumental variables only in this case.

The results of the endogeneity tests seem to confirm that over the period of study governments were more engaged in the preparation of budget balance forecasts than public debt forecasts. When governments elaborate their GDP growth forecasts, they have in mind the forecasted changes of the budget balance, but not the forecasted changes of public debt, probably because the public debt rule was not been a matter of great concern until the sovereign debt crisis.

As variables related to domestic institutions evolve very slowly over time and thus including them in our country effects models could lead to unreliable estimated coefficients, the three-step procedure proposed by Beetsma *et al.* (2009) was followed to examine their influence. First, for each institutional variable we computed a mean value for each country over time. Then, for each of the dependent variables, we estimated the country fixed effects of the regressions including only the economic and political variables that were significant. Finally, we investigated whether the mean of each institutional variable contributes significantly to the explanation of those country fixed effects.

Table 4: Forecasted changes in budget balance and public debt

	$\Delta B_{i,t}^{t-1}$				$\Delta Debt_{i,t}^{t-1}$		
	A	B	C		A	B	C
$y_{i,t}^{t-1}$	0.392* (0.20)	0.478*** (0.15)	0.638*** (0.18)	$y_{i,t}^{t-1}$		-0.514*** (0.14)	-0.670** (0.27)
$B_{i,t-1}^{t-1}$	-0.255** (0.10)	-0.340*** (0.08)	-0.355*** (0.06)	$B_{i,t-1}^{t-1}$	-0.730*** (0.13)	-0.759*** (0.11)	-0.698*** (0.14)
$Debt_{i,t-1}^{t-1}$				$Debt_{i,t-1}^{t-1}$		-0.079*** (0.02)	-0.072*** (0.02)
$SGPb_{i,t-1}^{t-1}$	0.199** (0.08)			$SGPdebt_{i,t-1}^{t-1}$			
$DiffECb_{i,t}^{t-1}$		0.446** (0.16)	0.668*** (0.10)	$DiffECdebt_{i,t}^{t-1}$	-0.214*** (0.06)	-0.692*** (0.13)	-0.725*** (0.13)
$\Delta B_{i,t}^{t-2}$	0.355*** (0.12)	0.400*** (0.12)	0.320*** (0.13)	$\Delta Debt_{i,t}^{t-2}$	0.463*** (0.15)	0.468* (0.22)	0.547** (0.22)
$gov_new_{i,t-1}$	0.253*** (0.07)	0.265** (0.10)	0.248*** (0.11)	$gov_party_{i,t-1}$	0.170** (0.08)		
R^2	0.80	0.84	0.86		0.81	0.89	0.89
N	150	150	150		146	146	146
Country effects	4.44***	4.64***	5.48***		2.41*	2.63**	2.69**
Time effects	10.24***	3.59**	8.69***		45.73***	10.39***	4.23***
Hausman test	35.99***	35.97***	36.90***		59.21***	37.69***	42.33***

Notes: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. As regards budget balance forecasted changes, the models incorporate instrumental variables with country and time fixed effects. The 'real GDP growth forecasts' are instrumented by using the 'real GDP growth estimates 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 forecasted changes do not include instrumental variables. Standard errors corrected by the jackknife method are given in parentheses.

Table 5: Errors in forecasted changes in budget balance and public debt

	$EB_{i,t}^{t,t-1}$				$EDebt_{i,t}^{t,t-1}$		
	A	B	C		A	B	C
$EB_{i,t-1}^{t-1,t-2}$	0.306*** (0.10)			$EDebt_{i,t-1}^{t-1,t-2}$			
$Ey_{i,t}^{t,t-1}$	0.490*** (0.09)	0.452*** (0.10)	0.349** (0.13)	$Ey_{i,t}^{t,t-1}$	-0.989** (0.41)	-0.710** (0.30)	-0.771* (0.37)
$\Delta B_{i,t}^{t-1}$		-0.247** (0.10)	-0.277** (0.11)	$\Delta Debt_{i,t}^{t-1}$		-0.319*** (0.10)	-0.374*** (0.10)
$DSGPb_{i,t-1}^{t,t-1}$	1.079* (0.57)	0.959*** (0.24)	1.111*** (0.23)	$DSGPdebt_{i,t-1}^{t,t-1}$			
$elect_{i,t}$	-0.418* (0.21)			$snap_{i,t}$	1.728* (0.93)	1.583** (0.73)	1.264* (0.66)
$gov_party_{i,t}$		-0.135** (0.06)		$gov_new_{i,t}$	0.679* (0.38)		0.837* (0.46)
$gov_gap_{i,t}$			-0.210* (0.10)				
$gov_type_{i,t}$	-0.309* (0.16)						
$gov_chan_{i,t}$		-0.383** (0.15)	-0.411** (0.17)				
R^2	0.60	0.65	0.60		0.58	0.49	0.50
N	150	165	165		162	162	162
Country effects	1.9	1.74	1.13		1.89	3.07**	3.12**
Time effects	4.71***	25.56***	16.86***		8.12***	4.30***	4.19***
Breush–Pagan LM test	0.00	0.93	0.06		4.61**	21.21***	21.03***
Hausman test	55.92***	14.69	2.06		0.87	1.20	4.68

Notes: *, **, and *** indicate statistical significance at the 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.

Table 6: Forecasts and forecast errors of real GDP growth

	$y_{i,t}^{t-1}$			$Ey_{i,t}^{t-1}$			
	A	B		A	A'	B'	C'
$y_{i,t-1}^{t-1}$	0.532*** (0.06)	0.522*** (0.04)	$y_{i,t}^{t-1}$				
$B_{i,t-1}^{t-1}$			$Dy_{i,t-1}^{t-1}$	0.833* (0.44)	0.818*** (0.24)	0.491** (0.24)	0.358* (0.21)
$SGPb_{i,t-1}^{t-1}$	-0.241*** (0.06)	-0.196*** (0.06)	$DB_{i,t-1}^{t-1}$				
$DiffECy_{i,t}^{t-1}$	0.763*** (0.05)	-0.131** (0.05)	$DSGPb_{i,t-1}^{t-1}$				
$gov_chan_{i,t-1}$	-0.123* (0.06)	-0.101* (0.05)					
R^2	0.94	0.91		0.69	0.68	0.65	0.76
N	165	165		165	165	165	165
Country effects	3.20**	4.86***		0.78			
Time effects	42.26***	32.85***		48.93***	14.14***	14.80***	21.41***
Breusch-Pagan LM test	0.00	11.84***		0.00	0.00	0.00	0.00
Hausman test	80.16***	98.54***					

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

EMPIRICAL RESULTS

Economic and political determinants and the role of the SGP

On the basis of published studies on the determinants of budgetary plans cited earlier in the paper, two models are constructed to explain forecasted changes in budget balance and public debt, respectively:

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

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

The models include country v_i and time z_t fixed effects. The first three explanatory variables are common to both models and are real GDP growth forecasts for year t , $y_{i,t}^{t-1}$, budget balance estimates for year $t-1$, $B_{i,t-1}^{t-1}$, and public debt estimates for year $t-1$, $Debt_{i,t-1}^{t-1}$. In these models, real GDP growth forecasts is an explanatory variable, but we also investigate their determinants in this paper to verify whether governments used the growth forecasts for

window dressing. Concerning the state of public finances, we use the estimates of the two EMU fiscal indicators, budget balance and public debt, to compare their relative importance in explaining the fiscal forecasted changes.

The further three explanatory variables related to the fiscal variable used in each equation are designated excessive budget deficit/public debt, $SGPb_{i,t-1}^{-1}$ and $SGPdebt_{i,t-1}^{-1}$, difference from EC budget balance/public debt forecasts, $DiffECb_{i,t}^{-1}$ and $DiffECdebt_{i,t}^{-1}$, and forecasted change in budget balance/public debt in the year $t-2$ program, $\Delta B_{i,t}^{-2}$ and $\Delta Debt_{i,t}^{-2}$. These three variables are related to the role of the SGP and so are of special interest in this study. The excessive budget deficit and excessive public debt variables are used only for EMU countries. The variables have a positive value if the figures published by the EC at the time at which the forecasts were made indicate a breach of the Maastricht Treaty limits in year $t-1$. These variables are included to assess whether non-compliant EMU countries submitted forecasted changes consistent with fiscal consolidation plans. The difference from EC budget balance/public debt forecasts is defined as the difference between the government forecasts inscribed in SCPs and those prepared by the EC. The variables have a positive sign when the state of public finances predicted by national governments is more favorable than that predicted by the EC. The SGP gives a prominent role to EC forecasts and in the case of significant differences from EC forecasts, governments are asked to provide detailed explanations. Because SCPs are rolling and flexible multiannual budgetary frameworks, the variables forecasted change in budget balance/public debt in the year $t-2$ program aim to specify the relationship between the forecasts in year $t-2$ and those made in year $t-1$, that is, thereby determining the level of governments' commitment to the fiscal targets enshrined in their SCPs.

Finally, *Pol* designates a set of political variables. For the purposes of this study, these are divided into three groups. For variables of the first group, we use the Golinelli and Momigliano (2009) database, which we have updated and completed. The political variables of the second and third groups were collected from the database published by Armingeon *et al.* (2009). The first group consists of variables underpinning what have been termed opportunistic motivations for governments introducing bias into their forecasts. The first variable signals whether legislative elections took place or not in year t , $elect_{i,t}$. The other two indicate the type of elections involved: regular elections, $regular_{i,t}$, and early elections, $snap_{i,t}$.⁹ The second group embraces variables

⁹ Regular elections and early elections are dummy variables, taking the value 1 in the years in which elections occur regularly or are called early, respectively. Elections are considered to be regular when they occur at the end of the mandate or no more than 6 months before its end. Otherwise, elections held outside of the normal electoral calendar are considered early.

linked to potential ideological motivations for biasing forecasts: party composition of government, $gov_party_{i,t}$, and ideological gap between current and previous governments, $gov_gap_{i,t}$. The final group refers to variables reflecting the degree of fragmentation of the political system: the variable type of government, $gov_type_{i,t}$, is related to size fragmentation, while the variables number of government changes per year, $gov_chan_{i,t}$, and new party composition of government, $gov_new_{i,t}$, reflect the temporal dimension of political fragmentation.

As we are interested in the explanatory power of political variables that relate to the year in which forecasts are published, in the study of the opportunistic motivations we consider only the variable regular elections, referring to elections that policymakers know will take place during the following year at the time forecasts are included in the SCPs. Given the high correlation coefficients between some of these political variables, we add each of them to the model one at a time to avoid problems of multicollinearity that might lead to incorrect estimates of statistical significance.

Columns A, B and C in Table 4 present the coefficients for the statistically significant variables for each of the three specifications used to estimate forecasted changes in budget balance and public debt. Our objective is to determine the existence of significant differences between the estimated coefficients of the two models.

Improvements in economic growth perspectives, $y_{i,t}^{t-1}$, are reflected both in more favorable budget balance and public debt forecasted changes, with the exception of public debt forecasts when SCP estimates are used. If, at the end of year $t-1$, the budget deficit rises by 1% of GDP, a further fiscal adjustment of about 0.3% of GDP will be planned in year t , with the remaining two-third provoking an increase in the public debt forecasted for year t . The public debt estimates for year $t-1$, $debt_{i,t-1}^{t-1}$, are not statistically significant in explaining budget balance forecasted changes. In the case of public debt, and despite its low absolute value, the estimated coefficient of public debt is statistically significant when EC estimates are used. These results indicate that governments were little concerned with exerting restraint over the growth of their public debt ratios.

In Specification A, the estimated coefficient of the excessive budget deficit, $SGPb_{i,t-1}^{t-1}$, is positive and statistically significant, showing that the more excessive the budget deficit, the greater the adjustment planned in the budget balance. However, when EC data are used, this variable loses its statistical significance. The difference between specifications may be explained by EMU governments with excessive deficits intentionally signaling their commitment to the deficit rule. The estimated coefficient of excessive public debt, $SGPdebt_{i,t-1}^{t-1}$, has no statistical significance in any of the specifications. This seems to confirm that, in the period under scrutiny, the national governments

and the European institutions attached much less importance to situations of excessive debt than to excessive budget deficits.

The size and significance of the variables difference from EC budget balance and public debt forecasts depends to a large extent on the source of the statistical information. As these differences increase, the budget balance forecasted changes are more favorable when EC estimates are used. In the case of public debt, the estimated coefficients are negative and statistically significant in the three specifications, but their absolute values are higher when EC estimates are used. This outcome indicates that there are differences between forecasts and also between the estimates produced by governments and by the EC, which affect the size of forecasted changes in the budget balance and public debt.¹⁰

In the case of forecasted change in budget balance/public debt in the year $t-2$ program, the interpretation of estimated coefficients suggests that forecasted changes inscribed in SCPs submitted in the previous year were revised downward. A lack of government commitment is more striking in the case of the budget balance, probably because governments tended to produce more ambitious deficit-reduction plans as they were conscious of the close scrutiny to which these would be subjected by European institutions.

Most political variables proved to have no significant influence, with two exceptions. First, changes in the party composition of the government in the year in which the budget balance forecasts are published presage more ambitious fiscal consolidation plans. Second, when we use SCP estimates for public debt, it is left-wing, rather than right-of-center or center parties, that tend to present more prudent forecasts.

Our analysis of the determinants of errors in the forecasted changes in budget balance and public debt is based on the following models:

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

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

The forecast error of real GDP growth, $Ey_{i,t}^{t,t-1}$, is common to both models. For the specific fiscal variable being studied in each equation, three other explanatory variables are considered: the lagged error in forecasted change, $EB_{i,t-1}^{t-1,t-2}$ or $EDebt_{i,t-1}^{t-1,t-2}$, the forecasted change, $\Delta B_{i,t}^{t-1}$ or $\Delta Debt_{i,t}^{t-1}$, and the revision of the excessive budget deficit or public debt, $DSGPb_{i,t-1}^{t,t-1}$ or

¹⁰ After analyzing government revisions of previous estimates of fiscal balance, Castro *et al.* (2013) concluded that the previously published information is biased and non-efficient, and that budget balance estimates have tended to be revised upwards.

$DSGPdebt_{t,t-1}^{t-1}$. For EMU countries, the variables revision of excessive budget deficit/public debt, $DSGPb_{t,t-1}^{t-1}$ and $DSGPdebt_{t,t-1}^{t-1}$, have positive signs when a revision of deficit or debt estimates points to an even more unfavorable outcome, and negative signs when the outcome – albeit still excessive – is less serious than the first estimates previously indicated. The aim of this exercise is to assess whether governments were more effective in the implementation of their respective adjustment paths, leading to smaller forecasting errors, if their revised estimates revealed a more serious situation than forecasted.

To understand whether shifts in the political context contribute to the explanation of forecasting errors, we examine political variables that describe government behavior in the year following the publication of forecasts. To reveal cases of opportunism, the variables elections and early elections are now considered.

The estimated coefficients for Specifications A, B, and C are shown in Table 5. Negative real GDP growth forecast errors, $Ey_{t,t-1}^{t-1}$, constrain the effective implementation of the planned changes in budget balance and particularly in public debt.

The lagged forecasting error, $EB_{t,t-1}^{t-1,t-2}$, only has significance in explaining errors in forecasted changes in budget balance if SCP estimates are used, although some persistence seems to occur. Conversely, forecasted changes in budget balance and public debt, $\Delta B_{t,t-1}^{t-1}$ and $\Delta Debt_{t,t-1}^{t-1}$, are only statistically significant when EC estimates are used. Taken together, these two results suggest that, in the case of budget balance, negative lagged forecasting errors partly account for negative errors in forecasted changes when SCP statistical information is used. However, when the analysis is carried out with EC estimates, forecasted changes that are overly optimistic appear to induce negative forecasting errors. In both situations, the absolute value of the estimated coefficients is between 0.2 and 0.3. This inverse relationship between the optimism of forecasted changes and the capacity to implement them effectively corroborates our argument that any serious attempt to identify the determinants of forecasting errors must examine all the explanatory variables that underpin the respective forecasts.

The estimated coefficient of the variable revision of the excessive budget deficit is high, positive, and statistically significant in explaining budget balance forecasting errors. This suggests that when a government identifies a situation of excessive deficit that is worse than initially estimated, it feels compelled to undertake additional restrictive fiscal measures, resulting in a greater-than-planned improvement in the budget balance.¹¹ Again, this

¹¹ While Pina (2009) arrived at a similar conclusion, for Beetsma *et al.* (2009) the variable proved to have no statistical significance.

interpretation does not hold when there are unfavorable revisions of public debt estimates in excess of 60% of GDP.

While the statistical significance of political variables depends on the source of the data used, a combination of ideologically motivated opportunistic behavior and the fragmentation of the political system exacerbate the difficulties of concretizing the forecasted fiscal changes. Variables related to the electoral cycle appear to function in a number of ways. If SCP estimates are used, the proposed fiscal consolidation is more difficult to achieve when forecasts refer to a year in which legislative elections are to take place. Early elections, $snapi_{i,t}$, contribute to an increase in errors in forecasted changes in public debt of at least 1.3% of GDP. As expected, the coefficients related to political variables with an ideological dimension, $gov_party_{i,t}$ and $gov_gap_{i,t}$, show that the substitution of a more right-wing government with a left-wing one tends to harm budget implementation when EC estimates are used. An increase in the number of parties represented in the government, $gov_type_{i,t}$, and an increase in changes in government per year, $gov_chan_{i,t}$, contribute to larger and more negative errors in forecasted changes in budget balance when SCP and EC estimates, respectively, are used. Finally, a new party composition of government, $gov_new_{i,t}$, contributes to an increase in the errors in forecasted changes in public debt, except in Specification B. These results confirm that coalition governments and political instability undermine the implementation of planned measures.

In the preceding analysis, we confirm that real GDP growth forecasts and economic forecast errors are important in explaining the forecasted changes in budget balance and public debt and errors in those forecasted changes, respectively. Therefore, we have constructed identical models to those used for fiscal variables to investigate whether the SGP and economic and political variables affect growth forecasts and respective errors in a similar way.

To explain real GDP growth forecasts, the following model is employed:

$$y_{i,t}^{t-1} = v_i + z_t + \beta_1 y_{i,t-1}^{t-1} + \beta_2 B_{i,t-1}^{t-1} + \beta_3 SGPb_{i,t-1}^{t-1} + \beta_4 DiffECy_{i,t}^{t-1} + \beta_p Pol + u_{i,t} \quad (6)$$

The explanatory variables are the real GDP growth estimate, $y_{i,t-1}^{t-1}$, the budget balance estimate, $B_{i,t-1}^{t-1}$, in both cases for year $t-1$, the excessive budget deficit, $SGPb_{i,t-1}^{t-1}$, and the difference from EC economic forecasts, $OPFy_{i,t}^{t-1}$. As the last variable corresponds to the difference between the real GDP growth forecasts provided by governments and by the EC, its sign is positive when forecasts of official governments are relatively more optimistic.

The model for real GDP growth forecast errors is:

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

Four economic variables are analyzed: real GDP growth forecasts, $y_{i,t}^{t-1}$, the difference in real GDP growth estimates for the year $t-1$ published in t and in $t-1$, $Dy_{i,t-1}^{t-1}$, the difference in budget balance estimates for the year $t-1$ published in t and in $t-1$, $DB_{i,t-1}^{t-1}$, and revisions of excessive budget deficit, $DSGPb_{i,t-1}^{t-1}$. With regard to the political determinants of economic forecasts and respective errors, we include the same aforementioned variables used to account for forecasted changes and for forecasting errors in the fiscal variables, respectively.

The results presented in Table 6 for Specifications A and B, which draw on government and EC forecasts, respectively, lead us to conclude that all the explanatory variables, except the budget balance estimate, $B_{i,t-1}^{t-1}$, have a statistically significant influence over real GDP growth forecasts. This conclusion does not support the idea that governments use window dressing to subvert the fiscal rules; put another way, the evidence does not show that less favorable budget deficit situations systematically encourage governments to publish more optimistic economic growth forecasts as some authors (Milesi-Ferretti and Moriyama, 2006; van den Noord, 2007) have argued.

Each 1% over-estimate of real GDP growth in year $t-1$ contributes to an increase of 0.5% in the forecasted real GDP growth in year t . For EMU countries, however, a further worsening of an already excessive deficit situation reduces forecasted real GDP growth, probably because of government recognition that fiscal consolidation policies will need further strengthening. As expected, the estimated coefficients for the variable difference from EC economic forecasts show that the government forecasts of real GDP growth contained in SCPs tend to be more optimistic than the forecasts made by the EC.

Of all the political variables analyzed, only the number of changes in government, $gov_chan_{i,t-1}$, proves to be statistically significant in explaining real GDP growth forecasts. In the year a given forecast is published, changes in government appear to increase the likelihood that forecasts will be slightly more unfavorable, which could signal the intention of new governments to implement more restrictive fiscal measures.

With respect to real GDP growth forecast errors, when we use models with country and time fixed effects, only in Specification A is there at least one significant estimated coefficient. Specifications B and C are omitted because none of the coefficients are statistically significant. The difference in real GDP growth estimates for the year $t-1$ published in t and in $t-1$, $Dy_{i,t-1}^{t-1}$, has a positive and statistically significant coefficient in Specification A, leading us to conclude that downward revisions of economic growth estimates will induce greater negative errors in real GDP growth forecasts of SCPs. This causality derives from the fact that, as has already been mentioned, economic growth

forecasts tend to be more optimistic when growth estimates for year $t-1$ have proven to be more favorable.

Because none of the variables are statistically significant in Specifications B and C, and because country fixed effects are not statistically significant in any of the three specifications, a pooled OLS model is also applied. The results are presented in Columns A', B', and C' of Table 6. According to the estimated coefficients, the difference in real GDP growth estimates is also the only variable with statistical significance, and the resulting forecasting errors are greater when SCP estimates and forecasts are used.

Finally, the results indicate that none of the political variables have any statistically significant influence over forecasting errors related to economic growth.

Robustness check

The crisis in the years 2008 and 2009 had a great impact on the real economy of most European countries and respective public finances that was not expected at the time of the publication of the first forecasts. Thus we divide the sample into two sub-samples, 1999–2007 and 2008–2009, and use Chow tests to verify the robustness of results.¹²

The estimated coefficients show that in the crisis years, the forecasted fiscal changes are mainly explained by the differences between the government forecasts and those produced by the EC, because some of the SCPs submitted at the end of 2008 were later updated by the respective governments. Regarding the errors in the forecasted changes in budget balance, another important result is that although the economic and financial crisis worsened the excessive deficits, the governments were more effective in the implementation of their planned consolidation policies.

Institutional determinants

Five indicators are used to attach relative magnitudes to the variables associated with the domestic fiscal framework, characterizing member countries in terms of governance, the presence of multiannual budgetary frameworks, the type of fiscal rules applied at the national level, the existence of independent fiscal institutions and whether forecasts are produced by independent institutions.

Delegation countries, $delegation_{i,t}$, is a dummy variable that takes the value 1 for countries operating under delegation and 0 for countries operating under contracts. The countries classified as delegation countries are Austria, Germany, Greece, Spain, France, Italy, Portugal, and the United Kingdom. For the 15 European countries studied, with the exception of Portugal, von

¹² The results are available from the authors on request.

Hagen's (2010) classification is used. In the case of Portugal, and in line with the EC (2006) and Debrun *et al.* (2009), we judge it more appropriate to classify it as a delegation country. The objective of this dummy variable is to verify whether countries operating under contracts publish more prudent forecasts than delegation countries because of the transaction costs of renegotiating coalition agreements.

The variable multiannual budgetary frameworks, $MTBF_{i,t}$, refers to the medium-term budgetary framework index attributed to each member state by the EC. Similarly, the variable national fiscal rules, $rule_{i,t}$, corresponds to the EC's fiscal rule index. The variable independent fiscal institutions, $institution_{i,t}$, uses an index computed by Debrun and Kumar (2008), consisting of an unweighted average of four criteria: the legal influence of the fiscal institution over the budget process, the extent of its independence from government influence, the perceived utility of its forecasts, and its perceived effectiveness. The third criterion, regarding the utility of its forecasts, corresponds to our independent forecast variable, $indfor_{i,t}$. The higher the values for these four variables, the greater the expected contribution to more accurate forecasts and to reducing forecasting errors.¹³

To avoid problems of multicollinearity, we individually test the mean of each institutional variable for its contribution to the explanation of the country fixed effects v_i of the models that include the statistically significant economic and political variables.

On the basis of the estimated coefficients for the mean of each institutional variable, presented in Table 7, we are able to draw the following conclusions. While countries with better multiannual budgetary frameworks and with independent forecasts make more optimistic forecasts of budget balance, their effective implementation is higher. For public debt, the quality of the multiannual budgetary frameworks is not relevant in explaining the forecasted changes, but it reduces the size of forecasting errors when EC estimates are used.

Stronger national fiscal rules lead to forecasts of additional public debt reduction when the EC estimates are used and reduce the size of errors in forecasted changes in public debt when government estimates are used.

Governments operating under delegation publish more prudent budget balance forecasts in Specification B. However, as expected, delegation countries produce more optimistic public debt forecasts in Specification A and the errors in the forecasted changes in public debt in Specifications B and C are higher. Except for the variable *delegation*, all institutional variables reduce

¹³ Indices regarding multiannual budgetary frameworks, national fiscal rules, independent fiscal institutions and independent forecasts have been normalized to the [0, 1] interval.

Table 7: Institutional variables

	A	B $v_i \text{ de } \Delta B_{i,t}^{t-1}$	C	A	B $v_i \text{ de } \Delta Debt_{i,t}^{t-1}$	C	A	B $v_i \text{ de } y_{i,t}^{t-1}$	C
<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>indfor_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)	
		$v_i \text{ de } EB_{i,t}^{t-1}$			$v_i \text{ de } EDebt_{i,t}^{t-1}$			$v_i \text{ de } E y_{i,t}^{t-1}$	
<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>indfor_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: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors are omitted. R^2 values are given in parentheses. The number of observations corresponds to the number of countries (15) in all estimations.

the forecasted growth in real GDP. Thus the better the quality of domestic institutions, the less optimistic are the real GDP forecasts. However, these variables are not statistically significant in explaining economic growth forecast errors. Multiannual budgetary frameworks display the highest determination coefficient (R^2) in the regressions of forecasted changes in budget balance and real GDP growth forecasts. The change in its respective index explains about half of the estimated country fixed effects.

Conclusions

This paper undertakes an analysis of the determinants of fiscal forecasts and respective errors. We focus on the budget balance, public debt, and GDP growth forecasts presented by the 15 European governments in the Stability and Convergence Programs for the period 1999–2009. Our results suggest that governments were more engaged in the preparation of budget balance forecasts than public debt forecasts, probably because the debt rule of the corrective arm of the SGP was not effective until 2011, when it was tightened.

As deficits are higher at the time of the publication of fiscal forecasts, the budget balance forecasts are more optimistic and the public debt forecasts are more prudent. The public debt estimates only influence the respective forecasted changes that are more prudent. Thus, governments seem less concerned with presenting plans for the reduction of their public debt ratios than of their budget balance ratios. The Maastricht limits do not influence the respective forecasted changes, except in the case of budget balance when SCP estimates are used: EMU governments with excessive deficits present adjustment plans with the intention of signaling their commitment to the deficit rule. The forecasted fiscal changes do not adequately reflect the planned changes inscribed in the SCPs submitted in the preceding year. The lack of commitment of governments to the fiscal objectives previously established has accounted for the recurrent delays in the implementation of fiscal consolidation plans.

As expected, the errors in forecasted fiscal changes are higher when the respective forecasts are more optimistic, which confirms that it is more appropriate to investigate simultaneously the role of the SGP and of other variables in explaining the government forecasts submitted in SCPs and respective errors, as is done in this paper.

When there is a situation of excessive deficit that exceeds initial estimates, governments have a strong incentive to implement further fiscal adjustments, which results in an improvement in the budget balance greater than forecasted. Thus, the deficit limit established in the corrective arm of SGP seems to have been effective. The same does not seem to be true for the debt limit:

errors in forecasted changes in public debt are not explained by unfavorable revisions of public debt estimates in excess of 60% of GDP.

The real GDP growth forecasts are not explained by the estimates of budget balance at the time of their elaboration, except when there are excessive deficits that incentive the governments to present more prudent economic forecasts. Thus, governments do not seem to have used the economic growth forecasts to subvert the rules of the SGP as some authors have argued. The GDP growth forecast errors are greater when the estimates and economic growth forecasts elaborated by governments are used, but they are mainly the result of information problems concerning the real economic situation at the time the forecasts are elaborated.

Finally, our findings point out that better domestic fiscal frameworks, mainly multiannual budgetary frameworks, contribute to more prudent GDP growth forecasts and smaller errors in forecasted fiscal changes. Given the prominence that domestic institutions have received in recent years, mainly in Europe, we highlight that in countries where independent institutions prepare the forecasts, the economic growth forecasts are more prudent and the forecasts of budget balance are more optimistic, but their effective implementation is higher.

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APPENDIX

Description of variables

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

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

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

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

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

$$DiffECb_{i,t}^{t-1} = B_{i,t}^{t-1,SCPs} - B_{i,t}^{t-1,EC}$$

$$DiffECdebt_{i,t}^{t-1} = - (Debt_{i,t}^{t-1,SCPs} - Debt_{i,t}^{t-1,EC})$$

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

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

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

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

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

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