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The Political Economy of EDP Fiscal Forecasts: An Empirical Assessment

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The political economy of EDP fiscal forecasts: an empirical assessment

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Abstract

This paper analyses the track record of fiscal forecasts reported by 15 European countries in the context of the Excessive Deficit Procedure. For the budget balance, gross fixed capital formation (GFCF) and interest payments, we study the statistical properties of forecast errors and their politico-institutional determinants. While errors in interest and GFCF expenditure present few systematic patterns, budget balance errors are responsive to fiscal institutions and to opportunistic motivations, especially from 1999 onwards: upcoming elections induce over-optimism, whereas commitment or mixed forms of fiscal governance and numerical expenditure rules (but not deficit and debt rules) are associated to greater prudence.

1. Introduction

This paper studies the track record of fiscal forecasts by 15 European Union (EU) countries drawing on a previously unexploited data source: the notifications reported twice a year in the context of the Excessive Deficit Procedure (EDP). We document the statistical properties of forecast errors and analyse their economic, political and institutional determinants through panel data modelling. The variables under study comprise not only the general government budget balance but also two more disaggregated items (interest payments and gross fixed capital formation – GFCF).

The use of forecasts is a pervasive feature of fiscal policy. When drafting their budgets, governments need a macroeconomic scenario upon which to base revenue projections. On the expenditure side, it is also the case that budgetary appropriations often have the nature of a forecast – which is particularly clear as regards social transfers and entitlement spending in general, but also holds for other items. In the EU, the institutional framework for fiscal policy has been a powerful catalyst for the dissemination and scrutiny of macroeconomic and budgetary projections: countries report current year forecasts in EDP notifications, and medium-term plans in their Stability and Convergence Programmes (SCPs).

Besides their influence on private agents' expectations and behaviour, fiscal forecasts play a prominent role in the assessment of compliance with both the preventive and corrective arms of the Stability and Growth Pact (SGP). Therefore, it is of interest to analyse forecasting accuracy, and to address the factors which may help explain forecast errors. Recent studies – such as Strauch *et al.* (2004), Brück and Stephan (2006), Annett (2006) or Jonung and Larch (2006) – document the existence of forecast biases in fiscal policy formulation, which vary across countries and time and are influenced by political considerations (e.g. forthcoming elections) or budgetary institutions (e.g. forms of fiscal governance).

Forecasts of fiscal variables are prepared by national governments, international organisations and – in some countries – independent institutions, giving rise to several different datasets. Artis and Marcellino (2001) analyse forecasts by the IMF, the OECD and the European Commission; Brück and Stephan (2006) focus on the latter organization; Strauch *et al.* (2004), Moulin and Wierts (2006) and Annett (2006) resort to national SCPs. In this study, we draw on a different source of forecasts: EDP notifications. Compared to alternative projections by national governments (i.e. those contained in national budgets or in SCPs), EDP data offer the advantages of a larger sample and of more uniform statistical definitions and reporting dates. A number of recent papers have used this dataset: Mora and Martins (2007) study the magnitude of data revisions, i.e. statistical reliability; Koen and van den Noord (2005) and Buti *et al.* (2006) address issues of accounting transparency. While these studies work only with fiscal outturns, we are, to the best of our knowledge, the first to analyse forecasts from the EDP notifications.

Apart from drawing on a new dataset, this paper contains two other innovative contributions. First, we consider a larger set of possible determinants of fiscal forecast errors, putting together a number of economic and politico-institutional factors that

previous analyses had considered separately, as well as testing the significance of some previously unused variables. Second, we do not restrict our attention to the overall budget balance, but study some individual spending items as well, namely GFCF and interest payments.

We find that, besides reflecting the operation of automatic stabilizers, budget balance forecast errors are also responsive to the institutional framework of fiscal policy and to opportunistic political motivations. The commitment and mixed forms of fiscal governance (Hallerberg, 2004) are associated to more prudent forecasts, and so is the reliance on stronger expenditure rules. By contrast, upcoming elections tend to induce budget balance forecasts that turn out over-optimistic, especially when the subsequent outcomes are reported under a government dominated by the former opposition. These institutional and political effects have become stronger since the coming into force of the SGP. Forecasts for GFCF and interest payments display better statistical quality than their budget balance counterparts, and do not seem to be influenced by most politico-institutional variables.

The remainder of this paper is structured as follows. The next section describes the dataset of fiscal forecasts. Section 3 assesses the statistical properties of forecast errors, through summary statistics and formal tests of unbiasedness and autocorrelation. Section 4 presents an extended set of potential determinants of forecast errors, and reports panel data evidence of their actual impact on fiscal projections. The final section concludes.

2. Data

According to Council Regulation (EC) No. 3605/93 and in the context of the EDP, EU countries must report twice a year to the European Commission a set of public finance data including both forecasts and outcomes. These data transmissions, often referred to as EDP reportings or notifications, started in March 1994 and have since taken place at regular dates, by 1 March and 1 September until 2005, and by 1 April and 1 October from 2006 onwards.

EDP notifications include forecasts of the general government nominal budget balance, gross debt, interest expenditure and GFCF, as well as of GDP at current market prices, for the current year (i.e., year t) and estimates or finalized values of the same variables for years $t-1$, $t-2$, $t-3$ and $t-4$. Budget balances figures are also to be provided for the general government sub-sectors (central, state and local governments, and social security funds). Finally, countries also report detailed information on differences between public accounts and national accounts data and on stock-flow adjustments.

To our knowledge, this dataset has never been used before to study fiscal forecasting. Nevertheless, it presents important advantages over SCPs, hitherto the most widely used source of fiscal projections by national governments. First and foremost, EDP notifications provide a wider coverage, in particular as regards the 1990s: SCPs only started to be submitted on a regular basis in late 1998. Second, they have a higher

standardization of both statistical concepts and reporting dates, thus improving comparability both over time and across countries.

One should nonetheless acknowledge the existence of some methodological changes since 1994. Most prominently, while all the notifications until 1999 were prepared in accordance with ESA 79 accounting rules, from March 2000 onwards countries started to report their data according to ESA 95. As regards reporting deadlines, the fact that in the United Kingdom the fiscal year does not coincide with the calendar year implies a slightly different timing of data transmissions relative to the annual budget cycle[1]. By means of sensitivity analysis we will go some way to ensure that our empirical findings are not distorted by these data peculiarities[2].

In this paper we use data for the general government budget balance, interest expenditure and GFCF, all in ratios to GDP, from 1994 to 2006. Our sample includes the 15 countries belonging to the EU before the 2004 enlargement. Since issues of creative accounting are beyond the scope of our study, we do not explore the reported information on debt or on stock-flow adjustments (see Buti *et al.*, 2006). Nor do we make use of data on sub-sectors' balances, since the possibility of intra-annual transfers between them would make it difficult to conduct a meaningful comparison of forecasts and outcomes.

3. Statistical properties of EDP forecasts

In this section we describe the statistical properties of forecast errors. For each of the three fiscal variables of interest (budget balance, interest payments and GFCF), the year t forecast error (e_t) is defined as the outturn (R_t) minus the forecast (F_t), both in percentage of the contemporary forecast or estimate of GDP.

$$e_t = R_t - F_t \tag{1}$$

Hence, in the case of the budget balance, positive forecast errors mean a better-than-projected budgetary execution, yielding a higher surplus (or a lower deficit). The opposite holds for interest payments and GFCF, where positive errors will signal higher-than-expected expenditure ratios, often associated to spending overruns.

The outcome for year t is taken from the first notification of year $t+1$, submitted by 1 April (formerly 1 March). The corresponding forecast is found in the first notification of year t. Measuring outcomes by first available estimates, as we do, fails to take into

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[1] The UK fiscal year goes from 1 April to 31 March. Forecasts in EDP notifications refer to fiscal or financial years – e.g. by 1 April 2007 the UK reported projected figures for the 2007/2008 financial year. Therefore the April reporting deadline coincides with the beginning (or end) of fiscal years, whereas for other countries there is a 3-month gap.

[2] Even controlling for the factors outlined in this paragraph, we do not claim to have achieved a perfectly homogeneous data set: other methodological changes exist (e.g. the recent move from base 1995 to base 2000 in national accounts) and reporting dates are sometimes not fully uniform (for instance, we have retained corrections to the original data submitted on a few occasions by national governments shortly after the notification deadlines). We claim, however, to have improved on alternative datasets.

account data revisions. On the other hand, working with definitive data would have reduced the number of available observations, and increased the likelihood of methodological divergences between forecasts and outturns. Further, first available estimates generally have more policy relevance than final, revised outturns, which is the most common argument for their widespread use in the literature (see e.g. Artis and Marcellino (2001) or Brück and Stephan (2006)).

We compute three widely used summary statistics of forecast errors: the mean error (ME), the mean absolute error (MAE) and the root mean squared error (RMSE). We also test for unbiasedness and for autocorrelation. As is well known, biases correspond to cases of systematic overestimation or underestimation, whereas autocorrelation refers to systematic patterns of demeaned forecast errors over time (for example, the existence of some degree of persistence). The absence of both bias and autocorrelation is sometimes called "weak form informational efficiency" (henceforth weak efficiency; see Öller and Barot, 2000).

Following the suggestion by Öller and Barot (2000), we test for both unbiasedness and autocorrelation by regressing forecast errors on a constant and as many lagged errors as needed for residuals to become a white noise[3]. We thus estimate the following model:

$$e_t = \beta_0 + \lambda_1 e_{t-1} + \lambda_2 e_{t-2} + \mu_t \tag{2}$$

Autocorrelation is tested through an F-test for $\lambda_1 = \lambda_2 = 0$, and unbiasedness through a t-test for $\beta_0 = 0$. This latter test is performed after dropping unnecessary lags.

Results for the budget balance are shown in Table 1. Although prudent forecasts largely outnumber optimistic ones, one observes considerable heterogeneity across countries. Five out of 15 member states (Greece, France, Italy, Portugal and the UK) present negative mean errors, implying that outturns are, on average, worse than projected. At the opposite end, also five countries have positive mean errors which exceed 0.5 p.p of GDP - Ireland, Luxembourg, the Netherlands, Finland and Sweden.

As regards forecasting accuracy, measured by the MAE or the RMSE, there is also sizeable cross-country variation. Belgium and Spain are the best performers, with average absolute errors of only 0.28 and 0.39 p.p. of GDP, respectively. By contrast, Greece, Ireland, Luxembourg and Sweden have MAE values higher than 1 p.p. In this latter group of countries, however, the apparent common lack of forecasting precision hides different situations: in the northern trio, high absolute errors mainly reflect the prevalence of large positive errors, the figures for the ME and MAE being relatively close (especially for Luxembourg); whereas in Greece the contrasting ME and MAE values are due to an unstable forecasting performance, with large errors of opposite signs.

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[3] This avoids the problem of invalid inference on the constant due to autocorrelated residuals. Adding one or two lags proved sufficient.

The two final columns of Table 1 suggest a rather poor statistical quality of budget balance forecasts[4]. Autocorrelation is detected in three countries and a significant bias in six; altogether, only four countries meet the requirements for weakly efficient forecasts, as defined above – Denmark, Germany, Austria and Portugal. Nevertheless, it is hard to draw normative implications from these results, since biased forecasts have only been found in countries which are either very prudent in their fiscal projections (Ireland, Luxembourg, Finland and Sweden) or which display a high degree of precision (Belgium and Spain)[5].

Table 1. Statistical properties of general government budget balance forecast errors (in % of GDP)

	ME	MAE	RMSE	No. Obs	No bias	No corr
Belgium	0.19	0.28	0.37	13	2.08 *	0.36
Denmark	0.42	0.71	0.98	13	1.65	0.69
Germany	0.05	0.88	1.07	13	0.15	0.27
Greece	-0.41	1.05	1.42	13	-0.89	3.83 *
Spain	0.29	0.39	0.49	13	2.47 **	0.15
France	-0.23	0.41	0.57	13	-1.21	6.94 **
Ireland	1.18	1.68	1.94	13	2.64 **	0.02
Italy	-0.40	0.78	0.92	12	-	-
Luxembourg	1.18	1.28	1.54	13	4.10 ***	0.73
Netherlands	0.51	0.98	1.17	13	1.71	9.39 ***
Austria	0.10	0.51	0.64	12	0.53	0.45
Portugal	-0.19	0.68	1.04	13	-0.64	0.79
Finland	0.61	0.83	1.13	12	2.12 *	1.94
Sweden	1.05	1.32	1.43	12	3.59 ***	1.71
United Kingdom	-0.22	0.67	0.76	11	-	-

Notes: ME, MAE and RMSE are the mean, mean absolute and root mean squared errors, respectively. "No bias" is the t-statistic for zero mean forecast errors ($\beta_0=0$ in eq. 2 with unnecessary lags excluded). "No corr" reports the F-statistic for the null hypothesis that $\lambda 1= \lambda 2=0$ in eq. (2). (*), (**) and (***) denote rejection of H0 at 10%, 5% and 1% levels of significance, respectively. Test statistics are not reported for countries which present missing values in intermediate years, as the number of observations to test for autocorrelation is significantly reduced.

Results for GFCF forecast errors (Table 2) are in sharp contrast with those for the budget balance. With the exception of Luxembourg and (to a lesser extent) Portugal, mean errors tend to be very small. Though on average most countries tend to err on the side of prudence (in the sense that the actual expenditure ratio turns out lower than forecast), this behaviour is seldom systematic: MAE figures are generally high compared to mean errors, indicating that errors often switch in sign. More formally, a significant bias is only detected for three countries (Luxembourg, Portugal and Finland). There are no instances of significant autocorrelation in forecast errors.

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[4] Statistical results should be regarded with prudence, as the number of observations is limited. When missing values in intermediate years induced an even smaller sample, the tests were not performed.
[5] For a given average error, a higher volatility makes it less likely that the null of no bias is rejected.

Table 2. Statistical properties of GFCF forecast errors (in % of GDP)

	ME	MAE	RMSE	No. Obs	No bias	No corr
Belgium	-0.01	0.12	0.15	12	-0.33	0.09
Denmark	-0.04	0.13	0.16	13	-0.85	0.42
Germany	-0.05	0.11	0.14	13	-1.44	0.99
Greece	-0.15	0.28	0.36	10	-	-
Spain	0.02	0.19	0.22	12	0.23	1.83
France	-0.03	0.18	0.20	13	-0.52	1.60
Ireland	-0.03	0.24	0.28	13	-0.31	0.12
Italy	0.05	0.26	0.35	9	-	-
Luxembourg	-0.47	0.59	0.75	13	-2.81 **	1.82
Netherlands	0.04	0.20	0.27	13	0.68	2.32
Austria	-0.11	0.20	0.24	12	-1.66	1.06
Portugal	-0.22	0.38	0.46	13	-1.93 *	0.05
Finland	0.11	0.13	0.18	12	2.43 **	1.88
Sweden	-0.03	0.27	0.35	12	-0.28	0.06
United Kingdom	-0.07	0.16	0.18	11	-	-

See notes under Table 1.

As regards interest payments (Table 3), the mean error is negative for all 15 countries, and often close (with switched sign) to the mean absolute error, suggesting that the overestimation of this budget item has been systematic. One possible explanation for this pattern is that countries failed to fully anticipate the magnitude of the fall in interest rates during the run-up to EMU. Formal tests point to a statistically significant pessimistic bias in roughly half the member states considered. As in the case of GFCF, the null hypothesis of no autocorrelation is never rejected.

Table 3. Statistical properties of interest expenditure forecast errors (in % of GDP)

	ME	MAE	RMSE	No. Obs	No bias	No corr
Belgium	-0.08	0.16	0.21	13	-1.56	1.43
Denmark	-0.08	0.16	0.24	13	-1.21	1.41
Germany	-0.04	0.19	0.30	13	-0.46	0.03
Greece	-0.55	0.60	0.72	11	-	-
Spain	-0.26	0.27	0.33	12	-4.35 ***	1.36
France	-0.04	0.10	0.13	13	-1.11	0.91
Ireland	-0.33	0.33	0.39	13	-5.25 ***	0.49
Italy	-0.26	0.30	0.37	11	-	-
Luxembourg	-0.01	0.05	0.05	13	-0.66	0.01
Netherlands	-0.05	0.11	0.16	13	-1.14	0.00
Austria	-0.07	0.12	0.16	12	-1.80 *	0.41
Portugal	-0.12	0.16	0.20	13	-2.56 **	0.78
Finland	-0.17	0.29	0.41	11	-	-
Sweden	-0.35	0.47	0.52	12	-3.00 **	0.23
United Kingdom	-0.04	0.11	0.13	11	-	-

See notes under Table 1.

Overall, we conclude that from a statistical point of view the quality of forecasts is worse for the budget balance than it is for interest and GFCF expenditure. Further, the degree of cross-country heterogeneity is much bigger as regards the budget balance projections. Finally, it is interesting to remark that even in the case of countries with negative average budget balance forecast errors, interest payments and GFCF spending

tend to be projected with prudence[6], and thus the source of budget balance slippages is to be found elsewhere.

4. Modelling Forecast Errors

4.1. Methodology and explanatory variables

In this section our goal is to find out which economic, political and institutional variables play a role in explaining fiscal forecast errors – as regards both the general government budget balance and two specific expenditure items, interest payments and GFCF. The panel data model to be estimated can be written as

$$e_{it} = \alpha + \sum_{j} \beta_j X_{j,it} + \varepsilon_{it}, \tag{3}$$

where e_{it} is the relevant forecast error (defined as in section 3), $X_{j,it}$ denotes the potential determinants of errors, α and β_j are parameters, t, i and j index years, countries and regressors, respectively, and the disturbance ε_{it} may contain an unobserved country effect.

As in existing studies, the choice of regressors is mainly guided by the political economy literature applied to fiscal policy. Without claiming to encompass previous contributions, we have attempted to control for the factors they highlighted, as well as to test new variables, either constructed for the first time or borrowed from recent datasets.

Our regressors fall into five different categories[7]. First, economic controls include the output gap and the forecast error in real GDP growth. The former, intended to control for the possibility of greater optimism in good times (as detected by Strauch *et al.*, 2004), is computed according to two different methods: the Hodrick-Prescott filter and the production function approach. It is taken with a lag so as to capture cyclical conditions (roughly) at the time of preparing the fiscal forecasts. GDP forecast errors – perhaps the most obvious variable to control for, due to the operation of automatic stabilizers – were defined bearing in mind two concerns. The first was to align as closely as possible the timing of GDP forecasts and outturns with that of the fiscal variables. The second was to minimize problems of endogeneity by resorting to a forecaster not involved in the preparation of the EDP notifications[8]. We have thus opted for the European Commission Spring forecasts, using projections from the previous Autumn for robustness checks.

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[6] With very minor exceptions in the case of Spanish and Italian GFCF – see Table 2.
[7] The Data Appendix provides a more detailed description of each variable.
[8] There would be endogeneity if in some circumstances governments decided to manipulate both GDP and deficit forecasts by assuming a rosy macroeconomic outlook, which in turn would translate into overoptimistic projections for tax revenues. Analysing variables net of cyclical factors, Jonung and Larch (2006) provide evidence that a similar behaviour has indeed prevailed in some of the largest EU countries.

A second category of variables addresses the possible impact of fiscal rules and institutions. As in previous studies – e.g. Strauch *et al.* (2004), Annett (2006) – we account for different forms of fiscal governance (Hallerberg, 2004), creating indicator variables for the commitment, delegation and mixed forms of budget process centralization, as well as for cases of fragmented fiscal decision-making (variable *fiefdom*). Following standard practice, we also define a dummy variable that groups together commitment and mixed systems. An innovative feature of our study is the assessment of the influence of national-level numerical fiscal rules on forecasting performance. For this purpose we have resorted to a set of indices described in Ayuso *et al.* (2007), which quantify the coverage and strength of national numerical fiscal rules in EU countries from 1990 to 2005[9]. We consider an index comprising numerical rules of different types (budget balance, debt, expenditure and revenue rules – variable *numerical rules*), as well as indices that restrict attention to expenditure rules or to budget balance and debt rules. All indices are increasing in the degree of coverage and strength.

A third category includes variables attempting to capture political motivations of an opportunistic nature. Here, we follow previous studies (Strauch *et al.* (2004), Brück and Stephan (2006)) in considering how close the next general elections are, either by means of a dummy variable indicating if elections are expected in the current calendar year, or through a continuous variable measuring the expected time (in months) until the next elections. A refinement we introduce is that in both cases we consider the *expected* situation at the time of reporting the fiscal forecasts. Further, we construct a new dummy variable (*previous opposition reports outturn*) for situations where a forecast and the respective outturn are reported by governments controlled by opposing parties. This indicator attempts to control for the incentive that a new government may have to discredit its predecessor (of a different political family) and enhance its own fiscal performance by reporting for the previous year a "bad" fiscal outturn.

The fourth group of regressors intends to control for the possible effects that an ongoing or imminent excessive deficit procedure may have on the forecasts of the country concerned. We define an indicator variable (*ongoing EDP*) for the cases where a country is already in excessive deficit at the time of forecasting, and a slightly enlarged variant (*ongoing or run-up to EDP*) also comprising instances where the declaration of an excessive deficit is to take place in the near future.

A final category of regressors concerns the government's strength, fragmentation and ideology. We use indicator variables for coalition and for minority governments, and a variable coding the ideological position of the executive on a 1 to 5 scale (increasing from right-wing to left-wing parties). These three variables were compiled in such a way as to reflect the situation prevailing at the time of forecasting.

We estimate equation (3) by pooled OLS with clustered robust standard errors[10]. Variables such as the forms of fiscal governance display little variation over time, in

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[9] Coverage refers to the share of public finances governed by the rules, whereas strength is assessed with reference to the rules' statutory basis, monitoring and enforcement provisions and media visibility. We thank Ayuso and co-authors for sharing with us the time series for the indices.

[10] Estimations were performed using Stata, version 9.2.

which case fixed effects (FE) estimates are often imprecise (as noted by Strauch *et al.* (2004) and Annett (2006)). In turn, the random effects (RE) estimator requires more restrictive assumptions than pooled OLS with robust estimation of standard errors. We have checked, however, that using the FE or RE estimators broadly confirms the results obtained by pooled OLS. The use of clustered robust standard errors allows for the existence of heteroskedasticity across countries (suggested by the strong cross-country heterogeneity as regards the RMSE of forecast errors) and of serial correlation of unspecified form of disturbances within countries.

4.2. Results for the budget balance

Columns (1) to (3) in Table 4 report results for the whole sample of forecast errors (1994 to 2006). As expected, positive growth surprises induce better than projected fiscal balances, by an amount broadly in line with standard estimates of the size of automatic stabilisers. As in Strauch *et al.* (2004) or Annett (2006), we also find that fiscal governance characterised by commitment or mixed forms is strongly associated to more prudent budgetary forecasts[11]. However, unlike those studies, our results do not support the hypothesis that a positive output gap imparts a significant optimistic bias to fiscal projections.

Opportunistic motivations seem to play a role as well. Though in column (1) elections in the near future do not exert a statistically significant impact, it is the case that a new government dominated by a party previously in opposition is often associated to the disclosure of a worse-than-forecast fiscal performance under its predecessor. Further, if one ceases to control for the latter effect (column (2)), then elections regain significance, making governments err on the side of optimism, as in Brück and Stephan (2006). Our interpretation of these results is that electoral effects on forecast errors prove strongest when incumbents lose and are replaced in office by their opponents[12].

Further, as regards the existence or prospect of an excessive deficit, results suggest that countries have tended to underestimate deficits in the run-up to the declaration of an excessive deficit; once it has been declared, however, the effect vanishes (column (3)). Finally, and unlike the results in Brück and Stephan (2006), coalition or minority governments do not seem to issue overly optimistic forecasts to any significant degree; likewise, the left-right position of a government appears irrelevant to its forecast performance[13].

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[11] An alternative would be to enter into the equation three of the fiscal governance indicator variables, thus assessing their effects against the fourth. Doing so reveals that commitment and mixed forms have significant and similar coefficients (the equality of which cannot be rejected) measured against delegation, whereas fiefdom lies far from statistical significance (results available upon request). We have hence decided to assimilate mixed systems to the commitment form of governance, as often done in the literature.

[12] With a few exceptions (e.g. unexpected elections or change of government without elections being called), variable *previous opposition reports outturn* takes value one in a subset of the observations where variable *election in current year* equals one.

[13] As mentioned before, we have also considered variants for some of the regressors – such as the output gap, the forecast error in real GDP growth or the proximity of elections. Results available upon request show that the above conclusions are robust to the use of such variants.

Table 4. Modelling budget balance forecast errors
Method of estimation: Pooled OLS

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Without numerical rules			With numerical rules		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GDP forecast error (Spring)	0.38*** (0.07)	0.40*** (0.07)	0.38*** (0.07)	0.35*** (0.07)	0.37*** (0.08)	0.35*** (0.08)
Output gap (HP) (lagged)	-0.05 (0.05)	-0.04 (0.05)	-0.06 (0.05)	-0.07 (0.05)	-0.05 (0.05)	-0.07 (0.05)
Commitment or mixed	0.57*** (0.14)	0.59*** (0.15)	0.64*** (0.15)	0.33** (0.15)	0.54*** (0.15)	0.31* (0.15)
Expenditure rules				0.24** (0.08)		0.33** (0.12)
Interaction expenditure rules-commitment or mixed						-0.11 (0.12)
Balance or debt rules					0.06 (0.07)	
Election in current year	-0.19 (0.17)	-0.38*** (0.13)	-0.16 (0.18)	-0.27 (0.18)	-0.25 (0.18)	-0.27 (0.18)
Previous opposition reports outturn	-0.49** (0.22)		-0.54* (0.26)	-0.24 (0.23)	-0.32 (0.23)	-0.25 (0.23)
Ongoing or run-up to EDP	-0.39* (0.19)	-0.44* (0.21)		-0.75** (0.31)	-0.61* (0.30)	-0.77** (0.31)
Ongoing EDP			-0.02 (0.18)			
Ideology	-0.003 (0.04)	0.01 (0.04)	0.01 (0.04)	-0.02 (0.04)	0.01 (0.04)	-0.02 (0.04)
Coalition	-0.002 (0.21)	0.01 (0.22)	-0.01 (0.22)	-0.07 (0.18)	0.03 (0.22)	-0.11 (0.19)
Minority	0.05 (0.22)	0.04 (0.22)	0.07 (0.23)	0.11 (0.20)	0.10 (0.23)	0.10 (0.20)
R-squared	0.34	0.32	0.32	0.37	0.34	0.37
No. Observations	187	187	187	172	172	172

Notes: Robust standard deviations are reported in brackets. (*), (**) and (***) denote significance of the estimated coefficients at 10%, 5% and 1% levels of significance, respectively.

Next – columns (4) to (6) – we add indices of national-level numerical fiscal rules to the previous equations (the sample becomes slightly smaller as these indices are only available up to 2005). Expenditure rules are found to be associated to more prudent forecasts, whereas deficit or debt rules fail to exert any noticeable impact[14]. A possible explanation is that stronger expenditure rules help prevent spending overruns, which in turn play a major role in accounting for worse-than-expected deficit outcomes. Though our dataset does not disaggregate the budget balance into revenues and expenditures,

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[14] Results for the index of numerical rules of all types are similar to those obtained with the index of expenditure rules.

Moulin and Wierts (2006) and the European Commission (2007) find that spending overruns (in nominal and real terms) are indeed the main explanation for the failure to achieve the planned improvements in the budget balance set out by Member States in their SCPs.

Further, we have checked whether the impact of expenditure rules on forecast errors was significantly affected by the type of fiscal governance in place[15]. Results in column (6) suggest that those rules foster prudent projections regardless of the form of fiscal governance, as the coefficient of the expenditure rules index interacted with the governance indicator is far from significant.

Table 5. Modelling budget balance forecast errors - pre-SGP vs. SGP periods
Method of estimation - Pooled OLS

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Equation 1			Equation 2		
	Without numerical rules			With numerical rules		
	Complete Sample	Pre-SGP	SGP	Complete Sample	Pre-SGP	SGP
GDP forecast error (Spring)	0.42*** (0.05)	0.43*** (0.09)	0.41*** (0.07)	0.40*** (0.05)	0.47*** (0.10)	0.34*** (0.09)
Commitment or mixed	0.55*** (0.11)	0.27 (0.16)	0.78*** (0.20)	0.35*** (0.11)	0.10 (0.20)	0.56*** (0.17)
Expenditure rules				0.18** (0.07)	0.20 (0.14)	0.18** (0.08)
Previous opposition reports outturn	-0.58*** (0.16)	-0.04 (0.24)	-1.16*** (0.23)	-0.41** (0.18)	0.06 (0.21)	-1.07*** (0.26)
Ongoing or run-up to EDP	-0.39* (0.20)		-0.20 (0.16)	-0.73** (0.32)		-0.52* (0.28)
R-squared	0.33	0.36		0.34	0.38	
No. Observations	189	189		174	174	

See notes under Table 4.

Table 5 reruns in a more parsimonious way the "baseline" specifications of Table 4 – columns (1) and (4), discarding non-significant variables – allowing for different coefficients before and after the coming into force of the SGP (1999)[16]. It is noteworthy that the numerical and/or statistical significance of fiscal institutions (especially as regards the forms of fiscal governance) is much stronger in the SGP period. Similarly, opportunistic effects become apparent only from 1999 onwards, in line with Brück and Stephan's (2006) detection of an electoral effect in Euro area countries after the introduction of the SGP. Similar results (available upon request) are obtained if the SGP subsample is further restricted to euro area countries (subject to the most stringent provisions of the EDP, such as the possibility of pecuniary sanctions). These findings suggest that the increased importance and visibility of fiscal forecasts in the SGP period made them more vulnerable to political manipulation; in turn, in a context of heightened

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[15] Hallerberg *et al.* (2007) consider a related question when analyzing the impact of fiscal institutions on public debt, and find that fiscal targets/rules tend to be a more efficient device in "commitment" countries (characterized by large ideological distance and high political competition among parties in government).

[16] The intercept (not reported) is also allowed to vary, whereas the excessive deficits dummy only takes non-zero values in the SGP subsample.

political pressures, the quality of fiscal institutions has also become more influential in forecasting performance.

The annex shows that the main conclusions above survive a set of robustness checks. These comprise (i) excluding the forecast errors affected by the move from ESA79 to ESA95 (i.e., those referring to 1999, with forecasts under ESA79 rules and outturns reported by 1 March 2000 according to the ESA95); (ii) excluding the UK observations, since its different fiscal year implies that the timing of forecasts and outturns relative to the annual budget cycle is not the same for the UK and for the remaining countries; (iii) estimating fixed effects and random effects models instead of using pooled OLS[17].

4.3. Results for GFCF and interest expenditure

After analyzing which political and institutional factors help explain the general government budget balance forecast errors, we turn our attention to forecasts of two important (though much less media exposed) expenditure items – GFCF and interest expenditure. To our knowledge, this is the first time that such an exercise is done, taking advantage of the possibilities offered by our dataset. We wish to investigate whether the same variables that exert an impact on the overall balance projections also influence the pattern of forecast errors of more disaggregated items.

Starting with GFCF, column (1) in Table 6 reruns the same specification already used in column (1) of Table 4. Nevertheless, conclusions are far from similar, as none of the regressors is significant. If we specify all individual forms of fiscal governance (instead of grouping together mixed and commitment systems), we find that countries characterized by fragmented fiscal decision-making are more prone to over-estimate GFCF spending (columns (2) and (3)). Though this could reflect a prudent budgetary execution, we tend to favour a different interpretation: faced with many competing demands and in the absence of a sound fiscal process, governments may feel pressured to announce large amounts of public investment, only part of which actually materialises. The prospect of elections in the near future also plays a role, being somewhat associated to modest spending overruns. Though understandable from a political economy perspective, this effect loses statistical significance when the proximity of elections is measured in a different way (variable *months until next election*, column (3)).

As regards the role of the various types of numerical fiscal rules, conclusions are also very different from those of the previous section, as their coefficients are never significant – columns (4) to (6). The explanatory power of fragmented fiscal processes is preserved, and there are some signs of GFCF overruns in the run-up to the declaration of an excessive deficit (columns (4) and (5)), which cease to be significant once that declaration has taken place (column (6)).

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[17] In the case of fixed effects, the main differences, as expected, concern the coefficients of variables with little variation over time.

Table 6. Modelling GFCF forecast errors
Method of estimation: Pooled OLS

Dep. Variable: GFCF forecast error (% GDP, outturn minus forecast)	Without numerical rules			With numerical rules		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP forecast error (Spring)	-0.004 (0.02)	-0.01 (0.02)	-0.01 (0.02)	0.02 (0.02)	0.01 (0.01)	0.01 (0.01)
Output gap (HP) (lagged)	0.005 (0.01)	0.002 (0.01)	0.002 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Commitment		-0.07 (0.10)	-0.08 (0.10)		-0.03 (0.07)	-0.05 (0.07)
Mixed		-0.07 (0.09)	-0.08 (0.10)		-0.003 (0.09)	-0.02 (0.10)
Fiefdom		-0.23*** (0.04)	-0.23*** (0.04)		-0.22*** (0.05)	-0.20*** (0.05)
Commitment or mixed	-0.02 (0.08)			0.01 (0.06)		
Expenditure rules				-0.05 (0.04)	-0.06 (0.04)	-0.05 (0.04)
Balance or debt rules				0.05 (0.03)	0.03 (0.03)	0.02 (0.03)
Election in current year	0.06 (0.04)	0.06* (0.03)		0.03 (0.04)	0.05 (0.04)	
Months until next election			-0.002 (0.001)			-0.001 (0.001)
Previous opposition reports outturn	-0.06 (0.06)	-0.04 (0.05)	-0.04 (0.06)	-0.06 (0.07)	-0.05 (0.07)	-0.02 (0.05)
On-going or run-up to EDP	0.02 (0.06)	0.04 (0.07)	0.04 (0.07)	0.16** (0.06)	0.18** (0.07)	
On-going EDP						0.12 (0.10)
Ideology	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.01 (0.02)	-0.02 (0.02)
Coalition	0.07 (0.07)	0.05 (0.05)	0.06 (0.05)	0.07 (0.06)	0.06 (0.05)	0.07 (0.06)
Minority	0.10 (0.08)	0.13 (0.08)	0.14 (0.08)	0.09 (0.08)	0.09 (0.08)	0.09 (0.08)
R-squared	0.03	0.08	0.08	0.08	0.11	0.10
No. Observations	180	180	180	166	166	166

See notes under Table 4.

Results for interest payments forecast errors are reported in Table 7. Columns (1) to (3) display specifications similar to those used for the budget balance. However, in contrast to Table 4, significant variables are few and hard to interpret. The run-up to an excessive deficit seems associated to overestimation – i.e., lower interest payments in % of GDP than forecast. The same happens with positive growth surprises, though in this

case the magnitude of the estimated coefficient suggests an important role played by denominator effects[18].

Table 7. Modelling interest payments forecast errors
Method of estimation: Pooled OLS

Dep. Variable: interest payments forecast error (cols. 1 to 3: % GDP, outturn minus forecast; cols. 4 to 7: see text)	(1)	(2)	(3)	(4)	(5)	(6) Pre-SGP	(6) SGP	(7)
GDP forecast error (Spring)	-0.05** (0.02)	-0.05** (0.02)	-0.05** (0.02)	-1.59*** (0.42)	-1.56*** (0.42)	-2.84*** (0.78)	-0.99** (0.35)	-1.50*** (0.46)
Output gap (HP) (lagged)	0.003 (0.01)	0.001 (0.01)	0.003 (0.01)	-0.64* (0.33)	-0.64** (0.27)	-0.85** (0.38)	-0.42 (0.40)	-0.71** (0.33)
Commitment or mixed	0.03 (0.05)	-0.08 (0.05)	-0.02 (0.05)	-1.16 (0.71)	-1.39* (0.68)	-0.01 (0.97)	-2.26 (1.36)	-1.96** (0.75)
Expenditure rules		0.04 (0.02)						0.45 (0.51)
Balance or debt rules		0.02 (0.03)						-0.06 (0.52)
Election in current year	0.13 (0.09)	0.13 (0.10)	0.14 (0.09)	2.44 (1.41)	2.03* (1.10)	1.09 (1.25)	2.48 (1.42)	2.10* (1.17)
Previous opposition reports outturn	0.005 (0.07)	0.01 (0.08)	-0.005 (0.06)	-1.08 (1.38)				
On-going or run-up to EDP	-0.08*** (0.03)	-0.13*** (0.04)		-0.77 (0.49)	-0.87 (0.59)		-1.17 (0.70)	-1.27 (1.45)
Ongoing EDP			-0.07 (0.04)					
Ideology	0.01 (0.01)	-0.01 (0.02)	0.01 (0.01)	-0.01 (0.32)				
Coalition	0.15 (0.10)	0.13 (0.08)	0.15 (0.10)	2.08* (1.00)	2.45** (0.89)	2.12* (1.11)	2.94** (1.37)	2.66** (1.13)
Minority	-0.07 (0.08)	-0.07 (0.07)	-0.07 (0.08)	-0.81 (0.97)				
R-squared	0.15	0.18	0.14	0.27	0.27	0.29		0.27
No. Observations	183	168	183	182	183	183		168
Time Dummies	No	No	No	Yes	Yes	Yes		Yes
Normalized forecast errors	No	No	No	Yes	Yes	Yes		Yes

See notes under Table 4.

In the remainder of the table the equations are altered in two ways. First, we introduce year dummies[19], to capture developments in interest rates that are largely common to the several countries. Second, we normalize the dependent variable by taking the ratio of interest expenditure forecast errors to the realized gross debt in the previous year (both in % of GDP of the respective year), thus eliminating the relative forecasting disadvantage of more indebted countries (for the same degree of uncertainty

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[18] If in a country interest payments stand at 3% of GDP (a value often exceeded, especially in the early years of the sample), the forecast error in nominal terms is zero and there is a positive growth surprise of 1 p.p., then the forecast error in % of GDP will be -0.03, which compares with an estimated coefficient of -0,05.

[19] Coefficients for the year dummies are available upon request.

surrounding interest rates, a high-debt country will tend to record larger absolute errors in the interest-to-GDP ratio than a low-debt one)[20].

While column (4) retains all the regressors of column (1), columns (5) to (7) drop the three least significant variables. A positive output gap is associated to prudent forecasts, the opposite taking place with coalition governments. Commitment or mixed forms of fiscal governance seem to foster prudence, while the prospect of elections in the current year induces spending overruns – results reminiscent of those obtained for the budget balance, though much less robust, and failing to reach statistical significance when one allows for different coefficients before and after the SGP (column (6)). Numerical rules remain of negligible relevance, as it was the case in column (2). Overall, adding time effects and dividing errors by public debt brings us only marginally closer to the conclusions drawn when modeling budget balance forecast errors[21].

In sum, it is much harder to find systematic relationships between forecast errors and politico-institutional variables in the case of interest and GFCF spending than it is for the overall budget balance. This finding echoes the conclusions drawn in section 3, namely the better statistical quality of forecasts for the two disaggregated items. It is probably the case that their much lower profile reduces the importance of non-technical considerations at the time of reporting forecasts and outturns.

5. Conclusions

In this paper we have assessed fiscal forecasting in 15 EU countries by looking at budgetary projections contained in EDP notifications – a previously unexploited source with important advantages over alternatives. For three fiscal variables (the overall budget balance, GFCF and interest payments, all in ratios to GDP), we have documented the statistical properties of forecast errors and performed a panel data analysis of their potential determinants, considering a wide set of economic, political and institutional variables.

Budget balance forecast errors respond to growth surprises due to the operation of automatic stabilisers, and tend to be positive (i.e. with outcomes better than projections) when fiscal governance takes the commitment or mixed forms. A higher coverage and strength of national-level expenditure rules is also conducive to more prudent forecasts, both for commitment/mixed systems and for other forms of fiscal governance. Two sorts of opportunistic considerations also exert some impact on forecast errors. First, upcoming elections are associated to forecasts that turn too rosy, especially when the ensuing outcomes are reported by the former opposition. Second, countries have also tended to be over-optimistic in the run-up to the declaration of an excessive deficit, though this result must be regarded with prudence due to the very small number of observations. Both the effect of fiscal rules and institutions and that of opportunistic

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[20] For readability of the estimated coefficients, the ensuing dependent variable is then multiplied by 1000.
[21] For both GFCF and interest payments equations were also estimated with FE and RE. Results (available upon request) broadly confirm those above, the main differences pertaining to variables with little variation over time in FE models.

political motivations have become stronger once the SGP has come into force. Finally, the coalition or minority nature of a government, its partisanship, the output gap estimates at the time of forecasting and the reliance on national-level deficit or debt rules all fail to exert any significant influence.

We have next asked whether the above results for the budget balance forecasts also held in the case of GFCF and interest payments projections, and found a generally negative answer. Systematic relationships between interest or GFCF expenditure forecast errors and politico-institutional variables are scarcer and less robust. There tends to be GFCF overestimation when fiscal decision-making is fragmented, which might correspond to governments being pressured by interest groups to announce large amounts of public investment, only part of which actually materialises. In the case of interest payments, some specifications detect an influence of fiscal governance forms and of electoral effects which is coherent with the results for the budget balance, but statistically fragile. To some extent, these conclusions match those from the univariate analyses of forecast errors, which showed fewer systematic patterns for interest payments and GFCF than for the budget balance[22].

The whole of our analysis suggests that the influence of political and institutional variables on fiscal forecasting strongly increases with the public visibility and policy relevance of such forecasts. A clear illustration is provided by the contrasting results for the budget balance before the SGP, GFCF and interest expenditure, on the one hand, and for the budget balance under the SGP, on the other. The higher the profile of forecasts, the stronger the political pressures are likely to become, and the greater the importance of sound fiscal rules and institutions in delivering a prudent assessment of the fiscal outlook.

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[22] With the exception of a generalized overestimation of interest expenditure – see section 3.

Annex

Table 4A. Modelling budget balance forecast errors: excluding 1999 forecast errors due to ESA change. Method of estimation: Pooled OLS

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Without numerical rules			With numerical rules		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP forecast error (Spring)	0.37*** (0.07)	0.38*** (0.07)	0.37*** (0.08)	0.34*** (0.08)	0.35*** (0.08)	0.34*** (0.08)
Output gap (HP) (lagged)	-0.06 (0.05)	-0.04 (0.05)	-0.06 (0.05)	-0.07 (0.06)	-0.05 (0.05)	-0.07 (0.06)
Commitment or mixed	0.61*** (0.15)	0.64*** (0.16)	0.68*** (0.16)	0.38** (0.17)	0.58*** (0.16)	0.37* (0.17)
Expenditure rules				0.23** (0.09)		0.33** (0.13)
Interaction expenditure rules-commitment or mixed						-0.13 (0.14)
Balance or debt rules					0.06 (0.07)	
Election in current year	-0.18 (0.18)	-0.39** (0.13)	-0.15 (0.19)	-0.29 (0.19)	-0.25 (0.18)	-0.30 (0.19)
Previous opposition reports outturn	-0.50* (0.24)		-0.55* (0.27)	-0.24 (0.25)	-0.32 (0.24)	-0.24 (0.25)
Ongoing or run-up to EDP	-0.37* (0.19)	-0.41* (0.22)		-0.72** (0.32)	-0.59* (0.30)	-0.74** (0.32)
On-going EDP			0.01 (0.18)			
Ideology	-0.02 (0.04)	-0.01 (0.04)	-0.01 (0.04)	-0.03 (0.04)	-0.01 (0.04)	-0.04 (0.04)
Coalition	-0.03 (0.22)	-0.03 (0.23)	-0.05 (0.23)	-0.09 (0.20)	0.01 (0.24)	-0.14 (0.21)
Minority	0.07 (0.24)	0.05 (0.23)	0.09 (0.24)	0.11 (0.22)	0.13 (0.25)	0.10 (0.22)
R-squared	0.33	0.32	0.32	0.35	0.33	0.35
No. Observations	173	173	173	158	158	158

See notes under Table 4.

Table 5A. Modelling budget balance forecast errors - pre-SGP vs. SGP periods - excluding 1999 forecast errors due to ESA change. Method of estimation: Pooled OLS

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Equation 1			Equation 2		
	Without numerical rules			**With numerical rules**		
	Complete Sample	**Pre-SGP**	**SGP**	**Complete Sample**	**Pre-SGP**	**SGP**
GDP forecast error (Spring)	0.41*** (0.05)	0.43*** (0.09)	0.39*** (0.08)	0.39*** (0.05)	0.47*** (0.10)	0.31*** (0.09)
Commitment or mixed	0.58*** (0.12)	0.27 (0.16)	0.87*** (0.23)	0.41*** (0.13)	0.10 (0.20)	0.69*** (0.23)
Expenditure rules				0.16* (0.08)	0.20 (0.14)	0.14 (0.11)
Previous opposition reports outturn	-0.58*** (0.17)	-0.04 (0.24)	-1.22*** (0.24)	-0.41** (0.19)	0.06 (0.21)	-1.16*** (0.27)
Ongoing or run-up to EDP	-0.37* (0.20)		-0.13 (0.18)	-0.70** (0.32)		-0.42 (0.28)
R-squared No. Observations	0.32 175	0.36 175		0.33 160	0.38 160	

See notes under Table 4.

Table 4B. Modelling budget balance forecast errors: excluding the United Kingdom
Method of estimation: Pooled OLS

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Without numerical rules			With numerical rules		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP forecast error (Spring)	0.37*** (0.07)	0.39*** (0.07)	0.37*** (0.07)	0.34*** (0.08)	0.36*** (0.08)	0.34*** (0.08)
Output gap (HP) (lagged)	-0.06 (0.05)	-0.04 (0.05)	-0.06 (0.05)	-0.07 (0.06)	-0.05 (0.05)	-0.07 (0.06)
Commitment or mixed	0.56*** (0.14)	0.58*** (0.15)	0.63*** (0.15)	0.33** (0.15)	0.52*** (0.15)	0.32* (0.15)
Expenditure rules				0.24** (0.08)		0.32** (0.13)
Interaction expenditure rules- commitment or mixed						-0.11 (0.13)
Balance or debt rules					0.07 (0.08)	
Election in current year	-0.21 (0.18)	-0.44*** (0.13)	-0.17 (0.19)	-0.30 (0.20)	-0.27 (0.20)	-0.30 (0.20)
Previous opposition reports outturn	-0.58** (0.21)		-0.64** (0.25)	-0.33 (0.22)	-0.41* (0.22)	-0.34 (0.22)
Ongoing or run-up to EDP	-0.43** (0.19)	-0.49** (0.22)		-0.76** (0.30)	-0.63** (0.29)	-0.78** (0.30)
Ongoing EDP			-0.06 (0.19)			
Ideology	-0.01 (0.04)	0.003 (0.04)	0.01 (0.04)	-0.02 (0.04)	0.02 (0.04)	-0.03 (0.04)
Coalition	-0.05 (0.27)	-0.04 (0.27)	-0.05 (0.28)	-0.11 (0.23)	-0.04 (0.26)	-0.15 (0.23)
Minority	0.01 (0.24)	0.01 (0.24)	0.04 (0.25)	0.08 (0.22)	0.05 (0.24)	0.07 (0.22)
R-squared	0.34	0.32	0.33	0.37	0.34	0.37
No. Observations	176	176	176	162	162	162

See notes under Table 4.

Table 5B. Modelling budget balance forecast errors - pre-SGP vs. SGP periods - excluding the United Kingdom
Method of estimation: Pooled OLS

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Equation 1			Equation 2		
	Without numerical rules			**With numerical rules**		
	Complete Sample	**Pre-SGP**	**SGP**	**Complete Sample**	**Pre-SGP**	**SGP**
GDP forecast error (Spring)	0.41***	0.41***	0.41***	0.39***	0.45***	0.34***
	(0.05)	(0.09)	(0.07)	(0.05)	(0.10)	(0.09)
Commitment or mixed	0.52***	0.25	0.72***	0.34***	0.10	0.52***
	(0.11)	(0.18)	(0.21)	(0.11)	(0.22)	(0.17)
Expenditure rules				0.17**	0.18	0.17*
				(0.07)	(0.14)	(0.08)
Previous opposition reports outturn	-0.67***	-0.14	-1.17***	-0.51***	-0.03	-1.09***
	(0.14)	(0.24)	(0.23)	(0.16)	(0.21)	(0.25)
Ongoing or run-up to EDP	-0.43**		-0.27	-0.74**		-0.56*
	(0.20)		(0.16)	(0.31)		(0.27)
R-squared	0.33	0.36		0.34	0.37	
No. Observations	178	178		164	164	

See notes under Table 4.

Table 4C. Modelling budget balance forecast errors
Method of estimation: Random Effects

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Without numerical rules			With numerical rules		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GDP forecast error (Spring)	0.38*** (0.07)	0.39*** (0.07)	0.38*** (0.07)	0.35*** (0.08)	0.36*** (0.08)	0.35*** (0.08)
Output gap (HP) (lagged)	-0.05 (0.05)	-0.04 (0.05)	-0.06 (0.05)	-0.07 (0.06)	-0.05 (0.05)	-0.07 (0.06)
Commitment or mixed	0.54*** (0.15)	0.56*** (0.15)	0.60*** (0.16)	0.27 (0.17)	0.48*** (0.15)	0.24 (0.18)
Expenditure rules				0.26*** (0.08)		0.35*** (0.12)
Interaction expenditure rules-commitment or mixed						-0.11 (0.13)
Balance or debt rules					0.08 (0.08)	
Election in current year	-0.20 (0.17)	-0.39*** (0.13)	-0.17 (0.18)	-0.28 (0.18)	-0.26 (0.18)	-0.28 (0.19)
Previous opposition reports outturn	-0.49** (0.23)		-0.54** (0.27)	-0.24 (0.24)	-0.31 (0.24)	-0.25 (0.24)
Ongoing or run-up to EDP	-0.41** (0.19)	-0.45** (0.22)		-0.74** (0.31)	-0.65** (0.31)	-0.76** (0.31)
Ongoing EDP			-0.03 (0.18)			
Ideology	-0.004 (0.04)	0.01 (0.04)	0.01 (0.04)	-0.01 (0.04)	0.01 (0.04)	-0.01 (0.04)
Coalition	-0.03 (0.24)	-0.02 (0.23)	-0.04 (0.24)	-0.08 (0.20)	0.003 (0.25)	-0.12 (0.23)
Minority	-0.0003 (0.24)	0.004 (0.23)	0.03 (0.25)	0.06 (0.23)	0.05 (0.25)	0.04 (0.24)
Overall R-squared	0.34	0.32	0.32	0.37	0.34	0.37
No. Observations	187	187	187	172	172	172

See notes under Table 4.

Table 5C. Modelling budget balance forecast errors - pre-SGP vs. SGP periods
Method of estimation - Random Effects

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Equation 1			Equation 2		
	Without numerical rules			**With numerical rules**		
	Complete Sample	**Pre-SGP**	**SGP**	**Complete Sample**	**Pre-SGP**	**SGP**
GDP forecast error (Spring)	0.42*** (0.05)	0.43*** (0.09)	0.41*** (0.07)	0.40*** (0.05)	0.47*** (0.10)	0.34*** (0.09)
Commitment or mixed	0.54*** (0.11)	0.24 (0.17)	0.75*** (0.20)	0.35*** (0.11)	0.10 (0.20)	0.56*** (0.17)
Expenditure rules				0.18*** (0.07)	0.20 (0.14)	0.18** (0.08)
Previous opposition reports outturn	-0.58*** (0.16)	-0.04 (0.24)	-1.16*** (0.23)	-0.41** (0.18)	0.06 (0.21)	-1.07*** (0.26)
Ongoing or run-up to EDP	-0.39** (0.20)		-0.20 (0.16)	-0.73** (0.32)		-0.52* (0.28)
Overall R-squared	0.33	0.36		0.34	0.38	
No. Observations	189	189		174	174	

See notes under Table 4.

Table 4D. Modelling budget balance forecast errors
Method of estimation: Fixed Effects

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Without numerical rules			With numerical rules		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
GDP forecast error (Spring)	0.36*** (0.07)	0.37*** (0.07)	0.35*** (0.08)	0.35*** (0.08)	0.35*** (0.08)	0.35*** (0.08)
Output gap (HP) (lagged)	-0.06 (0.05)	-0.05 (0.05)	-0.06 (0.05)	-0.07 (0.07)	-0.05 (0.06)	-0.07 (0.07)
Commitment or mixed	-0.10 (0.24)	-0.11 (0.23)	-0.13 (0.24)	-0.21 (0.29)	-0.02 (0.29)	-0.26 (0.24)
Expenditure rules				0.32* (0.17)		0.43*** (0.12)
Interaction expenditure rules-commitment or mixed						-0.17 (0.15)
Balance or debt rules					0.08 (0.14)	
Election in current year	-0.23 (0.15)	-0.42*** (0.13)	-0.21 (0.16)	-0.29 (0.18)	-0.27 (0.17)	-0.29 (0.18)
Previous opposition reports outturn	-0.47* (0.25)		-0.49* (0.26)	-0.24 (0.26)	-0.30 (0.26)	-0.25 (0.26)
Ongoing or run-up to EDP	-0.29 (0.19)	-0.32 (0.22)		-0.59 (0.35)	-0.56 (0.36)	-0.62* (0.34)
Ongoing EDP			0.12 (0.25)			
Ideology	0.001 (0.03)	0.01 (0.04)	0.01 (0.04)	0.01 (0.04)	0.01 (0.04)	0.01 (0.05)
Coalition	-0.96** (0.41)	-1.02** (0.42)	-1.20*** (0.40)	-0.58 (0.54)	-0.65 (0.55)	-0.58 (0.54)
Minority	-0.20 (0.48)	-0.17 (0.47)	-0.17 (0.48)	-0.08 (0.44)	-0.11 (0.46)	-0.10 (0.45)
Overall R-squared	0.08	0.06	0.04	0.23	0.15	0.23
No. Observations	187	187	187	172	172	172

See notes under Table 4.

Table 5D. Modelling budget balance forecast errors - pre-SGP vs. SGP periods
Method of estimation - Fixed Effects

Dep. Variable: budget balance forecast error (% GDP, outturn minus forecast)	Equation 1			Equation 2		
	Without numerical rules			With numerical rules		
	Complete Sample	Pre-SGP	SGP	Complete Sample	Pre-SGP	SGP
GDP forecast error (Spring)	0.41*** (0.05)	0.41*** (0.09)	0.40*** (0.07)	0.40*** (0.05)	0.50*** (0.12)	0.33*** (0.08)
Commitment or mixed	-0.18 (0.10)	-0.47* (0.25)	-0.04 (0.18)	-0.15 (0.13)	-0.59** (0.27)	-0.18 (0.26)
Expenditure rules				0.12 (0.07)	0.25 (0.15)	0.31* (0.16)
Previous opposition reports outturn	-0.58*** (0.18)	-0.001 (0.23)	-1.18*** (0.24)	-0.42** (0.19)	0.08 (0.23)	-1.09*** (0.25)
Ongoing or run-up to EDP	-0.37* (0.21)		-0.13 (0.14)	-0.67* (0.34)		-0.42 (0.25)
Overall R-squared No. Observations	0.21 189	0.22 189		0.27 174	0.29 174	

See notes under Table 4.

Data Appendix

balance or debt rules – index of the coverage and strength of national-level numerical fiscal rules targeting the budget balance or public debt. Source: Ayuso *et al.* (2007); unpublished index, constructed along the lines of variables *expenditure rules* and *numerical rules* below, and kindly made available by the authors. See *numerical rules* below for more details.

coalition – dummy variable equal to 1 if there is a coalition government in a country in a given year. Data refer to the type of government that was in office at the time of reporting the forecasts. Sources: Armingeon *et al.* (2006), variable coded as gov_type, until 2004. Data for 2005: European Journal of Political Research (2006), 45. Data for 2006: Parties and Elections in Europe, at www.parties-and-elections.de. The 1995/96 caretaker government in Italy has been classified as a coalition government.

commitment – dummy equal to 1 if a given country in a given year has a commitment form of fiscal governance. Sources: until 2004, Hallerberg (2004), complemented by Annett (2006, p. 6, Table 1); for 2005 and 2006, European Commission (2006, p. 156, Table III.3) and 2006 updates of SCPs. The institutional information for 2006 contained in the latter source did not suggest any change in classification relative to 2005 for the countries considered in our sample. Likewise, the classification of forms of fiscal governance given in European Commission (2006) did not point to any change relative to the situation in 2004 as presented in Annett's table, with the exceptions of Portugal (classified in the European Commission publication as a delegation country) and Greece (omitted). In the Portuguese case, developments in fiscal institutions in 2005 do not seem enough to justify a departure from the 2004 classification, which was therefore extrapolated. The same criterion was applied to Greece.

commitment or mixed – dummy equal to 1 if a given country in a given year has a commitment or mixed form of fiscal governance. Source: same as for *commitment* above.

delegation – dummy equal to 1 if a given country in a given year has a delegation form of fiscal governance. Source: same as for *commitment* above.

election in current year – dummy variable equal to 1 if a country held a legislative election in a given year after reporting the forecasts. Only expected elections at the time of reporting are considered. Source: Armingeon *et al.* (2006), until 2004. European Journal of Political Research (2006), 45 and Parties and Elections in Europe, at www.parties-and-elections.de for 2005 and 2006. In order to check if a given election was expected at the time of reporting, the European Journal of Political Research has been used. For example, in France, an election took place on June 1st, 1997. However, at the time of the 1997 reporting, elections were not expected before 1998, as President Chirac announced the dissolution of the National Assembly only on April 21st (European Journal of Political Research (1998), 34). Hence this dummy takes value zero for France in 1997.

expenditure rules – index of the coverage and strength of national-level numerical fiscal rules targeting public expenditure. Source: Ayuso *et al.* (2007), where it is called "Expenditure Rule Index". See *numerical rules* below for more details.

fiefdom – dummy equal to 1 if a given country in a given year has a fragmented fiscal process, termed in Hallerberg (2004) a "fiefdom" form of fiscal governance. Source: same as for *commitment* above.

GDP forecast error (Autumn) – GDP growth rate forecast error, corresponding to the first available estimate for the year *t* GDP growth rate (from the European Commission Spring Forecasts of year *t+1*) minus the forecast for year *t* included in the European Commission Autumn Forecasts of year *t-1*. Source: European Commission Autumn Forecasts, several issues.

GDP forecast error (Average) – GDP growth rate forecast error, corresponding to the first available estimate for the year *t* GDP growth rate (from the European Commission Spring Forecasts of year *t+1*) minus the average forecast for year *t* (computed as the simple average of the forecasts included in the Spring Forecasts of year *t* and in the Autumn Forecasts of year *t-1*). Source: European Commission Spring Forecasts and Autumn Forecasts, several issues.

GDP forecast error (Spring) – GDP growth rate forecast error, corresponding to the first available estimate for the year *t* GDP growth rate (from the European Commission Spring Forecasts of year *t+1*) minus the forecast for year *t* included in the European Commission Spring Forecasts of year *t*. Source: European Commission Spring Forecasts, several issues.

ideology – cabinet composition (Schmidt index): (1) hegemony of right-wing parties (no social-democratic or other left parties represented); (2) dominance of right-wing (and centre) parties (social-democratic or other left parties representing less than 33.3% of the cabinet posts); (3) stand-off between left and right (social-democratic or other left parties with a proportion of cabinet posts between 33.3% and 66.6%); (4) dominance of social-democratic and other left parties (social-democratic and other left parties with more than 66.6% of the cabinet posts); (5) hegemony of social-democratic and other left parties (no right-wing and centre parties representation). Data refer to that type of government that was in office at the time of reporting the forecasts. Sources: Armingeon *et al.* (2006), variable coded as govparty, until 2004. Data for 2005: European Journal of Political Research (2006), 45. Data for 2006: Parties and Elections in Europe, at www.parties-and-elections.de. For recent years we have continued to adopt the ideological classification of each party proposed by the codebook of Armingeon *et al.* (2006). The 1995/96 caretaker government in Italy has not been coded.

minority – dummy variable equal to 1 if there is a minority government in a country in a given year. Data refer to that type of government that was in office at the time of reporting the forecasts. Sources: Armingeon *et al.* (2006), variable coded as gov_type, until 2004. Data for 2005: European Journal of Political Research (2006), 45. Data for

2006: Parties and Elections in Europe, at www.parties-and-elections.de. The 1995/96 caretaker government in Italy has been classified as a minority government.

mixed – dummy equal to 1 if a given country in a given year has a mixed form of fiscal governance. Source: Source: same as for *commitment* above.

months until next election – number of months from the date of reporting the forecasts (defined as March 1 until 2005, April 1 afterwards) till the next legislative election (computed as the number of days till the next legislative election divided by 30, as in Brück and Stephan, 2006). Only expected elections at the time of reporting are considered. For elections not yet scheduled, we have admitted, in the absence of better information, that they will take place at the end of the legislature, on the same date (day and month) of the latest elections. Source: Armingeon *et al.* (2006), and Parties and Elections in Europe, at www.parties-and-elections.de and official electoral departments of each country for recent years.

numerical rules – index of the coverage and strength of national-level numerical fiscal rules of all different types (budget balance, debt, expenditure and revenue rules). Source: Ayuso *et al.* (2007), where it is called "Fiscal Rule Index". The original index omits Greece, since this country did not have any numerical rule in the period considered by the authors (1990-2005). Both in this case and as regards expenditure rules and balance or debt rules, we have included Greece by setting its value (constant in time) equal to the sample minimum (i.e., the smallest value observed in other countries, which was confirmed to correspond to an absence of rules). After including Greece the indices were renormalised (zero average and unit standard deviation).

ongoing EDP – dummy equal to 1 if a country is under an ongoing excessive deficit procedure (with a Council decision on the existence of an excessive deficit having taken place) at the time of reporting the forecasts. Source: European Commission, Economic and Financial Affairs, at:
http://ec.europa.eu/economy_finance/about/activities/sgp/edp_list_en.htm

ongoing or run-up to EDP – dummy equal to 1 if a country is or will be under an ongoing excessive deficit procedure (with a Council decision on the existence of an excessive deficit having taken place) at the time of reporting the forecasts or at some future time in the same calendar year. Source: European Commission, Economic and Financial Affairs, at:
http://ec.europa.eu/economy_finance/about/activities/sgp/edp_list_en.htm

output gap (HP) – output gap relative to trend DGP (deviation of actual output from trend output as a percentage of trend GDP; the latter is estimated through the Hodrick-Prescott filter). Source: AMECO (Annual Macro Economic Database, European Commission), Spring 2007.

output gap (production function) – output gap relative to potential GDP (deviation of actual output from potential output as a percentage of potential GDP; the latter is estimated through an aggregate production function). Source: AMECO, Spring 2007.

previous opposition reports outturn – dummy equal to 1 if the following conditions are cumulatively verified: (i) the government that reports the first available estimate of the outturn (henceforth the new government) is different from the government that reported the respective forecast (henceforth the previous government); (ii) the dominant party of the new government (considering as dominant the party to which the Prime-Minister belongs) did not take part in the previous government; (ii) the dominant party of the previous government does not take part in the new government. Source: European Journal of Political Research, several issues, and Parties and Elections in Europe, at www.parties-and-elections.de, for recent years.

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