Fiscal forecast errors: governments versus independent agencies? *

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Abstract

We present evidence pointing to the fact that international agencies' fiscal forecasts were affected to some extent by the same type of problems that the literature widely acknowledges for governmental ones. Informational shortages may lead independent agencies' staff to internalize "political biases" in governmental forecasts when trying to grasp genuine "private information". Our study is based on a real-time database of EC, OECD and national governments' public deficit forecasts for 15 European countries over the period 1999-2007 and four vintages of projections per forecasted year. Against this background, independent national fiscal institutions might be a natural option, to the extent that they may have better access to inside national information than international organizations. Our results also provide some support to policy positions that claim a closer monitoring of official budgetary projections, in particular as regards transparency requisites, accountability and the threat of sanctions.

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1 Introduction

Should the role of preparing budgetary projections be delegated to an independent agency? A debate around this issue has been recently spurred in Europe by many voices, given the high public deficit and debt levels currently held by many European Union (EU) governments. In fact, planned government deficits turned out to exceed recurrently budgetary plans by a significant magnitude in recent years. For example, as late as October 2008 the public deficits estimated for 2008 by many European governments missed by some 2 percentage points of GDP the afterwards released figures for 2008. A similar situation occurred in 2009-2012, leading many countries to register record high government deficits. Explanatory factors for these misalignments include large GDP shocks or fiscal stimulus packages adopted on the run, but beyond this, also lack of both transparency and a realistic account of facts.[1] As short-run budgetary targets were missed by far, medium run plans were revised quickly and resulted in a fast decline of the credibility of Europe's fiscal framework, namely the Stability and Growth Pact (SGP). As a consequence, right now, many European countries are embarked in widespread medium-term fiscal consolidation packages, that require adherence to strict budgetary targets for long periods of time. In parallel, there is an ongoing policy debate on the need to strengthen economic governance in the EU that has already resulted in a number of institutional reforms.[2]

The deterioration of governments' budget balances and the lack of accuracy of fiscal projections are neither issues confined to the current juncture nor only to EU countries. Indeed, a large strand of the literature has analyzed in the recent past the potential bias the political and institutional process might have on government revenue and spending forecasts, as well as the nature and properties of forecast errors within national states.[3] For the

[1]For an evaluation of the effects of the financial crisis on the fiscal positions of OECD countries, see Tagkalakis (2013).

[2]On the importance of the design of fiscal rules and forms of governance in EU countries see Hallerberg et al. (2007). For the discussion on EU's fiscal framework weaknesses and needs for reform see, for example, Larch, van den Noord and Jonung (2010) or Muscatelli et al. (2012). For the most recent approved and ongoing reforms and/or agreements, see EC's webpage dedicated to EU economic governance ("http://ec.europa.eu/economy_finance/economic_governance/index_en.htm").

[3]See for example Brück and Stephan (2006), Jonung and Larch (2006), Boylan (2008), Leal et al. (2008),

case of EU governments, this literature tends to find evidence in favor of the existence of systematic political and institutional biases in revenue forecasting, while the evidence for the US is mixed, depending on the institutional coverage of the analysis (Federal government or States).[4]

One particular aspect under evaluation in the policy fora linked to the previous discussion is the proposal to introduce independent forecasts in the fiscal domain prepared by independent agencies (Debrun et al., 2009; Leeper, 2009; Wyplosz, 2008; Jonung and Larch, 2006; European Commission, 2006). These independent agencies could be for example national councils or intergovernmental agencies. As regards the latter option, in the case of EU countries, some authors have advocated that the European Commission (EC) should have some role as the "independent agency" preparing budgetary and/or macroeconomic projections, given that fiscal forecasts by national authorities are scrutinized by the EC according to EU's fiscal rules framework (the SGP).[5]

Against this framework, in order to be in a position to judge the appropriateness of such proposals, the relevant question is whether the track record of international agencies' forecasts is better than the one of national governments. In this particular respect the literature is almost silent. There are almost no studies that compare the accuracy and the determinants of governments' fiscal forecasts with those of international organizations for a given country. The fact that some international organizations like the EC, the OECD or

Beetsma et al. (2009), von Hagen (2010), Pina and Venes (2011), Frankel (2011), Jong-a-Pin et al. (2012), or Frankel and Schreger (2013a, 2013b).

[4]As Auerbach (1999) argues, if the costs of forecast errors were symmetric (i.e. if positive errors were as bad as negative errors), the forecasts should present no systematic bias (i.e. on average the forecast error should not differ significantly from zero). There are, however, reasons to presume that the loss function of governments may not be symmetric. Thus a kind of bias in fiscal forecasts could be optimal. For instance, a government would tend to favor a deficit when the loss of an underestimation is greater (for example, a conservative, stability oriented government, see Bretschneider et al. 1989). Public authorities may have an interest in presenting a pessimistic forecast to build in a safety margin that would allow them to meet budgetary targets, also in case of revenue or expenditure slippages. The literature in question finds mixed evidence for political economy-based explanations of this sort. See Leal et al. (2008) for a broad survey of the issues discussed here.

[5]See for example Buti and van den Noord (2004).

the IMF publish fiscal forecasts and have been doing so for long periods of time provides a natural laboratory to analyze their track record against that of national governments. From a theoretical point of view, once accounting for errors in macroeconomic forecasts, independent agencies' fiscal forecasts should not be expected to display the biases typically found in governments' fiscal projections. Nevertheless, one may also claim that information matters when preparing budgetary projections, and as a consequence outside forecasts (from international organizations) could turn out to be less accurate than inside forecasts (from staff of the relevant organizations, like for example the Ministry of Finance or the Treasury), as found by Grizzle and Klay (1994) for the US states.

In our paper we provide homogeneous and comprehensive empirical evidence pointing to the fact that international agencies' budgetary forecasts for EU countries do display correlation with electoral cycles. These results are derived using a common methodology – based on the same econometric method and the same empirical specification – to look at alternative datasets, over the same sample period. We build up a large real-time dataset covering fiscal forecasts: (i) that are prepared by national governments (GOV), the EC and the OECD; (ii) for 15 European countries; (iii) for two forecast origins per year (spring and autumn of each year); (iv) for two forecast horizons from each forecast origin (spring current year, autumn current year, spring one year-ahead and autumn one year-ahead). By focusing on the sample 1999-2007, we analyze a period with a common monetary policy regime (Eurosystem) and a common fiscal policy regime (SGP). In addition, we eliminate three potential sources of distortion: (i) the changes in statistical standards that did occur in the preceding period (ESA79-ESA95 changeover); (ii) the EMU convergence process; (iii) the great recession that started in 2008.

We try to illustrate the empirical analysis in the framework of a model in which the international agency tries to minimize the distance to the forecast of the government. We exploit the idea that government's information set includes private information (e.g. better access to the relevant data, information on policy measures, etc) not available to international agencies. When preparing fiscal projections, international agencies' staff try to grasp as much private information as possible from government's forecasts, while at the same time face a "signal extraction problem" when trying to disentangle "political biases" from genuine

"private information".

The rest of the paper is organized as follows. In Section 2 we present some political economy arguments to frame the subsequent empirical analysis, pose the hypotheses to be tested, and discuss the related literature. In Section 3, we describe the data and variables used in the study. In Section 4 we discuss the empirical methodology and the main results. In Section 5 we present some conclusions and policy lessons. Finally, we include an Appendix in which we develop, in the framework of the approach of the main body of the paper, a theoretical illustration on the potential role of sanctions in forcing better fiscal forecasts.

2 Some political economy considerations

2.1 Political economy arguments and literature review

Why could fiscal forecasts prepared by governmental agencies differ from those of international organizations?

First, fiscal forecasts can display differences because governments usually have access to more information than outside forecasters. For example, governments have advanced information on short-term tax developments, the design and impact of planned tax measures or information on the implementation of spending plans.

Second, the methods used by government officials and international agencies' staff for revenue and spending estimation and forecasting can be different. Government forecasts are prepared for all budgetary items and thus the approach typically followed is a bottom-up one, with an extremely high level of disaggregation. On the contrary, fiscal forecasts by international organizations are prepared for fewer, more aggregated budgetary items (see Leal et al. 2008). At the same time, it is typically the case that the forecasting methods used by international agencies to forecast those more aggregated items tend to be more sophisticated.

Third, governments can influence forecasts prepared by international organizations, as national countries are shareholders of these organizations and thus have the possibility to know those forecasts in advance and discuss them with the staff of the relevant organization.

For example, IMF Article IV reports (country reviews) acknowledge the discussions with government officials and signal discrepancies in assessment.[6]

Finally, related to the previous point, governments have access to private information and international organizations tend to be shorter of specialized staff than national organizations. Therefore, intergovernmental agencies' reports usually have to broadly explain the reasons for any departure from national government's forecasts. Along these lines, one could also argue that international organizations do not have the resources to make their own forecasts for each individual member state and, therefore, must rely heavily on the information conveyed to them by the member states.[7]

The evidence on the track record of international organizations as regards fiscal projections is relatively scarce and mainly descriptive.[8] This should be clear when inspecting Table 1, where we list the main papers dealing with the analysis of fiscal projections in Europe.[9] Most papers analyze budgetary forecasts prepared by the governments and typically try to explain fiscal forecast errors (or only forecasts) by means of explanatory variables labeled as economic (e.g. actual/forecast GDP growth or the output gap) and political/institutional (e.g. election year or fiscal governance structure). These papers typically focus on one vintage of projections.[10] The papers that analyze projections prepared by international organiza-

[6]Artis and Marcellino (2001) argue that the OECD is freer from the political pressures of EU governments than the EC. However, Poplawski-Ribeiro and Rülke (2010) do not find the data supporting the latter hypothesis. Christodoulakis and Mamatzakis (2009) note that even though year-ahead government balance forecasts are symmetric for most EU-15 countries, there seemed to be some leeway against breaching the 3% threshold value, especially for higher debt countries.

[7]This argument is taken from von Hagen (2010), that applies it to fiscal forecasts prepared by the European Commission. Along similar lines see also Kopitz (2010).

[8]As regards the GDP and inflation forecasts track records of international organizations, these seem to have been reasonable in terms of size and directional accuracy, as can be inferred from Marinheiro (2010), Dreher et al. (2008), Melender et al. (2007), Aldenhoff (2007), Timmermann (2007), Artis and Marcellino (1998, 2001), Pons (2000) or Keereman (1999). Nevertheless, some works point to a worse accuracy record than that of private sector analysts (see Batchelor, 2001; Blix et al., 2001; Poplawski-Ribeiro and Rülke, 2010). Also, Aldenhoff (2007) reveals significant correlation with election dates in the case of IMF GDP forecasts for the US.

[9]A recent contribution for the case of Portugal is Afonso and Silva (2012).

[10]By a vintage of projections we mean a set of forecasts prepared at a given point of time for a given

tions tend to look at the properties of the whole vintage of forecasts errors[11], but typically follow a descriptive approach (i.e. size and sign of errors, presence of biases, rationality) and do not provide comparisons with budgetary forecasts prepared by national governments.

2.2 A stylized model to frame the discussion

With all these considerations in mind, one can conceive the preparation of fiscal forecasts by international agencies as an exercise in which they try to minimize the discrepancy from government's projections. Auerbach (1999) develops a model for a different problem than ours, whose main elements can be adapted in such a way that it is suitable for the discussion of the issues at hand here. Let Ω be the information set commonly observed by all fiscal forecasters, both government officials and the staff of a given international agency. Let x be the variable to be forecasted, say the government budget balance, revenue or expenditure, such that:

$$\bar{x}_{\Omega} = E\left(x|\Omega\right) \tag{1}$$

where $E\left(x|\Omega\right)$ denotes the conditional expectation of x given the information set Ω. Now, let Π be the information set comprising some private information known only by the government, where $\Omega \subset \Pi$. The best forecast prepared by the government would then be:

$$\bar{x}_{\Pi} = E\left(x|\Pi\right) \tag{2}$$

while the associated forecast error would be $x - \bar{x}_{\Pi} = \varepsilon$, where ε is a stochastic, possibly zero mean, error. If Π were the true information set, ε would have zero mean. Given that the international agency only has partial access to government's private information, its forecast error would be such that $x - \bar{x}_{\Omega} = \nu + \varepsilon$, where ν is orthogonal to ε and it denotes the additional error that the international agency would commit because of its lack of access to government's private information set.[12]

forecast horizon like, for example, forecasts published in Autumn of year t for year t+1.

[11]Typically forecasts are published in Spring and Autumn of each year and provide projections for the current year, one year ahead and, in some cases, two- and three years ahead.

[12]Under the assumption that the technical forecast error ε is the same for the two institutions. In practice, two different ε-type errors could be considered, due to differences in forecasting methods. This is immaterial for the discussion at hand and thus it is left aside at this point.

The government has two options. First, it can prepare the best possible forecast given its information set, $\bar{x}_{\Pi}$, as in (2), in which case it would minimize a loss function of the sort $\Lambda_1 = E[\bar{x}_{\Pi} - x|\Pi]^2$. Nevertheless, as signalled by the literature on politically-motivated fiscal forecast biases, the government has a second option. It can aim at minimizing a loss function of this sort: $\Lambda_2 = E[(\bar{x}_{\Pi} - x - \theta)|\Pi]^2$, where θ is a bias included in the forecasting process for political reasons. In this case, the best (constrained) forecast prepared by the government would be $\bar{x}^{\theta}_{\Pi} = \bar{x}_{\Pi} + \theta$ so that the associated forecast error is:

$$x - \bar{x}^{\theta}_{\Pi} = \varepsilon + \theta \tag{3}$$

where θ is a negative parameter if x does refer to the government balance.

The independent agency, in turn, has also two options. First, it can prepare a fully independent forecast that can be compared ex-post to government's forecast. In this case, though, the independent agency would loose any access to government's private information. Then, a second option would be to minimize the distance to the forecast of the government, so that the error term ν is minimized. In actual situations, the second alternative tends to be the preferred one, not only because of the existence of private information on the side of governments, but also due to institutional and policy constraints, as discussed above. Thus, in this latter case the independent agency when minimizing its loss function (distance to government's forecast) knows that its forecast error would be:

$$x - \bar{x}_{\Omega} = \nu + \theta + \varepsilon \tag{4}$$

and as a consequence knows that it has to disentangle the contribution of each of the three components of the error term: (i) ε, the technical error (model error); (ii) θ, the political–bias–induced error; (iii) ν, the part of the overall error due to limited access to information. Thus, the cost for the international agency of trying to grasp as much private information as possible – aiming at reducing the term ν – is that it would inherit to some extent the political bias, θ.

In the latter respect, one particular device to ex-ante reduce the size of θ would be the following. Suppose that the international agency (e.g. EC) were in a position to impose sanctions on the government depending on the historical distance of fiscal forecasts from

the final outcome. In this case, it could influence the extent to which the government bases its forecast on Ω rather than Π. This can be done by imposing a penalty on the government if it deviates from a forecast based on the common information set, $\bar{x}_\Omega$. This idea is developed in Appendix A, where we show how the EC could choose the value of the relative penalty that minimizes its expected loss function in order to force the government to use its superior information. In general, nonetheless, the EC would try to minimize the distance to biased government projections, by minimizing a loss function of the kind $L^{EC} = E[(x - \{\bar{x}_\Pi + \theta\})|\ \Omega]^2$.

In order to separate, ex-post, the different sources of error, the EC has to form beliefs about θ, ν, and ε. In this respect, the EC knows that $(x - \bar{x}_\Omega)$ would be a function of the errors, call it $\Phi(\theta, \nu, \varepsilon)$. For example, $\Phi(\theta, \nu, \varepsilon)$ can take the form $\Phi(\theta, \nu, \epsilon) \approx c(\nu, \theta) + \Theta(s, ELEC) + \xi$. The constant c would proxy the systematic part of the information bias, but also part of the political bias.[13] The function $\Theta(s, ELEC)$ would proxy the part of the political bias determined by errors in the forecast of fundamentals linked to the state of the business cycle (s) and the electoral cycle ($ELEC$). The term ξ is a normally distributed zero-mean random disturbance term.

From the empirical point of view, the EC could run a standard linear regression on the series of its forecast errors, as it is customary in the extant literature:

$$x - \bar{x}_\Omega = \delta_0 + \delta_1\ ELEC + \delta_2\ s + \xi \tag{5}$$

where time subindexes have been dropped for simplicity and s could be proxied by the forecast errors committed by the EC when forecasting real GDP. In this way, the EC would get estimates of the coefficients in the regression: $\hat{\delta}_0$, $\hat{\delta}_1$ and $\hat{\delta}_2$. Even if the constant $\hat{\delta}_0$ can be partly interpreted as reflecting the bias from the lack of access to private information, it will also reflect part of the political bias, if we assume that the EC is minimizing the distance to government's projections. If EC forecasts were produced independently, the constant would just capture the first factor. Now, it is feasible within our framework that $\hat{\delta}_1$ turns out to be statistically different from zero, given that it would also capture part of

[13] It could also be the case that ε had non-zero mean, associated to non-optimal forecasts' production processes and the use of non-optimal forecasting methods, in which case the constant would also partially reflect this.

the "inherited" political bias. In fact, even though $\hat{\delta}_2$ should capture the genuine impact of errors in forecasting GDP on fiscal forecast errors (most notably in revenue estimation), it could also be the case that it is affected by political biases, to the extent that political cycles are linked to the state of the business cycle.

A similar regression of the type of (5) run on government's projection errors would produce a set of coefficients, $\hat{\delta}_0^{GOV}$, $\hat{\delta}_1^{GOV}$ and $\hat{\delta}_2^{GOV}$ that can be compared with $\hat{\delta}_0$, $\hat{\delta}_1$ and $\hat{\delta}_2$. The difference of constant terms $\hat{\delta}_0 - \hat{\delta}_0^{GOV}$ would be difficult to interpret, as it will mix-up all the sources of bias discussed above. Nonetheless, $\hat{\delta}_0^{GOV}$ does have a clear reading as political bias, as it is usually interpreted in the literature. As regards the difference $\hat{\delta}_1 - \hat{\delta}_1^{GOV}$, one might expect it to be negative as EC projections are presumably affected only by political cycles in an indirect way, i.e. through government projections, as discussed above. Finally, as for the difference $\hat{\delta}_2 - \hat{\delta}_2^{GOV}$, the expected sign would be positive as government projections tend to be more judgmental than the ones of international organizations and thus less sensitive to changes in macro fundamentals.

2.3 Hypotheses to be tested

Against the background of the previous discussion, we are interested in testing the following hypotheses:

H_1: Government budgetary projections are less accurate than those of international organizations (i.e. the EC and the OECD).

H_2: Fiscal projections prepared by international organizations are not subject to political economy distortions.

On the one hand, one may expect that neither H_1 nor H_2 are rejected, given the vast available empirical literature on politically-motivated fiscal projections by governments and under the assumption that international organizations prepare truly independent forecasts. On the other hand, though, if international organizations were to face some type of "signal extraction problem" of the kind discussed above, one may expect that both H_1 and H_2 are rejected.

In the subsequent sections we will aim at shedding light on these issues. To answer these questions we use a common methodology, i.e. the same econometric method and the same empirical specification, to look at several alternative datasets (by institution, by vintage and by horizon), over the same sample period.

3 Data description

3.1 The real-time database of fiscal forecast errors

Let us denote by d_{t+1} the government balance observed in year $t+1$. International agencies typically prepare forecasts for d_{t+1} at different schedules during the year. In order to maximize the number of available observations, we take in our paper the sequence of projections of d_{t+1} that starts with a projection prepared with information up to Spring of year t (Spring one-year-ahead forecast), and then it is updated in Autumn of year t (Autumn one-year-ahead forecast), and further in year $t+1$ in Spring (Spring current-year forecast) and Autumn (Autumn current-year forecast). Notice that the four described forecasts for d_{t+1} differ in the information set available at the time of preparation of the projection. Each forecast, ex-post, has an associated forecast error. If we denote Spring one-year-ahead forecasts, Autumn one-year-ahead forecasts, Spring current-year forecasts and Autumn current-year forecasts respectively as $E_t[d_{t+1}|S_t]$, $E_t[d_{t+1}|A_t]$, $E_{t+1}[d_{t+1}|S_{t+1}]$ and $E_{t+1}[d_{t+1}|A_{t+1}]$, then the associated forecast errors in each case can be written as:[14]

$$\begin{aligned} \epsilon_{t+1}^{S_t} &\equiv d_{t+1} - E_t[d_{t+1}|S_t] \\ \epsilon_{t+1}^{A_t} &\equiv d_{t+1} - E_t[d_{t+1}|A_t] \\ \epsilon_{t+1}^{S_{t+1}} &\equiv d_{t+1} - E_{t+1}[d_{t+1}|S_{t+1}] \\ \epsilon_{t+1}^{A_{t+1}} &\equiv d_{t+1} - E_{t+1}[d_{t+1}|A_{t+1}] \end{aligned} \tag{6}$$

Following this structure, we build up a database of forecasts for the government balance-to-GDP ratio and real GDP growth, as published by the EC, the OECD and European governments in real-time.

[14] All over the study forecasts are lined up with the year in which the forecast was made, not the year being forecast.

EC projections have been taken from the different issues of the publication *European Economy* (Supplement A, Economic Trends). For the OECD, the source is the *OECD Economic Outlook*. Both the EC and the OECD publish projections for $E_t[d_{t+1}|S_t]$, $E_t[d_{t+1}|A_t]$, $E_{t+1}[d_{t+1}|S_{t+1}]$ and $E_{t+1}[d_{t+1}|A_{t+1}]$.

As regards governments' projections, the data have been compiled from two sources. The first source is derived from Stability and Convergence Programmes (SPs). At the end of a given year (November/December) or the beginning of the next year (January) national fiscal authorities submit to the EC SPs[15], that include multi-annual fiscal projections covering three to four years ahead. As discussed by Pina and Venes (2011), despite being a widely used source of governments' fiscal projections, SPs present a number of limitations. First, the submission on a regular basis by national governments only started in late 1998. Second, they present some issues related to international comparability across countries, such as differences in dates of publication or in the approaches followed to build up projections. For our dataset, we have taken data on $E_t[d_{t+1}|A_t]$ from SPs. Regarding the second source, national governments submit to the EC twice a year (in Spring and Autumn of each year) current year projections in the framework of the so-called Excessive Deficit Procedure (EDP). This procedure is designed for EU countries to report, in a homogeneous and standardized framework, past fiscal data including fiscal data revisions. Nevertheless, the EDP questionnaires also incorporate updated projections for the current year, which allowed us to compile data on $E_{t+1}[d_{t+1}|S_{t+1}]$ and $E_{t+1}[d_{t+1}|A_{t+1}]$ from the latter source. Compared to SP forecasts, EDP notifications present two main advantages: they have a higher standardization of reporting dates, and they provide a wider time coverage, given that they are available since the early 1990s. As reviewed before, within the related literature, a number of papers have used SP forecasts (see e.g. Strauch et al., 2004; Moulin and Wierts, 2006; Annet, 2006; Halleberg et al., 2009; Beetsma et al, 2009; von Hagen, 2010; Frankel and Schreger, 2013), providing a focus on the vintage $E_t[d_{t+1}|A_t]$, while only recently Pina and Venes (2011) draw on EDP fiscal forecasts. Finally, there is no official and comparable source from which to compile data for vintage $E_t[d_{t+1}|S_t]$.

[15] As of 2011, in the framework of the so-called European Semester, Stability and Convergence Programmes are submitted by April of each year.

Regarding budget balance outcomes used to compute the forecast errors, we have taken first released fiscal data, i.e. government balances for year t (d_t in our notation) are those published by Eurostat in March/April of year $t+1$ in the framework of the EDP data reporting process (see de Castro et al., 2013, for details on this issue). We have used the same outcome (Eurostat figure) to compute the forecast errors for all organizations to make sure that the comparison among organizations is not influenced by this choice. By choosing first-released figures we follow the standard approach in the literature. In addition we proxy the fact that for real-time policy discussions the latter tends to be the relevant outcome for policy purposes.

The time period covered by our database is 1999-2007, and the sample includes the 15 countries members of the EU prior to the 2004 EU enlargement, namely Belgium, Germany, Greece, Ireland, Spain, France, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Denmark, Sweden, and the United Kingdom. In particular, we take all forecast vintages since Spring 1999 (current-year projections) till Autumn 2007 (current-year projections). Thus, we have a maximum of 105 observations per organization for regular $E_t[d_{t+1}|S_t]$ and $E_t[d_{t+1}|A_t]$ vintages, and 135 observations per organization for regular $E_{t+1}[d_{t+1}|S_{t+1}]$ and $E_{t+1}[d_{t+1}|A_{t+1}]$ vintages. In some cases, there are less observations because: (i) as mentioned before, there is no data for vintage $E_t[d_{t+1}|S_t]$ in the case of government forecasts; (ii) we were not able to find a few figures for the case of Luxembourg. All in all, we end up with the following datasets for the vintages [$E_t[d_{t+1}|S_t]$, $E_t[d_{t+1}|A_t]$, $E_{t+1}[d_{t+1}|S_{t+1}]$, $E_{t+1}[d_{t+1}|A_{t+1}]$] by institution: [0, 105, 133, 135] for governments' projections, [105, 105, 135, 135] for EC projections, and [104, 103, 134, 133] for OECD projections.

We focus on the EMU sample 1999-2007. As mentioned in the Introduction, this selected period exhibits a desirable degree of institutional homogeneity in that both the monetary policy regime (Eurosystem) and the fiscal policy regime (SGP) remained broadly stable. In addition, by focusing on that sample we reduce the potential effects of three sources of distortions: (i) the changes in statistical standards that did occur in the preceding period (ESA79-ESA95 changeover); (ii) the EMU convergence process; (iii) the great recession that started in 2008. All that being said, for the sake of robustness, we have also looked at the 1995-2007 sample. For the pre-1999 period, EC and OECD forecasts are compiled from

the sources above. In the case of governments, EDP forecasts provide a natural source for the pre-1999 because of their homogeneity and regular reporting since the early 1990s.[16] Thus, for the pre-1999 exercises we will focus on current year forecasts, more specifically, the $E_{t+1}[d_{t+1}|S_{t+1}]$ vintage.

Table 2 shows some unconditional descriptive statistics of the real-time data set described above. Government balance mean errors (Panel A) over the whole sample were positive for the pool and each organization's (GOV, EC and OECD) projections, for current year vintages, thus presenting a small pessimistic bias (under-prediction of budget balances) over the years 1999 to 2007. On the contrary, year-ahead vintages tend to display a negative, though small, optimistic bias. However, when accounting for variability, only current year vintages turned out to be statistically significant from zero in the case of the three institutions. As showed in Panel B, this reflects the compensation of higher-than-projected budget balances in "good times" with lower-than-projected budget balances in "bad times". As regards the size of the government balance errors measured by the Mean Absolute Error (Table 2, Panel A), two facts can be highlighted. First, accuracy improves with the information set, as expected, given that both statistics get reduced as the information set gets closer to Autumn of the current year. Second, the size of EC and OECD forecast errors is commensurate or lower than the one of national governments when considering Autumn one-year-ahead forecasts and Spring current-year ones. However, the estimates at the end of the current year (Autumn current-year forecasts) improve significantly in the case of GOV when compared to EC and OECD estimates. This latter fact may reflect again the conservative bias on the side of international agencies mentioned before, but also the existence of private information on the side of GOV, most likely on current-year budgetary execution and in particular as regards expenditures.

[16]The interested reader is referred to the points made by Pina and Venes (2011) on the problems of using SPs. Potential problems with datasets based on SP forecasts have, nevertheless, been dealt with in a number of papers, as in the list of references mentioned above.

3.2 Other variables

Along with the real-time database of government budget balance forecasts, we have also compiled a real-time database of GDP forecasts for the same organizations, taken from the publications described above.[17] Errors committed during the forecasting process are responsible for an important part of fiscal forecast errors (see for example Leal et al., 2008) and thus it is natural to include GDP errors in the analysis. For example, optimistic revenue forecasts tend to be associated to optimistic GDP forecasts (Jonung and Larch, 2006). Moreover, an important argument in the debate of fiscal projections by an independent agency versus the government is that the former may produce better (unbiased) GDP growth forecasts, while the latter may use GDP growth forecasts in a strategic manner. In Panel C of Table 2 we present some descriptive properties of the real GDP forecast errors included in our sample. For the pool of organizations (GOV, EC, OECD) and for each individual organization, one-year-ahead forecasts display an optimistic bias that tends to be statistically significant, i.e. projected growth rates are on average higher than observed ones. Current year errors, in turn, do display a conservative, albeit small, bias. As in the case of government balance forecasts, not surprisingly, accuracy improves over time (with the vintage), with the exception of the Spring vintage of GOV. From this descriptive evidence, that has to be taken only as an illustration, GOV growth forecasts do not seem to be on average different from those of the two considered international organizations.

Related and supported by empirical observations in Panel B of Table 2, we include in the empirical analysis a "good times" dummy variable. This dummy variable takes the value 1 in the years 1999-2000 and 2004-2007, following the EU and euro area real GDP growth profile. "Bad times", in turn, comprise years 2001-2003. In bad times the peer and EU-wide institutional pressure might be stronger and thus θ might be smaller than in good times. On different grounds, in good times it should be easier for international organizations to get governments to disclose their private information. Therefore, ν should be smaller than in bad times, allowing international organizations to differentiate their forecasts from those of governments. On the contrary, in bad times governments may have more incentives to use

[17] In the case of EDP Notifications only nominal GDP figures are available. In those instances we deflated nominal GDP projections with the same-vintage projected deflators by the EC.

the private information in a confidential way. In bad times, thus, it should be more difficult to disentangle θ from ν, and then EC and OECD forecasts would tend to be closer to the ones of governments.

As with political budget cycles, there may be electoral, partisan or institutional forecast cycles (see for example Mink and de Haan, 2006, or Efthyvoulou, 2012). In the case of political forecast cycles, policy makers deceive the public and the EC on their true budgetary position in order to exploit the Phillips curve in the short-run. In an electoral forecast cycle, a given election date determines government spending and taxation plans and the corresponding information policy (see Alesina et al., 1998, and the references quoted therein). For example, a government may increase spending prior to an election and hide the emerging deterioration of the budget balance, exploiting temporary information asymmetries. We aim at capturing these effects by including country dummy variables that display a value of 1 in an election year and a zero otherwise. We took the data from Armingeon et al. (2008) for the period 1999-2005, and extended the variables by ourselves for 2006 and 2007.

The extant literature has shown that institutional variables are important determinants of governments' fiscal forecasting procedures and outcomes (see von Hagen, 2010 or Beetsma et al., 2012 and the references quoted therein). Nevertheless, during the time period chosen for our analysis fiscal frameworks were basically unchanged in most of the countries included in the study. At the same time, political institutions changed very little in the period 1999-2007 in the 15 EU countries considered. For these reasons the effect of fiscal rule indexes used in extant studies tend to be concealed by country fixed effects.[18] Given that country fixed effects are not rejected by our empirical specifications, we decided to let the fixed effects of the models capture differences in institutions across countries.

EU fiscal rules were applied to certain countries over the sample period considered in our analysis. In the case of the EU, the Stability and Growth Pact prescribes the well-known rule that governments that exceed the 3% threshold value for public deficit-to-GDP, under

[18] von Hagen (2010) analyzes the influence of fiscal institutions on budgetary deviations from governments' plans over the period 1999-2004 and decides to leave out country fixed-effects throughout his empirical study. The justification stated by this author is that country fixed-effects would absorb, if introduced, the effect of institutional dummies as institutions did not change over the sample period.

certain conditions, have to enter into a corrective path. This corrective path is defined and monitored in the framework of an Excessive Deficit Procedure. Everything else equal, countries under an EDP, being less disciplined than the others, might have exhibited a differentiated behavior within the analyzed sample. At the same time, these countries were subject to explicit peer pressure by the other EU countries and the EC. Countries that exceeded the 3% of GDP public deficit dictated by EU fiscal rules at any time t within the sample 1999-2007 are Germany, France, United Kingdom, Greece, Italy, Netherlands and Portugal.

As regards the potential impact of fiscal data revisions, it is worth mentioning that after the first data release, according to the EU regulations on this matter, figures can be revised up to eight times until they are considered "final". As shown by existing evidence, along this process fiscal data are indeed revised in many instances, with the most relevant revisions typically happening (on average) in years beyond $t+1$, i.e. after the policy focus on the specific fiscal year has vanished, as shown by de Castro et al. (2013) or Jong-a-Pin et al. (2012). In this respect, we have included in some empirical specifications a variable that measures the ex-post budget balance revisions, defined as $d_t - d_t^{A_{t+2}}$, i.e. the revision between the first vintage and the 4^{th} vintage.[19] While this variable would not have been available at the time of the preparation of the forecasts, it might be helpful to check if differences between government's and international organizations' projection errors change, when we control for ex-post fiscal revisions.[20]

[19]Other vintages up to the 8^{th} vintage could have also been used but we preferred to use the 4^{th} one to keep the same sample size as in similar empirical specifications.

[20]In the data revision literature it is usual to study to what extent initial releases are unbiased and rational forecasts of finally revised budget balances. The objective is to provide inference about how the information available is used, i.e. the efficiency of the estimation process, in the sense of whether revisions between two consecutive vintages incorporate the relevant "news" embedded in the newly available information, or rather reflect "noise" in the production of the previous estimate. Following this idea Jong-a-Pin et al. (2012) include the forecasts/initial data releases as additional regressors.

4 Empirical strategy and results

4.1 Empirical strategy

Along the lines of the stylized equation discussed in (5), the baseline empirical equation we estimate is as follows:

$$\epsilon^{h}_{t,i,j} = \delta_0 + \delta_1\ ELEC_{t,i} + \delta_2\ \epsilon^{GDP}_{t,i,j,h} + \delta_3\ D^{GOV}_{t,i,j,h} + \delta_4 D^{UP}_{t} + \delta_5 D^{EDP}_{t} + \xi_{t,i,j,h}$$

where $\epsilon^{h}_{t,i,j}$ refers to errors in forecasting public balance and it is defined as in (6). The four relevant sub-indexes $\{t, i, j, h\}$ refer to time, country, institution and vintage of projection: i is the country index; j the institution index, $j = (GOV,\ EC,\ OECD)$; h refers to the vintage of projections $h = \{S_t, A_t, S_{t+1}, A_{t+1}\}$. The dummy variable for electoral periods $ELEC$ is composed of 0's (no election in year t in country i) and 1's (every time year t is an election year in country i). The terms ϵ^{GDP} refer to errors in forecasting real GDP of country i in year t incurred by institution j at vintage h. The variable D^{GOV} is a dummy for government forecasts, that takes the value of 1 if $j = GOV$. Finally, D^{UP}_{t} and D^{EDP}_{t}represent additional dummy variables needed in the analysis to control the effect of economic upturns and forecasts prepared for countries subject to an EDP procedure. Country-level fixed effects are also included in all regressions and control, among other issues for differences in budgetary institutions among countries as discussed above.

To correct for groupwise heteroskedasticity of error variances and cluster cross-correlation, all regressions use estimators with cross-sectional, panel-corrected standard errors. We decided to use a two-stages instrumental variable method (IV, henceforth) because ϵ^{GDP} is likely to be endogenous and thus correlated with the error term of the regression.[21] Given the characteristics of our dataset, controlling carefully for cross-correlation is crucial. This is the case because in some regressions we include forecasts of different institutions for the same country and forecasts prepared by the same institution for different vintages. Thus,

[21]Regressions are run using the ivreg2 command in STATA version 11. Using Weighted Least Squares provided similar results to those obtained by IV in some cases, and are thus presented in some tables for comparability with related studies. As regards all models estimated by IV, excluded instruments are lagged GDP errors and time dummies.

clustering is implemented. It is also relevant to control for heteroskedasticity, as some governments/international institutions may display more volatile budget balance forecasts and more/less accuracy.

4.2 Empirical results

We show a first set of results for the pool of all countries, all institutions and all vintages. These results are presented in Table 3 and constitute the most important set of results in the paper. In the empirical specification shown in column [1], the dummy for government forecasts is not statistically significant. [22] This means that, within the pool, the estimation method does not allow to distinguish governments' forecast errors from those of the two international organizations. GDP errors, in turn, are significant and the average estimated point elasticity is 0.48, along the lines of related studies. The positive sign of the coefficient indicates that a negative GDP growth shock produces ex-post optimistic government revenue and budget balance forecasts. The dummy for years of election is significantly different from zero and negative and thus contributes to optimistic budget balance forecasts. On average over all the dimensions considered, projections underestimated by 0.44% of GDP actual government balances. As regards the two additional control dummies, on the one hand, the dummy for governments of countries subject to an EDP procedure is negative and significant, indicating that on average EDP countries prepared more optimistic budget balance forecasts than non-EDP countries. On the other hand, the "good-times dummy" turns out to be positive and significant, showing that forecasts tend to be on average more pessimistic when the economic situation is buoyant than otherwise. Finally, it is worth mentioning that if the estimation is conducted without fixed-effects and without the EDP dummy, a significant and negative constant is obtained, confirming the presence of an average optimistic bias in

[22] The empirical specification shown in Table 3 includes a dummy variable only for government forecast errors as one way of assessing if observations pertaining to national governments are statistically different from those of international organizations (EC and OECD) taken as a group. In any case, in a separate regression (not shown) we included dummies for the EC and the OECD (excluding the dummy for national governments' observations), and tested the null hypothesis of equality of the coefficients, which was not rejected at the usual significance levels.

government balance projections.

Another important issue is the effect of electoral cycles. Column [2] of Table 3 breaks down the impact of the election dummy by institutions.[23] Standard tests show that the coefficient of the interaction term "elections × GOV" is significantly higher than the ones corresponding to the EC and the OECD. This can be interpreted as a sign of more independent fiscal forecasts by international organizations.[24]

In columns [3] and [4] we show the same estimations as before but controlling for ex-post fiscal data revisions. Although these revisions are not available during the forecast process, it might be helpful to examine these variables in order to draw more precise policy messages.[25] Even though results in columns [3] and [4] are quite similar to the real-time specifications in columns [1] and [2], the following results can be highlighted. First, fiscal data revisions are significant and the estimated coefficient presents a negative sign. Given that the variable is defined as $d_t - d_t^{A_{t+2}}$, and given that on average there have been revisions towards worse budget balances (i.e. on average $d_t - d_t^{A_{t+2}} > 0$, see de Castro et al., 2013), a negative sign of the coefficient means that controlling for data revisions unveils that ex-post the "optimistic bias" of government balance projections turns out to be larger. Second, when comparing the estimations in column [3] with those in column [1], the coefficient of the variable "Elections" becomes larger in absolute value and also in statistical terms. Thus controlling for fiscal data revisions also unveils that ex-post the "political bias" of the projections turned out to be larger. Third, when comparing the estimations in column [4] with those in column [2], the coefficients of the "Elections" variables by organization also become larger in absolute value, while at the same time there is no evidence of differentiated results for government's and international organizations' coefficients. Fourth, controlling for ex-post fiscal revision does

[23] In this way, within the pool of data, we estimate a separate coefficient for each institution for the election variable, instead of the single coefficient for the whole pool in specification [1].

[24] It is worth noting that the underidentification tests show that all models are identified, i.e that the excluded instruments are adequately correlated with the endogenous regressor. In addition, the weak instruments tests show that instruments are relevant.

[25] An alternative way of dealing with the potential impact of fiscal data revisions on forecast errors would have been to account for revisions in the base year that is used to produce a given forecast in each particular vintage. In this regard see Jong-a-Pin et al. (2012).

not have implications for the significance of the "Dummy government" variable. The point estimate of the coefficient is the same in both set of results, and it only becomes significant at the 10% significance level (see column [3]) compared to a borderline case in the baseline case (see column [1]).

Still in Table 3, columns [4] to [8] present the same analysis as before but with regressions run over the "good times" sample and the "bad times" sample separately. The most insightful features of the empirical estimations are the following. First, fiscal forecasts turned out to be more judgemental (i.e. less responsive to GDP errors) in bad times than in good times. This is consistent with the usual approach to conduct discretionary policies more actively in times of distress, typically by implementing expansionary measures at the beginning of a downturn and implementing fiscal adjustment measures when public debt builds-up beyond certain, sustainable limits. Second, governments display a distinct optimistic budget balance forecast bias in good times (the "dummy government" is negative and significant), while in bad times they seem to be more in line with the other institutions. Third, bad times exert a kind of discipline over EDP countries, as the relevant dummy is not significant in those periods. Fourth, the negative influence of electoral cycles is significant in both types of periods, but it is more muted in bad times than in good times. Finally, with all due caveats, when fixed-effects and EDP dummies are excluded from the regressions the constant term is negative in bad times (optimistic bias) and positive in good times (conservative bias).

Table 4 shows results by organization (i.e. GOV, EC, and OECD). An interesting result arising from this additional break-down is related to the explanatory power of GDP forecast errors in each case. Indeed, the coefficient associated to GOV is 0.26 (even though not significant at the usual significance levels), below those estimated for the EC and the OECD, which are respectively 0.41 and 0.58. This result indicates that, overall, governments' fiscal balance projections are more judgemental than those produced by international organizations, i.e. they tend to rely less on their macroeconomic projections. OECD GDP forecast errors account for a larger fraction of budget balance forecast errors than EC GDP errors. However, in this table one has to consider that the weak instruments test shows evidence of weak identification in the case of the GOV regression, and it is borderline in the case of OECD. Weighted Least Squares results (WLS), in turn, broadly confirm Instrumental

Variables (IV) findings.

In Table 5, we present the analysis by vintage of projection. The empirical analysis presents some insightful results. First, the importance of errors in GDP as explanatory factors of government balance errors decreases with the vintage, i.e. the closer the projection is to the forecasted year. This result proves that the accuracy of GDP forecasts increase as the information set gets increased, but also the fact that pure fiscal factors (like short-term data on budgetary execution) gain relevance versus macro fundamental in the forecast process the closer the end of the fiscal year. Second, the dummy for electoral dates is negative for all vintages, but it is mainly significant for the vintages with forecast origin within the year of the election.[26] Third, in the case of the Spring current year vintage the dummy for government projections turns out to be significant, showing an optimistic bias in that vintage. This bias vanishes in the case of Autumn-current-year projections, the time of budget preparation. Finally, it is worth noticing that in current year vintages the availability of private information is more relevant, in particular as regards data on the budgetary execution of sub-national levels of government. Overall, the Spring current-year vintage seems to be the one more subject to policy judgement and political bias. This is precisely the vintage of projections published at the time of the year that is most relevant for implementing corrective fiscal measures in order to guarantee that budgetary targets are met.

Finally, in Table 6 we show some results for the pre-1995 sample for the Spring current-year vintage. As discussed above, we provide this information for the sake of robustness. The main results discussed in the previous paragraph and reported in Table 5 remain valid. In the case of the Spring current year vintage the dummy for government projections is statistically significant indicating an optimistic bias. Elections, GDP growth and EDP dummy also present the same signs and similar levels of statistical significance. At the same time, some additional insights are gained by looking at Table 6: (i) the bias induced by electoral cycles is larger in the 1999-2007 sample; (ii) the same applies to the differentiated bias that countries under EDP display; (iii) the pre-1999 period introduced a certain level of prudence in fiscal balance projections, as shown by the positive and significant coefficients of the pre-1999

[26] These results seem to be in line with those found by Jong-a-Pin et al (2012).

dummy (a variable equal to 1 for years 1995-1998 and zero otherwise) and the variable linear trend for the 1995-1998 period. This result can be certainly associated with the desire of national governments to enter the first stage of EMU. Overall, these results seem to indicate additional degree of fiscal prudence induced by EMU accession vanished in the post-1999 (EMU) period.

5 Conclusions and policy lessons

Our results seem to point out that, in the past, international agencies' fiscal forecasts were affected to some extent by the same type of problems that the literature widely acknowledges for governmental ones. We provide empirical evidence on the existence of political economy determinants of international organizations' (EC and OECD) fiscal forecasts for EU countries over the period 1999-2007.

Our main empirical results are the following. First, in line with the literature, we find a significant influence of electoral cycles on governmental fiscal forecasts; at the same time we find that, to a lesser extent, European Commission and OECD projections are also affected by elections' dates. Second, GDP errors influence significantly government balance errors, in the sense that a negative growth shock produces ex-post optimistic budget-balance forecasts. Governments' projections are found to be less reactive to the economic cycle (more judgemental) than European Commission and OECD ones. Third, fiscal forecasts turn out to be more judgemental (i.e. less responsive to GDP errors) during economic downturns than during upturns. This is consistent with the common approach to conduct discretionary policies more actively in times of distress, typically by implementing expansionary measures at the beginning of a downturn and implementing fiscal adjustment measures when public debt builds up beyond certain sustainable limits. Governments display a distinct optimistic budget-balance forecast bias in upturns, while in downturns they seem to be more in line with the other institutions. Fourth, elections influence government balance forecast errors more strongly during economic upturns, while EC/OECD projections become more independent. Finally, we also find that controlling for successive fiscal data revisions in the empirical models unveils that the 'optimistic bias' of the projections turns out to be larger ex-post.

We shed light on the possible rationale of our empirical results by looking at a simple model in which government's information set includes private information not available to international agencies. Therefore, international agencies try to minimize the distance to government's forecast. When preparing their fiscal projections, international agency's staff try to grasp as much private information as possible from the government, while at the same time have to disentangle "political biases" from genuine "private information". Thus, the presence of an inherited bias in international agencies' fiscal forecasts stems naturally in this set up.

The analysis and results of this paper do have important implications for the current policy debate. The first policy implication of our paper is that independent national fiscal institutions might be a natural option, to the extent that they may have better access/knowledge to/of inside national information than international organizations. In order to strengthen the watchdog role of international organizations, some institutional changes would need to be implemented to improve the transparency of fiscal data reporting by governmental agencies, so as to minimize ex-ante the private information bias. In addition, institutional changes should aim at improving the accountability of governments and at minimizing ex-ante the political bias either by increasing peer pressure or by increasing the ex-ante pressure on misbehaving governments. For instance, the threat of sanctions (i.e. a penalty on poor government's track record of fiscal forecasts) might be instrumental for the purpose of minimizing the private information bias in governments' forecasts. Some of these elements are either part of the provisions of the so-called 'Six-Pack' or have been included in the documents currently under discussion under the umbrella of the 'Two-Pack', even though they have still to be implemented in practice.

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Appendix A. Illustration of the potential role of sanctions in forcing better fiscal forecasts

As briefly discussed in the main text, suppose that the EC could impose sanctions on the government depending on how far its fiscal forecasts are from the final outcome. In this case, it could influence the extent to which a government bases its forecast on Ω rather that Π. This can be done by imposing a penalty on the government if it deviates from a forecast based on the common information set, $\bar{x}_\Omega$. Let this penalty be forcing the government to choose a $\hat{x}$ given that there is a penalty P given by $P = \beta(\hat{x} - \bar{x}_\Omega)$. Setting $\beta = 0$ will lead the government to use Π to minimize its own loss function, Λ_1, while setting $\beta = \infty$ will cause the government simply to report the common forecast $\bar{x}_\Omega$. More generally, the government would choose a $\hat{x}$ to minimize a weighted average of its own loss function Λ_2 and the additional penalty, P, with weight β', and given by $\beta'\bar{x}_\Omega + (1-\beta')(\bar{x}_\Pi + \theta)$. In this case, a weight $\beta' = \beta/(\beta+\gamma)$ ranges from 0 to 1 as β ranges from 0 to ∞. The EC's loss function would be in this case:

$$\begin{aligned} L^{EC} &= E[x - \{\beta'\bar{x}_\Omega + (1-\beta')(\bar{x}_\Pi + \theta)\}|\ \Omega]^2 \\ &= E[x - \{\beta'(x+\nu+\epsilon) + (1-\beta')(x+\epsilon+\theta)\}|\ \Omega]^2 \end{aligned}$$

The EC would choose the value of the relative penalty, β' that minimizes its expected loss function. It is easy to find that such a value is:

$$\beta' = \frac{\sigma_\theta^2}{\sigma_\nu^2 + \sigma_\theta^2}$$

where σ_ν^2 and σ_θ^2 stand for the variance of the private information error and the politically-motivated error, respectively. From this expression it is clear that the EC has to force the government to use its superior information the larger σ_ν^2, i.e. the greater the informational advantage is, and the smaller σ_θ^2, i.e. the less unpredictable the political bias is.

Table 1: Some related literature analyzing government budget balance forecast errors in EU countries.

Main papers and time periods covered	Information source	Type of analysis [f]	Forecasts of organization: EC	OECD	Governments
Strauch et al. (2004), 1991-2002	National [a]	Econometric	–	–	Autumn j-period-ahead forecasts, $j = 0, 1, 2$
Brück-Stephan (2006), 1995-2003	EC [b]	Econometric	–	–	Autumn j-period-ahead forecasts, $j = 1$
von Hagen (2010), 1999-2004	National[a]	Econometric	–	–	Autumn j-period-ahead forecasts, $j = 0, 1, 2$
Frankel-Schreger (2013), 1999-2012	National[a]	Econometric	–	–	Autumn j-period-ahead forecasts, $j = 0, 1, 2$
Jong-a-Ping et al. (2013), 1997-2006	OECD	Econometric	–	–	All vintages
Pina & Venes (2011), 1994-2006	National EDP [c]	Econometric	–	–	Spring and Autumn current year forecasts
Annet (2006), 1980-2004	National [a]	Econometric	–	–	Autumn j-period-ahead forecasts, $j = 1$
Moulin-Wierts (2006), 1998-2005	National [a]	Econometric	–	–	Autumn j-period-ahead forecasts, $j = 1$
Beetsma et al. (2012), 1998-2008	National [a]	Econometric	–	–	Autumn j-period-ahead forecasts, $j = 0, 1, 2$
Artis-Marcellino (2001), 1975-1995 [e]	EC [b], OECD [d]	Descriptive	All vintages	All vintages	– –
Keereman (1999), 1970-1997	EC [b]	Descriptive	All vintages	–	– –
Melander et al. (2007), 1970-2005	EC [b]	Descriptive	All vintages	–	– –
Marinheiro (2010), 1999-2007	EC [b]	Descriptive	All vintages	–	–

Notes: [a] National sources: Stability and Convergence Programmes by EU Member States.

[b] European Commission, several vintages of the publication "European Economy- Economic Forecasts".

[c] EDP reports: Excessive Deficit Procedure reports.

[d] OECD Economic Outlook.

[e] Their analysis also covers IMF projections (World Economic Outlook).

[f] "Descriptive" refers to the implementation of standard measures of forecast accuracy, including directional accuracy, plus traditional bias and efficiency tests. "Econometric" refers to the inclusion of economic, political and/or institutional variables as explanatory variables. "All vintages" refers to Spring and Autumn current year and year-ahead forecasts.

Table 2: Some descriptive statistics of the sample of government balance and real GDP forecast errors.

Panel A. Government balance forecast errors: some descriptive statistics

	Mean Error				Mean Absolute Error			
	Pool	GOV	EC	OECD	Pool	GOV	EC	OECD
Spring, 1-year ahead	-0.11	-	-0.10	-0.11	1.72	-	1.68	1.77
Autumn, 1-year ahead	0.01	-0.04	0.08	-0.01	1.47	1.41	1.48	1.52
Spring, current year	0.23[a]	0.12	0.29[a]	0.28[a]	0.85	0.94	0.79	0.81
Autumn, current year	0.23[a]	0.23[a]	0.25[a]	0.20[a]	0.48	0.43	0.49	0.52

Panel B. Government balance forecast errors: good times vs bad times

	Mean Error: good times				Mean Error: bad times			
	Pool	GOV	EC	OECD	Pool	GOV	EC	OECD
Spring, 1-year ahead	1.09[a]	-	1.05[a]	1.13[a]	-1.71[a]	-	-1.64[a]	-1.79[a]
Autumn, 1-year ahead	0.95[a]	0.86[a]	1.02[a]	0.96[a]	-1.24[a]	-1.24[a]	-1.17[a]	-1.32[a]
Spring, current year	0.56[a]	0.45[a]	0.61[a]	0.61[a]	-0.42[a]	-0.53[a]	-0.35[a]	-0.38[a]
Autumn, current year	0.31[a]	0.30[a]	0.32[a]	0.30[a]	0.07	0.08	0.11	0.01

Panel C. Real GDP forecast errors: some descriptive statistics

	Mean Error				Mean Absolute Error			
	Pool	GOV	EC	OECD	Pool	GOV	EC	OECD
Spring, 1-year ahead	-0.72[a]	-	-0.71[a]	-0.73[a]	1.31	-	1.28	1.33
Autumn, 1-year ahead	-0.36[a]	-0.40[a]	-0.32[b]	-0.35[b]	1.11	1.14	1.11	1.10
Spring, current year	0.11	0.20	0.00	0.13	0.92	1.21	0.76	0.78
Autumn, current year	0.09[a]	0.05	0.11[b]	0.10[b]	0.30	0.31	0.30	0.29

[a] Significant at 1%; [b] Significant at 5%; [c] Significant at 10%.

Table 3: Explaining the government balance forecast errors: results for the pool of all countries, all organizations (governments, EC, OECD) and all vintages ($\epsilon_{t+1}^{S_t}$, $\epsilon_{t+1}^{A_t}$, $\epsilon_{t+1}^{S_{t+1}}$ and $\epsilon_{t+1}^{A_{t+1}}$).

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	Whole sample				Good times		Bad times	
GDP forecast error	0.48 [a]	0.48 [a]	0.48 [a]	0.47 [a]	0.84 [a]	0.84 [a]	0.18 [c]	0.18 [c]
	(0.09)	(0.09)	(0.08)	(0.08)	(0.14)	(0.14)	(0.11)	(0.11)
Dummy government	-0.14		-0.14 [c]		-0.22 [c]		-0.08	
	(0.09)		(0.09)		(0.13)		(0.12)	
Elections	-0.44 [a]		-0.52 [a]		-0.49 [a]		-0.35 [a]	
	(0.08)		(0.08)		(0.11)		(0.11)	
Elections x GOV		-0.67 [a]		-0.74 [a]		-0.76 [a]		-0.44 [b]
		(0.15)		(0.16)		(0.22)		(0.18)
Elections x EC		-0.37 [a]		-0.45 [a]		-0.45 [a]		-0.26 [c]
		(0.11)		(0.10)		(0.15)		(0.15)
Elections x OECD		-0.40 [a]		-0.48 [a]		-0.37 [b]		-0.39 [a]
		(0.11)		(0.11)		(0.16)		(0.15)
Fiscal data revisions			-0.54 [a]	-0.54 [a]				
			(0.08)	(0.08)				
EDP country	-0.79 [a]	-0.79 [a]	-0.82 [a]	-0.82 [a]	-1.58 [a]	-1.58 [a]	-0.03	-0.08
	(0.29)	(0.29)	(0.20)	(0.20)	(0.28)	(0.28)	(0.38)	(0.29)
Good times dummy	1.11 [a]	1.12 [a]	0.90 [a]	0.90 [a]				
	(0.10)	(0.10)	(0.09)	(0.09)				
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1132	1132	1132	1132	684	684	448	448
R-squared	0.43	0.43	0.47	0.47	0.36	0.36	0.49	0.49
Underidentification test [1]	142.6	142.9	145.1	145.3	79.0	79.3	74.3	74.5
(p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weak identification test [2]	21.8	21.8	21.9	21.9	16.9	17.0	23.5	23.4
Crit.val. 5% max. bias	20.3	20.3	20.3	20.3	19.3	19.3	13.9	13.9
Crit.val. 10% max. bias	11.4	11.4	11.4	11.4	11.1	11.1	9.1	9.1
Crit.val. 10% max. size	33.8	33.8	33.8	33.8	29.2	29.2	22.3	22.3
Crit.val. 15% max. size	18.5	18.5	18.5	18.5	16.2	16.2	12.8	12.8
Overidentification test [3]	83.0	83.0	84.0	84.0	67.3	67.5	6.2	6.2
(p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04
Pro memoria:								
- Constant from regression	-0.03	-0.06	0.13	0.10	1.05 [a]	1.00 [a]	-0.24 [b]	-0.25 [b]
without fixed effects	(0.10)	(0.09)	(0.09)	(0.08)	(0.09)	(0.09)	(0.11)	(0.10)
- Constant reg. w/o fixed	-0.36 [a]	-0.39 [a]	-0.11	-0.14	0.77 [a]	0.72 [a]	-0.66 [a]	-0.68 [a]
effects, w/o EDP dummy	(0.11)	(0.10)	(0.09)	(0.09)	(0.06)	(0.06)	(0.13)	(0.12)

Notes: The dependent variable is the public balance forecast error (actual minus forecast). Standard deviations of coefficient's estimates are reported in parentheses. [a] Significant at 1%; [b] Significant at 5%; [c] Significant at 10%. [1] Kleibergen-Paap rk LM statistic: the null hypothesis is that the equation is underidentified. [2] Cragg-Donald Wald F statistic: the null hypothesis is that the instruments are weak; Stock-Yogo weak ID test critical values: "max. bias" stands for maximal IV relative bias.

Table 4: Explaining the government balance forecast errors: results for each organization (pool of vintages and countries).

	IV			WLS		
	GOV	EC	OECD	GOV	EC	OECD
GDP forecast error	0.26	0.41 [a]	0.58 [a]	0.21 [a]	0.38 [a]	0.40 [a]
	(0.16)	(0.12)	(0.15)	(0.06)	(0.08)	(0.06)
Elections	-0.51 [a]	-0.40 [a]	-0.41 [a]	-0.44 [a]	-0.40 [b]	-0.41 [b]
	(0.17)	(0.12)	(0.13)	(0.11)	(0.17)	(0.16)
EDP country	-1.47 [a]	-0.86 [b]	-0.82 [b]	-0.92 [a]	-0.70 [a]	-1.78 [a]
	(0.47)	(0.41)	(0.34)	(0.09)	(0.13)	(0.11)
Good times dummy	1.24 [a]	1.13 [a]	1.12 [a]	0.91 [a]	1.13 [a]	1.23 [a]
	(0.19)	(0.15)	(0.17)	(0.14)	(0.19)	(0.19)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	238	450	444	373	480	474
R-squared	0.48	0.44	0.42	0.41	0.44	0.43
Underidentification test [1]	22.7	75.5	71.9			
(p-value)	0.00	0.00	0.00			
Weak identification test [2]	2.6	13.7	9.7			
Crit.val. 5% max. bias	20.3	20.3	20.3			
Crit.val. 10% max. bias	11.4	11.4	11.4			
	18.09	38.01	31.16			
	0.01	0.00	0.00			
Pro memoria:						
- Constant from regression	-0.01	-0.06	-0.10			
without fixed effects	(0.19)	(0.14)	(0.15)			
- Constant reg. w/o fixed	-0.48 [b]	-0.35 [b]	-0.40 [b]			
effects, w/o EDP dummy	(0.23)	(0.16)	(0.16)			

Notes: The dependent variable is the public balance forecast error (actual minus forecast). Standard deviations of coefficient's estimates are reported in parentheses. [a] Significant at 1%; [b] Significant at 5%; [c] Significant at 10%. [1] Kleibergen-Paap rk LM statistic: the null hypothesis is that the equation is underidentified. [2] Cragg-Donald Wald F statistic: the null hypothesis is that the instruments are weak; Stock-Yogo weak ID test critical values: "max. bias" stands for maximal IV relative bias.

Table 5: Explaining the government balance forecast errors: results for each vintage of projections (pool of organizations and countries). Instrumental variables estimation.

	$\epsilon_{t+1}^{S_t}$		$\epsilon_{t+1}^{A_t}$		$\epsilon_{t+1}^{S_{t+1}}$		$\epsilon_{t+1}^{A_{t+1}}$	
GDP forecast error	0.50 [a]	1.13 [a]	0.42 [a]	0.77 [a]	0.23 [c]	0.66 [a]	0.38 [a]	0.35 [b]
	(0.12)	(0.10)	(0.08)	(0.09)	(0.12)	(0.10)	(0.15)	(0.15)
Dummy government			-0.05	-0.01	-0.21 [c]	-0.25 [c]	0.02	0.02
			(0.15)	(0.19)	(0.12)	(0.15)	(0.06)	(0.06)
Elections	-0.29	-0.39	-0.21	-0.42 [b]	-0.58 [a]	-0.80 [a]	-0.32 [a]	-0.32 [a]
	(0.22)	(0.27)	(0.15)	(0.19)	(0.14)	(0.16)	(0.07)	(0.07)
EDP country	-0.79	0.11	-1.40 [a]	-1.07 [b]	-1.11 [a]	-0.90 [a]	-0.82 [a]	-0.83 [a]
	(0.59)	(0.69)	(0.46)	(0.53)	(0.30)	(0.34)	(0.25)	(0.25)
Good times dummy	2.00 [a]		1.86 [a]		0.71 [a]		0.25 [a]	
	(0.30)		(0.16)		(0.15)		(0.06)	
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	209	209	313	313	312	312	403	403
R-squared	0.57	0.32	0.54	0.29	0.46	0.15	0.34	0.32
Underidentification test [1]	81.2	83.9	129.9	146.9	28.9	75.6	41.0	49.3
(p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weak identification test [2]	25.1	41.2	67.1	65.5	6.0	12.9	14.7	13.1
Crit.val. 5% max. bias	18.4	19.3	18.4	19.3	19.3	19.9	20.3	20.5
Crit.val. 10% max. bias	10.8	11.1	10.8	11.1	11.1	11.3	11.4	11.5
Crit.val. 10% max. size	26.9	29.2	26.9	29.2	29.2	31.5	33.8	36.2
Crit.val. 15% max. size	15.1	16.2	15.1	16.2	16.2	17.4	18.5	19.7
Overidentification test [3]	31.75	38.57	25.32	86.29	24.84	33.35	20.81	32.35
(p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pro memoria:								
- Constant from regression	-0.40	1.11 [a]	-0.35 [b]	0.81 [a]	0.30 [b]	0.74 [a]	0.29 [a]	0.46 [a]
without fixed effects	(0.30)	(0.21)	(0.17)	(0.16)	(0.12)	(0.10)	(0.07)	(0.06)
- Constant reg. w/o fixed	-0.83 [b]	0.79 [a]	-0.83 [a]	0.39 [a]	-0.03	0.40 [a]	0.12 [c]	0.28 [a]
effects, w/o EDP dummy	(0.33)	(0.17)	(0.18)	(0.14)	(0.14)	(0.08)	(0.07)	(0.05)

Notes: The dep. variable is the public balance forecast error (actual minus forecast). Standard deviations of coefficient's estimates are reported in parentheses. Excluded instruments for GDP errors are lagged GDP errors (prior vintage) and time dummies. [a] Significant at 1%; [b] Significant at 5%; [c] Significant at 10%.

[1] Kleibergen-Paap rk LM statistic: the null hypothesis is that the equation is underidentified.

[2] Cragg-Donald Wald F statistic; Stock-Yogo weak ID test critical values: "max. bias" stands for maximal IV relative bias, and "max size" for maximal IV size.

[3] Hansen J statistic.

Table 6: Explaining the government balance forecast errors: results for an expanded sample period for one selected vintage.

	$\epsilon_{t+1}^{S_{t+1}}$ Sample 1995-2007			$\epsilon_{t+1}^{S_{t+1}}$ Sample 1999-2007	
GDP forecast error	0.70 [a]	0.65 [a]	0.62 [a]	0.66 [a]	0.23 [c]
	(0.12)	(0.11)	(0.16)	(0.10)	(0.12)
Dummy government	-0.20 [c]	-0.23 [b]	-0.23 [b]	-0.25 [c]	-0.21 [c]
	(0.12)	(0.12)	(0.11)	(0.15)	(0.12)
Elections	-0.53 [a]	-0.50 [a]	-0.50 [a]	-0.80 [a]	-0.58 [a]
	(0.16)	(0.15)	(0.14)	(0.16)	(0.14)
EDP country	-0.71 [b]	-0.72 [b]	-0.73 [b]	-0.90 [a]	-1.11 [a]
	(0.33)	(0.32)	(0.32)	(0.34)	(0.30)
Good times dummy			0.10		0.71 [a]
			(0.21)		(0.15)
Pre-1999 dummy		0.32 [c]	0.33 [c]		
		(0.17)	(0.17)		
Linear trend pre-1999		0.08 [a]	0.08 [a]		
		(0.02)	(0.02)		
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	563	563	563	312	312
R-squared	0.02	0.09	0.11	0.15	0.46
Underidentification test [1]	101.6	97.3	89.3	75.6	28.9
(p-value)	0.00	0.00	0.00	0.00	0.00
Weak identification test [2]	10.3	12.1	11.2	12.9	6.0
Crit.val. 5% max. bias	21.0	20.7	20.5	19.9	19.3
Crit.val. 10% max. bias	11.5	11.5	11.5	11.3	11.1
Crit.val. 10% max. size	43.3	38.5	36.2	31.5	29.2
Crit.val. 15% max. size	23.2	20.9	19.7	17.4	16.2
Overidentification test [3]	51.06	52.77	35.87	33.35	24.84
(p-value)	0.00	0.00	0.00	0.00	0.00

Notes: The dependent variable is the government balance forecast error (actual minus forecast). Standard deviations of coefficient's estimates are reported in parentheses. Excluded instruments for GDP errors are time dummies. [a] Significant at 1%; [b] Significant at 5%; [c] Significant at 10%.

[1] Kleibergen-Paap rk LM statistic: the null hypothesis is that the equation is underidentified.

[2] Cragg-Donald Wald F statistic; Stock-Yogo weak ID test critical values: "max. bias" stands for maximal IV relative bias, and "max size" for maximal IV size. [3] Hansen J statistic.