From First-Release to Ex-Post Fiscal Data: Exploring the Sources of Revision Errors in the EU[*]

Roel Beetsma,[†] Benjamin Bluhm,[‡] Massimo Giuliodori[§] and Peter Wierts[**]

ABSTRACT

This paper explores the determinants of deviations of ex-post budget outcomes from first-release outcomes published towards the end of the year of budget implementation. The predictive content of the first-release outcomes is important, because these figures are an input for the next budget and the fiscal surveillance process. Deviations of ex-post from first-release fiscal figures may arise for political and strategic reasons. In particular, Ministries of Finance control the production of first-release figures, and may have an incentive to be over-optimistic at this stage. Our results suggest that an improvement in the quality of institutions, whether measured by the tightness of national fiscal rules, the medium-term budgetary framework or budgetary transparency, reduces the degree of optimism at the first-release stage, thereby making first-release figures more informative about the eventual outcomes. This supports European Commission proposals for minimum standards for national fiscal frameworks. It also strengthens the case for a close monitoring by the Commission of the first-release production of fiscal figures.

This version: December 2011.

JEL codes: E6, H6.

Keywords: real-time data, first-release data, ex-post data, fiscal policy, biases, decomposition, base effect, growth effect, denominator effect, fiscal institutions.

1.   Introduction

The budget process consists of three stages. The first stage is the planning stage,[1] while the second stage is the implementation stage, which leads to the real-time "first-release" outcomes published towards the end of the year of implementation.[2] Finally, the ex-post control stage produces the "ex-post" or final outcomes. These outcomes measure the budgetary situation of a given year most accurately, because they are based on the largest available amount of information and (in the EU) are published by the national statistical office after having been scrutinised by Eurostat. First-release outcomes generally differ from the originally planned or projected values, for example, because discretionary measures are taken in response to unexpected economic events during the implementation stage or because policymakers choose to deliberately bias their projections. The result is an *implementation error*, defined as the difference between the first-release and planned figure. Also the ex-post outcome often differs from the first-release outcome, giving rise to a *revision error*, which is defined as the difference between the two figures. Revision errors may arise because of data revisions and the fact that first-release figures are constructed before the end of the fiscal year. In addition, governments may have political or strategic motives to bias the first-release figures.

While the literature has analysed relatively extensively fiscal implementation errors in the EU, much less attention has been paid to revision errors.[3] This is an important omission, because the relevance and sources of slippages at the various budgetary stages vary and, hence, different institutional measures may be required to deal with them. For example, Beetsma *et al.* (2009) extensively explore the determinants of implementation errors using data from the EU Stability and Convergence Programs (SCPs) over the period 1998-2008.

---

[1] The planning stage can be further divided into a stage in which the government constructs the budget and a parliamentary approval stage.

[2] Use of real-time data for fiscal policy analysis has become quite popular recently, an advantage of real-time data being that such data capture more accurately (than ex-post data) the information set of the policymakers at the moment they take their decisions. These decisions comprise both the fiscal plan and its implementation. See, for example, Forni and Momigliano (2004), Marinheiro (2008), Bernoth *et al.* (2008), Lewis (2009), Pina (2009) and Cimadomo (2011a). An early contribution is Strauch *et al.* (2004), who use data on budget balances from the Stability and Convergence Programs over the period 1991-2002 and find that governments on average predict the future budget outcome fairly well. Brück and Stephan (2006) and Pina and Venes (2011) investigate the political determinants of forecast errors in fiscal policy, while controlling for economic variables. For a survey of the literature, see Cimadomo (2011b).

[3] Exceptions are Balassone *et al.* (2006, 2007), who compare the quality of alternative indicators for fiscal discipline and conclude that a major shortcoming of the deficit in this regard is that it is often subject to substantial revisions. They also argue that consistency cross-checks between deficits and debt changes may offer useful monitoring information. Gordo and Nogueira Martins (2007) provide a descriptive analysis of revisions in EDP debt and deficit data.

These programs constitute a harmonised source of data on fiscal plans and outcomes in EU countries. The authors show that fiscal slippages can be mainly attributed to the spending side of the budget. Moreover, they find that economic rather than political factors are major determinants of implementation errors. National fiscal rules and medium-term budgetary frameworks also affect the ambition of fiscal plans as well as the degree of adherence to those plans. The importance of the tightness of national fiscal rules is confirmed in work by Abbas *et al.* (2011), who focus on large adjustment plans over a three-year horizon in the EU initiated in the period 1991-2005, and by Holm-Hadulla *et al.* (2011), who show that tighter expenditure rules in the EU limit deviations of actual from planned discretionary spending in response to positive output gap surprises.

In this paper, we complement the study of Beetsma *et al.* (2009), which focuses on the planning and implementation stages, and analyse the ex-post control stage by studying the fiscal revision errors in the EU. Such an analysis is relevant for several reasons. First, an assessment of the predictive content of first-release for ex-post figures is important, because first-release figures are used for fiscal surveillance and could give rise to policy adjustments. In particular, first-release data may send an early signal of a lack of fiscal sustainability, in which case a tightening of planned fiscal policy could be warranted. Second, because first-release data provide an estimate of the current budgetary situation, they form the basis for the evaluation of the budget implementation for the current year and they are an input into the formulation of the new budget.[4] First-release figures are closest to the information set available to policymakers when they implement their policies and so are most informative about the behaviour of policymakers. However, if governments for political reasons have an incentive to manipulate those figures, first-release figures may lose their usefulness as indicators of the eventual outcomes and as an input into the budgetary process. Hence, it is important to explore also which institutional settings are conducive to the production of reliable first-release figures. Third, findings on the sources of fiscal slippages differ in the literature. In contrast to Beetsma *et al.* (2009), Von Hagen (2010) points to public revenues instead of expenditures as the source of these slippages. Our approach reconciles these findings by showing how slippages differ at different stages of the budget process.

Related to this paper is De Castro *et al.* (2011), who explore the properties of subsequent revisions in the budget balances of a given year. Our results confirm their finding that preliminary data releases are biased estimators of the final data. At the same time, our

---

[4] Since the early 2000s such an evaluation has become a standard practice in the assessment by the European Commission of the national Stability and Convergence Programmes.

analysis complements their approach. While they focus in more detail on the data revision process of the budget balance using Excessive Deficit Procedure (EDP) notifications, we study fiscal slippages at the various stages of the budgetary cycle, although our emphasis is on revision errors. More importantly, in contrast to the aforementioned contributions, we provide an explicit framework for decomposing errors into their components. This includes the revenue and expenditure side of the budget, but also a further decomposition of errors on each side of the budget. Moreover, we stress the political-economy effects of real-time estimations by the Ministry of Finance versus final data as produced by the statistical office. Finally, we explore the role of budgetary institutions in countering biases.

The European Commission applies our decomposition framework in its regular fiscal surveillance of individual SCPs. However, our approach differs as we apply the decomposition to all countries and all years, in order to identify systematic patterns in the decomposition. We also apply it to both implementation and revision errors. The decomposition provides the starting point for an empirical analysis that links revision errors and their components to economic, political and institutional variables.

Our main findings are the following. First, while fiscal plans are on average too optimistic relative to the first-release outcomes, a result in line with much of the related literature, first-release figures are in turn overly optimistic relative to the ex-post figures.[5] Given their control over the production of first-release figures, governments may be tempted to be over-optimistic at this stage. We find that while most of the over optimism at the planning stage relative to the first-release stage is driven by expenditures, revision errors are mainly caused by over optimism about revenues at the first-release stage. The most important force driving the over-optimism is the "base effect", that is, the revision of the previous period's balance in the light of this year's new information. Further, our regression analysis suggests that economic factors play a limited role in explaining the revision errors and its components, while political factors play virtually no role at all. By contrast, institutional arrangements do seem to be important. An improvement in the quality of national fiscal institutions, whether measured as the tightness of fiscal rules, the strength of the medium-term budgetary framework or the degree of transparency, reduces the degree of optimism at the first-release stage and makes first-release figures more informative about the eventual outcomes. These findings support the European Commission's (2010) proposal to specify minimum requirements for domestic fiscal frameworks. These minimum requirements

---

[5] This result is consistent with De Castro *et al.* (2011), who find that initial releases of government deficits in the EDP notifications are biased predictors of subsequent releases, with later vintages showing larger deficits.

concern in particular the adoption of properly designed numerical fiscal rules and medium-term budgetary frameworks as well as requirements on transparency.

The remainder of this paper is structured as follows. Section 2 provides a conceptual framework for the existence of implementation and revision errors. This section also decomposes implementation and revision errors into their components. The regression analysis in Section 3 explores the role of economic, political and institutional factors in explaining revision errors, while Section 4 concludes the paper.

2. Conceptual framework and decompositions

In this section, we first describe how systematic revision errors in fiscal policy may arise, after which we present the formal decompositions of the deviations of the first-release budgetary outcomes from their planned values and the ex-post outcomes from their first-release outcomes. Finally, we present summary statistics for both stages of the decomposition.

2.1 Sources of fiscal slippages

The budget process consists of three stages, the planning stage, the implementation stage and the ex-post control stage. The planning stage takes place towards the end of year *t-1* and produces a planned balance for *t*, while the implementation stage leads to the so-called first-release of the balance. It becomes available towards the end of period *t*. Finally, the ex-post control stage gives rise to the ex-post or final figure for the balance of year *t*. It may take some years for this figure to become available. Plans and first-release figures are based on real-time data. The difference between the first-release and planned figure will be called the "implementation error", while the difference between the ex-post and first-release figure will be called the "revision error". To understand implementation and revision errors, we should know (i) who controls and reports the fiscal figures, and (ii) what are the incentives under which these figures are reported?

During the planning stage, it is the cabinet that agrees on the budget and the medium-term fiscal plan. Beetsma *et al*. (2009) describe why the planned budget balance may be deliberately optimistic. In sum, during planning, fiscal policymakers are required to present an adjustment path as demanded by the preventive arm of the Stability and Growth Pact (SGP). At the same time, they may also want to signal to the public that they respond to the many

spending needs in society. Tools for hiding this trade off include systematic optimism in growth and revenue projections. However, as the year of implementation unfolds, it becomes clear that the original plan cannot be adhered to.

The empirical evidence in Beetsma *et al.* (2009) indeed confirms that for the EU-14 countries as a whole, budgetary implementation falls short of what was planned. Moreover, biases are concentrated on the expenditure side. Part of the explanation lies in the systematic shortfalls of real output growth relative to projected growth. However, governments may also deliberately deviate from their original spending plans.[6] In line with these findings, regressions show that implementation errors are to a substantial degree predictable. They are related to economic, political and institutional factors.

In this paper we follow up on this earlier work by investigating the empirical determinants budgetary revision errors. In almost all EU Member States it is the national statistical office that is responsible for compiling the budget balance data once the fiscal year is over.[7] Given the independent position of statistical offices in most countries,[8] we expect ex post data to be free from biases caused by political influences.

In this setting revision errors may arise for several reasons. First, ex-post outcomes may differ from their first-release counterparts if implementation differs from planned fiscal policy for the last months of the year implicit in the first-release estimate. In other words, our findings may be partially determined by implementation biases of the type discussed above.

Second, data revisions may drive a wedge between ex-post and first-release fiscal outcomes. Revisions may occur for various reasons, such as new information on government transactions, the identification of errors or inconsistencies, changing insights on how to best comply with the accounting rules and changes in the accounting rules themselves (see Gordo and Nogueira Martins, 2007, and De Castro *et al.*, 2011). While one would a priori not expect accounting revisions to produce systematic biases into one or the other direction, De Castro *et al.* (2011) point out that "so-called Eurostat decisions reflect the need to monitor in detail practices by national statistical institutes that tend to be close to the limit of the interpretation

---

[6] The OECD questionnaire on budgeting practices and procedures (OECD, 2008) suggests that in all EU countries for which this information is available the government is allowed to increase mandatory spending after the legislature has approved the budget. Specifically, the relevant questions are "Q.51.a.1. Increase mandatory spending – is it possible?", "Q.51.a.2. Increase mandatory spending – does it require any approval?", "Q.51.b.1. Increase discretionary spending – is it possible?" and "Q.51.b.2. Increase discretionary spending – does it require any approval?"

[7] An exception is Belgium, where the national central bank compiles the data for the deficit.

[8] In Greece, the Ministry of Finance has been involved in the compilation of EDP data for the deficit and the debt.

of existing legislation at each point in time." Hence, most of Eurostat's decisions result in an upward revision of a deficit figure.

Third, given that it is the Ministry of Finance that produces the first-release figures these figures may be affected by political-strategic motives. In particular, because fiscal data are recorded on an accrual basis, the Ministry of Finance has some margin left in the publication of the first-release revenues figures.

What the control over the first-release data by the Ministry of Finance implies for the revision bias depends also on the budgetary constraints under which the government operates. First, Milesi-Ferreti (2003) presents a theoretical framework in which the first-release fiscal outcomes in period t cannot be measured with complete precision, which is a realistic assumption as we explained above. Since externally enforced fiscal rules apply to the *measured* first-release balance, there is an incentive for creative accounting at this stage. Hence, empirically, we expect the chosen degree of creative accounting to depend on the extent to which external fiscal rules are also binding in terms of first-release figures. Obviously, the fact that the ex-post figures will in the end reveal current fiscal slippages may mitigate the incentive for creative accounting. However, governments tend to discount the future at a high rate and so may care relatively little about its future consequences. This discussion suggests the hypothesis of a systematically *negative* revision error, i.e. the ex-post balance falls short of the first-release balance, because during the period under consideration our sample countries have been subject to the SGP, which operates partly on the basis of the first-release figures reported by the EU member states.[9] Second, the case study by Beetsma *et al*. (2010) for the Netherlands leads us to conjecture that tighter *national* fiscal rules, which serve as a self-enforced commitment device implying that the Ministry of Finance takes more responsibility for "prudent" fiscal outcomes, produce less over-optimism at the first-release stage and, hence, revision errors that are smaller in absolute magnitude. Third, under those circumstances when the government has an incentive to resort to creative accounting at the first-release stage, we would expect the degree of creative accounting to be negatively related to the degree of transparency of the budget and thus revision errors to be smaller in absolute magnitude, as more transparency reduces the opportunities for creative accounting.

---

[9] Interestingly, Heinemann (2006), who investigates the quality of medium-term fiscal planning in Germany finds that over-optimism in financial projections has increased after the Maastricht Treaty came into effect.

2.2 The decompositions

Consider some variable *x*, which can be *BAL* (the budget balance as a share of GDP), *REV* (revenues as a share of GDP) or *EXP* (government spending as a share of GDP). We define the *implementation error* as the difference between the first-release outcome of the variable and its plan as follows:

$$e(x)_t^{t,t-1} = \left(x_t^t - x_t^{t-1} \right). \tag{1}$$

A superscript on a variable denotes the vintage (year) when it is published, while the subscript denotes the year to which the observation refers. For example, suppose that *x=BAL*. Then, BAL_t^{t-1} is the balance over GDP ratio planned in the Fall of year *t-1* for year *t* and BAL_t^t is the first-release figure for year *t* released in the Fall of year *t*. For convenience, variables are always expressed without a country index. Following the approach used by the European Commission in its assessment of the first-release figures contained in the SCPs, for *x=REV* and *x=EXP* we can further decompose the implementation error as follows:[10]

$$x_t^t - x_t^{t-1} \tag{2}$$

$$= \frac{1+g_{x,t}^{t-1}}{1+y_t^{t-1}} \left(x_{t-1}^t - x_{t-1}^{t-1} \right) \qquad \text{base effect}$$

$$+ \frac{x_{t-1}^t}{\left(1+y_t^t\right)\left(1+y_t^{t-1}\right)} \left(g_{x,t}^t - g_{x,t}^{t-1} \right) \qquad \text{growth effect}$$

$$- \frac{x_{t-1}^t}{\left(1+y_t^t\right)\left(1+y_t^{t-1}\right)} \left(y_t^t - y_t^{t-1} \right) \qquad \text{denominator effect}$$

$$+ \frac{x_{t-1}^t}{\left(1+y_t^t\right)\left(1+y_t^{t-1}\right)} \left(g_{x,t}^t y_t^{t-1} - g_{x,t}^{t-1} y_t^t \right) \qquad \text{residual effect.}$$

---

[10] This decomposition is related to the "growth accounting" procedure in Von Hagen *et al.* (2002), which separates the effects of economic growth and fiscal contraction on fiscal consolidation. The European Commission applies the decomposition on a case-by-case basis, while we apply it to all countries and all years, in order to identify systematic patterns in the decomposition. For example, the 2010 macro fiscal assessment (MFA) for Belgium applies the decomposition to 2008 and 2009 only – see Footnote 7 on page 11 in http://ec.europa.eu/economy_finance/sgp/pdf/20_scps/2009-10/02_technical_assessment/be_2010-03-31_ta_en.pdf. Since 2008 the Commission applies the decomposition in the MFAs of all the countries.

Here, $g_{x,t}^{t-1}$ is the planned growth rate of nominal revenues (if $x=REV$) or nominal spending (if $x=EXP$) over period t. Further, $g_{x,t}^{t}$ is the corresponding actual growth rate over the same period as measured towards the end of period t. Finally, y_t^{t-1} is the projected nominal income growth rate and y_t^{t} is the actual nominal income growth rate as measured towards the end of period t. The error for $x = BAL$ and its four constituent effects are calculated by subtracting the decomposition in (2) for spending from that for revenues. This yields the base, growth, denominator and residual effects for the implementation error in the budget balance.

The base effect contains new information on the starting (period *t-1*) position of the fiscal stance and, therefore, when compared with the planning stage it represents a positive or negative fiscal surprise when fiscal measures are implemented. It captures the part of the error that is due to the difference between the outcome (as measured one year later) of a variable in a given year *t-1* and its first release for year *t-1*. Apart from statistical revisions in the fiscal data, the base effect may also arise from statistical revisions that lead to a shift in the level of GDP. For example, if the level of GDP is revised upwards, the revenue and expenditure ratios both fall, while the effect on the balance largely cancels out.

The growth effect arises from deviations of nominal revenue or expenditure growth from their planned values. Those deviations may occur for various reasons. For example, they may be due to unexpected macroeconomic developments and overambitious planning (European Commission, 2007). In the case of revenues, deviations of tax elasticities from their expected values may also play a role.[11]

The denominator effect arises from projection errors in nominal output growth. If the output growth rate turns out to be higher than projected, both the revenue and expenditure ratios will fall short of their planned values. However, because both ratios move into the same direction, the denominator effects in the spending and revenue ratios largely cancel out against each other implying that the denominator effect in the budget balance is likely to be small. Finally, the residual component is usually of negligible size, as it is a second-order term formed by the product of growth rates.

In this paper we will mostly focus on the *revision error*, which is defined as the difference between the final or ex-post and the first-release outcomes, that is:

---

[11] Of course, spending elasticities may also differ from their predicted values. However, this is unlikely to be a substantial contributor to the growth effect, because spending elasticities are thought to be relatively small in absolute magnitude as spending contains only few items that are cyclically sensitive.

$$e(x)_t^{f,t} = \left(x_t^f - x_t^t \right) \tag{3}$$

where now the superscript f on a variable denotes the final vintage (year) when it is published. Analogous to (2), to study the revision error we decompose the difference between the ex-post and first-release outcomes for $x=REV$ and $x=EXP$:

$$x_t^f - x_t^t \tag{4}$$

$$= \frac{1+g_{x,t}^t}{1+y_t^t} \left(x_{t-1}^f - x_{t-1}^t \right) \qquad \text{base effect}$$

$$+ \frac{x_{t-1}^f}{\left(1+y_t^f\right)\left(1+y_t^t\right)} \left(g_{x,t}^f - g_{x,t}^t \right) \qquad \text{growth effect}$$

$$- \frac{x_{t-1}^f}{\left(1+y_t^f\right)\left(1+y_t^t\right)} \left(y_t^f - y_t^t \right) \qquad \text{denominator effect}$$

$$+ \frac{x_{t-1}^f}{\left(1+y_t^f\right)\left(1+y_t^t\right)} \left(g_{x,t}^f y_t^t - g_{x,t}^t y_t^f \right) \qquad \text{residual effect,}$$

while the corresponding effects for $x=BAL$ again follow by subtracting the decomposition for spending from that for revenues.

In the following, we will compare the implementation and revision errors and their constituent components. However, we are also interested in the *total ex-post error* which is defined as the difference between the ex-post outcome and the plan:

$$e(x)_t^{f,t-1} = \left(x_t^f - x_t^{t-1} \right) = e(x)_t^{t,t-1} + e(x)_t^{f,t} . \tag{5}$$

Hence, the total ex-post error is the sum of the implementation and the revision errors.[12]

---

[12] Notice that, whereas the total ex-post error equals the sum of the implementation and revision errors, this is not the case for the individual components of the decompositions. For instance, in the case of the base effect, it is easy to see that the base effects of the implementation and revision errors (respectively in equations (2) and (4)), have a different scaling factor (in general $\frac{1+g_{x,t}^{t-1}}{1+y_t^{t-1}} \neq \frac{1+g_{x,t}^t}{1+y_t^t}$). However, this difference is of second-order importance.

2.3 The data

Our planning and first-release data are from the EU SCPs submitted in the years 1998-2008. The SCPs are generally published in November or December. Therefore, the budgetary projections contained in those data should be close to the official budget. The advantage of using the SCPs is that they constitute a harmonised source of data on fiscal plans and outcomes in EU countries. Our ex-post figures are taken from the November 2010 AMECO dataset. Given that it may take up to four years to arrive at the "truly" final data (see Gordo and Nogueira Martins, 2007, and De Castro *et al.*, 2011), for the latest vintages of our SCP data we do not have the eventual outcomes, although they will likely be close to the final figures. Most of the data revision tends to be concentrated in the first two years after the first release. Indeed, De Castro *et al.* (2011) find very little change on average after these two years. Our sample covers Austria, Belgium, Denmark, Germany, Greece, Finland, France, Ireland, Italy, The Netherlands, Portugal, Spain, Sweden and the U.K. Only the U.K. has a fiscal year that differs from the calendar year. However, in November or December of each year the Chancellor of the Exchequer presents the 'Pre-Budget Report', which also contains an update of the public finances and proposed new tax measures. In the sequel, the "sample period" will always indicate the years to which the observations refer (i.e., subscript of a variable) as opposed to the vintages from which the data are taken (i.e., superscript of a variable). We also use data on political variables from Armingeon *et al.* (2010), supplemented by self-constructed figures for the year 2009, and on institutional indices from various sources. These are described below. Details on all the data are found in the Appendix A.

2.4 Outcomes of the decompositions

Figure 1 depicts planned budgets and first-release and ex-post budgetary outcomes for each country and each year in our sample. Clearly, both the implementation errors and the revision errors are often substantial. Moreover, there is no obvious visible difference in their average size. It may be instructive to comment on some specific cases. First, we see that in the case of Greece, in all but two years the first-release balance falls short of the planned balance, while the ex-post balance is always lower and sometimes substantially lower than the first-release balance. Secondly, we observe large negative spikes for Austria and Belgium in 2004 and 2005, respectively. The spike for Austria is the result of a 1.4 billion euro capital injection into the railway company and a 6.1 billion euro debt assumption of the railway company by

the state. Both transactions were reclassified afterwards by Eurostat as deficit-increasing measures. The spike for Belgium is related to a split-up of the Belgian National Railway Company, in which the company's debts were transferred to a separate entity. Eurostat held the view that this should be recorded as a 7.4 billion deficit-increasing capital transfer by the Belgian federal government. While both spikes may capture rather extreme shortfalls of ex-post from the first-release outcomes, we choose to keep them in our sample, because they are prima-facie examples of the sources of revision errors described above. In fact, leaving out these two observations for Austria and Belgium yields results that are qualitatively and quantitatively very similar to those obtained below.[13]

Before turning to the discussion of our error decomposition for the budget balance and its components, we explore first the corresponding errors in output growth, as those errors may be a driving force behind the errors in the budget balance. These errors are reported in Table 1 for nominal output, real output and the GDP deflator. Projections at the planning stage are overoptimistic relative to the first-release stage, but not relative to the eventual outcomes. The over-optimism relative to the first-release is larger for real output than for nominal output, because inflation is projected too low.

Table 2 shows the averages over all observations of the aforementioned decompositions of first-release minus planned budgetary figures (the implementation errors), ex-post minus first-release figures (the revision errors) and ex-post minus planned figures (total ex-post errors), respectively. While the focus of this paper is mostly on revision errors, it is instructive to present the other two decompositions as well. This enables us to compare the sizes of the implementation and revision errors. It also helps us in reconciling various results in the literature.

---

[13] De Castro *et al.* (2011, Section 2.2) mention examples of major revisions in EDP data. Their Table A.1 lists the Eurostat decisions leading to revision.

Figure 1: Planned, first-release and ex-post balances

Legend:
- Planned (blue)
- First-release (red)
- Ex-post (green)
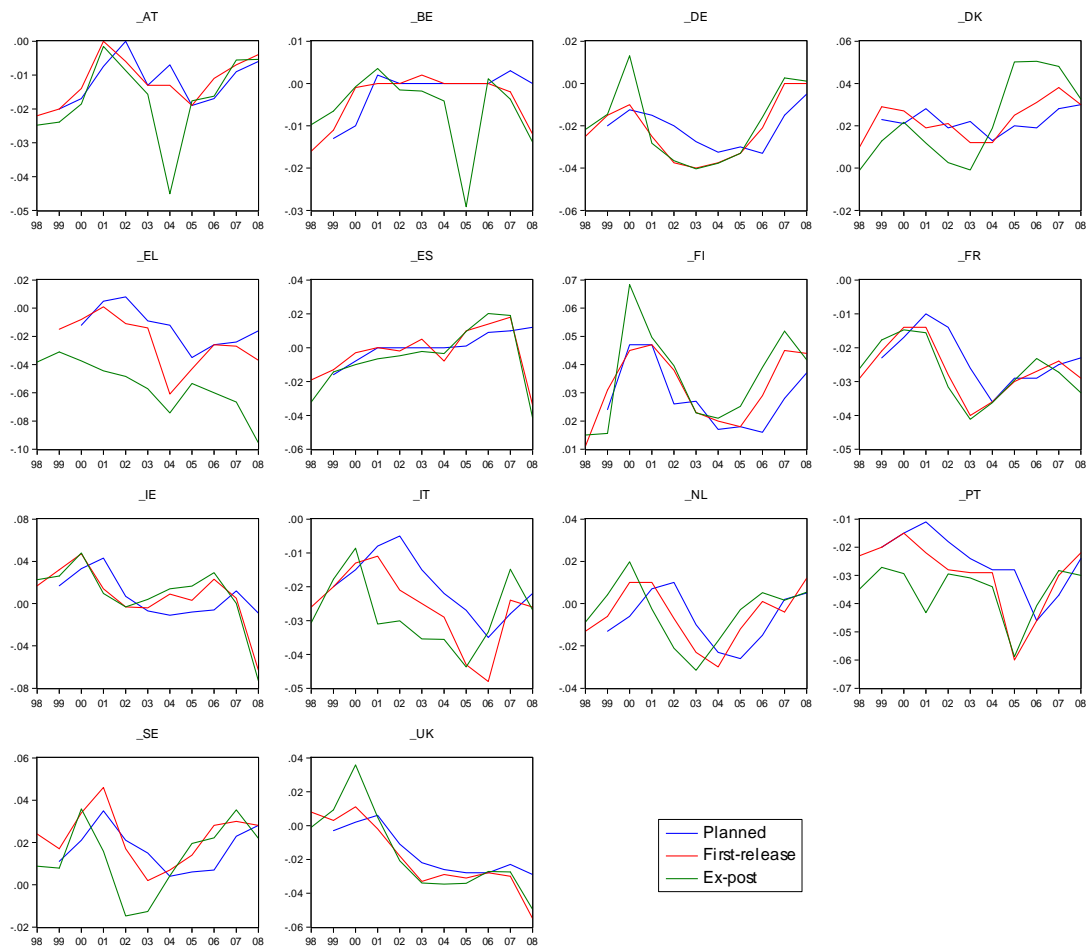
Table 1: Average forecast errors in GDP growth and the GDP deflator

	Nominal GDP	**Real GDP**	**GDP deflator**
First release minus forecast	-0.20* (0.12)	-0.32*** (0.09)	0.11* (0.06)
Ex post minus first release	0.26*** (0.09)	0.22*** (0.06)	0.03 (0.05)
Ex post minus forecast	0.06 (0.16)	-0.07 (0.13)	0.13* (0.08)

Notes: Forecast errors are expressed in percent. Standard errors (corrected for heteroskedasticity and serial correlation) are reported underneath. Further, * = significance at the 10% level; ** = significance at the 5% level; *** = significance at the 1% level. The sample period is 1999-2008, except for the ex-post minus first-release errors, in which case the sample period is 1998-2008.

Panel (A) of Table 2 reports the implementation errors and their decomposition into the four components. Not surprisingly, in view of earlier results from the literature, we see that the average implementation error in the balance is negative and significant, indicating a

systematic over-optimism in budgetary plans relative to their first-release outcomes. We observe a significantly positive base effect and a significantly negative growth effect, while the denominator effect is essentially zero. Splitting the implementation error in the balance into implementation errors for revenues and expenditures, we see that the expenditure side essentially explains the first-release errors, although its error is not statistically significant. Splitting each of the errors in revenues and expenditures further into their four components, we see that the implementation error in the balance is primarily driven by the growth effect in spending, because the base effects in spending and revenues partly cancel, while the denominator effects in spending and revenues caused by overoptimistic output projections relative to the first release fully cancel. The growth effect in spending is caused by planned spending falling short of its first-release outcome.

Turning to the revision errors reported in Panel (B) of Table 2, we see that they are on average negative. While plans are too optimistic relative to the first-release outcomes, the latter in turn are too optimistic relative to the ex-post outcomes. This is in line with our discussion that Ministries of Finance may have an incentive to depict their budgetary achievements too positively in real time (recall Section 2.1). The revision error is largely driven by a negative update on the previous period's balance (the base effect). A split into revision errors on the revenues and expenditure sides shows that most of the action is now on the revenues side. This is mostly likely explained by the fact that our data are on an accrual, rather than cash, basis. This implies that there is room for deliberate over-optimism about revenues at the first-release stage. In addition the margin for the strategic use of revenue projections may be enhanced because revenue developments are endogenous to the economic cycle and depend on seasonal patterns. Indeed, first-release revenue figures overestimate the eventual outcomes by 0.60% of GDP on average. This effect is driven by a substantial negative base effect of almost three-quarters of a percent of GDP on average and a denominator effect due to the pessimism about output growth at the first-release stage, which are partially compensated for by a growth effect in revenues. Not surprisingly, because the revenues and expenditure shares in GDP are of comparable magnitude, the denominator effect in revenues is wiped out by an equally-sized denominator effect in expenditure, thereby producing a total denominator effect of roughly zero in the balance. Finally, the growth effect in revenues dominates the growth effect in expenditures, but by not nearly enough to offset the difference in the base effects. The negative base effect for both revenue and expenditure is consistent with the systematic upward revisions in GDP that occurred in 2005 (while the effects of this GDP revision, via the base effects in revenues and expenditures, on the balance

almost fully cancel out). This revision covered all countries in our sample and was applied backwards to even beyond the start of our sample period.[14]

Panel (C) of Table 2 reports the total ex-post error as the difference between the ex-post and planned figures. It is the sum of the implementation and revision error and equals 0.5% of GDP on average. This sum is largely driven by the total ex-post error in revenues, a finding that may explain why Von Hagen (2010) attributes fiscal slippages to the revenue side. Again we can split the error into its four components. In contrast to the error, one can show that these components are generally not exactly equal to the sum of the corresponding components of the implementation and revision errors, although the deviations from the sum are very small under realistic settings (see Footnote 12). Base effects dominate the total ex-post error, while growth effects play the second-largest role. Finally, the denominator effect is essentially negligible for both revenues and expenditures, which is in line with the finding that actual GDP growth in the ex-post data does not significantly differ from projected GDP growth.

Table A.1 in Appendix B (not for publication) repeats all the decompositions when Greece is excluded. Qualitatively the findings are the same as before, although the magnitudes of the averages tend to be smaller. Table A.2 in Appendix B takes account of systematic differences in the variances of the implementation and revision errors between the countries and is based on Generalised Least Square (GLS) regressions of all observations on a constant. The resulting figures are qualitatively and quantitatively essentially the same as before and will not be commented on any further.

Panel (A) of Figure 2 depicts the average revision errors in the budget balance over the countries for each year in the sample. In seven out of the eleven years the average revision error is negative. Moreover, the negative averages tend to be much larger in absolute value than the positive averages. Next, Panel (B) of Figure 2 splits the revision errors into their four constituent effects, which are also averages across the countries. The denominator and residual effects are always (virtually) negligible and, hence, the revision errors are always the sum of a base effect and a growth effect. Remarkably, in each of our sample years the average base effect is negative and in a number of years it substantially dominates the growth effect.

---

[14] See http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/NATIONAL_2005/EN/NATIONAL_2005-EN.PDF. This level increase varies across Member States and years, but ranges between roughly 0.5% and 2.0%. Hence, if the revenue and expenditure ratios were 50% of GDP, the effect on these ratios would roughly be between 0.25 and 1.0 percentage points of GDP. No systematic effect on GDP growth rates is observed.

Table 2. Decomposition of errors in the budget and its components

	TE	BE	GE	DE	RE
(A) Implementation errors (based on first release minus plans)					
BAL	-0.17*	0.10*	-0.25***	-0.00	-0.01**
	(0.10)	(0.06)	(0.08)	(0.00)	(0.01)
REV	0.02	-0.05	-0.04	0.11**	0.00
	(0.12)	(0.11)	(0.08)	(0.05)	(0.00)
EXP	0.19	-0.15	0.21***	0.11**	0.02***
	(0.12)	(0.11)	(0.05)	(0.05)	(0.004)
PEXP	0.25**	-0.10	0.22***	0.11**	0.02***
	(0.13)	(0.10)	(0.05)	(0.05)	(0.00)
(B) Revision errors (based on ex post minus first release)					
	TE	BE	GE	DE	RE
BAL	-0.34***	-0.42***	0.07	0.00	-0.00
	(0.11)	(0.08)	(0.08)	(0.00)	(0.00)
REV	-0.60***	-0.74***	0.22***	-0.10***	0.01
	(0.18)	(0.16)	(0.06)	(0.03)	(0.00)
EXP	-0.26	-0.32**	0.14*	-0.10***	0.01
	(0.16)	(0.15)	(0.08)	(0.03)	(0.00)
PEXP	-0.05	-0.15	0.18**	-0.09***	0.01
	(0.15)	(0.14)	(0.07)	(0.03)	(0.00)
(C) Total ex-post errors (based on ex-post minus plans)					
	TE	BE	GE	DE	RE
BAL	-0.50***	-0.32***	-0.17	-0.00	-0.01*
	(0.17)	(0.11)	(0.13)	(0.00)	(0.01)
REV	-0.59***	-0.79***	0.19*	-0.01	0.01
	(0.21)	(0.19)	(0.10)	(0.06)	(0.00)
EXP	-0.09	-0.48***	0.36***	-0.00	0.02***
	(0.18)	(0.16)	(0.09)	(0.06)	(0.01)
PEXP	0.13	-0.29*	0.39***	-0.00	0.02***
	(0.18)	(0.16)	(0.09)	(0.06)	(0.01)

Notes: Mean forecast errors and sources of budgetary slippage are expressed in percent of GDP; standard errors (corrected for heteroskedasticity and serial correlation) are reported underneath. Further, * = significance at the 10% level; ** = significance at the 5% level; *** = significance at the 1% level. Abbreviations: *BAL* = Budget balance/GDP; *REV* = Revenue/GDP; *EXP* = Expenditure/GDP; *PEXP* = primary expenditure/GDP. TE = total error, BE = base effect, GE = growth effect, DE = denominator effect, RE = residual effect, all in percent of GDP. The sample period is 1999-2008 for Panels (A) and (C), and 1998-2008 for Panel (B).

Figure 2: Average revision errors in the budget balance across countries

A. Revision errors across countries for each year
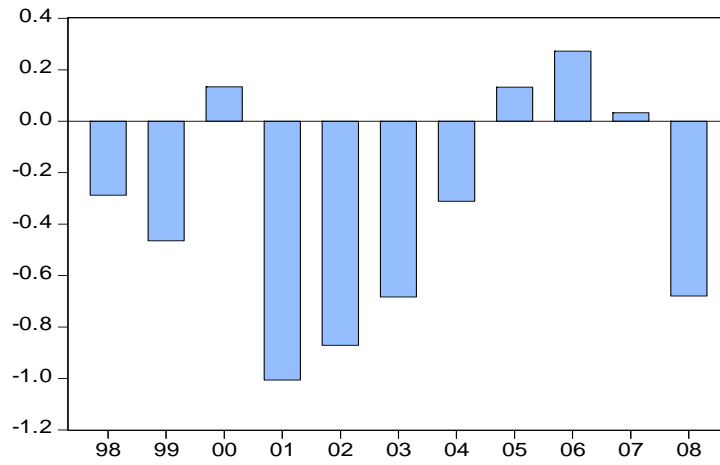
B. Individual effects across countries for each year

Base Effect
Growth Effect
Denominator Effect
Residual Effect
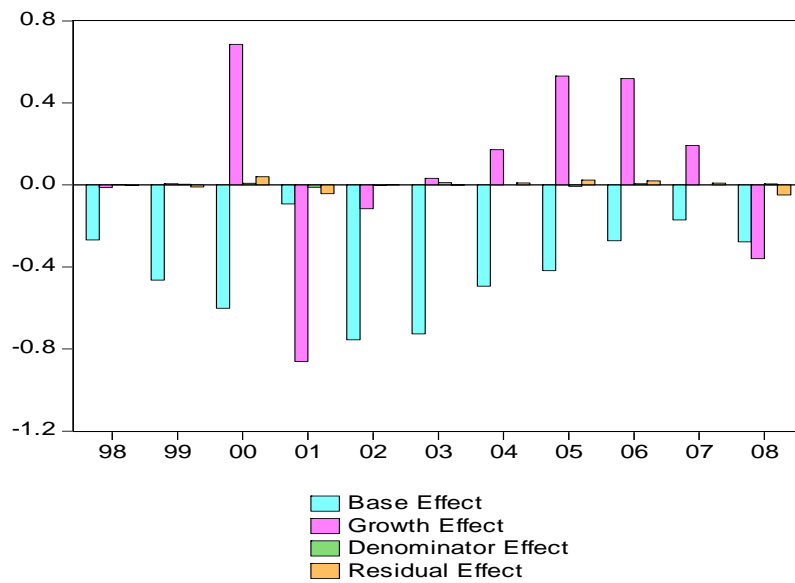
3.   Explaining the revision error and its main components

The analysis in the previous section clearly showed that the first-release budget balance BAL_t^t is a biased forecast of the ex-post outcome BAL_t^f. It is of interest to investigate the determinants of the revision error $\left(BAL_t^f - BAL_t^t\right)$, because this may provide directions for institutional or policy adjustments that improve the quality of first-release data as input for the new budget and for regular budgetary surveillance. In this section we explore those determinants, paying particular attention to the role of economic, political and institutional

factors. Of the components of the revision error we also analyse the base effect and the growth effect $\left(g_{REV,t}^{f} - g_{REV,t}^{t} \right) - \left(g_{EXP,t}^{f} - g_{EXP,t}^{t} \right)$, while controlling for the base effect.[15] However, we do not analyse the denominator effect for the balance, because it is always close to zero due to approximate cancellation of the denominator effects in revenues and expenditures. We also do not analyse the residual effect, because it is only of second order.

3.1.   Analysis of the revision error

A potentially important economic variable determining $\left(BAL_t^{f} - BAL_t^{t} \right)$ is the implementation error $\left(BAL_t^{t} - BAL_t^{t-1} \right)$. The analysis in the previous section suggested that planned balances are on average too optimistic relative to the first-release outcomes, which in turn are on average too optimistic relative to the ex-post outcomes. An increase in BAL_t^{t} raises the implementation error and reduces the revision error. Hence, we would expect the implementation error to enter with a negative sign in the regression for the revision error. However, we shall include the variables BAL_t^{t-1} and BAL_t^{t} separately, in order to allow for additional flexibility in our specification. Our specification for the revision error in the budget also includes the revision error in real growth $GROWTH_t^{f,t} \equiv \left(yr_t^{f} - yr_t^{t} \right)$, where yr denotes real output growth. We would expect that a pessimistic real growth figure at the first-release stage translates into a pessimistic figure about the budget balance at this stage. Hence, we expect a positive relationship between error in the budget balance and that in the real-growth rate output.

We consider also political variables to capture the effect of potential political distortions on the budget revision error. A major type of political distortion concerns "size fragmentation", which leads to common pool problems and hampers the correction of fiscal excesses. Each fraction of the government wants to increase spending on its own preferred cause, but only partially internalises the cost in terms of higher taxes. This possibility to shift the costs of targeted spending onto the general tax payer creates an incentive for overspending, formally illustrated in, for example, Von Hagen and Harden (1994). The original formulation of the common pool problem (Shepsle and Weingast, 1981) features a spending bias, but not necessarily a deficit bias. Subsequent work has also shown how higher

---

[15] We neglect the scalars in front of these effects – see equation (4). In fact, including them, we find very similar results.

deficits can be the outcome of common pool problems, for example, because they give rise to a voracity effect through which positive output shocks result in more than proportionate redistribution (Tornell and Lane, 1999, and Lane, 2003) or wars of attrition (Alesina and Drazen, 1991). Von Hagen (2006) provides a recent overview of the relevant literature. There is no obvious direction in which we can expect more fragmentation to affect the revision error. More fragmentation may lead to stronger pressures for budgetary optimism in order to depict a situation justifying more spending in the coming budget. However, the Finance Ministry, being the producer of the first-release figures, may try to ward off claims for more spending by depicting unduly gloomy figures. As a measure of size fragmentation we use the variable $GOVTYPE_t$, which is an index running from 1 (a single party majority government) to 6 (a temporary caretaker government).

A second major type of political distortion is the result of "time fragmentation". More frequent changes in government, which shorten the expected tenure of governments, and a larger degree of political polarisation cause more political instability and effectively raise the rate at which governments discount the future. As a result, they internalise to a lesser extent the (reputational) consequences of ex-post deviations of budgetary figures from the first-release figures. In other words, with more "time fragmentation" governments may perceive more leeway to be too optimistic at the first-release stage. Ideally on the basis of these arguments, we should include a measure of the *expected* government turnover in period t. However, since we do not have such a measure we try to capture time fragmentation with the variable $GOVCHAN_t$, which measures the number of government changes in year t.

One reason for potential over-optimism at the first-release stage is that ahead of an election the government may want to signal its competence at handling the economy (see also Rogoff, 1990). To capture this effect we include an election dummy $ELECT_{t+1}$, which is one when there is a general election in period $t+1$ and zero otherwise.[16] However, we will also test whether the contemporaneous election dummy $ELECT_t$ has any effect.

It is also conceivable that revision errors differ with the political colour of the government. We measure this aspect through the variable $GOVPARTY_t$, which is an index on the political colour of the cabinet running from 1 (hegemony of right-wing parties) to 5 (hegemony of left-wing parties). Another measure is $GOVGAP_t$, which is the ideological gap between new and old cabinet.

---

[16] For refinement in the construction of electoral variables, see for example Mink and de Haan (2005).

We capture the role of institutions with a variety of indices. The "fiscal rules index" (FRI_t) taken from the European Commission measures the presence and strength of numerical fiscal rules. Earlier versions of FRI_t have been used by Debrun *et al.* (2008), for example. The higher the value of FRI_t, the tighter are fiscal rules. A second index is that for a medium-term budgetary framework ($MTBF_t$). This index captures the procedures for the preparation, execution and monitoring of multi-annual budget plans. This index should be distinguished from that for fiscal rules, which sets numerical targets for important budgetary aggregates. We use two indices to capture fiscal transparency. The first transparency index TR_BW_t is the index "Audit" taken from Bernoth and Wolf (2008). This index is based on whether governments are externally audited for their finances, the degree of independence of the auditing and the extent to which the obtained information is disseminated. The second index TR_HSH_t is from Hallerberg *et al.* (2005) and measures the information content of the draft budget. To facilitate the comparison of the sizes of the effects, we normalise all the indices on a zero-one scale. That is, we assign a value of zero to the minimum value in the sample and a value of one to the maximum value in the sample and proportionally rescale all the other observations. Table 3 reports the average values of the various (normalised) indices on a country-by-country basis. Notice that Greece always produces a relatively weak score.[17] It is important to have Greece in our sample, because it adds variation to the quality of our institutional indices, thereby increasing the scope for finding evidence of a systematic link between institutional quality and the size of revision errors.

Table 3: Average normalised values of the institutional indices

	FRI	*MTBF*	*TR_BW*	*TR_HSH*
Austria	0.37	1.00	0.96	0.53
Belgium	0.47	0.83	0.87	0.53
Germany	0.63	0.83	0.64	0.72
Denmark	0.82	1.00	0.83	0.49
Greece	0.00	0.00	0.00	0.38
Spain	0.61	1.00	0.40	0.62
Finland	0.70	1.00	0.89	0.91
France	0.41	1.00	0.77	0.87
Ireland	0.09	0.17	0.91	0.62
Italy	0.34	0.83	0.66	0.28
Netherlands	0.81	1.00	0.79	1.00
Portugal	0.07	0.00	0.72	0.00
Sweden	0.75	1.00	1.00	0.72
United Kingdom	1.00	0.83	0.62	0.62

---

[17] Results based on the use of TR_BW_t should be interpreted with some care, because Bernoth and Wolf (2008) apply a score of zero for missing answers for Greece in the construction of their index. Obviously, the fact that some answers are missing may in itself be interpreted as a signal of a lack of transparency.

Table 4 presents our panel estimation results for the revision error. The baseline specification in Column (1) includes both country-fixed effects and time-fixed effects. The time effects are highly significant. They capture in particular common (across the countries) economic sources of revisions, for example as a result of unforeseen European-wide movements in the business cycle, and common methodological changes in the construction of the figures.[18] Of the economic variables only the lagged dependent variable is (highly) significant. Its significance may not be too surprising, because revisions of the budget balance reported in the same data vintage have a tendency to move into the same direction. Indeed the correlation between BAL_t^f and BAL_{t-1}^f is 0.82. The other variables, the planned balance BAL_t^{t-1}, its first release BAL_t^t and the real growth revision error $GROWTH_t^{f,t}$, have the expected sign but are insignificant. Replacing BAL_t^t and BAL_t^{t-1} with their difference $\left(BAL_t^t - BAL_t^{t-1}\right)$ yields the expected negative, though insignificant, coefficient and, hence, this regression is not reported. The sign on the real growth revision is in accordance with our prior that it would exert a positive effect on $\left(BAL_t^f - BAL_t^t\right)$. Further, none of our political variables (the election dummy $ELECT_t$, the index of the government type $GOVTYPE_t$ and the political colour variable $GOVPARTY_t$) is significant. These variables were selected to capture the various sources of political distortions potentially affecting revision errors.

Because of the potential feedback effect from the budget balance onto economic growth in Column (2) we instrument the real growth revision error with the average real growth revision error across the other countries in the sample and the lagged real growth rate. The results remain unchanged and, hence, in the remainder of Table 4 we proceed without using instrumental variables. To take account of the potentially systematic differences in the variances of the revision errors across the countries in our sample, we also estimated our baseline regression using generalised least squares. The results were unaffected, however.

Column (3) estimates the baseline specification excluding Greece. We investigate this case, because Figure 1 revealed Greece as the clearest example of persistent over-optimism at the first-release stage. However, the results are essentially unchanged. Only the growth revision error now becomes significant at the 10% level.

One may be surprised by the absence of a significant effect of the real growth revision error. However, revision errors in individual countries' growth rates are positively correlated.

---

[18] See also Table 7 in De Castro *et al.* (2011), who explore the role of Eurostat's methodological decisions explicitly.

Hence, by including time effects the potential role of the growth revision in the regression is reduced. Therefore, Column (4) excludes the time effects and the individual growth revision, while it includes both the weighted (by the respective country's GDP level) average growth revision error $\overline{GROWTH}_t^{f,t}$ and the deviation of the individual revision error from its average. The average revision error enters with a positive and significant coefficient. Moreover, its magnitude is quite large: a positive growth revision error by one percentage point leads to a positive revision of the budget balance by half a percent of GDP. The remainder of Table 4 reintroduces the time effects, in order to account for all common factors determining budget revision errors in a given period.

We also estimated a number of other variants on the baseline for which we do not explicitly report the results. First, we experimented by including a dummy variable that took a value of one (zero) when the current first-release deficit was higher (lower) than 3%, the motivation being that governments might try to limit the chances of entering the EDP by limiting the degree to which their first-release deficit violates the 3% limit. Similarly, we tried a dummy that took a value of unity when the current first-release deficit was between 2 and 3% of GDP, because in order to avoid the EDP governments might try to "push" their first-release balance to just below 3%. Both dummies were insignificant, suggesting little if any role for the European level fiscal restrictions at the point where they become binding. Second, we replaced the real growth revision error by including both the nominal growth revision error and the revision error in the GDP deflator. This specification is slightly more flexible. However, the results are unchanged. We also replaced the contemporaneous electoral dummy with the one-period ahead dummy $ELECT_{t+1}$, the idea being that ahead of elections the government may have an incentive to be over optimistic. However, $ELECT_{t+1}$ turned out to be insignificant, while the other coefficient estimates were unchanged. Of course, not all elections can be foreseen and $ELECT_{t+1}$ may be an imperfect measure of the electoral pressure at the moment that the first release data become available. However, we are not able to indicate in the data which elections were unforeseen, while it seems rather unlikely that such a correction would imply a turnaround of the results. Finally, we also explored the relevance of other political variables. In particular, replacing $ELECT_t$ with $GOVCHAN_t$ or $GOVCHAN_{t+1}$ or replacing $GOVPARTY_t$ with $GOVGAP_t$ yields coefficient estimates for these variables that are far from significant.

Column (5) drops the country-fixed effects. As a result, compared with our baseline in Column (1), the coefficient on our lagged dependent variable more than doubles to 0.60 or more and the first-release of the balance becomes significantly negative. The coefficient on

the planned balance increases in size, but remains insignificant. The other coefficient estimates remain rather far from significance. In Columns (6) – (9) we include one by one our institutional indices into the regression. Because these variables are either completely time invariant or they change relatively little over time, we proceed without the country-fixed effects. Compared with Column (5) the coefficients on the other variables remain essentially unchanged, although the significance of the first-release of the balance tends to strengthen somewhat.

We would be reluctant to draw strong conclusions about the precise direction in which fiscal frameworks need to be revised when we find that one or more institutional indicators are significant. In fact, our institutional indicators are merely proxies intended to capture certain aspects of national fiscal arrangements. Nevertheless, if we find that all or most of our indicators enter with a significantly positive coefficient, this would be a clear indication that an increase in institutional quality in its various dimensions is conducive to improving the usefulness of first-release budget figures for surveillance and budgeting purposes. After all, as we have seen, compared with the ex-post figures, first-release budget outcomes tend be over-optimistic. Hence, institutional improvements that reduce the degree of over optimism will be beneficial in this regard. Indeed, we see that all our institutional indicators are estimated with positive coefficients and three out of the four coefficients are significant. Only TRA_HSH_t is insignificant. The results suggest that the effects of an institutional improvement are also quantitatively important. For example, an improvement in the fiscal rules index from its minimum to its maximum in-sample value reduces the average degree of optimism in the first-release relative to the ex-post balance outcome by roughly 1% of GDP.[19]

Of course, the country-fixed effects include all country-specific time-invariant factors affecting the revision errors. Institutional quality along some specific dimension may be only one of them. Hence, an alternative approach is to keep the country-fixed effects in the specification, but to run a regression of the estimates of these fixed effects on our institutional indices. Table A.3 in Appendix B (not for publication) reports the results. Again all indices, except for TRA_HSH_t enter with a positive and significant coefficient.

These findings shed some light on some of the conjectures we posed earlier. The outcomes are in line with the hypothesis that more transparency limits the scope for creative accounting at the first-release stage and, hence, that it limits over-optimism at this stage. They

---

[19] In fact, if we drop Greece from our sample, the fiscal rules index remains highly significant.

are also consistent with the hypothesis that tighter self-imposed national fiscal rules produce smaller revision biases in absolute terms.

Table 4: Determinants of the revision error in the budget balance

	Dependent variable: $BAL_t^f - BAL_t^t$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$BAL_{t-1}^f - BAL_{t-1}^{t-1}$	0.30***	0.30***	0.24**	0.29***	0.69***	0.60***	0.64***	0.60***	0.67***
	(0.11)	(0.11)	(0.12)	(0.11)	(0.10)	(0.099)	(0.097)	(0.095)	(0.11)
BAL_t^{t-1}	0.088	0.087	-0.056	-0.14	0.17	0.13	0.19	0.18	0.16
	(0.15)	(0.15)	(0.14)	(0.12)	(0.12)	(0.12)	(0.12)	(0.11)	(0.12)
BAL_t^t	-0.12	-0.12	-0.03	-0.02	-0.16*	-0.18*	-0.19**	-0.19**	-0.17*
	(0.086)	(0.087)	(0.084)	(0.085)	(0.092)	(0.090)	(0.092)	(0.087)	(0.093)
$GROWTH_t^{f,t}$	0.15	0.10	0.21*		0.18	0.21	0.17	0.15	0.17
	(0.13)	(0.17)	(0.13)		(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
$GROWTH_t^{f,t} - \overline{GROWTH}_t^{f,t}$				0.09					
				(0.13)					
$\overline{GROWTH}_t^{f,t}$				0.50**					
				(0.25)					
$ELECT_t$	-0.13	-0.13	-0.14	-0.09	-0.25	-0.26	-0.26	-0.25	-0.24
	(0.19)	(0.19)	(0.19)	(0.19)	(0.21)	(0.20)	(0.20)	(0.20)	(0.21)
$GOVPARTY_t$	-0.056	-0.052	-0.066	-0.053	-0.012	-0.089	-0.026	0.0032	-0.013
	(0.067)	(0.067)	(0.067)	(0.068)	(0.053)	(0.058)	(0.052)	(0.052)	(0.053)
$GOVTYPE_t$	0.0044	-0.0055	0.059	0.008	0.11	0.097	0.052	0.042	0.11
	(0.12)	(0.12)	(0.12)	(0.11)	(0.086)	(0.081)	(0.085)	(0.085)	(0.086)
FRI_t						1.04***			
						(0.31)			
$MTBF_t$							0.67**		
							(0.26)		
TRA_BW_t								1.32***	
								(0.49)	
TRA_HSH_t									0.45
									(0.29)
Country-fixed effects	YES	YES	YES	YES	NO	NO	NO	NO	NO
Time-fixed effects	YES	YES	YES	NO	YES	YES	YES	YES	YES
Estimation method	OLS	IV	OLS	OLS	OLS	OLS	OLS	OLS	OLS
R^2-adjusted	0.53	0.53	0.23	0.48	0.43	0.46	0.45	0.47	0.43
DW	2.06	2.04	2.09	2.12	2.25	2.20	2.23	2.18	2.21
Sample period ($t = \ldots$)	1999-2008	1999-2008	1999-2008	1999-2008	1999-2008	1999-2008	1999-2008	1999-2008	1999-2008
Country sample	Full	Full	Greece excluded	Full	Full	Full	Full	Full	Full
N	139	139	130	139	139	139	139	139	139

Notes: Estimation as a panel. Standard errors are corrected for heteroskedasticity and serial correlation. Variables referring to the budget balance are in percent of GDP. Further, * = significance at the 10% level; ** = significance at the 5% level; *** = significance at the 1% level; N = number of observations. In Column (2), the real growth revision error $GROWTH_t^{f,t}$ is instrumented with the average real growth revision error across the other countries in the sample and the lagged real growth rate.

3.2. Analysis of the base effect

We saw earlier that the base effect $\left(BAL_{t-1}^{f} - BAL_{t-1}^{t} \right)$ tends to be the most important component of the budget revision error. Therefore, we now explore the determinants of this base effect. Column (1) of Table 5 reports the results for the baseline specification of this regression. The lagged base effect $\left(BAL_{t-2}^{f} - BAL_{t-2}^{t-1} \right)$ enters with a significant and positive coefficient. Given the positive correlation of the business cycle in subsequent years, data revisions tend to push BAL_{t-1}^{f} and BAL_{t-2}^{f} into the same direction. The revision of the previous balance BAL_{t-1}^{t} enters with a significant and negative coefficient. In fact, if we were to reparametrise the regression equation by adding BAL_{t-1}^{t} to both sides of the equation, then this latter variable would enter with a coefficient of 0.89, which is significantly different from unity, implying a rejection (at the 5% level) of the hypothesis that the first revision BAL_{t-1}^{t} is an unbiased predictor of the ex-post balance. Again, the political variables do not play any role. This would also be the case if we replace the current electoral dummy $ELECT_{t}$ with $ELECT_{t+1}$ (not reported in Table 5).[20]

Column (2) drops the country-fixed effects. The coefficient on the lagged base effect and its significance increase substantially. However, the coefficient on the first revision BAL_{t-1}^{t} shrinks and loses its significance. Otherwise, the estimates remain essentially unchanged. Columns (3) – (6) of Table 5 include our institutional indices one by one in regressions without the country-fixed effects. All indices enter with a positive and significant coefficient, suggesting that better institutions tend to reduce BAL_{t-1}^{t} relative to BAL_{t-1}^{f}, thereby making the revision error on average less negative. Again, we also regress the fixed effects of the baseline regression in Column (1) on our institutional indices with qualitatively the same results – see Table A.3 in the Appendix B (not for publication).

---

[20] Note that this regression does not include the real growth revision error $GROWTH_{t}^{f,t}$, as this revision error refers to period t, while the base effect refers to period t-1. Indeed, $GROWTH_{t}^{f,t}$ would be insignificant in the regression for the base effect.

Table 5: Determinants of the base effect

	Dependent variable: $BAL_{t-1}^f - BAL_{t-1}^t$					
	(1)	(2)	(3)	(4)	(5)	(6)
$BAL_{t-2}^f - BAL_{t-2}^{t-1}$	0.19*	0.52***	0.47***	0.48***	0.47***	0.49***
	(0.11)	(0.11)	(0.10)	(0.10)	(0.10)	(0.11)
BAL_{t-1}^t	-0.11*	-0.022	-0.063*	-0.034	-0.056*	-0.048
	(0.063)	(0.030)	(0.032)	(0.029)	(0.030)	(0.031)
$ELECT_t$	0.21	0.16	0.16	0.15	0.17	0.17
	(0.15)	(0.17)	(0.16)	(0.16)	(0.16)	(0.17)
$GOVPARTY_t$	-0.039	-0.019	-0.078	-0.029	-0.008	-0.020
	(0.058)	(0.046)	(0.049)	(0.046)	(0.046)	(0.046)
$GOVTYPE_t$	-0.022	0.031	0.016	-0.007	-0.000	0.041
	(0.089)	(0.062)	(0.060)	(0.062)	(0.062)	(0.063)
FRI_t			0.81***			
			(0.27)			
$MTBF_t$				0.47**		
				(0.23)		
TRA_BW_t					0.91**	
					(0.45)	
TRA_HSH_t						0.59**
						(0.24)
Country-fixed effects	YES	NO	NO	NO	NO	NO
Time-fixed effects	YES	YES	YES	YES	YES	YES
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS
R^2-adjusted	0.38	0.24	0.28	0.26	0.27	0.25
DW	2.12	2.30	2.26	2.28	2.25	2.25
Sample period (t-1 = …)	1999-2008	1999-2008	1999-2008	1999-2008	1999-2008	1999-2008
N	139	139	139	139	139	139

Notes: See Table 4.

3.3. Analysis of the growth effect

Column (1) of Table 6 reports the results of our baseline regression for the growth effect, which is the other main determinant of the revision error. Neither the revision error of the output growth figure, nor any of the political variables is significant. Only the base effect $\left(BAL_{t-1}^f - BAL_{t-1}^t \right)$ turns out to be significant. It exerts a negative effect on the growth effect in the balance. The intuition is as follows. Consider for instance the revenues side. A fall of REV_{t-1}^f relative to REV_{t-1}^t means that revenues growth between *t-1* and *t* has to revised upwards in order to account for a given revision error in revenues. The reasoning is analogous for spending. We have also run a regression in which we added the planned balance BAL_t^{t-1}. However, also this variable turned out to be far from significant, while the other estimates remained unchanged.

In Column (2) we instrument the output growth surprise. However, the results are unaltered. Hence, we proceed without using instrumental variables. In Column (3) we exclude the time effects and include as explanatory variables the cross-country weighted average revision error in output growth and the deviation of the individual country revision error from this average. The average revision error is positive and highly significant. Moreover, it is large in magnitude. A one-percentage point increase in the average revision error in output growth raises the growth effect in the budget balance by 1.25 percentage points. Column (4) drops the country-fixed effects. The base effect loses its significance, while the type of government $GOVTYPE_t$ now enters with a positive and significant coefficient, suggesting that a more fractionalised government with a smaller majority leads to a larger growth effect in the balance revision error, thereby contributing to more over optimism about the balance at the first-release stage.

Columns (5) – (8) add one-by-one our institutional indices to the regression in Column (4). The size of the coefficient of the base effect increases in absolute value and is significant in three of the four cases. However, it always remains less than half the size of the coefficient in the baseline regression in Column (1). Variable $GOVTYPE_t$ loses its significance again, while $ELECT_t$ becomes significantly negative in one instance, a result for which we do not have an obvious interpretation. The other estimates are essentially unaffected. Each of the four institutional indices enters with a positive and significant coefficient, indicating that an increase in institutional quality raises the growth effect in revenues relative to that in expenditures. Better institutional quality reduces over-optimism in the first-release figures, thereby reducing REV_t^t or raising EXP_t^t. This produces an increase in the growth effect $\left(g_{REV,t}^f - g_{REV,t}^t \right) - \left(g_{EXP,t}^f - g_{EXP,t}^t \right)$, thereby reducing the revision error in absolute terms. These results are essentially confirmed if we run a regression of the estimated fixed effects from our baseline specification on our institutional indices (see Table A.3 of Appendix B – not for publication). All indices come out with a positive coefficient, which is significant in all instances except for TRA_HSH_t. However, the coefficient on this variable is close to 10% significance.

	Dependent variable: $\left(g_{REV,t}^f - g_{REV,t}^t\right) - \left(g_{EXP,t}^f - g_{EXP,t}^t\right)$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$BAL_{t-1}^f - BAL_{t-1}^t$	-1.17*** (0.28)	-1.18*** (0.28)	-1.15*** (0.27)	-0.28 (0.27)	-0.49** (0.25)	-0.43* (0.25)	-0.51** (0.23)	-0.35 (0.28)
$GROWTH_t^{f,t}$	0.014 (0.28)	-0.11 (0.42)		0.30 (0.32)	0.30 (0.31)	0.23 (0.31)	0.15 (0.28)	0.25 (0.32)
$GROWTH_t^{f,t} - \overline{GROWTH}_t^{f,t}$			-0.01 (0.29)					
$\overline{GROWTH}_t^{f,t}$			1.25** (0.48)					
$ELECT_t$	-0.45 (0.39)	-0.44 (0.39)	-0.46 (0.40)	-0.65 (0.44)	-0.69* (0.41)	-0.64 (0.42)	-0.59 (0.41)	-0.62 (0.43)
$GOVPARTY_t$	0.010 (0.14)	0.018 (0.14)	-0.059 (0.14)	0.041 (0.12)	-0.13 (0.12)	0.011 (0.12)	0.076 (0.12)	0.039 (0.12)
$GOVTYPE_t$	-0.25 (0.23)	-0.27 (0.23)	-0.39 (0.25)	0.28* (0.15)	0.10 (0.15)	0.10 (0.16)	0.028 (0.16)	0.24 (0.15)
FRI_t					2.40*** (0.70)			
$MTBF_t$						1.58** (0.61)		
TRA_BW_t							3.16*** (0.94)	
TRA_HSH_t								1.27** (0.60)
Country-fixed effects	YES	YES	YES	NO	NO	NO	NO	NO
Time-fixed effects	YES	YES	NO	YES	YES	YES	YES	YES
Estimation method	OLS	IV	OLS	OLS	OLS	OLS	OLS	OLS
R^2-adjusted	0.32	0.31	0.21	0.15	0.22	0.19	0.23	0.16
DW	2.06	2.04	2.05	2.06	2.11	2.06	2.09	2.04
Sample period ($t = …$)	1998-2008	1998-2008	1998-2008	1998-2008	1998-2008	1998-2008	1998-2008	1998-2008
N	145	145	145	145	145	145	145	145

Notes: See Table 4.

4. Conclusions

There is a growing literature exploring the presence of biases in fiscal plans relative to the fiscal outcomes. However, there has so far been relatively little attention to the potential biases in the first-release fiscal figures as predictors of the ex-post figures and the determinants of these biases. The quality of the first-release figures is important, because these figures are an input for the next budget. Moreover, fiscal surveillance is based on these figures. For example, they may provide an indication that fiscal policy is on an unsustainable course and, hence, enable policymakers to undertake timely corrective action.

The ex-post outcomes are the final figures and the most accurate measure of the balance, because they are based on the largest information set. They are also the most

unbiased measure, because their production is removed furthest from the political process. Deviations of ex-post from first-release fiscal figures may arise for political and strategic reasons. In this paper we have presented a decomposition of these deviations into their various components, the base effect, the growth effect, the denominator effect and, finally, a residual effect. Exploration of the determinants of these individual components may provide us with leads for our analysis of the factors that determine the overall deviations of ex-post from first-release fiscal figures. In turn, this may guide the search for institutional adjustments that improve the first-release figures.

Our findings show that, while fiscal plans are on average too optimistic relative to the first-release outcomes, first-release figures are overly optimistic relative to the ex-post figures. Ministries of Finance control the production of first-release figures and may have an incentive to be over-optimistic at this stage.

We observe that, while most of the over optimism at the planning stage relative to the first-release stage is driven by expenditures, revision errors are mainly caused by over optimism about revenues at the first-release stage. Further, we see that most of the over-optimism at the first-release stage is in the base effect. We also find that an improvement in the quality of institutions, whether measured by the tightness of national fiscal rules, the medium-term budgetary framework or the degree of budgetary transparency, reduces the degree of optimism at the first-release stage and makes first-release figures more informative about the eventual outcomes. This is in line with our earlier conjecture that more transparency reduces the leeway for massaging budgetary figures at the first-release stage and, hence, that it limits over-optimism at this stage. It is also in line with the hypothesis that tighter self-imposed, national fiscal rules have the same effect.

Our results on the role of tight fiscal rules and medium-term national budgetary frameworks for the quality of first-release figures support the European Commission's (2010) proposal to specify minimum requirements for national budgetary frameworks. Also our findings on the role of enhanced transparency support the European Commission (2010), which proposes that "All the operations of extra-budgetary funds and bodies shall be integrated into the regular budgetary process" and "For all sub-sectors of general government, Member States shall publish information on contingent liabilities with potentially large impacts on public budgets, …".

While the changes proposed by the European Commission (2010) serve a wider purpose than improving only the accuracy of first-release macro- and fiscal data, a more direct way of achieving the latter may be to transfer the responsibility for producing these data to an

independent institution.[21] However, to achieve this, both political and practical obstacles may have to be overcome. The main practical complication is that the Ministry of Finance always needs to be relied upon to provide relevant real-time data.

Our analysis finally points to some recommendations regarding the conduct of fiscal surveillance. First, policymakers should focus less on slippages in individual years, but more on systematic patterns in errors and components of those errors. With first-release and ex-post data becoming available over longer horizons, the scope for such an approach is increasing. Second, by comparing fiscal data across countries, one can extract more accurate signals whether implementation and revision errors may be justified or not. Third, with SGP surveillance based on first-release figures, there is an incentive for governments to bias these figures, which makes them less useful for fiscal surveillance. As our results suggest, to ameliorate this trade-off it is important that surveillance at the European level be combined with enhanced fiscal transparency at the national level. In particular, judgment of first-release figures should be on a sufficiently comprehensive basis taking proper account of stock-flow adjustments and the risks associated with off-balance items. Finally, as our results show, revision errors in the budget balance may mask substantial and partially offsetting revision errors in revenues and spending. Therefore, it is important for fiscal surveillance to also focus on the individual components of the budget balance.

References

Abbas, S.A., Hasanov, F., Mauro, P. and J. Park (2011). The Performance of Large Fiscal Adjustment Plans in the European Union – A Cross-Country Statistical Analysis, *Mimeo*, IMF.

Alesina, A. and A. Drazen (1991). Why are Stabilizations Delayed? A Political Economy Model, *American Economic Review* 81, 1170-88.

Armingeon *et al.* (2010). *Comparative Political Dataset*, No. I and III, http://www.ipw.unibe.ch/content/team/klaus_armingeon/comparative_political_data_sets/index_ger.html .

Balassone, F., Franco, D. and S. Zotteri (2006). EMU Fiscal Indicators: a Misleading Compass? *Empirica* 33, 63-87.

Balassone, F., Franco, D. and S. Zotteri (2007). The Reliability of EMU Fiscal Indicators: Risks and Safeguards, *Temi di Discussione*, No. 633, Banca d'Italia.

Beetsma, R. and M. Giuliodori (2010). Fiscal Adjustment to Cyclical Developments in the OECD: An Empirical Analysis Based on Real-Time Data, *Oxford Economic Papers* 62, 3, 419-441.

---

[21] Frankel (2011) in his study of Chilean fiscal policy over the past decade argues in favour of supplementing budget rules with panels of independent fiscal experts that provide official forecasts of the output gap, for example.

Beetsma, R., Giuliodori, M. and P. Wierts (2009). Planning to Cheat: EU Fiscal Policy in Real Time, *Economic Policy* 24, 60, 753-804.

Beetsma, R., Giuliodori, M., Walschot, M. and P. Wierts (2010). Fifty Years of Fiscal Planning and Implementation in the Netherlands, *CEPR Discussion Paper*, No.7969.

Bernoth, K. and G. Wolff (2006). Fool the Markets? Creative Accounting, Fiscal Transparency and Sovereign Risk Premia, *DNB Working Paper*, No.103.

Bernoth, K. and G. Wolff (2008). Fool the Markets? Creative Accounting, Fiscal Transparency and Sovereign Risk Premia, *Scottish Journal of Political Economy*, 55, 4, 465-487.

Bernoth, K., Hughes-Hallett, A.J., and J. Lewis (2008). Did Fiscal Policymakers Know What They Were Doing? Re-assessing Fiscal Policy with Real-Time Data, *CEPR Discussion Paper*, No.6758.

Brück, T. and A. Stephan (2006). Do Eurozone Countries Cheat with their Budget Deficit Forecasts? *Kyklos* 59, 3-15.

Cimadomo, J. (2011a). Fiscal Policy in Real Time, *Scandinavian Journal of Economics*, forthcoming.

Cimadomo, J. (2011b). Real-Time Data and Fiscal Policy Analysis: A Survey of the Literature, *Working Paper*, No.11-25, Federal Reserve Bank of Philadelphia.

Debrun, X., L. Moulin, A. Turrini, J. Ayuso-Calsals, and M. Kumar (2008). Tied to the Mast? The Role of National Fiscal Rules in the European Union, *Economic Policy*, 23, 298 – 362, April.

De Castro, F., Pérez, J.J. and M. Rodríguez (2011). Fiscal Data Revisions in Europe, *mimeo*, Banco de España / European Central Bank.

European Commission (2007), *Public Finances in EMU* – 2007, European Economy, No.3, Directorate-General for Economic and Financial Affairs, Brussels.

European Commission (2010), http://ec.europa.eu/economy_finance/articles/eu_economic_situation/pdf/com2010__523en.pdf.

Forni, L. and S. Momigliano (2004). Cyclical Sensitivity of Fiscal Policies Based on Real-Time Data, *Applied Economics Quarterly* 50, 3, 299-326.

Frankel, J. (2011). A Solution to Fiscal Procyclicality: The Structural Budget Institutions Pioneered by Chile, *NBER Working Paper*, No. 16945.

Gordo, M.L. and J.N. Nogueira Martins (2007). How Reliable are the Statistics for the Stability and Growth Pact? *European Commission Economic Papers*, No. 273.

Hallerberg, M., Strauch, R. and J. von Hagen (2005). Fiscal Rules in the European Union 1991-2001: Updating the Von Hagen Fiscal Index, *Mimeo.*

Heinemann, F. (2006). Planning or Propaganda? An Evaluation of Germany's Medium-Term Budgetary Planning, *Finanzarchiv* 62, 4, 551-78.

Holm-Hadulla, F., Hauptmeier, S. and P. Rother (2011). The Impact of Numerical Expenditure Rules on Budgetary Discipline over the Cycle, *Applied Economics*, forthcoming.

Lane, P.R. (2003). The Cyclical Behaviour of Fiscal Policy: Evidence from the OECD, *Journal of Public Economics* 87, 2661-2675.

Lewis, J. (2009). Fiscal Policy in Central and Eastern Europe with Real-Time Data: Cyclicality, Inertia and the Role of EU Accession, *Working Paper*, No.214/2009, De Nederlandsche Bank.

Marinheiro, C. (2008). The Stability and Growth Pact, Fiscal Policy Institutions and Stabilization in Europe, *International Economics and Economic Policy* 5, 1, 189-207.

Milesi-Feretti, G.M. (2003). Good, Bad or Ugly? On the Effects of Fiscal Rules with Creative Accounting, *Journal of Public Economics* 88, 377-394.

Mink, M. and J. De Haan (2005). Has the Stability and Growth Pact Impeded Political Budget Cycles in the European Union? *CESifo Working Paper*, No. 1532.

Moulin, L. and P. Wierts (2006). How Credible are Multiannual Budgetary Plans in the EU? in Franco, D., Marino, M. and S. Momigliano (eds.), *Fiscal Indicators*, Banca d'Italia, 983-1005.

OECD (2008). Budget Practices and Procedures Survey, http://webnet4.oecd.org/budgeting/Budgeting.aspx.

Pina, A. (2009). Elusive Counter-Cyclicality and Deliberate Opportunism? Fiscal Policy from Plans to Final Outcomes. *Bank of Portugal Working Paper*, No. 6, April.

Pina, A. and N. Venes (2011). The Political Economy of EDP Fiscal Forecasts: An Empirical Assessment, *European Journal of Political Economy*, forthcoming.

Rogoff, K. (1990). Equilibrium Political Budget Cycles, *American Economic Review* 80, 1, 21-36.

Shepsle, K.A. and B.R. Weingast (1981). Political Preferences for the Pork Barrel: A Generalization, *American Journal of Political Science* 25, 96-111.

Strauch, R., Hallerberg, M. and J. von Hagen (2004). Budgetary Forecasts in Europe – the Track Record of Stability and Convergence Programmes, *ECB Working Paper*, No. 307.

Tornell, A. and P.R. Lane (1999). The Voracity Effect, *American Economic Review* 89, 22-46.

Von Hagen, J. (2006). Political Economy of Fiscal Institutions, in Weingast, B.A. and D.T. Wittman (eds.), *The Oxford Handbook of Political Economy*, Oxford University Press, Oxford.

Von Hagen, J. (2010). Sticking to Fiscal Plans: The Role of Fiscal Institutions, *Public Choice* 144, 487-503.

Von Hagen, J. and I. Harden (1994). Budget Processes and Commitment to Fiscal Discipline, *European Economic Review* 39, 771-779.

Von Hagen, J., Hughes Hallett, A. and R. Strauch (2002). Budgetary Consolidation in Europe: Quality, Economic Conditions, and Persistence, *Journal of the Japanese and International Economics* 16, 512-535.

Appendix A: The data

Sources and description of political variables:

The political variables are from the *Comparative Political Data Set* (CPDS), numbers I and III, constructed by Armingeon *et al*. (2010), supplemented by self-constructed figures for the year 2009 (CPDS-I covers 1960-2007, while CPDS-III covers 1990-2008).

ELECT   The dummy is 1, if there is a general election in the year, and 0, otherwise.

GOVCHAN   Number of government changes in the year. Termination of government due to (a) elections, (b) resignation of the Prime Minister, (c) dissension within government, (d) lack of parliamentary support, or (e) intervention by the Head of State.

GOVPARTY Cabinet composition (Schmidt-Index) on a scale from 1 to 5, where 1 is hegemony of right-wing (and centre) parties, 2 is dominance of right-wing (and centre) parties, 3 is balance of power between left and right, 4 is dominance of social-democratic and other left parties and 5 is hegemony of social-democratic and other left parties.

GOVTYPE Type of government ranging from 1 to 6, where 1 is single party majority government, 2 is minimal winning coalition, 3 is surplus coalition, 4 is single party minority government, 5 is multi party minority government and 6 is caretaker government (temporary).

GOVGAP Ideological gap between new and old cabinet ($GOVGAP = \Delta GOVPARTY$).

Sources and description of institutional variables:

FRI In its database on fiscal governance in EU Member States, the European Commission calculates a fiscal rule index (*FRI*) per country,[22] which combines the strength and coverage of all rules in force. Those rules may apply to the various government sectors (general, central, regional, local and social security). Strength is determined on the basis of five criteria: (1) the statutory or legal base of the rule (with a constitutional rule where there is no margin for adjusting objectives achieving the highest score); (2) the nature of the body in charge of monitoring the rule (the highest score assigned in the case of an independent authority or the national parliament); (3) the nature of the body in charge of enforcing the rule (again, the highest score for an independent authority or the national parliament); (4) the enforcement mechanism (highest score in the case of automatic corrections and sanctions in case of non-compliance); and (5) the degree of media visibility. The strength score of each rule is weighed by the share of general government finances covered. Finally, the weighted scores are aggregated over all rules in place, while if more than one rule applies to the same general government sub-sector the weights of all these rules except the strongest are halved.

MTBF European Commission (2007, p.162-163) computes the index of a national medium-term budgetary framework (*MTBF*) on the basis of five criteria: (1) the existence of such a framework (with the highest score for a framework that covers the entire

---

[22] See http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/index_en.htm.

government); (2) connectedness between the multi-annual budgetary targets and the preparation of the annual budget (with the highest score for a framework that cannot be altered as time passes); (3) involvement of the national parliament (the highest score is when a vote is required); (4) existence of coordination mechanisms prior to setting the medium-term budgetary targets (with the highest score for ex-ante coordination among all levels of general government); and (5) monitoring and enforcement (the highest score for regular monitoring and well-defined actions in response to deviations from plans).

TR_BW   This is the index "Audit" taken from Bernoth and Wolff (2008). It is based on the answers to an OECD and World Bank survey conducted in 2003. It is higher for countries in which governments are externally audited for their finances, when the degree of independence of the auditing is higher and the obtained information is more widely disseminated. Details on the survey questions are found in Bernoth and Wolff (2006).

TR_HSH   This index is taken from Hallerberg *et al.* (2005). It measures the information content and transparency of the draft budget and is further based on an assessment of transparency by government officials, the importance of special funds in the draft budget, whether government loans are included, whether it is linked to the national accounts and whether it consists of one document.

Appendix B: Additional results

Table A.1. Decomposition of errors in the budget and its components excluding Greece

(A) Implementation errors (based on first release minus plans)					
	TE	**BE**	**GE**	**DE**	**RE**
BAL	-0.10	0.16***	-0.25***	-0.00	-0.01**
	(0.10)	(0.05)	(0.09)	(0.00)	(0.01)
REV	0.13	0.05	-0.05	0.12**	0.00
	(0.12)	(0.10)	(0.08)	(0.05)	(0.00)
EXP	0.23**	-0.11	0.20***	0.13**	0.02***
	(0.11)	(0.10)	(0.05)	(0.05)	(0.004)
PEXP	0.29***	-0.07	0.22***	0.13**	0.02***
	(0.11)	(0.09)	(0.05)	(0.05)	(0.00)
(B) Revision errors (based on ex post minus first release)					
	TE	**BE**	**GE**	**DE**	**RE**
BAL	-0.13	-0.29***	0.15*	0.00	0.00
	(0.08)	(0.06)	(0.08)	(0.00)	(0.00)
REV	-0.34**	-0.51***	0.26***	-0.11***	0.01**
	(0.16)	(0.13)	(0.06)	(0.03)	(0.00)
EXP	-0.21	-0.22	0.11	-0.12***	0.00
	(0.15)	(0.13)	(0.08)	(0.03)	(0.00)
PEXP	0.01	-0.04	0.14*	-0.11***	0.00
	(0.14)	(0.13)	(0.07)	(0.03)	(0.00)
(C) Total ex-post errors (based on ex-post minus plans)					
	TE	**BE**	**GE**	**DE**	**RE**
BAL	-0.21	-0.13	-0.08	-0.00	-0.01
	(0.15)	(0.09)	(0.13)	(0.00)	(0.01)
REV	-0.28	-0.52***	0.23**	-0.01	0.01*
	(0.19)	(0.17)	(0.10)	(0.07)	(0.00)
EXP	-0.07	-0.40**	0.30***	-0.00	0.02***
	(0.18)	(0.15)	(0.08)	(0.07)	(0.01)
PEXP	0.15	-0.22	0.35***	-0.00	0.02***
	(0.18)	(0.15)	(0.09)	(0.06)	(0.01)

Notes: Mean forecast errors and sources of budgetary slippage are expressed in percent of GDP; standard errors (corrected for heteroskedasticity and serial correlation) are reported underneath. Further, * = significance at the 10% level; ** = significance at the 5% level; *** = significance at the 1% level. Abbreviations: *BAL* = Budget balance/GDP; *REV* = Revenue/GDP; *EXP* = Expenditure/GDP; *PEXP* = primary expenditure/GDP. TE = total error, BE = base effect, GE = growth effect, DE = denominator effect, RE = residual effect, all in percent of GDP. The sample period is 1999-2008 for Panels (A) and (C), and 1998-2008 for Panel (B).

Table A.2. Decomposition of errors in the budget and its components with GLS

	TE	BE	GE	DE	RE
(A) Implementation errors (based on first release minus plans)					
BAL	-0.10	0.13***	-0.24***	-0.00	-0.01***
	(0.07)	(0.03)	(0.06)	(0.00)	(0.01)
REV	0.01	-0.05	-0.05	0.05*	0.00
	(0.07)	(0.06)	(0.06)	(0.03)	(0.00)
EXP	0.21**	-0.13**	0.19***	0.05	0.01***
	(0.09)	(0.06)	(0.04)	(0.03)	(0.002)
PEXP	0.27***	-0.05	0.18***	0.05*	0.01***
	(0.09)	(0.06)	(0.04)	(0.03)	(0.00)
(B) Revision errors (based on ex post minus first release)					
	TE	BE	GE	DE	RE
BAL	-0.15**	-0.26***	0.04	0.00*	0.00
	(0.06)	(0.05)	(0.06)	(0.00)	(0.00)
REV	-0.56***	-0.60***	0.22***	-0.10***	0.00***
	(0.08)	(0.06)	(0.04)	(0.03)	(0.00)
EXP	-0.42***	-0.42***	0.17***	-0.11***	0.00
	(0.09)	(0.08)	(0.04)	(0.03)	(0.00)
PEXP	-0.21**	-0.28***	0.17***	-0.10***	0.00
	(0.10)	(0.08)	(0.03)	(0.03)	(0.00)
(C) Total ex-post errors (based on ex-post minus plans)					
	TE	BE	GE	DE	RE
BAL	-0.37***	-0.11*	-0.23**	0.00	-0.01**
	(0.12)	(0.06)	(0.10)	(0.00)	(0.004)
REV	-0.63***	-0.72***	0.14**	0.01	0.01**
	(0.10)	(0.09)	(0.07)	(0.05)	(0.00)
EXP	-0.16	-0.60***	0.37***	0.00	0.02***
	(0.12)	(0.09)	(0.04)	(0.05)	(0.00)
PEXP	0.08	-0.43***	0.42***	0.00	0.02***
	(0.11)	(0.09)	(0.05)	(0.05)	(0.00)

Notes: Generalized Least Square (GLS) estimation. Mean forecast errors and sources of budgetary slippage are expressed in percent of GDP; standard errors (corrected for heteroskedasticity and serial correlation) are reported underneath. Further, * = significance at the 10% level; ** = significance at the 5% level; *** = significance at the 1% level. Abbreviations: *BAL* = Budget balance/GDP; *REV* = Revenue/GDP; *EXP* = Expenditure/GDP; *PEXP* = primary expenditure/GDP. TE = total error, BE = base effect, GE = growth effect, DE = denominator effect, RE = residual effect, all in percent of GDP. The sample period is 1999-2008 for Panels (A) and (C), and 1998-2008 for Panel (B).

Table A.3: Relationship between institutional indices and country-fixed effects

	Dependent variable: estimated country-fixed effects			
	FRI	*MTBF*	*TR_BW*	*TR_HSH*
Revision error	1.51***	1.15**	1.98***	1.09
	(0.54)	(0.45)	(0.59)	(0.76)
Base effect	1.13**	0.85**	1.50***	1.14*
	(0.46)	(0.38)	(0.51)	(0.58)
Growth effect	2.96**	2.50**	4.49***	2.37
	(1.24)	(0.97)	(1.22)	(1.64)

Notes: Entries report the coefficient of the institutional index (averaged over time) in a linear OLS regression of the estimated country-fixed effects from the baseline regression on a constant and the average institutional index over time for each country. Estimates of the constant are not reported. Standard errors are reported in brackets underneath the coefficient estimate. The number of observations is in all cases 14.