Is fiscal data reporting in Europe reliable?*

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Abstract

We document the empirical properties of the revisions to annual government deficit figures in the euro area Member States, Denmark, Sweden, and the United Kingdom. Our motivation is linked to the key role of annual fiscal variables in the monitoring of Europe's Stability and Growth Pact (SGP) and the need to perform a detail analysis of the reliability of the different releases of the main fiscal variables. We characterise the relationships between initial and subsequent measurements of government deficit statistics using a real-time dataset from EDP Notifications as published by Eurostat over time. Our main findings are as follows: (i) most preliminary measurements are biased predictors of subsequent measurements, with later vintages of data tending to show larger deficits or lower surpluses than shown by earlier notifications; (ii) such systematic bias in government balance revisions cannot solely be attributed to the behaviour of a reduced number of countries; rather, it appears to be a more general issue; finally, (iii) we find that these are mostly genuine in the sense that, rather than being caused by revisions in GDP figures, they embed a systematic fiscal component, which might be consistent with some degree of manipulation of reported fiscal data.

***JEL Classification*:** E01; E21; E24; E31; E5; H600.

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1. Introduction

Annual government deficit statistics and forecasts are at the heart of the multilateral surveillance system of Europe's Stability and Growth Pact (SGP). Compliance with European fiscal rules is judged on the basis of multi-annual fiscal plans (targets and projections) submitted by EU Member States to the European Commission (EC) and the Council. The quality of these fiscal plans and the ability by the EC and the Council to assess their ex-ante plausibility and to evaluate their ex-post fulfilment is crucial. As regards the ex-ante assessment, the plausibility of the presented projections is evaluated against the independent forecasts prepared by the EC. As regards the ex-post fulfilment and the causes of observed deviations from initial plans, specific rules have been established in the updated SGP.[1] In all cases, budgetary statistics following homogeneous definitions across countries are used as the basis for the assessment.

Some concerns have been expressed on the quality of budgetary statistics and some recent official communications point to "the need and means to upgrade the quality of budgetary statistics".[2] Fiscal gimmicky (see Cohen and Van de Noord, 2004), the recurrent use of deficit-debt adjustments and the frequent interventions of Eurostat on

1 See "Council Regulation (EC) No 1466/97 on the strengthening of the surveillance of budgetary positions and the surveillance and coordination of economic policies", endorsed by the ECOFIN Council of 7 July 1997.

"Council Regulation (EC) No 1467/97 on speeding up and clarifying the implementation of the excessive deficit procedure", endorsed by the ECOFIN Council of 7 July 1997.

"Council Regulation (EC) No 1055/2005 amending Regulation (EC) No 1466/97 on the strengthening of the surveillance of budgetary positions and the surveillance and coordination of economic policies", endorsed by the ECOFIN Council of 25 June 2005.

"Council Regulation (EC) No 1056/2005 amending Regulation (EC) No 1467/97 on speeding up and clarifying the implementation of the excessive deficit procedure", endorsed by the ECOFIN Council of 25 June 2005.

"Specifications on the implementation of the Stability and Growth Pact and Guidelines on the format and content of Stability and Convergence Programmes", endorsed by the ECOFIN Council of 11 October 2005.Council of the European Union (1997a), (1997b), (2005a), (2005b) and (2005c).

2 The need for the reliability of the government deficit and debt figures of EU member states is reflected in the Council Regulation No 2103/2005 (OJ L337, 22.12.2005, p. 1) amending Regulation (EC) No 3605/93 as regards the quality of statistical data in the context of the excessive deficit procedure.

contentious issues [3] have made unavoidable a broadening of the definition of government deficit to account for creative accounting. In fact, the concept of government deficit and government debt in the EDP process somewhat differ from the standard national accounts' concepts.[4]

In particular, a key dimension of the quality assessment of official statistics is the analysis of their revisions over time. Frequent and/or sizeable revisions of fiscal data may give rise to concerns about the reliability of the official EDP statistics used in the monitoring of the SGP.[5] Sometimes revisions have lead to deficit figures exceeding the 3% threshold set by European fiscal rules, while previous releases of data showed figures below the threshold. As an illustration, Figure 1 shows the EDP deficit figures as notified by Greece and Italy to Eurostat over the period 1999-2007. Despite the fact that the Figure shows sizeable revisions for the government deficit, especially for the case of Greece, it should be pointed out that past changes in fiscal variables are not necessarily an indicator of current quality problems *per se*. In some cases, relatively

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[3] For example, general issues that affect to many Member States are the clarification of several undocumented capital injections; the clarification of the accounting treatment be applied on the securitisation operations undertaken by government or the payments in connection with the transfer of pension commitments to government; or the correct application of the Eurostat Decisions, such as the "The treatment of transfers from the EU budget to the Member States" (22/2005 - 15 February 2005) or the "Recording of military equipment expenditure" (9 March 2006).

[4] For the Excessive Deficit Procedure (EDP) definitions of general government deficit and debt and their differences with standard National Accounts concepts (1995 ESA) see the ECB Government Finance Statistics Guide (2007). Basically EDP deficit figures differ from their 1995 ESA counterparts in the accounting of settlements under interest rate swaps and forward rate agreements. So the government surplus or deficit in the EDP is not necessarily the same as general government net lending/net borrowing in the 1995 ESA accounts. The differences between the general government debt for EDP purposes and the 1995 ESA general government liabilities are more substantial. Mainly for practical reasons EDP debt comprises general government liabilities in the form of currency (coins), deposits, debt securities (securities other than shares and other equity) and loans only. Any general government liabilities in the form of shares and other equity, insurance technical reserves, other accounts receivable/payable and financial derivatives, are ignored for the EDP purposes, but included in the 1995 ESA general government liabilities. The second difference arises from valuation. In the 1995 ESA, general government liabilities are valued at market prices; in the EDP, they are entered at face value. It might also be noted that the market price will reflect accrued interest on the instrument, whereas EDP debt at face value does not increase with the accruing of interest (except for index-linked bonds). Finally, the EDP values certain debt denominated in foreign currency in a different way than the 1995 ESA. Finally, EDP debt is consolidated, meaning that general government debt for EDP purposes excludes all holdings of general government debt within the general government sector itself.

[5] In a related line revisions to CABs some papers have supported the use of cyclicality adjusted budget balances as an important ingredient of the multilateral surveillance system (see Larch and Turrini, 2009). On the other hand, Larch and Langedijk (2007) signal the problems they present to be reasonable real-time indicators in relation to measurement of output gap relying on arbitrary assumptions about the statistical properties of the two unobserved components ().

large data revisions are due to the materialisation of methodological improvements concerning accounting rules or to revisions in ratios due to revisions in the GDP levels. For Greece, the on-going revisions of the deficit figures reflect the joint efforts of Eurostat and the Greek statistical authorities to improve the Greek government finance statistics and in some cases, it reflects the upward revision of Greek GDP for 2003-2006. For Italy, the revisions of the deficit figures mainly reflect the application of several Eurostat Decisions[6].

The literature analysing revisions of fiscal data in Europe is relatively scarce. Exceptions are Balassone et al. (2007), Bier et al. (2004), and Gordo and Nogueira (2007). The first paper compares deficit and changes in debt (so called deficit-debt adjustment) to assess the reliability of the underlying data. Their econometric results point to deficit-specific fiscal gimmickry in the euro area countries in the period 2000-2004, which could hint the existence of opportunistic accounting and an underestimation of the budget deficits. [7] On different grounds, Bier et al. (2004), and Gordo and Nogueira (2007)[8] follow descriptive approaches to analyse the properties of the revisions in EDP deficit and debt figures (mainly by analysing the size of the revisions, the size of deficits or the volatility[9] of the revisions).

In a related fashion it is surprising to observe that the growing literature on the evaluation of fiscal forecasts in Europe (see Leal et al. 2008) has not addressed the

6 For instance, the Eurostat Decision on securitisation operations undertaken by general government (No 80/2002 - 3 July 2002) and the Eurostat Decision related to specific operations undertaken in Italy: SCIP, ISPA and Concessionari d'imposta (65/2005 – 23 May 2005).

7 Of special interest is their analysis on the reasons behind the substantial revisions of deficit for Italy, Portugal and Greece respectively in 2001, 2002 and 2003.

8 Some results are worth highlighting: (i) there seem to be no evidence of differences in revision patterns before and after the shift from 1979 ESA to 1995 ESA methodology in 2000; (ii) some anecdotal evidence points to the fact that high-deficit countries follow different revision patterns than low-deficit ones; (iii) major revisions are often observed between the first publication of the government deficit and debt data in March for the previous year and the successive publication in September; (iv) there seem to be a tendency for downward revisions in deficit figures, and upward revisions in debt figures.

9 For instance, through the analysis of the standard deviation of revisions or the coefficient of reliability standardized by volatility (CRSV).

issue of the impact of revisions to past fiscal data on the ex-post evaluation of forecasts.[10]

In this paper we extend the literature that analyses the properties of fiscal forecast errors in Europe along the lines of the related literature on revisions of macroeconomic variables.[11] In doing so, we aim at addressing the following issues for general government balance data: (i) are initial releases by the national statistical authorities biased?; (ii) are revisions large compared to the original values reported?; and (iii) are revisions predictable using the information set at the time of the initial reporting?. Due to the fact that the national statistical authorities have up to four years to provide final data on the government deficit (and debt) figures[12], there are inevitable margins of uncertainty in relation to the EDP figures published for the first time. Therefore, there is room for a revision process over time that may generate an increase in the quality of final statistics in comparison to the first releases. Indeed, revisions in government balances data could be justified by changes in the underlying statistical sources (GFS data or other statistical sources or changes in the compilation system) or to changes in the methodology (changes in the statistical treatment of specific operations or to Eurostat Decisions). Even if these changes may lead to an improvement in the reliability of the fiscal data, they may also complicate the EDP process, if the values of EDP deficits for a given year change whenever new data are notified. When addressing these issues we account for GDP revisions, one-off events (like UMTS proceeds) and the application of Eurostat Decisions (aimed at

10 Leal et al. (2008) stress the importance of having reliable indicators of fiscal developments that may help identify deviations of budgetary outturn from plans in order to decide upon the need for corrective measures. Moreover, they argue that such indicators are of the utmost importance in order to allow for a correct assessment of the degree of commitment of policymakers with announced promises and to help improve the accuracy of agents' expectations. On the other hand, Strauch et al. (2004) analyse the factors behind differences in the bias in budgetary projections in Stability Programme Updates across countries. In particular, they find that the cyclical position and the form of fiscal governance are the main determinants of forecast biases. Furthermore, concerning the role of institutional and political factors, (Brück and Stephan 2007) highlight that EC projections present a number of shortcomings, including the correlation of forecast errors with the political cycles of a number of countries.

11 See Aruoba (2005), Croushore and Stark (2001), Garrat and Vahey (2006), Patterson and Heravi (2004) or Swanson and van Dijk (2006), and the references quoted therein.

12 The status of the data can be estimated, half-finalised or final.

interpreting the national accounts rules). This enables to better capture patterns in data revisions in the time period analysed.[13]

The analysis has been carried out for 15 EU Member States, and covers the period 1995 to 2006. We use deficit figures as published by Eurostat from March 1999 to October 2007 in the framework of the excessive deficit procedure (EDP), following the 1995 ESA methodology in most cases.

The standard analyses in the literature look at the *n* vintages of a given (long) time series (typically US quarterly GDP or Industrial Production). On the contrary, we analyze the *n* vintages of given (short) government deficit time series for a cross-section of 15 countries. We use panel data cointegration and pool estimations to cover the questions at hand. This is the first paper to deal with the issues at hand using cross-section data.

In addition, along the lines of Swanson and van Dijk (2006) we examine the entire revision history of government balances. This means that for each calendar date, we have a complete historical record of the actual values available at different release dates. Thus we can inspect the entire revision process of this variable in detail, and analyse up to what point a preliminary release is a fine estimate of the final statistic.

The paper is organised as follows. Section 2 describes the data used in the paper. Section 3 describes the sample, and tackles the issue of rationality of early releases and the relation (co-integration) between different vintages of data. Finally, Section 4 provides the conclusions of the study.

2. The data

2.1 Sample

[13] Of course, data revisions are not *per se* a bad feature of official statistics. Fiscal figures can be revised due to a broad number of reasons such as changes in the underlying data sources, changes in GDP or changes in the 1995 ESA methodology. More in general, McKenzie (2006) shows a comprehensive analysis on the reasons for revisions of official statistics.

The analysis has been carried out for fifteen EU countries, i.e. Belgium, Germany, Greece, Spain, France, Italy, Luxembourg, Netherlands, Ireland, Austria, Portugal, Finland, Denmark, Sweden and the United Kingdom, for the period 1995 to 2008.

We use the publicly available figures as released by Eurostat from March 1999 to October 2007 in the framework of the excessive deficit procedure (EDP). Regulation (EC) 3605/93[14] stated that, as from spring 1994, Members States had to report biannually their government deficit figures to the European Commission. This implied updating the statistics from year t-4 up to year t-1, and the planned figures for year t. Since spring 1999 (news release 20/99 – 8 March 1999), Eurostat regularly publishes through official the Press Releases[15] the provision of deficit figures notified by the Member States to the European Commission twice per year (spring and autumn). Since the adoption of the Regulation (EC) 2103/2005 amending Regulation (EC) 3605/93, this is done by end-March and end-September of each year.

All in all, our sample covers 15 countries, 2 notifications per year and 14 years of data. Given that different vintages of data contained a different amount of information, our sample contains 420 data points (and not 15 x 2 x 14 points).

The majority of the observations included in the sample follow 1995 ESA methodology. 1995 ESA[16] replaced 1979 ESA methodology, which was the basis of EDP statistics up to 2000, was implemented in spring 2000 EDP data transmission. A priori, this shift of methodology may be considered as a structural one-off revision and therefore data affected are eligible to be excluded from the sample to avoid breaks, as Gordo and Nogueira (2007) point out. However, we decided to maintain the 1979 ESA observations in the sample for many reasons.[17]

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[14] See Council Regulation (EC) No 1467/97 of 7 July 1997 and the Ecofin Council conclusions on the "Code of best practice on the compilation and reporting of data in the context of the excessive deficit procedure" of 18 February 2003.

[15] More detailed explanations and the original press releases can be found on the Eurostat's website at http://ec.europa.eu/eurostat

[16] The 1995 ESA methodology was adopted by Council Regulation (EC) No 2223/96.

[17] Our justification is based on many reasons. First, the exclusion of these observations would imply the reduction of the sample in 150 data points (spring and autumn 1999 EDP Notifications). Second, it would be very difficult in practice to identify for which observations the change of methodology represent a structural break. Third, following the conclusions of the Gordo and Nogueira (2006), when comparing the evolution of the average and the standard deviation of revisions in absolute value under

2.2 Methodological issues

Regarding to the methodology used in the European Union, the measurement of government deficit has been strongly influenced by the Protocol No. 20 on the excessive deficit procedure (EDP) annexed to the Maastricht Treaty in 1992. [18] Together with the Council Regulation (EC) No 3605/93 and its amendment (Regulation (EC) 2103/2005), it defines government surplus/deficit and debt and other aggregates like interest expenditure, investment, and gross domestic product by reference to the accounting rules as described in the 1995 ESA - at that time 1979 ESA. Article 1 of the regulation defines "government deficit" as the balancing item "net borrowing/net lending" of general government. Regulation (EC) No 2558/2001 amends 1995 ESA to record net settlement flows under swaps and forward rate agreements (FRAs) as financial transactions rather than as interest. Accordingly, it introduces the term EDP B.9, the version of general government net borrowing/net lending, in which swaps and FRAs are treated as interest. Furthermore, Eurostat took a decision on 13 July 2000 to treat generally the allocation of mobile phone licences as the sale of a non-financial asset also affecting the EDP deficit. [19]

In the Council Regulation (EC) No 3605/93 "EDP debt" is defined as general government gross debt (Article 1 (5)) comprising the consolidated liabilities [20] of the 1995 ESA general government sector (S.13) and measured at "nominal value", in line with Protocol 5 of the EC Treaty, further defined in the regulation as the "face value".

1979 ESA and 1995 ESA, “while one cannot conclude that ESA95 data are more reliable that ESA79 data, the conjecture according to which the shift from ESA79 to ESA95 has harmed the reliability of data is not confirmed by evidence”.

18 Council Regulation (EC) No 3605/93 of 22 November 1993 and its amendment, Council Regulation (EC) No 475/00 of 28 February 2000, on the application of the Protocol on the excessive deficit procedure annexed to the Treaty establishing the European Community.

19 UMTS proceeds present the actual government revenue from the sale of Universal Mobile Telecommunications System (UMTS) licences, also known as third-generation (3G) mobile phone licences.

20 In the 1995 ESA categories: currency and deposits (AF.2), securities other than shares, excluding financial derivatives (AF.33), and loans (AF.4). EDP debt is sometimes labelled as "Maastricht debt" and the relevant 1995 ESA categories as "Maastricht debt instruments."

This means, in particular, that the government debt is not affected by changes in market yields, and excludes usually unpaid accrued interest. [21]

2.3 Definitions

Government balances in the analysis are defined according to the vintage they belong to. Therefore, they are defined as follows:

y_t^{υ}: vintage υ= 1, 2, …, m for the general government balance at time t.

y_t^m: final value of the general government balance at time t. We consider as "final" the latest available vintage.

$y_t^{\upsilon+1} - y_t^{\upsilon}$: sequential revision of the general government balance at time t.

$y_t^m - y_t^1$: total or cumulative revision of the general government balance at time t.

Subsequent revisions should have: (i) zero mean (each release should be an unbiased estimate of the final value); (ii) should have a small variance compared to the variance of the final value; (iii) the final revision should be unpredictable given the information set at the time of the initial announcement (if it were predictable, then it would not be an optimal forecast of the final value).

2.4 Some descriptive statistics of the sample

Table 1 shows the main descriptive statistics of accumulated deficit revisions at vintages 3, 6 and 8, respectively. On average, the highest revisions are observed government balances for the years between 2001 and 2003, when many countries were subject to Excessive Deficit Procedures. However, standard deviations unveil wide dispersion of revisions. Therefore, mean revisions are not statistically significant.

[21] One exception is the treatment of zero-coupon bonds, for which the nominal value is defined as the redemption value.

Table 2 shows some descriptive statistics of revisions in government balance-to-GDP ratios per country. These statistics are:

- *Mean of revisions between vintages* υ_{t-1} *and* υ_t: These means are not big, being highest in the case of Luxembourg and lowest (although with highest absolute value) in Greece.

- *Standard deviation of all revisions between vintages* υ_{t-1} *and* υ_t in relation to their average. In relation to the mean, they reveal a relatively wide dispersion. Therefore, the mean turns out to be statistically non-significant.

- *Average total revisions:* average of the difference between the latest available value and the first release for each observation period. This measure aims to capture possible biases of the first release. The data in the table show positive biases on average only in four counties: Ireland, France, Finland and Luxembourg. In the rest, total accumulated revisions are, on average, negative and in many cases non-negligible.

- *Average absolute revisions:* average of the absolute difference between the latest available value and the first release for each observation period regardless of their sign. This is a measure of the stability of the first release. In our case, except for France, revisions with respect to the first release are, in absolute value, sizeable in all cases. According to this statistic, Greece is the country whose first notification could be considered less reliable, followed by Luxembourg and Sweden.

- *Downward/upward revision ratio:* this is a directional indicator that calculates the ratio between the number of downward/upward revisions of a given variable and the number of observations. It compares the first and the latest values released. The outcome of the ratio can vary from 0 (no downward/upward revisions) to 1 (revised systematically downwards/upwards). Table 2 shows that, in general, downward revisions are more frequent and amount to 30% of total revisions, whereas upward revisions represent around 20%.[22]

[22] The remaining 50% corresponds to revisions implying no change in government balance-to-GDP ratios between two consecutive notification vintages.

- *Range:* lowest and highest total revisions to the first release for all observation periods. Therefore, the range is an indication of the reliability of the first release. As before, the highest downward revision is found in Greece, followed far by Austria and Belgium. By contrast, the most remarkable upward revisions are observed in Spain, Luxembourg, Italy and Sweden.

Figure 2 shows country histograms for revisions of government balance-to-GDP ratios between two consecutive notification vintages. They broadly confirm the insights got form statistics in Table 2. The most remarkable feature is the negative skewness of the distribution in most of the countries.

3. Properties of revisions to past fiscal data

3.1 Noise or news?

Research in the area of testing rationality of preliminary announcements is based almost exclusively on the framework put forward by Mankiw and Shapiro (1986), linking the first and final releases of data. Their setup aims to determine whether y_t^{υ}: (i) is a noisy estimate of the fully revised data y_t^m; (ii) is a rational forecast of the fully revised data y_t^m; (iii) neither of the two previous alternatives. In the first case the preliminary revision should be uncorrelated with the final data, while in the second case.

A standard way of assessing the rationality of successive data revisions is by estimating an equation of the type:

$$y_t^m - y_t^1 = \alpha + \beta\left(y_t^{\upsilon} - y_t^1\right) + \varepsilon_t \qquad (1)$$

where a significant α coefficient would signal the existence of a systematic bias in the revision process, and a β different from zero would imply the existence of explanatory power in a previous vintage of data. More generally, the hypothesis that the final release y_t^m is equal to y_t^v plus a measurement error ε_t could be given by the rejection of the joint null hypothesis $\alpha = 0$ and $\beta = 1$.

Table 3 shows the results for the estimations with revisions in government balance-to-GDP ratios without considering fixed effects, whereas Table 4 allows for the presence of fixed effects. The results are very similar between both specifications. In almost all cases, the joint null hypothesis $\alpha = 0$ and $\beta = 1$ is clearly rejected by the data. While in most of the cases it can be accepted that $\beta = 1$, the hypothesis that the intercept coefficient is zero is largely rejected. On the other hand, redundant fixed effects tests in Table 4 suggest the presence of significant fixed country-effects in the first three vintages of revisions, whereas these fixed country effects become non-significant in the remaining vintages. The same conclusion is obtained when looking at estimations with revisions of government balance levels (see Tables 5 and 6). Therefore, our estimations unveil a systematic bias in the revision process according to which earlier revisions tend to be revised downwards; in other words, later vintages of data tend to show larger deficits or lower surpluses than shown by earlier notifications.

One might be tempted to conclude that such bias might be conditioned by the sizeable data revisions of Greek data. However, our evidence is not consistent with this assessment. Table 7 summarises the previous estimations excluding Greece and the main results still hold. Therefore, systematic biases in government balance revisions appear to be a more general issue.

3.2 Panel cointegration

An alternative way of assessing the relationship between preliminary releases of data and subsequent revisions is via the concept of cointegration. Notice that in our case we do have the full history of revisions for a limited number of years (14 years, twice a year publications) but for a reasonable number of units (countries). Thus, we can assess whether two different vintages of data, say y_t^m and y_t^v, share a common trend using panel cointegration techniques. In order to make such assessment, we estimated the model

$$y_t^m = \alpha + \beta y_t^v + \varepsilon_t \qquad (2)$$

Table 8 shows the estimated long-run relationships between final and all previous notification vintages (2). The upper panel presents the estimations with government balance-to-GDP ratios, whereas the lower panel shows the results with government balances in levels. Since deficit series are non-stationary we performed some usual panel cointegration test. Pedroni cointegration tests (see Pedroni (1999) and Pedroni (2004)) in most cases lean toward rejecting the null hypothesis of no cointegration. In particular, while within-groups panel v and panel ρ statistics largely fail to reject the null of no cointegration at usual significance levels, PP and ADF statistics both in within-groups and between-groups dimensions, clearly reject it. Moreover, Kao panel cointegration tests (Kao, 1999) reject in all cases the null hypothesis of no cointegration.

In all cases, the intercept term is always negative and significant and the slope term β is in most cases lower than one. Moreover, the null hypothesis $\alpha = 0$ and $\beta = 1$ is always rejected. Thus, while different vintages share a common trend, the estimations show that earlier notifications, despite their forecast ability, contain systematic downward biases as compared to final values.

3.3 Factors underlying revisions to fiscal variables as a ratio to GDP

We try to dissect revisions to government deficit as a ratio to GDP in terms of, on the one hand, revisions to nominal GDP and, on the other hand, genuine revisions of nominal government balance.

$$y_{it}^{m} - y_{it}^{1} = \delta_i + \beta_i \left(GDP_{it}^{m} - GDP_{it}^{1} \right) + \gamma_i \left(Y_{it}^{m} - Y_{it}^{1} \right) + \varepsilon_{it} \qquad (3)$$

where *y* is the general government balance as a percentage of GDP, *GDP* is nominal GDP, and *Y* the general government balance in levels, also in nominal terms.

Table 9 presents the results corresponding to the estimation of (3) and a number of interesting conclusions can be drawn. Firstly, the constant term is almost always negative and significant, which, as previously stated, indicates that revisions of government balances entail a negative bias, that is previous notifications are systematically revised downwards. Secondly, the estimated coefficients have, in

general, the expected signs; revisions of nominal government balances are positively correlated with the corresponding revisions in the balance-to-GDP ratios, with this coefficient being, as expected, always significant. But maybe more interesting here is that the coefficient of GDP revisions is, in most cases, positive. When significant, this result indicates that upward GDP revisions yield also upward positive revisions in the government balance ratio, maybe due to progressive tax systems. Notwithstanding the latter, the coefficient of GDP revisions tends to be significant only in the specifications corresponding to the total accumulated revision and, curiously, for the revisions after the fifth notification vintage.

Accordingly, despite revisions in GDP figures account for some share of revisions in government balance-to-GDP ratio, the latter are mainly due to genuine fiscal revisions. This result may, to some extent, reflect imperfections in the relevant statistical sources as far as public finances are concerned. However, this fact, jointly with the systematic bias obtained in almost all the specifications might be indicative of some degree of manipulation in the reporting process of fiscal data.

4. Conclusions

The analysis of the empirical properties of the revisions to annual government deficit and debt figures in the euro area Member States, Denmark, Sweden, and the United Kingdom is warranted by the key role of annual fiscal variables in the monitoring of Europe's Stability and Growth Pact (SGP). Moreover, such an analysis is of the utmost importance in order to carry out a detail analysis of the reliability of the different releases of the main fiscal variables. For this purpose, we characterise the relationships between initial and subsequent measurements of government deficits.

Descriptive statistics show that revisions of fiscal data are frequent, although most of them do not imply significant changes in government balance-to-GDP ratios. However, amongst those which actually do, downward revisions clearly dominate. Consequently, final releases tend to display lower surpluses or higher deficits than initial notifications, although dispersion among and within countries seems to be large. Accordingly, though mostly negative, mean accumulated revisions turn out to

be non-significant. Moreover, in view of average absolute revisions, initial releases do not appear very stable, with sizeable revisions in either direction. The most remarkable case is Greece, with clearly the worst track record as far as revisions are concerned.

The econometric analysis largely confirms the negative bias suggested by descriptive statistics. Our estimations unveil a systematic bias in earlier vintages of EDP notifications, according to which later vintages of data tend to show larger deficits or lower surpluses than shown by earlier notifications. Our analysis also reveals that such systematic bias in government balance revisions cannot solely be attributed to the behaviour of a reduced number of countries; rather, it appears to be a more general issue. Moreover, when analysing the underlying factors behind revisions in government balance figures, we find that these are mostly genuine in the sense that, rather than being caused by revisions in GDP figures, they embed a systematic fiscal component. Accordingly, our analysis leads us to conclude that revisions can indeed be foreseen. While to some extent reflecting imperfections in the relevant statistical sources, this fact might reveal of some degree of manipulation of reported fiscal data.

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Table 1: Main descriptive pool statistics of revisions in government balance-to-GDP ratios revisions per year

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
$y^{8}_{t} - y^{1}_{t}$														
Mean				0.03	0.02	-0.34	-0.85	-0.66	-0.59	-0.30	-0.02			
Standard dev.				0.46	0.45	1.04	1.74	1.00	1.11	0.88	0.95			
Skewness				0.16	0.59	-1.39	-2.02	-2.69	-1.88	-2.18	-1.22			
Kurtosis				3.31	3.57	5.20	7.01	9.59	6.24	8.13	6.94			
Jarque Bera				0.11	1.08	7.33	20.29	45.14	15.38	28.34	13.43			
Nº obs.				14	15	14	15	15	15	15	15			
$y^{6}_{t} - y^{1}_{t}$														
Mean			-0.12	0.07	0.01	-0.20	-0.61	-0.59	-0.49	-0.08	0.01	0.24		
Standard dev.			0.30	0.48	0.42	0.60	1.26	0.95	1.14	0.44	0.91	0.49		
Skewness			-0.49	1.15	1.42	0.06	-1.03	-2.56	-2.93	0.16	-1.33	0.84		
Kurtosis			4.06	5.60	5.11	3.28	4.01	8.92	10.70	2.89	7.04	2.84		
Jarque Bera			1.30	7.53	7.81	0.06	3.31	38.31	58.53	0.07	14.62	1.77		
Nº obs.			15	15	15	15	15	15	15	15	15	15		
$y^{3}_{t} - y^{1}_{t}$														
Mean		-0.17	-0.17	0.07	0.17	-0.01	-0.23	-0.17	-0.32	0.14	-0.08	0.21	0.03	
Standard dev.		0.25	0.42	0.44	0.63	0.24	0.84	0.39	1.06	0.41	0.82	0.42	0.33	
Skewness		-0.44	-0.80	0.33	2.72	0.36	-0.44	-1.37	-3.05	1.48	-1.07	1.24	-0.42	
Kurtosis		1.93	5.41	3.74	10.05	2.80	3.27	4.61	11.36	5.39	6.47	3.88	4.75	
Jarque Bera		1.22	5.23	0.61	49.65	0.35	0.53	6.30	66.94	9.06	10.40	4.35	2.36	
Nº obs.		15	15	15	15	15	15	15	15	15	15	15	15	

Table 2: Descriptive statistics of revisions in government balance-to-GDP ratios per country

	Mean	Std. Dev.	Ave. of total revisions	Ave. of absolute revisions	Downward revision ratio	Upward revision ratio	Highest total revision	Lowest total revision	Total nº of revisions
Austria	-0.07	0.32	-0.38	0.39	0.38	0.14	0.10	-3.10	74
Belgium	-0.03	0.31	-0.15	0.44	0.23	0.28	0.60	-2.80	74
Denmark	-0.03	0.42	-0.15	0.45	0.32	0.30	1.00	-1.60	74
Finland	0.01	0.15	0.06	0.24	0.18	0.24	0.40	-0.60	74
France	0.00	0.06	0.01	0.06	0.12	0.12	0.20	-0.20	73
Germany	-0.01	0.11	-0.04	0.10	0.22	0.19	0.20	-0.30	74
Greece	-0.28	0.79	-1.49	1.60	0.54	0.20	0.40	-6.20	74
Ireland	0.01	0.15	0.03	0.23	0.31	0.34	0.70	-0.90	74
Italy	-0.05	0.20	-0.24	0.49	0.27	0.08	1.10	-1.80	74
Luxembourg	0.11	0.43	0.57	0.70	0.38	0.47	1.90	-0.50	74
Netherlands	-0.01	0.15	-0.06	0.27	0.26	0.18	0.80	-0.90	74
Portugal	-0.09	0.29	-0.46	0.46	0.34	0.08	0.00	-2.00	74
Spain	-0.03	0.31	-0.16	0.50	0.32	0.11	2.20	-0.90	74
Sweden	-0.08	0.43	-0.42	0.68	0.27	0.22	1.10	-2.20	73
United Kingdom	-0.01	0.12	-0.08	0.22	0.32	0.20	0.50	-0.60	74

Table 3: Accumulated revisions of government balance-to-GDP ratios. Pooled EGLS estimates with cross section weights

	$def\_g^8_t - def\_g^1_t$	$def\_g^7_t - def\_g^1_t$	$def\_g^6_t - def\_g^1_t$	$def\_g^5_t - def\_g^1_t$	$def\_g^4_t - def\_g^1_t$	$def\_g^3_t - def\_g^1_t$
c	-0.206***	-0.152***	-0.122***	-0.093***	-0.073***	-0.044***
	(0.030)	(0.023)	(0.023)	(0.024)	(0.021)	(0.016)
$def\_g^2_t - def\_g^1_t$	1.059***	1.102***	1.052***	0.996***	0.984***	1.061***
	(0.072)	(0.066)	(0.055)	(0.047)	(0.048)	(0.020)
R^2	0.542	0.613	0.623	0.697	0.587	0.779
Wald test of H_0: α=0, β=1	52.035***	44.410***	36.017***	15.068***	13.125***	19.140***
c	-0.160***	-0.111***	-0.067***	-0.051**	-0.018	
	(0.021)	(0.018)	(0.019)	(0.020)	(0.013)	
$def\_g^3_t - def\_g^1_t$	1.004***	1.035***	0.994***	0.953***	0.960***	
	(0.079)	(0.073)	(0.050)	(0.043)	(0.022)	
R^2	0.682	0.721	0.774	0.818	0.900	
Wald test of H_0: α=0, β=1	57.350***	40.218***	12.629***	6.473**	4.814*	
c	-0.083***	-0.033*	-0.026**	-0.011*		
	(0.018)	(0.019)	(0.010)	(0.006)		
$def\_g^4_t - def\_g^1_t$	1.090***	1.115***	1.073***	1.001***		
	(0.035)	(0.030)	(0.021)	(0.008)		
R^2	0.848	0.898	0.939	0.973		
Wald test of H_0: α=0, β=1	66.341***	28.067***	35.791***	3.1		
c	-0.044***	-0.009	-0.003			
	(0.012)	(0.013)	(0.003)			
$def\_g^5_t - def\_g^1_t$	1.092***	1.113***	1.032***			
	(0.026)	(0.028)	(0.016)			
R^2	0.909	0.946	0.978			
Wald test of H_0: α=0, β=1	36.021***	19.245***	5.419*			
c	-0.031***	-0.006				
	(0.007)	(0.006)				
$def\_g^6_t - def\_g^1_t$	1.038***	1.005***				
	(0.010)	(0.009)				
R^2	0.947	0.992				
Wald test of H_0: α=0, β=1	23.964***	3.378				
c	-0.015***					
	(0.008)					
$def\_g^7_t - def\_g^1_t$	1.033***					
	(0.016)					
R^2	0.978					
Wald test of H_0: α=0, β=1	6.968**					
Nº of pool observations	118	120	150	150	180	180

Notes: Standard errors in parentheses. The symbols *, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively. The Wald coefficient test follows a χ^2 with two degrees of freedom.

Table 4: Accumulated revisions of government balance-to-GDP ratios. Pooled EGLS estimates with cross section weights and fixed effects

	$def\_g^8_t - def\_g^1_t$	$def\_g^7_t - def\_g^1_t$	$def\_g^6_t - def\_g^1_t$	$def\_g^5_t - def\_g^1_t$	$def\_g^4_t - def\_g^1_t$	$def\_g^3_t - def\_g^1_t$
c	-0.358***	-0.284***	-0.205***	-0.177***	-0.121***	-0.072***
	(0.019)	(0.020)	(0.022)	(0.024)	(0.022)	(0.015)
$def\_g^2_t - def\_g^1_t$	1.071***	1.139***	1.052***	0.982***	0.968***	1.045***
	(0.096)	(0.047)	(0.060)	(0.037)	(0.048)	(0.034)
R^2	0.537	0.793	0.696	0.784	0.614	0.797
Fixed effects test	5.178***	4.755***	3.848***	3.685***	1.846**	2.027**
Wald test of H_0: α=0, β=1	391.937***	205.341***	90.107***	56.578***	35.602***	25.162***
c	-0.291***	-0.213***	-0.138***	-0.113***	-0.053***	
	(0.021)	(0.019)	(0.015)	(0.019)	(0.013)	
$def\_g^3_t - def\_g^1_t$	0.931***	0.999***	0.976***	0.932***	0.957***	
	(0.104)	(0.087)	(0.047)	(0.042)	(0.021)	
R^2	0.757	0.797	0.828	0.845	0.909	
Fixed effects test	2.888***	2.332***	2.472***	2.168**	0.998*	
Wald test of H_0: α=0, β=1	207.528***	133.391***	104.112***	40.538***	23.921***	
c	-0.200***	-0.119***	-0.071***	-0.050***		
	(0.021)	(0.019)	(0.009)	(0.007)		
$def\_g^4_t - def\_g^1_t$	1.023***	1.083***	1.039***	0.983***		
	(0.062)	(0.051)	(0.034)	(0.012)		
R^2	0.869	0.914	0.936	0.964		
Fixed effects test	2.428***	1.700*	1.957**	1.913**		
Wald test of H_0: α=0, β=1	156.303***	55.332***	126.952***	57.957***		
c	-0.125***	-0.041***	-0.023***			
	(0.018)	(0.015)	(0.003)			
$def\_g^5_t - def\_g^1_t$	1.074***	1.133***	1.023***			
	(0.048)	(0.029)	(0.018)			
R^2	0.922	0.962	0.983			
Fixed effects test	1.262	0.748	0.981			
Wald test of H_0: α=0, β=1	150.878***	38.158***	187.942***			
c	-0.098***	-0.033***				
	(0.007)	(0.000)				
$def\_g^6_t - def\_g^1_t$	1.027***	1.000***				
	(0.016)	(0.000)				
R^2	0.973	1.000				
Fixed effects test	1.314	1.296				
Wald test of H_0: α=0, β=1	327.357***	$3.17*(10)^9$***				
c	-0.067***					
	(0.007)					
$def\_g^7_t - def\_g^1_t$	1.017***					
	(0.013)					
R^2	0.991					
Fixed effects test	1.077					
Wald test of H_0: α=0, β=1	93.001***					
Nº of pool observations	118	120	150	150	180	180

Notes: Standard errors in parentheses. The symbols *, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively. The Wald coefficient test follows a χ^2 with two degrees of freedom.

Table 5: Accumulated revisions of government balances. Pooled EGLS estimates with cross section weights

	$def\_l^8_t - def\_l^1_t$	$def\_l^7_t - def\_l^1_t$	$def\_l^6_t - def\_l^1_t$	$def\_l^5_t - def\_l^1_t$	$def\_l^4_t - def\_l^1_t$	$def\_l^3_t - def\_l^1_t$
c	-1707.6***	-1455.7***	-799.7***	-741.4***	-315.4***	-168.5***
	(188.7)	(174.7)	(157.8)	(154.3)	(71.5)	(41.7)
$def\_l^2_t - def\_l^1_t$	0.892***	0.978***	0.825***	0.918***	0.919***	0.897***
	(0.094)	(0.091)	(0.061)	(0.083)	(0.064)	(0.080)
R^2	0.291	0.372	0.290	0.479	0.459	0.582
Wald test of H_0: α=0, β=1	83.498***	69.592***	26.695***	23.160***	20.612***	17.265***
c	-1376.5***	-922.6***	-424.3***	-279.3***	-44.02	
	(113.9)	(114.0)	(99.7)	(82.5)	(28.96)	
$def\_l^3_t - def\_l^1_t$	0.864***	0.925***	0.924***	0.939***	0.978***	
	(0.096)	(0.100)	(0.082)	(0.072)	(0.032)	
R^2	0.552	0.528	0.637	0.714	0.925	
Wald test of H_0: α=0, β=1	153.940***	78.553***	20.090***	12.904***	4.351	
c	-641.9***	-452.5***	-241.6***	-132.5***		
	(134.5)	(133.8)	(68.1)	(40.99)		
$def\_l^4_t - def\_l^1_t$	1.071***	1.048***	1.005***	0.978***		
	(0.066)	(0.059)	(0.029)	(0.023)		
R^2	0.727	0.762	0.847	0.927		
Wald test of H_0: α=0, β=1	44.799***	19.670***	19.698***	10.753***		
c	-136.5**	-11.4	-59.5**			
	(58.1)	(22.9)	(24.2)			
$def\_l^5_t - def\_l^1_t$	1.137***	1.130***	1.003***			
	(0.037)	(0.024)	(0.004)			
R^2	0.880	0.943	0.981			
Wald test of H_0: α=0, β=1	45.513***	32.037***	6.867**			
c	-35.31***	12.5				
	(9.94)	(9.97)				
$def\_l^6_t - def\_l^1_t$	1.084***	1.039***				
	(0.024)	(0.007)				
R^2	0.951	0.982				
Wald test of H_0: α=0, β=1	21.829***	92.818***				
c	-60.91**					
	(27.1)					
$def\_l^7_t - def\_l^1_t$	1.001***					
	(0.02)					
R^2	0.997					
Wald test of H_0: α=0, β=1	7.747**					
Nº of pool observations	118	120	149	150	180	180

Notes: Standard errors in parentheses. The symbols *, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively. The Wald coefficient test follows a χ^2 with two degrees of freedom.

Table 6: Accumulated revisions of government balances. Pooled EGLS estimates with cross section weights and fixed effects

	$def\_l^8_t - def\_l^1_t$	$def\_l^7_t - def\_l^1_t$	$def\_l^6_t - def\_l^1_t$	$def\_l^5_t - def\_l^1_t$	$def\_l^4_t - def\_l^1_t$	$def\_l^3_t - def\_l^1_t$
c	-2722.2***	-2375.7***	-1781.0***	-1549.8***	-1007.2***	-756.6***
	(41.9)	(37.6)	(48.9)	(46.7)	(32.3)	(21.0)
$def\_l^2_t - def\_l^1_t$	1.099***	1.160***	0.981***	0.980***	0.957***	0.963***
	(0.085)	(0.028)	(0.069)	(0.043)	(0.054)	(0.063)
R^2	0.784	0.869	0.65	0.774	0.611	0.698
Fixed effects test	9.856***	8.9745***	6.190***	6.474***	3.433***	2.683***
Wald test of H_0: α=0, β=1	5866.4***	4166.9***	1771.4***	1296.4***	975.5***	1297.5***
c	-2105.5***	-1748.0***	-1136.2***	-906.1***	-262.7***	
	(67.4)	(62.2)	(36.8)	(34.2)	(18.2)	
$def\_l^3_t - def\_l^1_t$	0.837***	0.867***	0.897***	0.899***	0.980***	
	(0.073)	(0.068)	(0.052)	(0.047)	(0.017)	
R^2	0.796	0.786	0.777	0.811	0.938	
Fixed effects test	7.843***	5.772***	4.152***	3.384**	1.164	
Wald test of H_0: α=0, β=1	4275.4***	2614.0***	1842.6***	1769.8***	209.9***	
c	-1534.4***	-1214.4***	-770.0***	-550.7***		
	(111.5)	(93.1)	(53.3)	(27.9)		
$def\_l^4_t - def\_l^1_t$	0.942***	0.940***	0.956***	0.949***		
	(0.073)	(0.056)	(0.034)	(0.021)		
R^2	0.859	0.879	0.884	0.934		
Fixed effects test	3.878***	3.597***	2.338***	1.961**		
Wald test of H_0: α=0, β=1	1905.4***	880.4***	999.6***	1159.8***		
c	-365.9***	-104.1*	-220.5***			
	(69.8)	(61.8)	(13.9)			
$def\_l^5_t - def\_l^1_t$	1.135***	1.123***	1.003***			
	(0.036)	(0.031)	(0.005)			
R^2	0.947	0.95	0.989			
Fixed effects test	1.371	0.993	1.555			
Wald test of H_0: α=0, β=1	2212.6***	449.4***	291.9***			
c	-270.3***	-43.5				
	(43.5)	(34.5)				
$def\_l^6_t - def\_l^1_t$	1.053***	1.028***				
	(0.022)	(0.015)				
R^2	0.957	0.969				
Fixed effects test	1.364	0.957				
Wald test of H_0: α=0, β=1	858.9***	117.1***				
c	-290.6***					
	(10.6)					
$def\_l^7_t - def\_l^1_t$	0.999***					
	(0.005)					
R^2	0.996					
Fixed effects test	1.261					
Wald test of H_0: α=0, β=1	1301.8***					
Nº of pool observations	118	120	149	150	180	180

Notes: Standard errors in parentheses. The symbols *, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively. The Wald coefficient test follows a χ^2 with two degrees of freedom.

Table 7: Accumulated revisions of government balances. Pooled EGLS estimates with cross section weights excluding Greece

	$def\_g^8_t$ - $def\_g^1_t$ (Ratios)		**$def\_l^8_t$ - $def\_l^1_t$ (Levels)**	
c	-0.160***	-0.236***	-1525.8***	-2648.4***
	(0.019)	(0.019)	(174.7)	(41.5)
$def\_?^2_t$ - $def\_?^1_t$	1.073***	1.081***	0.894***	1.105***
	(0.077)	(0.090)	(0.090)	(0.084)
R^2	0.389	0.728	0.297	0.785
Fixed effects test		5.137***		9.017***
Wald test of H_0: α=0, β=1	73.170***	176.681***	79.396***	5750.6***
c	-0.137***	-0.195***	-1271.1***	-2042.1***
	(0.015)	(0.020)	(113.9)	(70.4)
$def\_?^3_t$ - $def\_?^1_t$	0.971***	0.920***	0.852***	0.829***
	(0.081)	(0.106)	(0.097)	(0.075)
R^2	0.694	0.759	0.564	0.791
Fixed effects test		2.808***		7.222***
Wald test of H_0: α=0, β=1	92.199***	96.687***	125.568***	4020.5***
c	-0.081***	-0.128***	-577.3***	-1475.9***
	(0.017)	(0.020)	(128.5)	(113.4)
$def\_?^4_t$ - $def\_?^1_t$	1.058***	0.997***	1.071***	0.940***
	(0.037)	(0.063)	(0.069)	(0.073)
R^2	0.849	0.864	0.749	0.859
Fixed effects test		2.442***		3.324***
Wald test of H_0: α=0, β=1	163.959***	58.890***	22.029***	1811.7***
c	-0.053***	-0.080***	-106.0**	-291.0***
	(0.014)	(0.016)	(49.5)	(69.7)
$def\_?^5_t$ - $def\_?^1_t$	1.053***	1.053***	1.132***	1.135***
	(0.033)	(0.051)	(0.033)	(0.035)
R^2	0.915	0.922	0.893	0.949
Fixed effects test		1.286		1.198
Wald test of H_0: α=0, β=1	57.340***	67.113***	49.307***	1698.9***
c	-0.032***	-0.067***	-26.7***	-222.7***
	(0.009)	(0.009)	(8.73)	(39.0)
$def\_?^6_t$ - $def\_?^1_t$	1.015***	1.015***	1.076***	1.054***
	(0.015)	(0.014)	(0.019)	(0.020)
R^2	0.951	0.968	0.958	0.958
Fixed effects test		1.217		1.222
Wald test of H_0: α=0, β=1	28.552***	70.971***	23.796***	886.0***
c	-0.013	-0.035***	-51.8**	-252.9***
	(0.008)	(0.000)	(24.9)	(10.3)
$def\_?^7_t$ - $def\_?^1_t$	1.006***	1.000***	1.001***	0.999***
	(0.005)	(0.000)	(0.003)	(0.005)
R^2	0.991	1.000	0.998	0.996
Fixed effects test		1.375		1.123
Wald test of H_0: α=0, β=1	5.486*	6618.564***	6.372**	1019.0***
Nº of pool observations	110	110	110	110

Notes: Standard errors in parentheses. The symbols *, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively. The Wald coefficient test follows a χ^2 with two degrees of freedom.

Table 8: Long-term relationship between final and earlier deficit notifications. Pooled EGLS estimates with cross section weights. Dependent variable: $def\_?^8_t$ (government balances in the 8th notification)

	υ=1	υ=2	υ=3	υ=4	υ=5	υ=6	υ=7
Dependent variable: $def\_g^8_t$							
c	-0.355***	-0.366***	-0.307***	-0.217***	-0.151***	-0.111***	-0.076***
	(0.043)	(0.024)	(0.024)	(0.021)	(0.019)	(0.011)	(0.012)
$def\_g^{\upsilon}_t$	0.953***	0.966***	0.941***	0.968***	0.978***	0.987***	0.991***
	(0.019)	(0.007)	(0.023)	(0.020)	(0.016)	(0.006)	(0.004)
R^2	0.982	0.992	0.994	0.995	0.997	0.998	0.999
Fixed effects test	3.990***	5.299***	3.869***	2.844***	1.526	1.508	1.231
Wald test of H_0: α=0, β=1	73.100***	298.009***	287.974***	172.010***	106.831***	162.268***	90.229***
Nº of pool observations	118	118	118	118	118	118	118
Panel contegration tests:							
Pedroni: H_0: No cointegration							
Panel v-statistic (weighted)	-1.458	-1.756*	-0.462	-1.298	-1.522	-1.756*	-1.524
Panel ρ-statistic (weighted)	1.043	0.985	0.496	0.515	0.582	0.398	0.860
Panel PP-statistic (weighted)	-3.847***	-4.039***	-3.817***	-5.727***	-6.300***	-7.992***	-4.464***
Panel ADF-statistic (weighted)	-3.566***	-3.442***	-2.420**	-3.422***	-4.229***	-5.272***	-3.375***
Group ρ-statistic	2.382**	2.572**	2.380**	2.224**	2.163**	2.019*	2.558**
Group PP-statistic	-4.966***	-5.1056***	-3.444***	-7.423***	-9.303***	-11.390***	-4.612***
Group ADF-statistic	-3.578***	-4.336***	-1.847*	-3.040***	-5.579***	-6.232***	-2.562**
Kao: H_0: No cointegration							
DF t-statistic	-2.783***	-2.144***	-4.386***	-5.116***	-4.503***	-6.193***	-3.232***
DF* t-statistic	-1.854**	-2.237**	-2.249**	-3.204***	-2.724***	-3.369***	-3.139***
Dependent variable: $def\_l^8_t$							
c	-2848.3***	-2661.4***	-1995.9***	-1449.8***	-570.0***	-434.8***	-293.3***
	(81.4)	(37.4)	(61.5)	(53.4)	(68.9)	(32.4)	(9.777)
$def\_l^{\upsilon}_t$	0.999***	1.019***	0.992***	1.001***	1.016***	0.994***	0.999***
	(0.019)	(0.009)	(0.010)	(0.009)	(0.012)	(0.006)	(0.001)
R^2	0.993	0.996	0.996	0.997	0.996	0.997	1.000
Fixed effects test	4.713***	5.928***	5.417***	4.355***	2.259***	1.620*	1.203
Wald test of H_0: α=0, β=1	1697.7***	5472.6***	15854.7***	2255.8***	1273.1***	906.0***	1009.8***
Nº of pool observations	118	118	118	118	118	118	118
Panel contegration tests:							
Pedroni: H_0: No cointegration							
Panel v-statistic (weighted)	-0.498	-0.650	0.168	-0.915	-1.288	-1.366	-1.376
Panel ρ-statistic (weighted)	0.366	0.280	-0.400	-0.259	-0.222	-0.648	-0.281
Panel PP-statistic (weighted)	-3.797***	-4.330***	-5.627***	-7.895***	-7.599***	-9.163***	-7.128***
Panel ADF-statistic (weighted)	-2.889***	-3.377***	-5.034***	-5.568***	-5.039***	-6.597***	-5.294***
Group ρ-statistic	1.841*	1.999*	1.574	1.720*	1.613	1.206	1.756*
Group PP-statistic	-4.511***	-6.277***	-5.931***	-9.177***	-10.056***	-10.941***	-9.552***
Group ADF-statistic	-1.527	-2.842***	-4.464***	-4.267***	-5.087***	-6.389***	-5.781***
Kao: H_0: No cointegration							
DF t-statistic	-5.575***	-6.210***	-10.969***	-11.500***	-7.917***	-8.475***	-3.383***
DF* t-statistic	-1.434*	-1.045	-3.339***	-4.349***	-1.341*	-3.897***	-2.918***

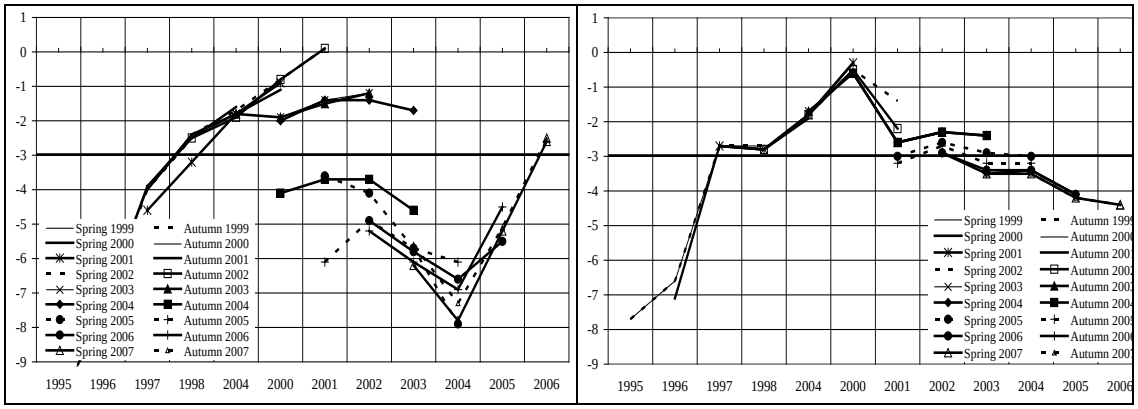
Notes: Standard errors in parentheses. The symbols *, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively. The Wald coefficient test follows a χ^2 with two degrees of freedom.

Table 9: Underlying factors behind government balance-to-GDP ratio revisions. Pooled EGLS estimates with cross section weights and fixed effects

	$y^m_t - y^v_t$						
	m=8	**m=7**	**m=6**	**m=5**	**m=4**	**m=3**	**m=2**
c	-0.164***	-0.129***	-0.059***	-0.054***	-0.047***	-0.012	0.007
	(0.030)	(0.028)	(0.011)	(0.012)	(0.010)	(0.009)	(0.007)
$GDP^m_t - GDP^1_t$	2.642*	2.195**	2.006***	1.633*	1.534**	1.287**	0.217
	(1.375)	(1.089)	(0.482)	(0.922)	(0.620)	(0.525)	(0.691)
$Y^m_t - Y^1_t$	76.338***	68.121***	77.925***	73.351***	74.440***	72.080***	71.522***
	(5.695)	(3.784)	(1.986)	(3.142)	(3.055)	(3.007)	(4.181)
Fixed effects test	3.054***	2.897***	3.342***	2.965***	2.592***	2.386***	2.232***
c	-0.191***	-0.142***	-0.091***	-0.085***	-0.065***	-0.029***	
	(0.026)	(0.025)	(0.011)	(0.006)	(0.011)	(0.006)	
$GDP^m_t - GDP^2_t$	1.642*	-0.349	0.772	0.452	0.047	-0.567	
	(0.979)	(0.787)	(0.682)	(0.661)	(0.795)	(0.454)	
$Y^m_t - Y^2_t$	68.972***	56.589***	67.837***	62.042***	55.856***	51.830***	
	(5.773)	(4.952)	(1.998)	(1.799)	(3.797)	(3.547)	
Fixed effects test	3.920***	3.694***	4.057***	3.457***	2.179**	2.201***	
c	-0.175***	-0.127***	-0.079***	-0.066***	-0.032***		
	(0.019)	(0.015)	(0.010)	(0.010)	(0.003)		
$GDP^m_t - GDP^3_t$	0.037	-0.035	0.134	-0.078	-0.252		
	(1.124)	(0.674)	(0.490)	(0.444)	(0.195)		
$Y^m_t - Y^3_t$	58.836***	52.830***	56.425***	51.896***	75.963***		
	(4.618)	(3.572)	(2.720)	(3.474)	(2.014)		
Fixed effects test	2.269***	1.924**	1.718*	1.067	1.122		
c	-0.124***	-0.078***	-0.035***	-0.028***			
	(0.014)	(0.08)	(0.004)	(0.004)			
$GDP^m_t - GDP^4_t$	0.664	0.408	-0.236	1.215			
	(1.027)	(0.646)	(0.906)	(0.890)			
$Y^m_t - Y^4_t$	59.523***	48.920***	52.658***	47.970***			
	(5.414)	(3.549)	(3.175)	(3.892)			
Fixed effects test	1.876	1.823**	1.949**	1.213			
c	-0.097***	-0.049***	-0.010***				
	(0.005)	(0.007)	(0.002)				
$GDP^m_t - GDP^5_t$	1.145***	0.855***	-0.264				
	(0.404)	(0.203)	(0.639)				
$Y^m_t - Y^5_t$	72.587***	59.160***	73.077***				
	(4.699)	(5.084)	(5.286)				
Fixed effects test	0.907	1.049	1.258				
c	-0.078***	-0.028***					
	(0.007)	(0.004)					
$GDP^m_t - GDP^6_t$	0.463	0.711*					
	(0.500)	(0.366)					
$Y^m_t - Y^6_t$	70.232***	58.250***					
	(5.649)	(4.419)					
Fixed effects test	0.960	1.165					
c	-0.046***						
	(0.009)						
$GDP^m_t - GDP^7_t$	0.676						
	(1.436)						
$Y^m_t - Y^7_t$	89.269***						
	(12.193)						
Fixed effects test	0.783						
Nº of pool observations	116	120	148	150	180	180	210

Notes: Standard errors in parentheses. The symbols *, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively.

Figure 1: Revisions to the government deficit (% of GDP) in Greece and Italy. The figure shows successive vintages of fiscal data as reported in Eurostat's Spring and Autumn Excessive Deficit Procedure (EDP) Notifications in some selected years.



Sources: authors' calculations on the basis of Eurostat data (successive EDP notifications for the years 1999-2006).

Figure 2: Histograms revisions of government balance-to-GDP ratios between vintages υ_{t-1} and υ_t