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Official fiscal forecasts in EU member states under the European Semester and Fiscal Compact – An empirical assessment

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ABSTRACT

The efficacy of official forecasts in the EU has been under the spotlight since the introduction of the euro, with biases widely reported prior to the 2008–12 financial and sovereign bond market crisis. Changes to the EU fiscal rules and procedures, in the form of the European Semester and Fiscal Compact, in the early 2010s were adopted to improve forecasting, including through providing a role for independent fiscal institutions. Using data for 22 countries between 2013 and 2019, this paper shows that, despite these changes, biases, of a pessimistic form, remain in forecasts of budget balance and output variables in Stability and Convergence Programmes and the European Commission's Spring Forecasts. Econometric analysis indicates forecast errors in both the headline budget balance and the structural budget balance being explained by forecast errors in output variables and by EU fiscal rule requirements. Member states under an excessive deficit procedure provide optimistic headline budget balance forecasts compared to non-EDP countries, while those that have not met their medium-term objective report smaller forecast errors for the structural budget balance. Independent fiscal institutions are linked to a smaller bias to forecasts of the structural budget balance but have no effect on the forecast errors of the headline budget balance.

1. Introduction

The efficacy of official fiscal forecasts – that is budgetary projections made by national governments and the European Commission - has been in the spotlight since the introduction of the euro. The literature in this area has primarily focussed on the forecasts of budget balance and output variables in EU member states' annual Stability and Convergence Programmes (SCPs). The emphasis on the overall, or headline, budget balance and its sub-component, the structural budget balance, over other fiscal variables reflect their being central to the EU fiscal rules. Excessive deficit procedures (EDPs) have been invoked when the headline budget balance is in deficit by more than 3 per cent and the structural budget balance is critical to the Stability and Growth Pact's medium-term objective (MTO) of a budget balance close to balance or in surplus. Forecasts of these budget balance ratios are dependent on output performance, which affects the headline budget balance's cyclical component directly and the structural budget balance indirectly. Consequently,

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evaluation of GDP growth and output gap projections are critical to assessing the viability of budget balance targets and the extent to which fiscal outturns differ from forecasts.[2]

Besides the influence of output conditions, there are political economy considerations surrounding official fiscal forecasts. The forecasts are in the public eye; as Jochimsen and Lehmann (2017, p. 212) note, in the parliamentary process "drawing up the budget attracts more attention than controlling budgetary implementation." The audience for fiscal forecasts will include both the electorate and analysts whose perspective on the projections can inform public reaction. Governments will want to be seen as competent in their management of the public finances and to have this illustrated in official forecasts. At the same time, they may wish to use fiscal policy to stimulate the economy to maintain their standing among the public. This can be a particularly important consideration when a general election is imminent or expected since, as Nordhaus (1975) notes, governments are primarily interested in being re-elected. Alesina and Perotti (1994) and Persson and Tabellini (1997) find governments looking to boost the economy through fiscal policy prior to elections to improve their appeal to the electorate. Biases in forecasts by national agencies have been found to be influenced by the electoral cycle (e.g., Bruck and Stephan, 2006; Brogan, 2012; Merola and Perez, 2013). Specific political economy considerations may act on budget balance forecasts among EU member states. The EU fiscal rules' emphasis on *ex-ante* performance (as captured in budgetary forecasts) incentivises an optimism bias to member states' forecasts that could lead them not to implement the planned budgetary adjustments needed to meet fiscal rule targets. Member states will also want to indicate in their forecasts that their structural budget balances are moving towards their MTO if that objective has not been met, while those in an EDP need to demonstrate that their headline budget balance is improving.

Empirical assessments have shown clear deficiencies in official forecasts within the EU. Strauch et al. (2004) detected biases in the forecasts in the earliest SCPs (those from between 1991 and 2002) with member states not using the information available to them efficiently. Jonung and Larch (2006) found an optimism bias in official forecasts of output growth among the four largest EU member states (Germany, France, Italy, and the UK), that is those forecasts, on average, over-estimated growth rates. Frankel (2011) and Frankel and Schreger (2013) attribute frequent *ex-post* violations of the excessive deficit threshold to such a bias. Fioramanti et al. (2016) find that, for many member states, larger forecast errors arose for the output growth rate and the General Government budget balance between 2008 and 2014 compared to the period 2000 to 2007. Fiscal policy in the EU is also responsive to output developments in a pro-cyclical manner (Larch et al., 2021a). Member states' fiscal policy often reacts to economic developments after their SCPs have been submitted, with recent data indicating intra-year fiscal policy in EU member states being sensitive to cyclical developments in the economy (Cronin and McQuinn, 2021a). In relation to the implementation of fiscal policy, Beetsma et al. (2009) noted budgetary adjustment routinely falling short of that planned. Such an occurrence implies, *ceteris paribus*, that fiscal outturns will be poorer than expected. Merola and Perez (2013) and Frankel and Schreger (2013) find member states subject to an EDP producing more optimistic budget balance forecasts.

As well as assessments of member states' forecasts, those of the European Commission have also been examined in the literature, including for the reason that such forecasts are critical to analysing member states' compliance with the EU fiscal rules. Yet, independent agencies, such as the Commission, often lack sufficient information about member states to provide accurate country forecasts (Leal et al., 2008). Merola and Perez (2013) outline a dilemma that the Commission and international agencies face when making projections for member states: they wish to obtain as much information from government forecasts and government agencies as possible, while facing a "signal extraction problem" in trying to discern authentic information from political partiality. Those authors find supra-national organisations displaying similar biases to member states. Von Hagen (2010) attributes such outturns to those institutions' reliance on national authorities for country information in preparing their own forecasts. Gilbert and De Jong (2017) hypothesise that such a dependence provides national authorities with an opportunity to steer Commission forecasts and illustrate that those forecasts are biased upwards when member states expect EU fiscal rules to hold.[3] Chabin et al. (2020) observe that Commission forecasts have been improving in recent years and have a comparable performance to that of other international institutions.

One mechanism for curbing biases and political sway in official forecasts is the putting in place of institutions that can help remove such influences (Fabrizio and Mody, 2006). Artis and Marcellino (2001) and Buettner and Kauder (2010) present evidence of greater forecasting accuracy being associated with institutional independence. Jonung and Larch (2006) argue that biases can be addressed by having independent national authorities prepare member states' official forecasts to "foster the production of unbiased forecasts". Their empirical assessment is that such institutions have no significant biases in their forecasts. Frankel and Schreger (2013) find smaller biases in official forecasts among member states that have adopted certain rules and institutions at the national level, particularly by creating independent fiscal institutions.

The sharp deterioration in member states' public finances in the late 2000s and the accompanying turmoil in European sovereign bond markets resulted in reforms of the EU fiscal rules, focussing in part on addressing deficiencies in official forecasts and in making forecasts independent of political influence. Those reforms were intended to address some of the longstanding issues highlighted above but also particular effects felt during that recessionary period. For example, Blanchard and Leigh (2013, 2014) find that a consequence of a poor forecasting of macroeconomic variables in the EU during the early 2010s was that the severity of fiscal consolidation measures on output growth were underestimated.

The major reforms to the EU fiscal rules and procedures then took place in two stages. First, the European Semester took effect in 2011 with the specific purpose of improving *ex-ante* budgetary policy among member states. It provided a more integrated framework

[2] Budget balances are not the only fiscal variables whose forecasting performance has been evaluated. For example, Buettner and Kauder (2010) and Chatagny (2015) focus on government revenue forecasting.

[3] McMorrow et al. (2017) also detect a sharp fall-off in the accuracy of Commission forecasts as the time horizon lengthens.

for peer review and assessment of member states' budgetary forecasts. The Semester spans the first six months of the calendar year, with the forecasts in the SCPs, submitted in April, being the focus of attention. The introduction of the Semester was followed by the adoption of the six pack in 2011 and of the Fiscal Compact (more formally, the fiscal chapter of the Treaty on Stability, Coordination and Governance), which took effect from the start of 2013. It aimed to reinforce the Pact, including by having EU fiscal rules written into national law, and to strengthen the Pact's "preventive arm" through greater scrutiny of member states' budgetary forecasts. These measures included providing a role for independent fiscal institutions in domestic budgetary practice with a view to tackling forecasting issues. Such institutions would provide autonomous oversight of member states' forecasting at the national level. Independent fiscal councils/institutions became the norm among member states during the 2010s.

Consequently, given this changed rules and oversight framework and the prospect that lessons were learned from earlier forecasting practices, it is appropriate to undertake an assessment of whether biases in official EU forecasts, widely documented as having occurred during the 1990s and 2000s, continue to arise, or not. This is pursued here through a statistical analysis of forecast errors and an econometric analysis of whether political economy factors and output growth forecast errors explain errors in forecasting fiscal variables. Given their importance to the EU fiscal rules, the focus is on annual projections for four variables (the General Government (headline) budget balance, the General Government structural budget balance, the real GDP growth rate and the output gap) relative to their outturns for 22 member states over the period 2013 (when the Fiscal Compact took effect) to 2019. The Spring Forecast occurs at a similar juncture in the calendar year to when SCPs are submitted and, consequently, the European Commission's forecasting performance is evaluated alongside that of the member states. Examining the Spring Forecast can also shed light on whether a supranational body, detached from the concerns of member states, has better forecasting power or shares any shortcomings in member states' forecasting.

In section 2, the data used in the study are outlined. Section 3 considers the descriptive statistics and the properties of the forecast errors of the four variables. Those indicate a pessimistic bias to the forecasts of the headline budget balance and the two output variables during the sample period. Section 4 then provides an econometric analysis of the forecast errors in the budget balance and the structural budget balance with a particular focus on how the critical EU rule requirements (the excessive deficit procedure and medium-term objective) and related institutions (independent fiscal councils) affect those errors. The estimations indicate that forecast errors in the output variables explain forecast errors in the budget balance variables. Member states in an excessive deficit procedure provide optimistic forecasts of the headline budget balance relative to non-EDP countries, while countries that have not yet met their medium term objective have smaller structural budget balance errors. Member states with independent fiscal institutions report smaller forecast errors for the structural budget balance, but not the headline budget balance, than those without those institutions. Section 5 concludes by assessing the empirical findings and their policy consequences.

2. Data

Official forecasts for four variables are considered. There are two budget balance measures: the General Government budget balance (also referred to as the headline budget balance) (*b*), expressed as a percentage of GDP, and its sub-component, the General Government structural budget balance (*sbb*), expressed as a percentage of potential output. There are also two measures of economic activity: the real GDP growth rate (*g*), in percentage points, and the output gap (*ygap*), expressed as a percentage of potential output. The latter two variables, and forecast errors in same, will have an influence on the outturns of the budget balance variables for two reasons. One is the direct effect that output fluctuations have on the cyclical component of *b* and the other is an indirect effect where government pursues a looser or tighter fiscal stance, which affects both *b* and *sbb*, in response to intra-year output developments that were unforeseen at the time forecasts were made. The projections assessed are those contained in the Stability and Convergence Programmes (*SCP*) and the European Commission's (*EC*) Spring Forecasts. Both *SCP* and *EC* forecasts are contained in the European Commission's annual overview of SCPs submitted in the current year (published in its *Institutional Papers* series).[4] The forecasts considered for each of the four variables are those for the current year, *t* (so, for example, the forecasts for 2013 in the SCPs and Spring Forecasts of that year are those evaluated).

As well as providing a single source of forecasts, the overviews published since 2013 contain tables of the forecasts of both the SCP output gaps and the structural budget balances harmonised by the Commission according to a standard methodology. Those harmonised series render consistent the data provided by member states for those variables for the 2013–2019 sample and allows them be compared to the *sbb* and *ygap* entries in the Spring Forecast. This harmonisation procedure is in operation since 2013, by which stage the post-crisis enhancement of the EU fiscal rules had been broadly completed, with a new, stable EU fiscal policy regime set in place. Those rules required member states to provide realistic projections based on the use of available data. The expectation among policymakers in implementing such changes to the review process, and in both member states and the Commission needing to be transparent about their forecasting procedures to financial markets and other observers, was that they would mitigate biases to official forecasts.[5]

[4] See: https://ec.europa.eu/info/business-economy-euro/economy-finance-and-euro-publications_en.

[5] As well as the new rules being in effect since that time, the absence of harmonised structural budget balance and output gap data before 2013 suggests that date as a suitable starting point for the empirical analysis. Moreover, the years 2008–2012 were extraordinary ones in terms of fiscal and output performance. There was also a change in the national accounts standard from ESA95 to ESA10, which renders integrating forecasts and outturns across different periods into a single dataset difficult. The main findings of the literature on pre-2008 official fiscal forecasting are covered in the literature review above.

Outturn values for the variables are taken from the EU AMECO database. Two vintages of outturn data are used. The first is the most recent release of data for the four variables (i.e. the Spring 2021 vintage of data), while the other is the Autumn $t+1$ vintage for each variable (for example, the 2013 outturn data are from the Autumn 2014 release, the 2014 outturns from the Autumn 2015 release, and so on). The latter would reflect the first releases of national account outturn data of the member states and are identified by the superscript 1*st* below, while the former are labelled by the superscript *lat*. Choosing to use both forms of outturn reflects a view in the literature that outcomes can be widely affected by fiscal and macroeconomic data revisions. De Castro et al. (2013) find preliminary EU data releases are biased and non-efficient predictors of subsequent releases, with contributory factors including Eurostat decisions and creative-accounting practices arising at the time first releases occur. Likewise, Cimadomo (2016) notes that fiscal revisions of outturn data are often large and initial releases can provide biased estimates of final values. The quality and accuracy of the data may improve in later vintages. At the same time, such revised outturn data may be owing to new information and changed methodological procedures but that then could lead to a finding of forecasting bias that is not, in fact, owing to the prowess of the forecaster but to those changes taking place. Initial releases may capture better the information set that was available to the forecasters. Given these issues, both the initial and the most recent releases are used here.

Data are available for all seven years, 2013 to 2019, for 24 of the 28 EU member states during this period. The exceptions are Greece (which had no SCP during this period, except in 2019), Cyprus (no Programme between 2013 and 2015), the United Kingdom (limited reporting of forecasts in its 2015 SCP), and Croatia (no SCP for 2013 and 2014).[6] To maintain a balanced panel, these countries are then excluded from the dataset examined. A further issue is that there are large outliers among the GDP growth rate outturn data for Ireland and Malta, particularly in 2015. Those two member states were then excluded from the panel as well. Consequently, the panel comprises data for 22 EU member states over the years 2013–2019, providing 154 observations for each variable for the current year.[7] Outturns beyond the current year will be affected by whatever tax and spending decisions are made in budgets subsequent to that provided for the current year, *t*, and, accordingly, are subject to much greater uncertainty. Moreover, as Larch et al. (2021b, p.1) put it, “in several countries, medium term plans remain moving targets built on faith” and EU surveillance is still very much centred on the current year. Consequently, while both SCPs and the Spring Forecast provide budgetary and economic forecasts over a medium-term horizon, the focus here is on the forecast and subsequent outturn for year *t*.

3. Properties of the forecast errors

3.1. Properties of forecasts of the headline budget balance and the structural budget balance

Biases in the forecasts of fiscal variables in EU member states have been evident in many studies of governmental and international agencies (see the review in Leal et al., 2008). In assessing SCP forecasts between 1999 and 2013, Giuriato et al. (2016) find average budget balance forecasts in EU member states varying between being optimistic and pessimistic over time. Fig. 1a shows histogram plots of *b* in the first column and *sbb* in the second column across all 22 member states and seven years. The first row shows the range of forecasts of those two variables for the current year, *t*, contained in SCPs over the sample period, with the forecasts of the European Commission Spring Forecast (EC), also for *t*, in the second row. The AMECO outturns for those years are shown in the third row (the latest release (Spring 2021) data, marked *lat*) and the fourth row (first release data, 1*st*). The horizontal axis in this chart (and in Fig. 1b) shows the range of forecasts that arise, and the vertical axis their frequency.

Descriptive statistics of those fiscal variables are provided in Table 1a with the *lat* and 1*st* superscripts indicating the outturn values and the *SCP* and *EC* superscripts the Stability/Convergence Programme and European Commission forecasts, respectively. The ratios in the first two rows show that for both forecasts and outturns, the mean and median *b* and *sbb* values are negative at between minus one and minus two per cent of GDP/potential GDP, i.e. deficit values arise. The mean and median outturns for both budget balance variables are closer to balance than the forecasts with the exception of the SCP *sbb* forecast. The standard deviations of the two variables' outturns are larger than those of the forecasts, as are the Jarque-Bera statistics. The range of outturns values between maximum and minimum values is also bigger than arises for the projected values.

Table 1b considers the statistics of both sets of forecast errors of the fiscal variables (with those forecast errors plotted in Fig. 1b). The forecast errors, both here and for the output variables below, are calculated as the realised value less the forecast value. Following on from Table 1a, the mean and median forecast errors have positive values with the exception of the mean error on the SCP structural budget balance forecast error, where the latest release is used for outturn values, which has a small negative value. Table 1b contains a number of test results. The first test is of the null hypothesis that the mean of the forecast errors is equal to zero against the two-sided alternative that it is not equal to zero. Based on a t-statistic, the *p*-value indicates that the null hypothesis is rejected at conventional significance levels for the columns where the forecast errors in *b* are considered (i.e., columns (i)-(iv)) but not for three of the four where the errors in *sbb* are assessed.[8] Consequently, the forecast errors for the headline budget balance, varying in a range of 0.22–0.25, are significant and indicate outturn values for the variable to be better than forecast, implying a pessimistic forecasting bias

[6] The Commission provided no structural budget balance forecast for Portugal for the year 2014 in its Spring Forecast. Since the relevant SCP has a forecast for that variable for 2014, Portugal is maintained in the dataset.

[7] Those 22 member states are Austria, Belgium, Bulgaria, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Luxembourg, The Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.

[8] The results for the structural budget balance compare to those of Hughes Hallett et al. (2007) who find data revisions to be so large as to render real-time estimates of cyclically-adjusted balances to have little power in capturing fiscal slippages as they occur.

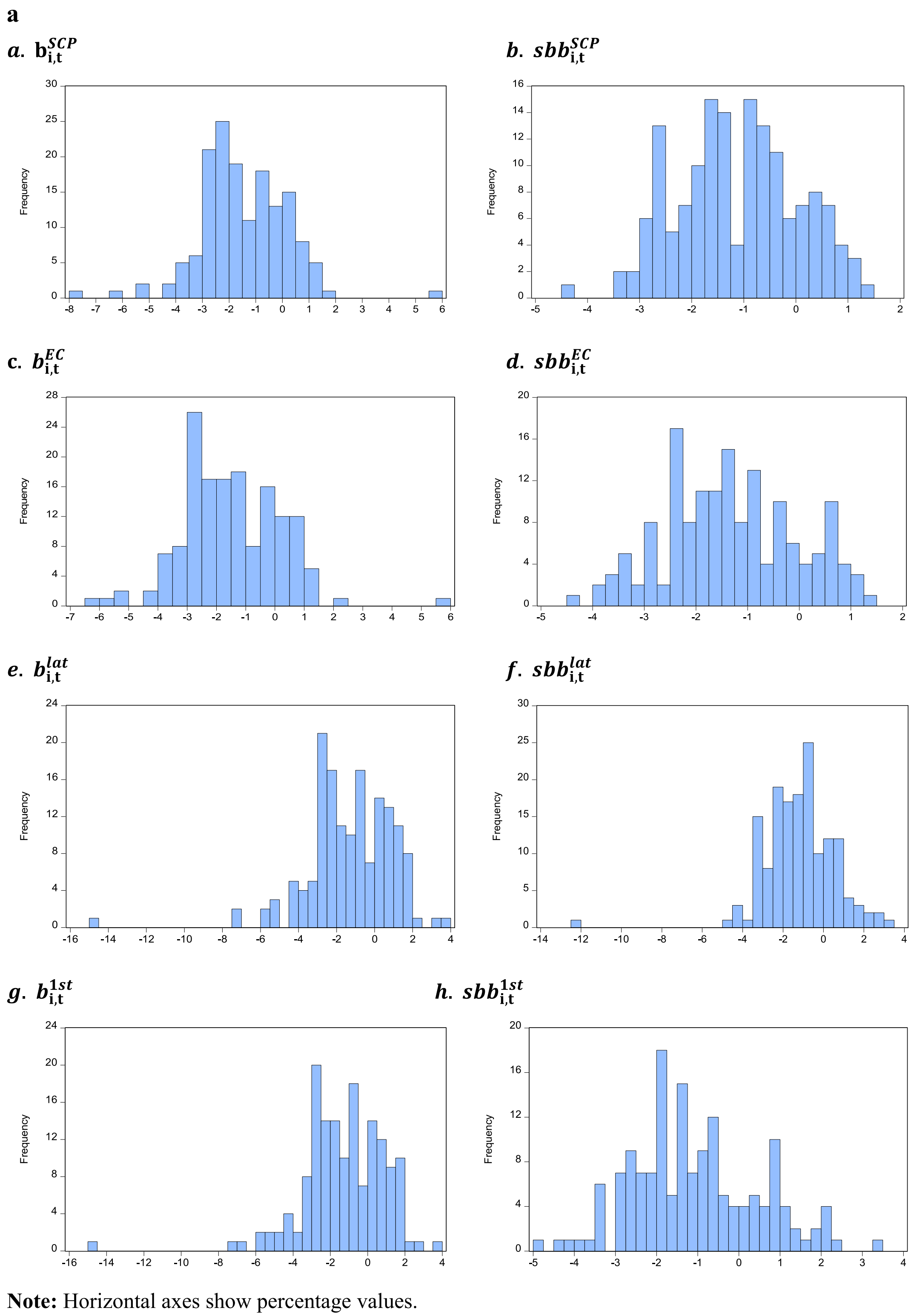
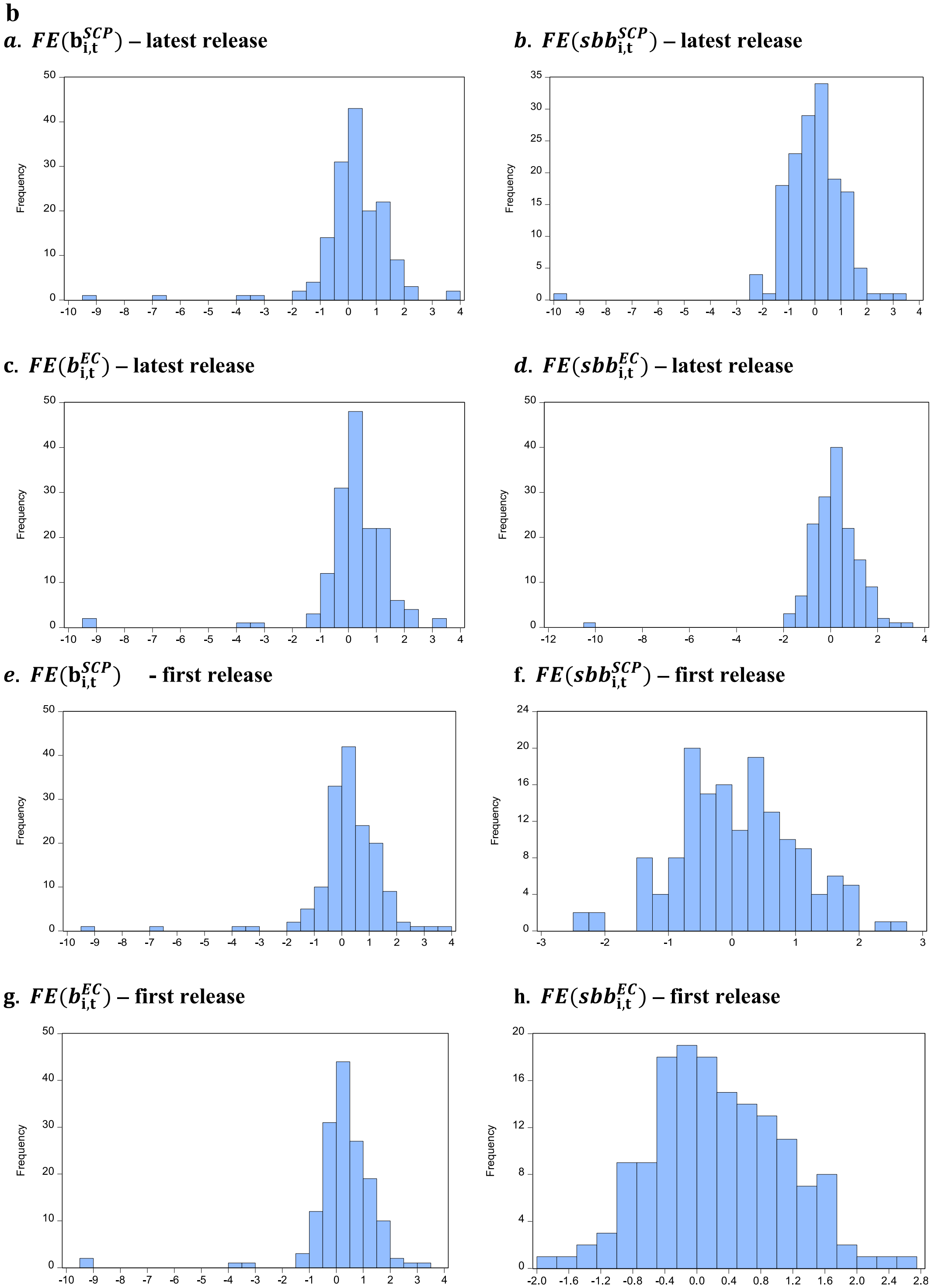


Fig. 1. **a.** Histogram plots of budget balance (b) and structural budget balance (sbb) ratios forecasts and outturns. **Note:** Horizontal axes show percentage values. **b.** Histogram plots of forecast errors of budget balance (b) and structural budget balance (sbb) ratios forecasts and outturns. **Note:** Horizontal axes: percentage values. Outturn data used in a.-d. are latest releases; e.-h.: first releases.



Note: Hori. axes: percentage values. Outturn data used in a.-d. are latest releases; e.-h.: first releases

Fig. 1. (*continued*).

Table 1a
Descriptive statistics of fiscal variables.

	(i) $b_{i,t}^{SCP}$	(ii) $b_{i,t}^{EC}$	(iii) $b_{i,t}^{lat}$	(iv) $b_{i,t}^{1st}$	(v) $sbb_{i,t}^{SCP}$	(vi) $sbb_{i,t}^{EC}$	(vii) $sbb_{i,t}^{lat}$	(viii) $sbb_{i,t}^{1st}$
Mean (%)	−1.53	−1.56	−1.31	−1.31	−1.15	−1.33	−1.19	−1.06
Median (%)	−1.65	−1.7	−1.26	−1.29	−1.1	−1.4	−1.14	−1.28
Maximum (%)	5.8	5.7	3.78	3.78	1.4	1.4	3.46	3.46
Minimum (%)	−7.9	−6.5	−14.59	−14.56	−4.3	−4.4	−12.41	−4.98
Standard deviation	1.65	1.68	2.26	2.23	1.16	1.26	1.79	1.54
Skewness	0.04	0.32	−1.44	−1.49	−0.01	0.09	−1.31	0.33
Kurtosis	5.89	4.53	9.67	10.02	2.36	2.37	11.98	2.80
Jarque-Bera	53.71	17.71	337.43	372.80	2.67	2.74	561.96	3.06
No. of observations	154	154	154	154	154	153	154	154

Table 1b
Statistics of forecast errors of fiscal variables.

	(i) $b_{i,t}^{lat} - b_{i,t}^{SCP}$	(ii) $b_{i,t}^{1st} - b_{i,t}^{SCP}$	(iii) $b_{i,t}^{lat} - b_{i,t}^{EC}$	(iv) $b_{i,t}^{1st} - b_{i,t}^{EC}$	(v) $sbb_{i,t}^{lat} - sbb_{i,t}^{SCP}$	(vi) $sbb_{i,t}^{1st} - sbb_{i,t}^{SCP}$	(vii) $sbb_{i,t}^{lat} - sbb_{i,t}^{EC}$	(viii) $sbb_{i,t}^{1st} - sbb_{i,t}^{EC}$
Mean (%)	0.22	0.22	0.24	0.25	−0.03	0.09	0.15	0.27
Significance (Mean = 0)	0.06	0.04	0.04	0.03	0.73	0.23	0.13	0.00
Median (%)	0.21	0.21	0.28	0.30	0.03	0.08	0.16	0.24
Sign (Exact binomial)	0.00	0.00	0.00	0.00	0.94	0.81	0.04	0.02
Sign (Normal approximation)	0.00	0.00	0.00	0.00	0.94	0.81	0.04	0.02
Wilcoxon signed rank	0.00	0.00	0.00	0.00	0.94	0.28	0.01	0.00
Van de Waerden test	0.00	0.00	0.00	0.00	0.94	0.24	0.00	0.00
No. of observations	154	154	154	154	154	154	153	153

Note: All entries in second and third column (except mean and median values) are probability values.

occurring on the part of both domestic authorities and the Commission.[9]

The left-hand-side column of Fig. 1b, which provides a histogram plot of the forecast error of the two variables, shows two large negative outlier values arising for *b*. Those outliers pertain to the Slovenia 2013 and Poland 2014 observations, with the deficit outturns being much larger than were forecast by both the member states and the Commission. There is also a large forecast error for *sbb* for the Slovenia 2013 observation where the latest outturn release is used in calculating the error. Examining the median forecast error can address the sensitivity of mean error values to such outliers. The null hypothesis that the sample median of each forecast error equals zero is tested using the binomial distribution sign test, the normal distribution sign test, the Wilcoxon signed ranks test and the Van der Waerden normal scores test. The results in Table 1b show the probability values of each of these tests indicating a rejection of the null hypothesis that the median error is equal to zero in the case of those involving *b* (columns (i) to (iv)). For the *sbb*, the null hypothesis is rejected for the forecast error where *EC* forecasts are under consideration but is not rejected for the *SCP* forecast errors.[10] [11]

[9] Merola and Perez (2013) also find a pessimistic bias to official forecasts of EU government budget balances over a sample period of 1999–2007.

[10] Moulin and Wierts (2006) indicated that a failure of member states to reduce government deficits to the extent expected during the early years of monetary union largely reflected their not adhering to expenditure plans. A separate exercise here considered the forecast errors of the two main components of the headline budget balance ratio – the total revenue ratio (*TR*) and the total expenditure ratio (*TE*). The appendix table, Table A1, shows those errors and the results of the same form of tests applied in Table 1b. It indicates that the mean forecast errors for the headline budget balance arise more from errors in forecasting government revenue than in expenditure, although those mean errors are not statistically significant for the two components, with the exception of column (vii). The small size of the total expenditure errors stands in contrast to the summary assessment in European Commission (2014, p.82) that expenditure slippages have historically played the dominant role in explaining overall budget errors in the EU.

[11] Grigoli et al. (2015) argue that confidence intervals around macroeconomic forecasts can vary by country. To consider cross-country differences in forecast errors of the headline budget balance, those errors were regressed on the respective forecast errors in the GDP growth rate, dummy variables for Poland 2014 and Slovenia 2013 (discussed in section 4 below), and country fixed effects using OLS and instrumental variable techniques (also discussed in greater detail in section 4). Such a procedure can address whether there are differences between member states in relation to the optimism or pessimism of forecasts, an issue examined by Rybacki (2021). The results are shown in Tables A2 and A3 with Belgium serving as the constant term, whose value is insignificant across all columns. Considering Table A2 where the latest releases are used to calculate the forecast errors for both variables, columns (i) and (ii) indicate several longstanding member states (The Netherlands, Austria, Denmark, Germany, Sweden and Luxembourg) having large statistically significant positive coefficients, indicating their average budget balance outturns being different from Belgium. This pattern is broadly replicated in Table A3 where the regression results using errors calculated with first release outturns are displayed. For these member states, the forecast errors made by the European Commission are usually smaller in value, in absolute terms, and often insignificant. The results suggest that there is no particular relationship between fiscal forecast errors and country size as the group of countries with significantly different average errors from the reference country are quite heterogeneous in terms of population and output levels.

3.2. Properties of forecasts of the real GDP growth rate and the output gap

Fig. 2a provides histogram plots of the forecasts and outturns for the real GDP growth rate, *g*, in the current year, *t*, in the left-hand-side column and for those of the output gap, *ygap*, in the same year in the right-hand-side column. Table 2a shows the mean and median outturns for *g* being higher than those of the SCP or Commission's forecasts, while the negative *ygap* values are closer to zero for the outturns compared to the forecasts (the median output gap value is positive for the latest return). Fig. 2b shows the histogram plots of the forecast errors of the output variables and Table 2b provides tests of the mean and median errors. As follows from Table 2a, there are positive mean and median forecast errors for both the real GDP growth rate and the output gap. The various tests of the null hypothesis that those mean/median errors are equal to zero rejects that hypothesis in all cases bar those in column (ii). The mean error for the real GDP growth rate is in a range of 0.13–0.40, while the range for the output gap is 0.42–0.62. Both sets of errors then generally indicate undue pessimism by both member states and the Commission in forecasting these two output variables.

The data and tests above then point to significant biases arising in official forecasts of critical fiscal and economic activity variables in the EU between 2013 and 2019, with the exception of the SCP *sbb* forecasts and the SCP *g* forecasts relative to the first releases. These biases reflect Commission and member state forecasts being less than outturn values; in other words, those institutions have been pessimistic in making projections, both for fiscal and output variables, since 2013. This differs from the findings of Strauch et al. (2004), Jonung and Larch (2006), Frankel (2011), and Frankel and Schreger (2013) who detect an optimistic bias in official output and fiscal forecasts during the 1990s and 2000s. The findings here for the two output variables are consistent with those of Cronin and McQuinn (2021b) who consider SCP and Spring Forecast real GDP growth forecasts (but not output gap or budget balance forecasts) for the 2013–2018 period and show those forecasts to have a pessimistic bias.

It is possible that the better-than-projected outturns that arise for the headline budget balance (*b*) are owing to output conditions turning out to be better than expected. This is because the cyclical component of the budget balance will improve when output growth is greater than forecast. Better-than-projected output outturns, in turn, could be owing at least in part to where member states are in the economic cycle, with member states not using the information available to them efficiently. During the sample period, 2013–2019, considered here, most member states were on the upswing of the economic cycle. Over a similar timeframe and country dataset to that used here, Cronin and McQuinn (2021a) find past realisations of GDP growth having a significant effect on future expectations of growth in EU countries. With the European economy recovering from the deep recession of the early 2010s, forecasters may have been cautious in making projections. Nevertheless, such forecasts are not rational and leave room for improvement.[12]

A positive error in the *sbb* - as reported here, on balance, in the case of the Commission's forecasts for that variable but not for the SCP projections – indicates that, absent any measurement issues, the fiscal stance proved more strenuous *ex-post* than *ex-ante*. This could be owing to real-time cyclical developments in the economy causing intra-year policy changes or the deviation of outturn from forecast could be independent of such cyclical factors and owing to other considerations, including the type of political ones mentioned in section 1. These other factors could also contribute to the forecast errors in *b*. These possibilities warrant an econometric investigation of the determinants of the forecast errors in both fiscal variables and whether the forecast errors in *b* and *sbb* are owing to unforeseen cyclical developments arising in the economy subsequent to the forecasts being made and/or to other factors that cause budgetary policy to differ from that on which forecasts are based.

4. Determinants of headline and structural budget balance forecast errors

4.1. Methodology and regression specifications

An assessment of the determinants of the fiscal errors, that is the forecast errors of the headline and structural budget balances, is undertaken against the background of the discussion above. One possible explanatory variable of fiscal errors are the errors in the forecasts of macroeconomic activity made by the member states and the European Commission, as represented by the real GDP growth and output gap variables. The headline budget balance is endogenous to the output growth rate with a better-than-expected (less-than-expected) growth outturn effecting an improvement (deterioration) in its cyclical budget component. Accordingly, Pina and Venes (2011), Beetsma et al. (2013) and Giuriato et al. (2016) include the forecast error in real output growth on the right-hand-side of their regressions explaining fiscal forecast errors. By construction, the economic cycle does not have any direct effect on the structural budget balance but it can have an indirect influence insofar as government may change fiscal policy in response to whether the economy is doing better or worse than initially forecast. Any change in fiscal policy that occurs will have an effect on the *ex-post* structural budget balance, and on the *ex-post* overall budget balance, compared to *ex-ante* values.

Besides economic conditions, political factors can also have influence on fiscal forecasts and ensuing errors. Giuriato et al. (2016) outline some of the general difficulties that arise, with government manipulating fiscal forecasts to comply with fiscal rule requirements, to sway financial investors, and to pursue political agendas, while attributing the forecast errors that follow to exogenous events. This results in fiscal illusion - that is a systemic misperception among the public in relation to critical fiscal variables. One factor that can cause forecasting bias is governments projecting a more benign fiscal outlook than is warranted when a general election is due or expected to take place. Such behaviour would induce a systematic bias to the fiscal forecasts with the headline budget balance proving to be worse than forecast, *ceteris paribus*. Bruck and Stephan (2006) find euro area governments manipulating deficit forecasts

[12] This feature of official forecasts being sensitive to the stage of the economic cycle has been noted previously with Strauch et al. (2004), who focus on SCP forecasts between 1991 and 2002, finding forecasting biases to be owing in part to where member states are in the cycle.

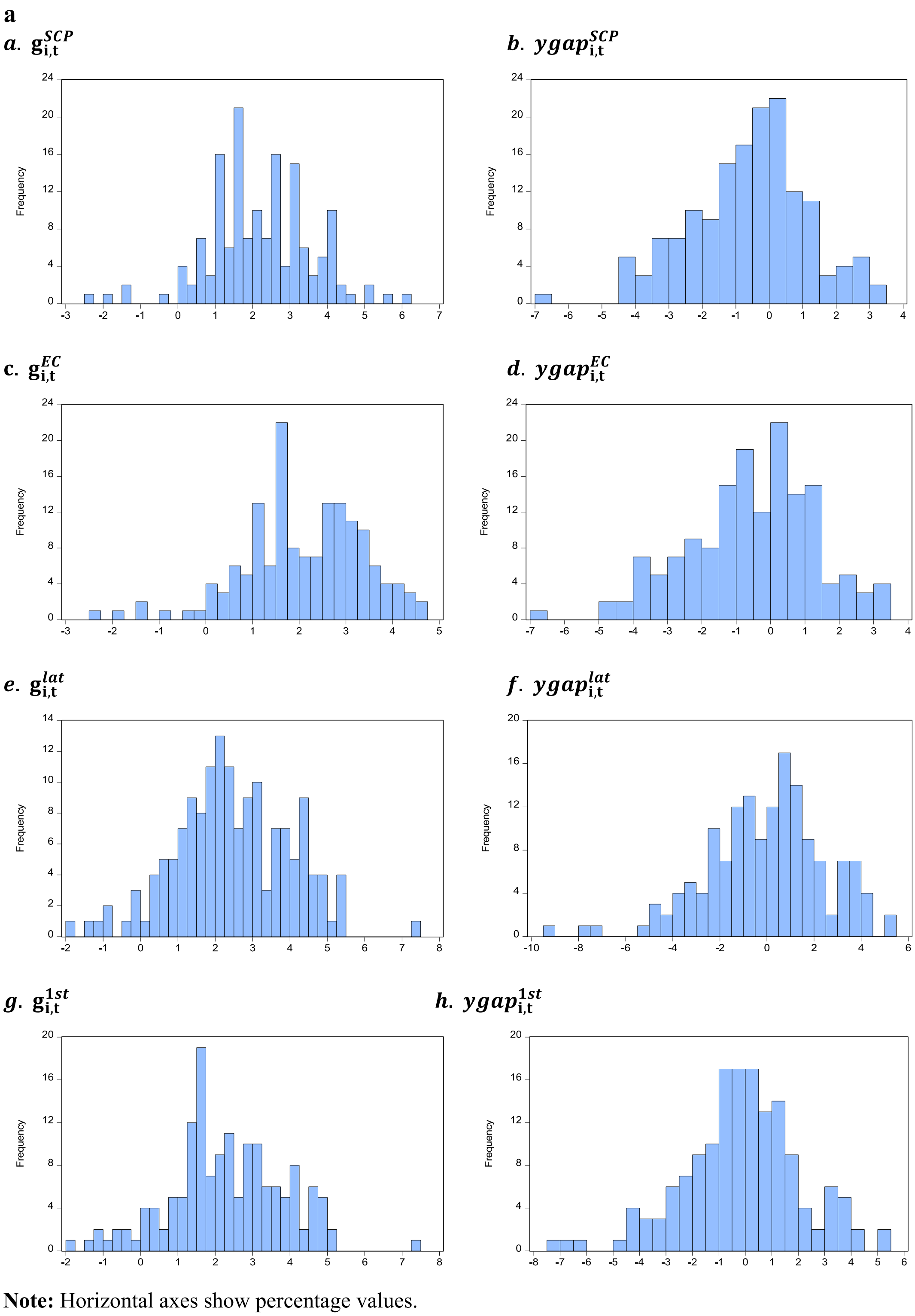
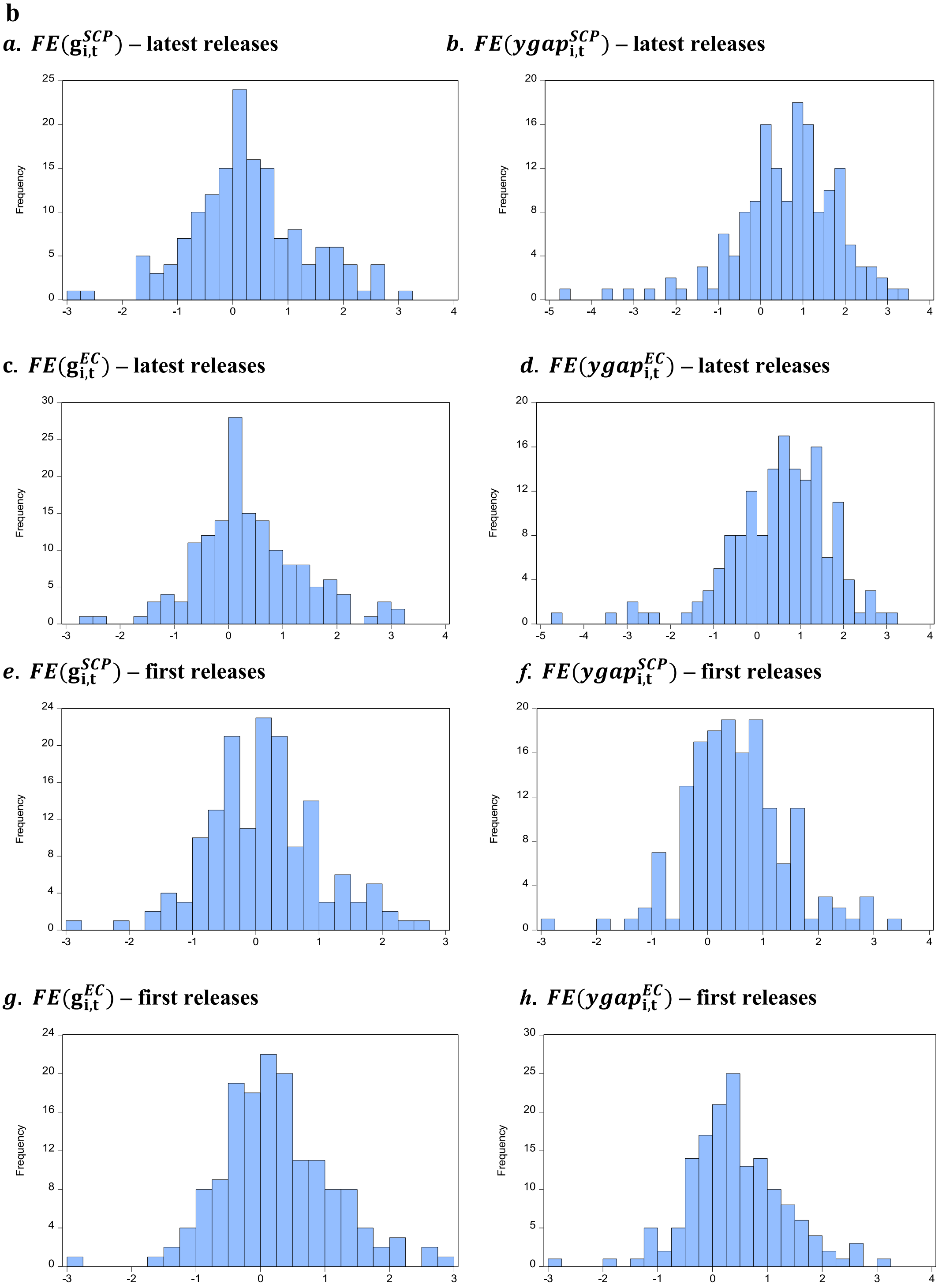


Fig. 2. a. Histogram plots of real GDP growth rate (*g*) and output gap (*ygap*) forecasts and outturns. **Note:** Horizontal axes show percentage values. **b.** Histogram plots of forecast errors of real GDP growth rate (*g*) and output gap (*ygap*) forecasts and outturns. **Note:** Horizontal axes: percentage values. Outturn data used in a.-d. are latest releases; e.-h.: first releases.



Note: Hori. axes: percentage values. Outturn data used in a.-d. are latest releases; e.-h.: first releases.

Fig. 2. (*continued*).

Table 2a
Descriptive statistics of output variables.

	(i) $g_{i,t}^{SCP}$	(ii) $g_{i,t}^{EC}$	(iii) $g_{i,t}^{lat}$	(iv) $g_{i,t}^{1st}$	(v) $ygap_{i,t}^{SCP}$	(vi) $ygap_{i,t}^{EC}$	(vii) $ygap_{i,t}^{lat}$	(viii) $ygap_{i,t}^{1st}$
Mean (%)	2.18	2.06	2.46	2.31	−0.66	−0.57	−0.04	−0.14
Median (%)	2.1	2.05	2.33	2.26	−0.4	−0.45	0.28	−0.21
Maximum (%)	6.1	4.7	7.32	7.26	3.4	3.4	5.24	5.24
Minimum (%)	−2.3	−2.3	−1.84	−1.93	−6.6	−6.7	−9.14	−7.49
Standard deviation	1.37	1.29	1.55	1.54	1.76	1.86	2.52	2.23
Skewness	−0.16	−0.56	−0.02	−0.08	−0.31	−0.34	−0.50	−0.28
Kurtosis	3.74	3.67	3.11	3.22	3.24	3.10	3.79	3.73
Jarque-Bera	4.25	10.82	0.09	0.47	2.83	3.00	10.49	5.33
No. of observations	154	154	154	154	154	154	154	154

Table 2b
Statistics of forecast errors of output variables.

	(i) $g_{i,t}^{lat} - g_{i,t}^{SCP}$	(ii) $g_{i,t}^{1st} - g_{i,t}^{SCP}$	(iii) $g_{i,t}^{lat} - g_{i,t}^{EC}$	(iv) $g_{i,t}^{1st} - g_{i,t}^{EC}$	(v) $ygap_{i,t}^{lat} - ygap_{i,t}^{SCP}$	(vi) $ygap_{i,t}^{1st} - ygap_{i,t}^{SCP}$	(vii) $ygap_{i,t}^{lat} - ygap_{i,t}^{EC}$	(viii) $ygap_{i,t}^{1st} - ygap_{i,t}^{EC}$
Mean (%)	0.28	0.13	0.40	0.25	0.62	0.52	0.52	0.42
Significance (Mean = 0)	0.00	0.08	0.00	0.00	0.00	0.00	0.000	0.00
Median (%)	0.19	0.13	0.24	0.16	0.79	0.48	0.65	0.33
Sign (Exact binomial)	0.00	0.09	0.00	0.02	0.00	0.00	0.00	0.00
Sign (Normal approximation)	0.00	0.09	0.00	0.02	0.00	0.00	0.00	0.00
Wilcoxon signed rank	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00
Van de Waerden test	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
No. of observations	154	154	154	154	154	154	154	154

Note: All entries in second and third column (except mean and median values) are probability values.

before elections, while Merola and Perez (2013) show that both international agencies and governments' forecasts are correlated with the electoral cycle. Jong-A-Pin et al. (2012) find distortions in government data revisions occurring in line with the electoral cycle.[13]

Of possibly greater importance here is whether budget balance thresholds continue to be influences on fiscal forecasts errors in EU member states even with the reforms provided by the Compact and Semester. Member states subject to an EDP must pursue headline budget balance values that allow the procedure to be revoked. States must also adhere to a medium-term objective (MTO) in setting their budgetary plans, whereby their structural budget balance meets a particular numerical value or is moving towards meeting that target. The EDP and MTO thresholds then operate on the forecasts of headline budget balance and the structural budget balance, respectively, under the EU fiscal rules. A concern follows that these requirements will lead affected member states to be unduly optimistic in their budget balance projections, *ceteris paribus*, and that such behaviour will then be a source of forecasting errors.

One further form of institutional influence on fiscal forecasts in the EU, designed in part to correct forecasting errors, relates to the manner in which forecasts are made, or inspected, at national level. Giuriato et al. (2016) indicate that political structures, along with fiscal rules, affect the quality of fiscal forecasts. Beetsma et al. (2013) consider improvements in the quality of fiscal institutions (including greater transparency in budgetary processes and the putting in place of a medium-term budgetary framework) to be beneficial to the data reported both at the time budgets are formalised and when budget outturns are announced. In this regard, the presence of independent fiscal institutions in member states may affect fiscal projections, with those advocating for such institutions of the view that they can improve forecasting compared to a situation where councils are not in place. Debrun and Kinda (2017) observe such institutions being associated with better projections, with lower forecasting biases arising. Beetsma et al. (2019) evaluate the performance of independent fiscal bodies using an IMF fiscal council database with their tentative econometric evidence indicating those bodies being associated with more accurate and possibly less optimistic fiscal forecasts.

Given the above arguments, the following equation is estimated for the headline budget balance forecast error:

$$\varepsilon_{i,t}^{BB} = \alpha + \beta_1 \varepsilon_{i,t}^{GDP} + \beta_2 EDP_{i,t} + \beta_3 ELECT_{i,t} + \beta_4 IFC_{i,t} + \beta_5 DVSL13_{i,t} + +\beta_6 DVPL14_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $\varepsilon_{i,t}^{BB}$ is the budget balance forecast error (as defined previously where the error is the realised outturn less the forecast) for country *i* in year *t* and $\varepsilon_{i,t}^{GDP}$ is the corresponding forecast error of the real GDP growth (again, as defined previously).[14] The dummy

[13] There are other political factors that could influence fiscal projections such as the ideological outlook of the government (Bischoff and Gohout, 2010; Chatagny, 2015), its length of tenure in office, the extent to which budgeting procedures are centralised (Hallerberg et al., 2007) and the degree of political fragmentation (Goeminne et al., 2008). These factors are, however, beyond the scope of this paper whose primary focus is on the influence that EU fiscal rule-related institutional features have on forecast errors.

[14] By "corresponding", it is meant that the forecast error of the output variable is calculated from the same forecast (be that *SCP* or *EC*) and outturn (be that *lat* or 1*st*) source as the fiscal variable.

variable $EDP_{i,t}$ has a value of one if member state i is subject to an EDP procedure in the current year, and is zero otherwise.[15] The dummy variable $ELECT_{i,t}$ has a value of one if a general election occurred in the member state in year t, and is zero otherwise.[16] The dummy variable $IFC_{i,t}$ has a value of one if an independent fiscal council is in place in the member state in the particular year, and zero otherwise.[17] The dummy variables $DVSL13_{i,t}$ and $DVPL14_{i,t}$ address outliers in the budget balance forecast errors of Slovenia in 2013 and Poland in 2014, respectively, with each dummy variable consequently having a value of one for each specific observation and of zero otherwise.

The regression equation for the structural budget balance forecast error is specified in (2).

$$\varepsilon_{i,t}^{SBB} = \alpha + \beta_1 \varepsilon_{i,t}^{GAP} + \beta_2 MTO_{i,t} + \beta_3 ELECT_{i,t} + \beta_4 IFC_{i,t} + \beta_5 DVSL13_{i,t} + \varepsilon_{i,t} \tag{2}$$

where $\varepsilon_{i,t}^{SBB}$ is the structural balance forecast error for country i in year t, $\varepsilon_{i,t}^{GAP}$ is the error in forecasting the output gap. In this regression, a country-specific dummy variable for Slovenia 2013 is included as the latest release outturn value for the structural budget balance is an outlier value (the dummy variable is not applicable where the forecast errors are calculated using the first release outturns as the Slovenia 2013 observation is not an outlier in that case).

As the excessive deficit procedure relates to the overall budget balance rather than the structural balance, the *EDP* dummy variable does not apply in (2). The regression equation does include a *MTO* dummy variable which has a value of one if the member state's structural budget balance had not attained its medium-term objective in the previous year (i.e., $t-1$), and is zero otherwise.[18] Since member states' structural balances are adjusted relative to the cyclical position of the economy, the convention in the literature (see, for example, Gali and Perotti, 2003; Forni and Momigliano, 2005; Cronin, 2020) whereby an output gap variable (in this case, its forecast error) is used in the structural budget balance regression is followed. Both the $ELECT_{i,t}$ and $IFC_{i,t}$ variables are included as the occurrence of a general election or the presence of an independent fiscal council might have influence on the forecast error of the structural budget balance.

The regression estimates of (1) and (2) are estimated for both the *SCP* and the *EC* datasets. Two estimation procedures are used. As the contemporaneous GDP growth error, $\varepsilon^{\mathrm{GDP}}$, and the output gap error, $\varepsilon^{\mathrm{GAP}}$, are likely to be endogenous, the equations are estimated using the two-stage least squares instrumental variables (IV) method alongside an ordinary least squares (OLS) estimation. Both the first lag (i.e., $t-1$ value) of the GDP error and the first lag of the output gap error are used as instruments in the headline and structural budget balance equations based on the results of instrument validity and identification tests.[19]

4.2. Results – headline budget balance forecast errors

Tables 3a and 3b presents the results of the estimation of equation (1), using both OLS and IV procedures, for the forecast errors of the member states/SCP forecasts in columns (i) to (ii) and for the Commission's forecasts in columns (iii) to (iv). The forecast errors for both the budget balance and output growth forecasts used in Table 3a are calculated with the latest releases outturn data (Spring 2021), while those in Table 3b use the first releases outturn data.

The test statistics in the bottom panel of columns (ii) and (iv) in Tables 3a and 3b examine the relevance and validity of the instruments for the GDP growth error. The first test is an under-identification (Underid.) test of whether the equation is 'identified' in that the excluded instruments are relevant and thus correlated with the endogenous regressors. The test has the null hypothesis that the equation is under-identified using the instruments. The Kleibergen-Papp rk LM statistics for this test, with the corresponding p-value, reported in the first two rows of the bottom panel of Tables 3a and 3b indicate that the null hypothesis is rejected in regressions using latest release data only. A weak identification test (weak id. test), using the Kleibergen-Papp Wald rk F statistic, is also reported. When compared with the corresponding Stock-Yogo critical values for this statistic in the fourth row of the bottom panel, the test points to the regressions being well-identified by the instruments again only when using outturns from the latest release. Finally, the fifth row of the panel reports the results of the Sargan-Hansen test of over-identifying restrictions. It has the null hypothesis that the instruments are valid in that they are uncorrelated with the error term. The test statistic is the Hansen J statistic and the associated p-value reported in

[15] There are 26 observations in the dataset corresponding to member states being under an excessive deficit procedure.

[16] There are 42 observations where a general election occurred within the year (source: http://www.parlgov.org/). The presumption is that those elections were anticipated in setting the budget forecasts, although this will not always have been the case.

[17] There are 128 observations where an IFC is in place. The principal source of these data is https://www.oecd.org/gov/budgeting/parliamentary-budget-officials. This is supplemented by Jankovics and Sherwood (2017) and European Parliament (2019).

[18] The country-specific numerical targets towards which the structural budget balance is required to be adjusting (if in excess of that value) are found in both the overviews and *Vade Mecum on the Stability and Growth Pact*, also published by the European Commission in its *Institutional Paper* series. Those MTOs typically range between 0 per cent and −1 per cent of potential GDP. In the SCP sample, there are 92 observations where the MTO has not been met in year $t-1$, with 94 such observations arising in the Spring Forecast dataset.

[19] Country fixed effects are not included in these regressions for three reasons (for assessing differences in average errors across member states, they are employed in the regressions reported in Tables A2 and A3 and commented upon in footnote 10). First, the sample period under consideration features a standardised set of fiscal rules prevailing across EU member states. Secondly, the dummy variables included for an independent fiscal council and the debt level should capture institutional, political, cultural or historical differences that may drive differences in the average level of budgetary forecast errors across countries. (In a similar vein, Von Hagen (2010), in his analysis of fiscal forecasting in the EU, argues that country fixed effects would absorb the effect of institutional dummies). Thirdly, the time dimension of the panel is relatively short (seven years), so that focussing excessively on a within-country analysis would ask too much of the data due to the limited degrees of freedom.

Table 3a
Determinants of Headline Budget Balance (BB) Forecast Errors using Latest Release Outturns.

	SCP BB Forecast Error		EC BB Forecast Error	
	OLS	IV-2SLS	OLS	IV-2SLS
	(i)	(ii)	(iii)	(iv)
Constant	0.482 [b]	0.378 [a]	0.473 [b]	0.320 [c]
	(0.212)	(0.194)	(0.193)	(0.177)
GDP growth error	0.201 [b]	0.372 [a]	0.191 [a]	0.411 [a]
	(0.073)	(0.125)	(0.068)	(0.104)
EDP	−0.773 [a]	−0.752 [a]	−0.612 [a]	−0.583 [a]
	(0.210)	(0.222)	(0.189)	(0.219)
ELECT	−0.209	−0.203	−0.187	−0.175
	(0.171)	(0.198)	(0.155)	(0.162)
IFC	−0.039	0.021	−0.038	0.030
	(0.212)	(0.227)	(0.191)	(0.216)
DVPL14	−9.170 [a]	−9.102 [a]	−9.242 [a]	−9.156 [a]
	(0.979)	(0.392)	(0.884)	(0.381)
DVSL13	−6.563 [a]	−6.629 [a]	−9.325 [a]	−9.415 [a]
	(0.979)	(0.351)	(0.884)	(0.354)
No. Obs.	154	154	154	154
R-square	0.556	0.539	0.653	0.628
Underid. test		6.65		6.61
(p-value)		0.03		0.03
Weak id. test		106.25		47.41
10% max. IV size		19.93		19.93
Overid. test		1.74		2.27
(p-value)		0.19		0.13

Notes: The dependent variable is the budget balance error from forecasts by either governments (SCP) or the European Commission (EC) using outturns from the latest release (Autumn 2020). Standard errors are in parentheses. [a], [b] and [c] denote statistical significance at the one, five and ten percent levels, respectively. The underidentification test reports the Kleibergen-Papp rk LM statistic. The weak identification test reports the Kleibergen-Papp rk Wald F statistic with the 10 percent maximal IV size taken from Stock-Yogo weak identification test critical values. The over-identification test reports the Hansen *J* statistic.

the last row of the table indicates that the null hypothesis of instrument validity cannot be rejected in either the first or latest release regressions. Accordingly, while the lagged GDP growth and output gap errors are valid instruments for the contemporaneous GDP growth forecast error using both first and latest release data, they can only be classified as strong or relevant in the case of the latter.[20]

In Table 3a, the coefficient on the GDP growth error is positive and significant, indicating that forecast errors in output growth cause errors of the same sign in the forecasts of the headline budget balance. This is the expected relationship for the cyclical component of the budget balance and the coefficient values of between 0.191 and 0.411 indicate that a one percentage point forecast error in the real GDP growth rate causes a forecast error of between one-fifth and two-fifths of a percentage point in the headline budget balance. These estimated point elasticity values are broadly in line with those reported in other studies, such as Merola and Perez (2013). In Table 3b, where first releases data are used in calculating output and budget balance errors, the coefficients on the growth rate variable are significant when OLS are used and insignificant by the IV estimation procedure.

The constant terms in both tables are positive in value and range in value between 0.320 and 0.482 in Table 3a and 0.466 and 0.525 in Table 3b. Turning to the dummy variables addressing political economy considerations, the regression coefficient on the *EDP* variable is negative and significant in all columns of Tables 3a and 3b The coefficient values range from −0.583 to −0.773 in Table 3a and from −0.425 to −0.592 in Table 3b. This indicates that budget balance forecasts for member states in an excessive deficit procedure tend to be optimistic by reference to the constant term. This is consistent with member states in an EDP having an incentive to provide optimistic budget balance forecasts, *ceteris paribus*. The coefficient on the dummy variable addressing the effect of general elections on budget balance forecast errors, *ELECT*, is insignificant in both tables. The coefficient on the *IFC* variable is also insignificant, indicating independent fiscal institutions not having influence on the forecast errors of the headline budget balance.

The regression results in Tables 3a and 3b, in the round, do not differ substantially between those using SCP data (columns (i) and (ii)) and those using the Commission forecasts (their counterparts in columns (iii) to (iv)). Consequently, the factors, including the *EDP* variable, that explain the member states' errors in forecasting the budget balance also have significance in accounting for the Commission's errors. This could be because, although an independent institution, the Commission perceives that governments have private information about the economy and public finances and so it allows governments' forecasts about these variables to affect its own projections even though it realises such information may be entangled with political influences on member states' forecasts. This may lead the Commission to internalise the latter in its own forecasts.

[20] It is long-established that two-stage least squares estimators with weak instruments are biased and lead to an underestimation of standard errors (Staiger and Stock, 1997).

Table 3b
Determinants of Headline Budget Balance (BB) Forecast Errors using First Release Outturns.

	SCP BB Forecast Error		EC BB Forecast Error	
	OLS	IV-2SLS	OLS	IV-2SLS
	(i)	(ii)	(iii)	(iv)
Constant	0.480 [b]	0.501 [a]	0.466 [b]	0.525 [a]
	(0.212)	(0.147)	(0.193)	(0.138)
GDP growth error	0.202 [a]	0.156	0.198 [a]	0.089
	(0.087)	(0.353)	(0.071)	(0.308)
EDP	−0.587 [a]	−0.592 [b]	−0.425 [b]	−0.436 [b]
	(0.211)	(0.270)	(0.191)	(0.224)
ELECT	−0.275	−0.274	−0.254	−0.252
	(0.173)	(0.209)	(0.155)	(0.185)
IFC	−0.008	−0.027	−0.005	−0.043
	(0.214)	(0.151)	(0.193)	(0.149)
DVPL14	−9.001 [a]	−9.017 [a]	−9.069 [a]	−9.104 [a]
	(0.983)	(0.309)	(0.888)	(0.291)
DVSL13	−6.725 [a]	−6.700 [a]	−9.489 [a]	−9.429 [a]
	(0.984)	(0.382)	(0.889)	(0.382)
No. Obs.	154	154	154	154
R-square	0.523	0.532	0.637	0.632
Underid. test		3.19		2.99
(p-value)		0.21		0.22
Weak id. test		2.29		2.61
10% max. IV size		19.93		19.93
Overid. test		0.17		0.02
(p-value)		0.68		0.91

Notes: The dependent variable is the headline budget balance error from forecasts by either governments (SCP) or the European Commission (EC) using outturns from the first release (Autumn of the following year). Standard errors are in parentheses. [a], [b] and [c] denote statistical significance at the one, five and ten percent levels, respectively. The underidentification test reports the Kleibergen-Papp rk LM statistic. The weak identification test reports the Kleibergen-Papp rk Wald F statistic with the 10 percent maximal IV size taken from Stock-Yogo weak identification test critical values. The overidentification test reports the Hansen *J* statistic.

Table 4a
Determinants of Structural Budget Balance (SBB) Forecast Errors using Latest Release Outturns.

	SCP SBB Forecast Error		EC SBB Forecast Error	
	OLS	IV-2SLS	OLS	IV-SLS
	(i)	(ii)	(iii)	(iv)
Constant	0.975 [a]	0.916 [a]	0.886 [a]	0.851 [a]
	(0.196)	(0.277)	(0.176)	(0.199)
Output gap error	−0.369 [a]	−0.489 [a]	−0.393 [a]	−0.476 [a]
	(0.057)	(0.054)	(0.055)	(0.070)
MTO	−0.381 [a]	−0.371 [b]	−0.221 [c]	−0.224 [c]
	(0.123)	(0.177)	(0.119)	(0.122)
ELECT	−0.215	−0.209	−0.165	−0.169
	(0.145)	(0.197)	(0.130)	(0.120)
IFC	−0.504 [a]	−0.349 [c]	−0.329 [b]	−0.229 [b]
	(0.191)	(0.207)	(0.171)	(0.108)
DVSL13	−11.712 [a]	−12.089 [a]	−11.989 [a]	−12.228 [a]
	(0.837)	(0.184)	(0.748)	(0.189)
No. Obs.	154	154	153	153
R-square	0.608	0.596	0.598	0.652
Underid. test		5.87		6.06
(p-value)		0.05		0.04
Weak id. test		71.15		50.5
10% max. IV size		19.93		19.93
Overid. test		2.38		3.65
(p-value)		0.12		0.09

Notes: The dependent variable is the structural budget balance error from forecasts by either governments (SCP) or the European Commission (EC) using outturns from the latest release (Autumn 2020). Standard errors are in parentheses. [a], [b] and [c] denote statistical significance at the one, five and ten percent levels, respectively. The underidentification test reports the Kleibergen-Papp rk LM statistic. The weak identification test reports the Kleibergen-Papp rk Wald F statistic with the 10 percent maximal IV size taken from Stock-Yogo weak identification test critical values. The overidentification test reports the Hansen *J* statistic.

4.3. Results – structural budget balance forecast errors

Tables 4a and 4b presents the results of estimating equation (2) for both the SCP and Spring Forecast structural budget balance forecast errors calculated using latest and first releases data, respectively. In terms of instrument validity and relevance, the test results indicate that the instruments for the output gap forecast error are valid in the case of both the first and latest releases, and strong in the case of the latest releases. However, the instruments in the first release regressions are only marginally below the Stock-Yogo critical values, and are above the often-used rule-of-thumb of 10.

The significant coefficients on the output gap have negative values in a range of −0.369 to −0.489 in Table 4a and of −0.480 to −0.783 in Table 4b. These coefficient values indicate a pro-cyclical policy response to output gap forecast errors: if the output gap is better (worse) than expected then the fiscal policy stance is loosened (tightened) relative to that planned, causing the structural budget balance to be lower (higher) than expected, a finding also of Cronin (2020).

The constant terms in both tables are statistically significant and positive in value, in a range of between 0.847 and 0.975. The coefficients on the *MTO* variable in Tables 4a and 4b are negative and significant but smaller in absolute value than the respective constant terms. Consequently, the econometric results indicate that member states that have yet to meet their medium-term objective have a smaller, positive structural budget balance forecast error than the average. The coefficient on the *ELECT* variable is insignificant across six of the eight columns of Tables 4a and 4b and significant at the ten per cent level only in the other two columns (those of columns (i) and (iii) of Table 4b).

There is a substantial difference in the coefficient on the *IFC* variable between Tables 4a and 4b It is significant in Table 4a, with coefficient values of −0.504 and −0.349 for the SCP columns and lower values, of −0.329 and −0.229, in the corresponding Spring Forecast columns. These coefficients indicate that member states with an independent fiscal council are associated with forecast errors that are smaller than the average but which still reflect a pessimistic bias. In Table 4b, the coefficient on the *IFC* variable is only significant (with a value of −0.355) in column (i).[21] The econometric evidence in relation to independent fiscal institutions then is that they provided improved, though still biased, forecasting for the structural budget balance compared to where no such institution was in place but had similar forecast errors in relation to the headline budget balance. [22]

[21] In response to a suggestion by a referee, the residual values from estimating (1) and (2) were each added as a regressor to (2) and (1), respectively, serving both as a robustness test and recognising the links between *BB* errors and *SBB* errors. For those regressions based on forecast errors calculated using latest releases, the coefficient on the *BB* error is significant and positive (with values of between 0.15 and 0.2) when added to (2), while the *SBB* error is insignificant when added to (1). In both cases, the additional regressor does not have any material effect on the estimated coefficients of the other variables in the regression. For those regressions based on forecast errors calculated using first releases, instrument weakness constrains the reliability of the results.

[22] A series of robustness tests were performed on both regressions (1) and (2). It is recognised in the literature that forecasting in the EU can be influenced by cyclical conditions. Giannone and Reichlin (2006) and Marcelino and Musso (2011) find output growth rate forecasts to be a function of where in the economic cycle forecasters assess countries to be. Strauch et al. (2004) observe budgetary projections to be sensitive to the cycle. Accordingly, in the first instance the variable $\Delta URX_{i,t}$ was included as an additional regressor, where it represents the change in the unemployment rate. It is used to capture whether the forecasting process is influenced according to whether macroeconomic conditions are improving or deteriorating. A second means of controlling for the economic cycle is through adding a dummy variable, denoted *GoodTimes*, which has a value of one if member state i had a positive output gap in year $t-1$, and zero otherwise (similar to an application employed by Merola and Perez, 2013). The qualitative results relating to the other variables in (1) and (2) are not sensitive to the inclusion or exclusion of the unemployment variable or the "good times" variable. The level of the unemployment rate, the deviation of the unemployment rate from the non-accelerating wage rate of unemployment (NAWRU), and the change in the output gap in the current year were also considered as separate control variables for the influence of the economic cycle. In each case, their inclusion was also found to have a negligible impact on the results for the other variables. These findings stand in contrast to Annett (2006) who finds that the cyclical position of the economy has an influence on fiscal forecast errors.In a second set of robustness tests, the change in the headline budget balance in year $t-1$, $\Delta BB_{i,t-1}$, was added to (1) and, similarly, the change in the structural budget balance, $\Delta SBB_{i,t-1}$, was added to (2). The coefficients on the variables in the baseline regressions were not materially affected by the inclusion of these additional variables. Separately, the variable $MTBF_{i,t}$ was included in both regressions. It is an index measure (with a value of between 0 and 1) of the strength of the medium-term budgetary framework in each member state, reflecting, inter alia, the involvement of independent fiscal institutions in budgetary plans. A higher index value indicates a stronger framework. When this variable is included in (1), it is insignificant and the coefficients on the other variables are unaffected. When included in (2), in those columns where it has a negative, significant coefficient (with a value of between about −0.7 and −1.1), the *IFC* coefficient is insignificant. Consequently, a stronger medium-term budgetary framework acts to reduce the forecast error of the structural budget balance. (The framework is described and the relevant data are found at https://ec.europa.eu/info/publications/medium-term-budgetary-frameworks-database_en.)A further exercise was undertaken to assess to what extent forecast errors using outturns from different vintages are influenced by data revisions. This issue is closely related to the literature on whether there are systematic inefficiencies in deficit forecasts (Cepparulo et al., 2014) and, in particular, whether deficit revisions incorporate new information only (Jong-A-Pin et al., 2012). To test for the role of data revisions, the approach of Merola and Perez (2013) is followed and the change in headline and structural balance ratio values between the initial and latest outturns are included as additional regressors in equations (1) and (2), respectively. The estimations indicate that revisions are only statistically significant in the IV estimation of equation (2), but that the instruments in that particular regression are under-identified. Accordingly, evidence of a systematic relationship between forecast errors and subsequent statistical revisions to the budget balance series does not arise. (These various estimation results are available on request from the authors).

Table 4b
Determinants of Structural Budget Balance (SBB) Forecast Errors using First Release Outturns.

	SCP SBB Forecast Error		EC SBB Forecast Error	
	OLS	IV-2SLS	OLS	IV-2SLS
	(i)	(ii)	(iii)	(iv)
Constant	0.935 [a]	0.956 [a]	0.847 [a]	0.899 [a]
	(0.186)	(0.299)	(0.168)	(0.222)
Output gap error	−0.498 [a]	−0.668 [a]	−0.480 [a]	−0.783 [a]
	(0.069)	(0.087)	(0.064)	(0.183)
MTO	−0.364 [a]	−0.365 [b]	−0.208 [c]	−0.236 [b]
	(0.128)	(0.159)	(0.116)	(0.110)
ELECT	−0.271 [c]	−0.220	−0.231 [c]	−0.172
	(0.142)	(0.191)	(0.127)	(0.149)
IFC	−0.355 [b]	−0.291	−0.217	−0.125
	(0.170)	(0.224)	(0.152)	(0.173)
No. Obs.	154	154	153	153
R-square	0.338	0.311	0.316	0.214
Underid. test		6.033		6.67
(p-value)		0.04		0.03
Weak id. test		12.54		19.88
10% max. IV size		19.93		19.93
Overid. test		0.44		0.09
(p-value)		0.51		0.75

Notes: The dependent variable is the structural budget balance error from forecasts by either governments (SCP) or the European Commission (EC) using outturns from the first release (Autumn of the following year). Standard errors are in parentheses. [a], [b] and [c] denote statistical significance at the one, five and ten percent levels, respectively. The underidentification test reports the Kleibergen-Papp rk LM statistic. The weak identification test reports the Kleibergen-Papp rk Wald F statistic with the 10 percent maximal IV size taken from Stock-Yogo weak identification test critical values. The overidentification test reports the Hansen *J* statistic.

5. Conclusion

Studies of official forecasts in the EU during the 1990s and 2000s, in general, indicate the presence of biases and political influence on both projections of fiscal and output variables. One of the grounds for the introduction of the European Semester and the Fiscal Compact in the aftermath of the sovereign bond crisis of the late 2000s and early 2010s was to improve fiscal forecasts within the EU against these shortcomings. This paper has assessed forecasting performance among 22 member states from 2013 to 2019, years in which both the Semester and Compact were in effect. It shows biases remaining a feature of forecasts of output activity and of budget balances, with forecasts generally being pessimistic compared to outturns. This finding differs from studies such as Jonung and Larch (2006) and Frankel (2011) that focussed on the pre-financial crisis era and which reported undue optimism, but is similar to that of Cronin and McQuinn (2021b) who study official forecasts of output growth (but not fiscal variables) in the EU in recent years.

The econometric results in section 4 show biases in output variable projections having explanatory power over errors in forecasting the two budget balance variables. Member states subject to an EDP provide optimistic forecasts for the headline budget balance compared to other member states. The fiscal rule requirement on the structural budget balance – the MTO – has a significant influence on the forecast errors of that variable with errors, while still positive in value, being smaller than arise on average. These influences of EDP and MTO requirements on forecast errors hold for both member states' SCP forecasts and the European Commission's Spring Forecasts. The presence or absence of independent fiscal councils in member states does not have a statistically significant effect on the headline budget balance error but does on the structural budget balance error when latest releases data are used in calculating the error, and indicate a smaller forecast error arising in that case. The econometric results indicate the occurrence of general elections having no effect on forecast errors.

The empirical assessment then provides overall findings of undue pessimism arising in official forecasts of budget balance and output variables in recent years, institutional stipulations explaining forecast errors in fiscal variables, and forecasting mistakes made at national level also arising at the EU level (through the Commission's Spring Forecasts). These findings hold lessons for both domestic fiscal authorities and supra-national monitoring bodies. Forecasting biases, including those attributable to specific EU rule requirements, undermine the standing of the body making the projections. Such errors can have the effect of fiscal policy not meeting budgetary targets, including mandated targets under the EDP and MTO, and, if persistent, may indicate to the public that the EU fiscal rules are not functioning properly. Moreover, the econometric results for the structural budget balance show governments adopting pro-cyclical fiscal responses to output growth developments. This is not conducive to stabilising output growth over the economic cycle.

It is unsatisfactory from a policy perspective that these deficiencies arise and do so even though there was a substantial reform of the EU fiscal rules after the European sovereign bond market crisis, a central focus of which was to improve official fiscal forecasts.

These shortcomings may be occurring for a number of reasons, including there being weaknesses in the preventive arm of the Stability and Growth Pact (De Jong and Gilbert, 2019) and the fiscal rules themselves prolonging convergence towards targets (European Fiscal Board, 2018).[23] Such issues should be under consideration in the current review of EU economic governance. The policy initiatives at EU level in the early 2010s may also have occurred without sufficient reform to forecasting and monitoring institutions taking place at national level, notwithstanding the putting in place of independent fiscal institutions, which may contribute to the type of forecasting errors reported here. Many such bodies face resource constraints and issues with their legal standing, both of which can impede how they review and endorse forecasts (Jankovics and Sherwood, 2017; European Fiscal Board, 2018).

Table A1
Statistics of forecast errors of the total revenue and total expenditure ratios

	(i) $TR^{lat}_{i,t} - TR^{SCP}_{i,t}$	(ii) $TE^{lat}_{i,t} - TE^{SCP}_{i,t}$	(iii) $TR^{1st}_{i,t} - TR^{SCP}_{i,t}$	(iv) $TE^{1st}_{i,t} - TE^{SGP}_{i,t}$	(v) $TR^{lat}_{i,t} - TR^{EC}_{i,t}$	(vi) $TE^{lat}_{i,t} - TE^{EC}_{i,t}$	(vii) $TR^{1st}_{i,t} - TR^{EC}_{i,t}$	(viii) $TE^{1st}_{i,t} - TE^{EC}_{i,t}$
Mean (%)	0.170	−0.054	0.220	−0.005	0.171	−0.083	0.221	−0.034
Significance (Mean = 0)	0.182	0.700	0.072	0.968	0.158	0.565	0.042	0.778
Median (%)	0.100	−0.200	0.167	−0.0009	0.200	−0.200	0.268	−0.133
Sign (Exact binomial)	0.413	0.073	0.090	1.000	0.086	0.251	0.012	0.573
Sign (Normal approximation)	0.413	0.073	0.091	0.936	0.086	0.251	0.013	0.573
Wilcoxon signed rank	0.118	0.241	0.044	0.558	0.055	0.099	0.008	0.274
Van de Waerden test	0.124	0.393	0.039	0.716	0.067	0.144	0.010	0.400
No. of observations	154	154	154	154	154	154	154	154

Note: All entries in second and third column (except mean and median values) are probability values.

Table A2
Determinants of Headline Budget Balance Forecast Errors using Latest Release Outturns

	SCP BB Forecast Error		EC BB Forecast Error	
	OLS	IV-2SLS	OLS	IV-2SLS
	(i)	(ii)	(iii)	(iv)
Constant	−0.250	−0.270	0.057	0.029
GDP growth error	0.178 [a]	0.249 [b]	0.178 [a]	0.262 [b]
DVPL14	−10.012 [a]	−9.981 [a]	−9.879 [a]	−9.851 [a]
DVSL13	−6.655 [a]	−6.672 [a]	−9.433 [a]	−9.449 [a]
Spain	−0.335	−0.326	−0.407	−0.395
France	0.127	0.139	−0.107	−0.095
Italy	0.203	0.234	−0.064	−0.032
Netherlands	0.872 [b]	0.875 [a]	0.530	0.534 [c]
Austria	0.678 [b]	0.714 [b]	0.354	0.387
Portugal	−0.604	−0.623	−0.694	−0.720
Slovenia	0.072	0.047	−0.075	−0.113
Slovakia	−0.024	0.013	−0.154	−0.116
Finland	0.371	0.389	0.070	0.085
Latvia	0.443	0.509	0.149	0.216
Lithuania	0.692	0.669 [c]	0.606	0.591
Bulgaria	1.037	1.023	0.469	0.440
Czech Rep.	0.724 [c]	0.689 [c]	0.503	0.458
Denmark	2.133 [a]	2.093 [a]	1.577 [a]	1.538 [a]
Hungary	0.213	0.179	−0.085	−0.144
Poland	0.802	0.785 [b]	0.445	0.429
Romania	0.357	0.350	0.164	0.097
Sweden	0.781 [c]	0.813 [b]	0.534	0.569 [a]
Germany	0.964 [a]	0.976 [a]	0.348	0.368
Estonia	0.415	0.377	−0.050	−0.098
Luxembourg	1.603 [a]	1.612 [a]	1.167 [a]	1.152 [a]
No. Obs.	154	154	154	154
R-square	0.694	0.691	0.742	0.739

Note: Standard errors are in parentheses. [a], [b] and [c] denote statistical significance at the one, five and ten percent levels, respectively. Country fixed effects are estimated with Belgium as the reference country.

[23] A majority of countries in the sample here had not met their MTO in 2018 according to the data in the 2019 SCPs and 2019 Spring Forecasts.

Table A3
Determinants of Headline Budget Balance Forecast Errors using First Release Outturns

	SCP BB Forecast Error		EC BB Forecast Error	
	OLS	IV-2SLS	OLS	IV-2SLS
	(i)	(ii)	(iii)	(iv)
Constant	−0.263	−0.244	0.038	0.054
GDP growth error	0.255 [a]	0.115	0.268 [a]	0.178
DVPL14	−9.673 [a]	−9.736 [a]	−9.545 [a]	−9.575 [a]
DVSL13	−6.788 [a]	−6.755 [a]	−9.566 [a]	−9.547 [a]
Spain	−0.322	−0.326	−0.393	−0.396 [c]
France	0.213	0.189	−0.021	−0.034
Italy	0.251	0.186	−0.016	−0.052
Netherlands	1.039 [a]	1.039 [a]	0.698 [b]	0.698 [b]
Austria	0.792 [b]	0.726 [b]	0.464 [c]	0.432
Portugal	−0.503	−0.485	−0.598	−0.584
Slovenia	0.171	0.245	0.009	0.065
Slovakia	0.111	0.082	−0.024	−0.034
Finland	0.363	0.311	0.059	0.034
Latvia	0.458	0.432	0.154	0.149
Lithuania	0.728 [c]	0.762 [b]	0.653	0.661 [b]
Bulgaria	0.806	0.862	0.219	0.269
Czech Rep.	0.835 b	0.868 [b]	0.607 [c]	0.632 [c]
Denmark	2.204 [a]	2.186 [a]	1.657 [a]	1.637 [a]
Hungary	0.362	0.409	0.039	0.091
Poland	0.826 [c]	0.873 [b]	0.469	0.496
Romania	0.225	0.237	−0.031	0.039
Sweden	0.827 [c]	0.801 [b]	0.579	0.565 [c]
Germany	0.858 [a]	0.832 [a]	0.251	0.228
Estonia	0.389	0.452	−0.085	−0.041
Luxembourg	1.687	1.602 [a]	1.232 [a]	1.203 [a]
No. Obs.	154	154	154	154
R-square	0.688	0.681	0.743	0.740

Note: Standard errors are in parentheses. [a], [b] and [c] denote statistical significance at the one, five and ten percent levels, respectively. Country fixed effects are estimated with Belgium as the reference country.

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None.

Data availability

The data are in the public sphere.

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