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A reason for revising the EU fiscal rules in the early 2010s was to improve member states' forecasts against a background of documented biases in official projections. Using data from Stability and Convergence Programmes and the European Commission's Spring Forecasts, evidence is presented which indicates deficiencies in official forecasting in the EU arising under the new enhanced EU fiscal framework, with forecasts being irrational and a pessimistic bias. Recently highlighted obstacles to the way in which independent fiscal institutions operate in member states and the EU fiscal rules' emphasis on *ex-ante* fiscal plans may contribute to such forecasting performance.

Keywords: Official forecasts; forecasting bias; EU fiscal rules

JEL codes: C23; E37; E62

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1. Introduction

Findings of biases in official economic projections have been a feature of studies of EU member states' forecasting behaviour. Such biases not only give the public a distorted view of the economic outlook but also impinge on the budgetary process and can lead to fiscal policy failing to meet budgetary targets. This is of particular concern in the euro area where a single currency, embracing a common monetary policy among those member states adopting the euro, places an onus on governments to exercise effective budgetary policy at the national level and to abide by cross-EU fiscal rules.

Concerns that biases arise in member states' output forecasts and in official projections in the EU more generally have been raised with some time. Strauch *et al.* (2004) found budgetary projections to be sensitive to where economies were in the output cycle and member states not using the information available to them efficiently. Jonung and Larch (2006) identified an "optimism bias" among the four largest EU member states (Germany, France, Italy, and the UK), where official output growth forecasts, on average, over-estimated the underlying speed of growth of the economy. When realised output growth proves less than expected, as an optimism bias implies, then budgetary outcomes can prove to be poorer than initially projected. This increases the risk of EU deficit and debt thresholds being violated and may even call into question the overall fiscal and economic direction that a member state is taking. Gilbert and de Jong (2017) show a bias in the European Commission's forecasts which they attribute to the EU fiscal rules, in particular the 3 per cent threshold on member states' deficit ratios.

Major EU fiscal rules reforms in the early 2010s were adopted, in part, to improve the forecasting performance of member states. The European Semester, in effect since 2011, allows for a more intrusive examination of member states' budgetary plans over the medium-term horizon, while the Fiscal Compact, effective since 2013, provided for autonomous

oversight of member states' forecasting at the national level. This includes a role for independent forecasting authorities. Jonung and Larch (2006, p. 529) advocate for the use of such institutions to "foster the production of unbiased forecasts". The European Commission (2014) sees independent forecasting bodies as being able to improve tasks such as macroeconomic forecasting at the national level, by providing their own forecasts or endorsing the forecasts of the national finance ministry. Reviewing the preparation of the 2015 draft budgetary plans for the euro area member states (excluding Cyprus and Greece), the European Commission (2014, pp.62-63) finds that all bar three member states had either separate macroeconomic forecasts produced by independent fiscal authorities or those bodies endorsing official forecasts.[1]

With these fiscal rules reforms in place and member states formulating budgetary policy with the input of independent forecasting oversight bodies, an improvement in official forecasting in the EU might be expected. Against that, the literature suggests that fiscal rules, such as arise in the EU, may cause bias and related difficulties. An optimism bias may reflect governments meeting their budgetary forecasts *ex-ante* by adjusting their output growth forecasts rather than altering fiscal policy (Frankel, 2011). Member states may come under pressure to set economic and fiscal programmes that are overly ambitious in the first instance. Their failure to be implemented in practice may, however, call into question the credibility of budgetary planning (Beetsma *et al.*, 2009). Similarly, as Jonung and Larch (2006) point out, if biases in forecasting economic activity are the cause of governments missing deficit targets

[1] Among the three member states that are the exceptions, the economics department and budgetary departments within Finland's finance ministry are separated from one another, while in Germany the ministry's macroeconomic forecasts involve independent research institutes. At the time the article was published, the macroeconomic forecast of the finance ministry in Latvia had not yet been endorsed by that country's fiscal monitoring institution, The Fiscal Discipline Council.

then changing deficit rules may not have the desired effect if such biases persist regardless of the rule changes.

Against this background, this paper examines whether biases are present, or absent, in official output growth forecasts since 2013 when the Fiscal Compact, the last substantial reform of the EU rules, took effect. It does so using current year and one-year-ahead projections from both member states' Stability and Convergence Programmes and the European Commission's Spring Forecasts, along with outturn data from the EU AMECO database. An econometric investigation of the data indicate that deficiencies remain evident in official forecasts in the EU despite the reforms put in place in the early 2010s. The empirical analysis shows that output growth forecasts are unduly pessimistic, are irrational, and are influenced by recent economic activity. This holds for both the member states' and Commission's forecasts. Output gap forecasts also have an influence on output growth projections. The implications of these findings, which indicate that the historical deficiencies of official forecasts in the EU remain in place, are considered in the final section of the paper.

2. Background and Literature Review

Prior to the euro area sovereign bond market crisis that took hold in late 2009, fiscal policy in EU member states was not conducted in a satisfactory manner. The European Commission (2011, p. 70) notes "persistently lax fiscal policy" prevailing during that period, while Beetsma *et al.* (2009) find fiscal adjustment regularly falling short of what was planned in annual budgets. Such behaviour may, or may not, have been unexpected given the fiscal rules framework put in place in the EU prior to the introduction of the euro.

Recognising that member states might not behave prudently in monetary union, the Stability and Growth Pact was adopted in 1997 to monitor and enforce compliance with the fiscal requirements laid down in the Maastricht Treaty of 1992. The Pact's purpose is to ensure EU

member states (both those in the euro area and outside it) avoid excessive deficit positions, those being where General Government deficit ratios exceed 3 per cent of GDP and/or General Government debt ratios above 60 per cent of GDP. It does so through the operation of both a preventive arm (involving surveillance of national public finances) and a corrective arm (requiring member states to adopt policies that correct excessive deficit and/or debt positions). Central to the preventive arm is the submission of Stability and Convergence Programmes (henceforth, SCPs) by member states.[2] SCPs set out member states' budgetary and economic forecasts over a medium-term horizon (including the current year). Reforms of the Pact have occurred over the years and have focussed on improving both the preventive and corrective arms. The first substantial changes to the Pact occurred in 2005. Those placed a greater emphasis on consideration of national economic circumstances and sharpened the implementation of the excessive deficit procedure.

The financial crisis and, in particular, the turmoil in euro area sovereign bond markets between 2009 and 2012 called into question the efficacy of the EU fiscal rules and their implementation. Financial markets grew concerned at the fiscal position of some of the area's member states (Caceres *et al.*, 2010), with a rapid deterioration occurring in national public finances. These developments undermined confidence in the efficacy of budgetary surveillance and practice at country and EU levels and led to a series of initiatives at the EU level. The European Semester was enacted in 2010 and took effect in 2011. It was initiated to improve *ex-ante* economic and budgetary policies among member states. The Semester refers to the first half of each calendar year at the centre of which is the submission of SCPs by member states in April.

[2] Stability Programmes are submitted by euro area member states while Convergence Programmes are submitted by other EU member states.

Those programmes are subject to peer review by the European Commission and other member states by end-June.

The other substantial Pact-related development in the 2010s has been the adoption of the Fiscal Compact (more formally, the Treaty on Stability, Coordination and Governance) in 2012, effective from the start of 2013. Its intention was to strengthen the Pact by requiring member states to improve their economic and budgetary projections by making the best use of available data and by making budget rules more binding by their adoption into domestic law. Both the Council Directive 2011/85 on national budgetary frameworks and the 2013 regulations introduced a role for national independent fiscal institutions in domestic budgetary practice with a view to tackling forecasting issues.

Against this background of how the EU fiscal rules have developed over time, findings of biases, and in particular an optimism bias, in official government forecasts, including in the EU, is commonplace in the literature. In a study of 33 countries, Frankel (2011) finds official government forecasts having a positive average bias and a larger bias at longer time horizons. He finds that among those countries, euro area member states have a particularly large bias, which may explain frequent violations of the excessive deficit threshold occurring *ex-post*. Over-optimism also arises on both the upside and downside of the economic cycle but is less obvious when GDP is close to its trend value. Forni and Momigliano (2004) detect an optimism bias among OECD countries, while Frankel and Schreger (2013) find an optimistic forecasting bias on the part of euro area member states that is particularly pronounced during booms. They also find bias to be at its lowest at the shortest forecasting horizon when independent fiscal authorities are in place.

Several studies have also considered whether the imposition of fiscal rules in itself creates biases in official forecasts. Beetsma *et al.* (2009) use the phrase "planning to cheat" to describe

the budgetary behaviour of member states bound by the EU fiscal rules. This includes governments failing to implement planned budgetary adjustments in full and the greater use of stock-flow adjustments when budgetary plans are more ambitious. Jonung and Larch (2006) observe EU governments overestimating output growth in their forecasts. Similarly, Strauch *et al* (2004) find an optimism bias arising in SCPs, which a later study by Marinheiro (2011) backs up. In relation to the European Commission, Gilbert and de Jong (2017) hypothesise and illustrate that its forecasts are biased upwards when member states expect EU fiscal rules to hold.

One mechanism for curbing biases and political sway in the budgetary process is the putting in place of institutions that remove such influences (Fabrizio and Mody, 2006). Independent fiscal councils at the national level are one such institution. As well as playing an important role in strengthening transparency and accountability in fiscal policymaking and notwithstanding that such councils are designed differently between EU member states, one specific task they can address, as advocated by the post-crisis EU fiscal rule initiatives, is to improve economic forecasting, including tackling forecasting bias.

Jonung and Larch (2006) sum up the basis for independent input into official forecasts by noting that economic forecasting is not something governments are particularly well-equipped to do and that it should be left to non-political experts with the necessary technical expertise to provide the short-to-medium term projections required. They find independent fiscal institutions not having a statistically significant bias in their forecasting, while Debrun and Kinda (2017) observe fiscal councils being associated with better macroeconomic and budgetary projections through lower forecasting bias. Reuter (2019) finds independent monitoring and enforcement bodies improving compliance with numerical fiscal rules in EU member states between 1995 and 2015. Against these favourable assessments, Beetsma *et al.* (2019) evaluate the performance of independent fiscal councils using an IMF fiscal council

database and find fiscal councils not having any meaningful effect on the forecast errors of the real GDP growth rate. A cyclical bias in growth forecasts remains with undue optimism occurring in good times and pessimism arising in bad times.

While Jonung and Larch (2006) and others argue for delegating macroeconomic forecasting at the national level to independent agencies, Marinheiro (2011) asks whether the delegation should be conferred on supra-national bodies. He finds the European Commission's forecasting record to be good in the short term while there is considerable variation in the accuracy of member states' forecasts. He concludes that the Commission's projections provide a good benchmark for assessing those of the member states and that national governments should be asked to explain large deviations in their forecasts from those of the Commission. An earlier study by Leal *et al.* (2008) advocates for the role of supra-national bodies' oversight of national forecasting processes as a basis for reducing forecasting deficiencies, including political biases. In contrast, Merola and Perez (2013) find the same shortcomings that arise in member states' projections also occurring for the European Commission.

The view of the European Commission (2014) itself on this issue is that independent forecasting authorities (which it terms "fiscal watchdogs") can, inter alia, "produce or endorse macroeconomic forecasts for the budget preparation that do not suffer from the optimistic biases often found in official government forecasts". They can also "impartially monitor the implementation of budget plans and the respect of fiscal rules and budgetary objectives".[3] A study by Commission staff (Jankovics and Sherwood, 2017) notes that among the 19 euro area member states, independent forecasting bodies directly provide macroeconomic forecasts in the budgetary planning process in five countries. In the remaining member states, ministries

[3] Source: https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/fiscal-governance-eu-member-states/independent-fiscal-institutions_en

of finance produce the macroeconomic forecasts with the national fiscal councils then assessing and endorsing those projections. The authors focus on comparing the forecasts of real GDP growth to the outturns for that variable and find that independent fiscal councils have reduced optimism bias but not forecasting accuracy. They argue that the economic recovery after the financial crisis earlier in this decade could have rectified the optimism bias that was present before it (between 2000 and 2007).

In the following sections of this paper, the macroeconomic forecasting performance (specifically in relation to real GDP growth rates) of both the member states and the European Commission since 2013 are assessed against this background of fiscal reforms aimed at improving such performance. Output growth rate forecasts are central both to agents' overall perception of how the economy is expected to perform and to government deficit and debt projections which are dependent on cyclical conditions in the economy.[4] Including the Commission's projections alongside those of the member states in the empirical analysis will shed light on whether any shortcomings in forecasting are shared between both entities.

3. Data and methodological approach

3.1 Data

To assess member states' output growth forecasts, annual projections and outturns from 2013 to 2018 for both real GDP growth rates and output gaps are used. The forecasts are taken from the European Commission's annual overview of SCPs submitted in the current year (published

[4] Any bias or inefficiency in output growth rate forecasts will distort the projections for the government deficit and debt ratios. The efficiency of forecasts of these key fiscal variables are not considered in this study as the bias and irrationality of the output growth rate forecasts illustrated below is sufficient to make the case that official forecasts in the EU remain imperfect. Moreover, the interpretation of government deficit and other fiscal data can be compromised by policy changes and the influence of one-off effects, including the 'creative accounting' of stock-flow adjustments that have been used to improve budget balances and meet EU deficit criteria (Von Hagen and Wolff, 2006).

in its *Institutional Papers* series each autumn).[5] As well as containing the real GDP growth rate forecasts, which are the main focus of attention here, provided in the SCPs in April, the overviews published since 2013 also contain tables of its recalculation of member states' SCP output gap estimated outturns and forecasts according to a commonly-agreed methodology. Those harmonised series render consistent the data provided by member states for that variable, which benefits the econometric analysis undertaken here. A starting date of 2013 is appropriate not only for the benefit of this harmonisation of data but, more importantly, because the post-crisis enhancement of the EU fiscal rules had been largely completed by then, with the European Semester in operation and the Fiscal Compact having taken effect. The analysis thus examines a period when the enhanced fiscal rules and policy-monitoring framework would have been expected to benefit member states' forecasting.[6]

Projections for both real GDP growth and output gaps from the European Commission's Spring Forecast are also included in each of its annual reviews of the SCPs. Both the Commission's and the member states' estimated outturns for the previous year $(t-1)$ and projections for the current year (t) and the following year $(t+1)$ are included in its overview publication.[7] The Commission's projections are used here as a comparator for assessing member states' forecasting prowess and to see whether a supra-national body (the European Commission), detached from the member states, might prove to have better forecasting power. Outturn, or

[5] For example, the 2018 overview can be found at https://ec.europa.eu/info/sites/info/files/economy-finance/ip088_en.pdf. The data used here are taken from the statistical annexes to these publications.

[6] The period 2013 to 2018 was one when the EU economy moved from underperformance (with an output gap reported by the AMECO database at -2.9 per cent in the EU in 2013) to seeing output exceed capacity in 2017 and 2018 (with an EU output gap of 0.8 per cent in the later year). Among the 138 observations used in this study, 56 are for countries-years when a positive output gap arose.

[7] Noting that SCPs are submitted in April each year, the current year forecast in the 2017 SCPs, for example, would have been for 2017 and the one-year-ahead forecast would have been for 2018.

ex-post, real GDP growth rate data necessary to the tests employed below are taken from the EU AMECO database.

By way of representation, the real GDP growth rate (g) forecasts for the current year (t) and the following year ($t+1$) are the principal variables under consideration here. These period signatures are added as subscripts to the variables, as appropriate, and the superscripts SCP and EC indicate whether the forecasts being referred to are from member states' SCPs or the European Commission's Spring Forecasts, respectively. The real GDP growth rates that are observed as the *ex-post* outturns, and are calculated from the real GDP outturns reported in the AMECO database, have the superscript 'AMC'. The output gap, forecasts of which are used as an explanatory variable in some of the later regressions, is denoted as $ygap$.

There are gaps in the data for specific member states within the Commission's annual overviews. These principally relate to SCPs not being submitted by them for some or all years between 2013 and 2018, whether due to their being in an official rescue programme (Greece and Cyprus) or their membership of the EU (Croatia). To work with a balanced panel of data, those member states are then excluded. There are also large outliers among the outturn (i.e. AMECO) GDP growth rate data relating to observations for Ireland and Malta, where very high growth rates were reported in some years. Given that such outliers could affect the bias tests reported upon below, those two member states were excluded from the panel as well. Consequently, the panel comprises data for 23 EU member states over the years 2013 to 2018.

In each year, the member states and the Commission each forecast for the current year (t) and the following year ($t+1$). Consequently, there are current year forecasts for the years 2013 to 2018 and one-year-ahead forecasts for 2014 to 2019 in the SCPs submitted between 2013 and 2018 (and, likewise, in the Commission's Spring Forecasts). The $t+1$ dataset comprises five outturn observations (2014 to 2018) per country, giving a panel size of 115 observations

at that horizon. The current year panel comprises 138 observations. The AMECO outturns for the current year are denoted g_t^{AMC}, while those in the one-year-ahead dataset are specified as g_{t+1}^{AMC}.

Figure 1 plots the current year and one-year-ahead real GDP growth rate forecasts of both the member states and the European Commission in histogram form, with the matching AMECO outturns in the bottom two panels. Table 1 provides the basic descriptive statistics of the data in those charts. It is evident that both the mean and medians of the outturn real GDP growth rates are higher than the forecasts of both the member states and the Commission, i.e. negative forecasting errors are in evidence - that is the outturn growth rates are greater, on average, than the forecasts. There is no more than a 0.11 per cent mean difference in the forecasts contained in the SCPs and in the Spring Forecasts, while the median values are identical at both horizons. The range of forecasts (as measured by the difference between maximum and minimum values in the table columns) is larger for the member states than the Commission.

3.2 Methodological approach

The approach taken here to the data is to inspect the output growth rate forecasts of the individual member states (treated as one group) and of the European Commission from a number of perspectives. Initially, whether the forecasts for years t and $t+1$ are biased is assessed by examining whether GDP growth rate forecast errors (the differences between the forecasts and their respective observed outturns, as taken from the AMECO database) are, on average, equal to zero or not. The relative performance of the forecasts in terms of accuracy of the Commission with those of the member states is also considered using a standard two-tailed t-test.

These tests are added to by panel regression estimations, with a fixed effects model being employed in each case. As well as allowing for country-specific effects, fixed effects can

address endogeneity issues between the left- and right-hand side variables of the regression equations that a standard OLS estimation would not achieve. The rationality of the member states' and Commission's forecasts are evaluated by whether their respective GDP growth rate forecasts accurately predict the actual, or observed, GDP growth rates (provided by the AMECO database). These estimations use, in turn, the current year (t) and next year ($t+1$) forecasts as right-hand-side variables. The determinants of the GDP growth forecasts are considered by examining the extent to which they are influenced by the estimated outturn of output growth by the member states/Commission for the previous year ($t-1$) and the relevant output gap projections. The latter are used here to examine whether forecasters' own assessments of where the economy will be in the economic cycle have implications for their real GDP growth rate forecasts.

4. Econometric Results

4.1 Properties of forecast errors

To assess forecasting performance, the properties of the errors that the member states and the European Commission make in forecasting real GDP growth (i.e. the difference between the output growth rate forecasts for years t and $t+1$ and what the observed *ex-post* outturns for those years are in the AMECO database) is critical. The initial test employed here then is a two-sample t-test, which examines whether the means of the forecast errors of both the member states and the European Commission are statistically different from one another. The test is conducted for individual years and for the sample as a whole (2013–2018 for the current year forecasts and 2014–2018 for the one-year-ahead forecasts). For both the individual years and the sample as a whole, the null hypothesis of no difference between the forecast errors cannot be rejected at both the t and $t+1$ horizons.

Table 3 provides further statistics on the forecast errors. In examining forecast errors as to whether they are rational and/or unbiased, the approach of Croushore and Van Norden (2018), who build on earlier work by Campbell and Dufour (1991) and Campbell and Ghysels (1995), is followed. The median error is examined alongside the mean error as the latter can be sensitive to large outliers and a lack of power in certain circumstances. Statistical tests in Table 3 indicate both mean and median errors to be significantly different from zero.[8] In all cases then the null hypothesis that either the mean or the median error is equal to zero is rejected. Both mean and median forecast error are larger at the one-year-ahead forecast horizon than in the current year. This table then confirms what Table 1 suggested: that both the member states and the Commission were pessimistic in their output growth forecasts during the 2013-2018 period. After the event, this was a period when the euro area was emerging from a period of recession in the early 2010s. AMECO data indicate that for the years 2013 to 2016 the gap between actual and potential GDP was negative, if diminishing, for the EU as a whole (from -2.9 per cent of potential GDP in 2013 to -0.6 per cent in 2016). Only in the final two years of the sample used here were positive, if small, output gaps reported (of 0.4 per cent in 2017 and 0.8 per cent in 2018).

4.2 Regression results

In Tables 4a and 4b, the results of regressions of the actual outturns for the real GDP growth rate on the contemporaneous forecasts in the SCPs, or the Spring Forecast, and fixed effects pertaining to the individual member states are reported. As noted in Döpke *et al.* (2018) and Audretsch and Stadtmann (2005), the null hypothesis of a rational forecast can be rejected in a

[8] The first test, using a t-statistic, is of the null hypothesis that the sample mean value is equal to zero. In all four cases, the null hypothesis is rejected. The null hypothesis that the sample median equals zero is tested using a series of tests (the binomial distribution sign test, the normal distribution sign tests, the Wilcoxon signed ranks test, and the Van der Waerden (normal scores) test). Again, for all four cases considered in Table 2, the probability values from each of these tests rejects the null hypothesis.

panel regression if the coefficient on the contemporaneous/one-year-ahead forecast is not equal to one and/or the individual country dummies are not jointly equal to zero. In Tables 4a and 4b, which show the results for year t, the coefficient on the forecast variable is statistically different from one and the F-tests on the inclusion of the fixed effects (as reported at the bottom of each table) reject the null hypothesis that the country dummies are not different from zero.[9] [10] These results, taken with the results in Table 3, indicate that the null hypothesis of rational expectations in the forecasting processes of the member states and the European Commission is rejected in both cases.

Having examined the rationality and bias, or otherwise, of forecasts, what affects or determines the current year and one-year ahead growth expectations of the member states and the European Commission is considered next and, in particular, whether the issues raised in the previous tables also influence those expectations. For example, if future GDP growth expectations are motivated by past growth performance then this would point to the presence of bias in the forecasting generating processes of member states and the Commission. A significant coefficient on the estimated output growth rate variable would indicate that forecasters exhibit a form of extrapolative expectations with past GDP growth rate developments having an impact on future growth rate expectations. Consequently, the estimated GDP growth outturns for the past year in the SCPs and the Spring Forecast are included in the regression specifications.

As part of the forecasting process, both member states and the Commission also publish forecasts of the output gaps for the current year and one year ahead. Given that the output gap

[9] In the case of Table 4a, the null hypothesis for the country dummies is only rejected at the 6 per cent level.

[10] To save space, the results where the observed growth rates for $t+1$ are regressed on the member states' or European Commission's forecasts for $t+1$ and fixed effects are not shown in tabular form (but are available from the authors on request). For the regression where the member states' forecasts for $t+1$ are the explanatory variable, a coefficient value of 0.31 (with standard error of 0.15) is reported. That coefficient is statistically different from one. The test on the inclusion of the fixed effects also reject the null hypothesis that the country dummies are not different from zero (with a F-statistic of 3.57). Similar qualitative and quantitative results arise where the Commission's forecasts for $t+1$ are used as the regressor.

provides their assessment as to where an economy's aggregate output is in relation to its potential, it is informative to see whether that variable also has explanatory power on GDP growth projections. The motivation for including the output gap variable in the regression specification comes from Giannone and Reichlin (2006), Marcelino and Musso (2011) and González-Astudillo (2018) who argue that the usefulness of estimates of the output gap can be assessed by their ability to predict future output growth. Marcelino and Musso (2011), in particular, examine the predictive content of alternative measures of the euro area output gap in out-of-sample forecasts of output and find significant forecast gains from including the output gap. The current year and one-year-ahead output gap forecasts in both the SCPs and the Spring Forecasts are plotted in histogram form in Figure 2, while their descriptive statistics (in Table 5) indicate their mean and median values to be negative in value.

Consequently, the final set of regressions involves regressing the forecast GDP growth rate (in t or $t+1$, respectively) on the estimated GDP growth rate outturn for $t-1$ at the time the forecasts are made, the output gap projection (for t and $t+1$, respectively), and country fixed effects. The results in Tables 6a and 6b indicate that output growth forecasts are indeed influenced by the estimated growth rate for the past year and by the position of the aggregate output in the economic cycle.[11] The significance of the previous period's outturn on the forecast confirms that both sets of forecasters' future expectations are not in line with the rational expectations hypothesis. There is a degree of inertia amongst both member state and Commission forecasters in that their estimated output growth rate outturn for the previous year has a positive and significant impact on the output growth rate forecast for the current year. In both cases, the degree of inertia is of a similar magnitude (0.49 for the member states and 0.44

[11] For the $t+1$ real GDP growth rate forecasts, the coefficients on the right-hand-side variables have the same sign as those reported in Tables 6a and 6b and are statistically significant. For the SCP regression, the coefficient on g_{t-1}^{SCP} is 0.16 with a t-statistic of 2.52 and the coefficient on $ygap_{t+1}^{SCP}$ is 0.20 with a t-statistic of 2.54. For the Commission forecasts, the coefficient on g_{t-1}^{EC} is 0.18 with a t-statistic of 3.96 and the coefficient on $ygap_{t+1}^{EC}$ is 0.11 with a t-statistic of 2.08.

for the Commission). These coefficient values imply that if GDP growth is estimated to have grown by 1 per cent in year $t-1$ then this causes the forecast growth rate in year t to increase by almost 0.5 per cent. This result suggests that neither member state nor Commission forecasters exhibit mean reversion in their growth expectations.

The coefficients on the output gap variable in Tables 6a and 6b are positive and statistically significant. This coefficient sign provides backing to the views of Giannone and Reichlin (2006) and Marcelino and Musso (2011) that the output growth rate forecast may be a function of where in the cycle forecasters expect the economy to be. Strauch *et al.* (2004) observed that budgetary projections in the early years of monetary union were sensitive to where countries were in the output cycle with member states not using information available to them efficiently. A positive coefficient on the output gap projection for the current year, such as arises in Tables 6a and 6b, means that a negative output gap projection, as was the norm in the 2013 to 2018 period, significantly reduced the output growth rate projection in the same year.

5. Conclusion

The empirical results in this paper indicate that the deficiencies reported in previous studies of biases and inefficiencies in official forecasts in the EU remain in the post-financial crisis era. This occurs against the background of the significant reforms of the EU fiscal rules and procedures that took place in the early 2010s. The results do not lend support to the view of Jonung and Larch (2006) and others that independent forecasting bodies, which have become commonplace in member states in recent years, help foster the provision of unbiased forecasts in the EU. The results for the European Commission's projections are broadly similar to those for the member states indicating that that supra-national body, which, unlike individual countries, has no incentive to deceive or be inaccurate in its predictions, does not have a better forecasting performance.

A central finding of other studies in this area (Jonung and Larch (2006), Beetsma *et al.* (2019)) is that recent growth performance affects official output growth forecasts in the EU. Examining the period between 1999 to 2006, Marinheiro (2008) notes that European policymakers have a propensity to underestimate output growth after the trough of the business cycle. These cyclical effects hold here as well, with pessimism observed in the forecasts occurring during a period when EU member states were operating mostly on the downside of the economic cycle. This suggests that the lessons from earlier studies have not been absorbed into forecasting processes, although it is also possible that the additional checks and intrusiveness into member states' forecasts in recent years may not only have quelled any optimism bias on their part but caused their forecasts to move in the opposite direction. Furthermore, the similarity of the results between the Commission and the member states reported here suggests that the findings of Von Hagen (2010) and Merola and Perez (2013) - that the reliance of supra-national organisations on national governments for country information may cause these organisations to absorb the biases of the member states - still hold. The vouched improvements in surveillance and enforcement that the new EU fiscal framework would deliver in the aftermath of the financial crisis have not removed biases and other inefficiencies in official forecasting processes in the EU.

To conclude, this paper finds that many of the forecasting mistakes of the past persist under the new enhanced EU fiscal rules framework. This may arise because of longstanding factors, such as the relatively strong emphasis on *ex ante*, as opposed to *ex post*, compliance with the fiscal rules in the EU (Beetsma and Giuliodori, 2010). Another explanation is that the independent fiscal institutions model has not yet been fully developed or implemented in the EU. While acknowledging that independent fiscal bodies have become an integral part of EU policymaking in recent years, the European Fiscal Board (2019) points out that such bodies often face obstacles in how they operate, including in their legal standing and through resource

constraints, and that these affect their ability to review and endorse forecasts. Likewise, Jankovics and Sherwood (2017) find that while the early years of independent fiscal institutions in the EU have seen these bodies provide a useful role in national fiscal policymaking, there is a need to enhance their autonomy and how they endorse forecasts.

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Table 1: Descriptive statistics of GDP growth rates

	g_t^{SCP}	g_t^{EC}	g_t^{AMC}
Mean (%)	2.12	2.02	2.38
Median (%)	2.00	2.00	2.34
Maximum (%)	6.10	4.70	6.99
Minimum (%)	-2.30	-2.30	-1.73
Standard deviation	1.36	1.29	1.50
Skewness	-0.20	-0.57	-0.17
Kurtosis	3.84	3.76	3.44
Jacque-Bera	4.98	10.74	1.77
Number of observations	138	138	138
	g_{t+1}^{SCP}	g_{t+1}^{EC}	g_{t+1}^{AMC}
Mean (%)	2.36	2.25	2.69
Median (%)	2.10	2.10	2.58
Maximum (%)	5.50	4.40	6.99
Minimum (%)	0.20	-0.10	-0.63
Standard deviation	1.03	0.90	1.26
Skewness	0.66	0.22	0.39
Kurtosis	3.04	2.44	3.29
Jacque-Bera	8.34	2.44	3.31
Number of observations	115	115	115

Table 2: Comparison of GDP growth rate forecast errors (Two-sample t-test) between SCPs and European Commission Spring Forecast

Period	t	$t+1$
2013	0.42	0.14
2014	0.19	0.27
2015	0.15	0.20
2016	0.28	0.41
2017	0.30	0.86
2018	1.11	
2014-2018		0.77
2013-2018	0.88	

Note: date in first year column refers to year in which forecasts for t and $t+1$ were made.

Table 3: Statistics of GDP growth rate forecast errors

	$g_t^{SCP} - g_t^{AMC}$	$g_t^{EC} - g_t^{AMC}$
Mean (%)	*-0.26*	*-0.36*
Significance (Mean = 0)	0.00	0.00
Median (%)	*-0.22*	*-0.26*
Sign (exact binomial)	0.03	0.00
Sign (normal approximation)	0.03	0.00
Wilcoxon signed rank	0.00	0.00
Van de Waerden test	0.00	0.00
Number of observations	138	138
	$g_{t+1}^{SCP} - g_{t+1}^{AMC}$	$g_{t+1}^{EC} - g_{t+1}^{AMC}$
Mean (%)	*-0.34*	*-0.44*
Significance (Mean = 0)	0.00	0.00
Median (%)	*-0.32*	*-0.37*
Sign (exact binomial)	0.00	0.00
Sign (normal approximation)	0.01	0.00
Wilcoxon signed rank	0.00	0.00
Van de Waerden test	0.00	0.00
Number of observations	115	115

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

Table 4a: Regression of observed GDP growth rates ($\mathbf{g_t^{AMC}}$) on member states' contemporaneous GDP growth rate forecasts and country fixed effects

Variable	Coefficient	Std. Error	T-Statistic
$\mathbf{g_t^{SCP}}$	0.73	0.08	9.60
Belgium	0.42	0.39	1.07
Germany	0.62	0.40	1.56
Estonia	1.28	0.43	2.99
Spain	0.68	0.41	1.68
France	0.40	0.39	1.01
Italy	0.01	0.39	0.02
Latvia	0.65	0.46	1.41
Lithuania	1.06	0.44	2.41
Luxembourg	0.65	0.46	1.42
The Netherlands	0.72	0.40	1.80
Austria	0.31	0.40	0.76
Portugal	0.63	0.39	1.61
Slovenia	1.37	0.41	3.36
Slovakia	1.06	0.44	2.41
Finland	0.40	0.39	1.03
Bulgaria	1.13	0.42	2.70
Czech Republic	1.29	0.42	3.10
Denmark	0.81	0.40	2.03
Hungary	1.47	0.44	3.34
Romania	1.67	0.48	3.49
Poland	1.23	0.45	2.72
Sweden	0.66	0.43	1.53
United Kingdom	0.68	0.41	1.67
$\overline{R^2}$	0.61		
Durbin-Watson Statistic	1.71		
F-test (Country Dummies)	1.58 with significance level 0.062		

Note: Panel of annual data from 2013 to 2018 (138 observations). Country entries are fixed effect estimates.

Table 4b: Regression of observed GDP growth rates ($\mathbf{g_t^{AMC}}$) on European Commission's contemporaneous GDP growth rate and country fixed effects

Variable	Coefficient	Std. Error	T-Statistic
$\mathbf{g_t^{EC}}$	0.78	0.08	10.16
Belgium	0.38	0.38	1.00
Germany	0.45	0.39	1.15
Estonia	1.19	0.42	2.83
Spain	0.61	0.40	1.54
France	0.39	0.38	1.01
Italy	0.05	0.37	0.14
Latvia	0.62	0.45	1.38
Lithuania	0.82	0.44	1.87
Luxembourg	0.71	0.44	1.62
The Netherlands	0.68	0.39	1.76
Austria	0.35	0.39	0.90
Portugal	0.61	0.38	1.61
Slovenia	1.35	0.40	3.40
Slovakia	1.00	0.43	2.34
Finland	0.45	0.38	1.20
Bulgaria	1.17	0.40	2.89
Czech Republic	1.28	0.40	3.17
Denmark	0.69	0.39	1.79
Hungary	1.53	0.42	3.62
Romania	1.85	0.45	4.10
Poland	1.10	0.45	2.48
Sweden	0.56	0.42	1.33
United Kingdom	0.58	0.40	1.46
$\overline{R^2}$	0.63		
Durbin-Watson Statistic	1.69		
F-test (Country Dummies)	1.73 with significance level 0.032		

Note: Panel of annual data from 2013 to 2018 (138 observations). Country entries are fixed effect estimates.

Table 5: Descriptive statistics of output gap forecasts

	$ygap_t^{SCP}$	$ygap_t^{EC}$
Mean (%)	-0.95	-0.85
Median (%)	-0.8	-0.7
Maximum (%)	3.2	3.4
Minimum (%)	-6.6	-6.7
Standard deviation	1.67	1.76
Skewness	-0.33	-0.39
Kurtosis	3.32	3.14
Jacque-Bera	3.16	3.53
Number of observations	138	138
	$ygap_{t+1}^{SCP}$	$ygap_{t+1}^{EC}$
Mean (%)	-0.81	-0.63
Median (%)	-0.7	-0.4
Maximum (%)	2.7	2.6
Minimum (%)	-4.8	-4.7
Standard deviation	1.25	1.5
Skewness	-0.21	-0.26
Kurtosis	3.42	2.76
Jacque-Bera	1.73	1.56
Number of observations	115	115

Table 6a: Regression of forecast GDP growth rates ($\mathbf{g}_t^{SCP}$) on estimated GDP growth rates, contemporaneous output gap projections, and country fixed effects

Variable	Coefficient	Std. Error	T-Statistic
$\mathbf{g}_{t-1}^{SCP}$	0.49	0.06	7.70
$ygap_t^{SCP}$	0.16	0.07	2.37
Belgium	0.91	0.28	3.26
Germany	0.87	0.28	3.11
Estonia	1.35	0.28	4.81
Spain	1.57	0.36	4.32
France	1.07	0.31	3.51
Italy	1.17	0.29	3.96
Latvia	1.37	0.30	4.63
Lithuania	1.37	0.30	4.56
Luxembourg	2.14	0.36	5.97
The Netherlands	1.21	0.30	4.06
Austria	1.21	0.28	4.36
Portugal	1.27	0.31	4.15
Slovenia	1.19	0.29	4.15
Slovakia	1.84	0.37	5.01
Finland	1.07	0.29	3.65
Bulgaria	1.29	0.32	4.04
Czech Republic	1.41	0.30	4.67
Denmark	1.35	0.34	3.98
Hungary	2.01	0.31	6.41
Romania	2.07	0.38	5.48
Poland	1.88	0.34	5.52
Sweden	1.55	0.31	4.92
United Kingdom	1.11	0.29	3.85
$\overline{R^2}$	0.79		
Durbin-Watson Statistic	2.35		
F-test (Country Dummies)	3.52 with significance level 0.000		

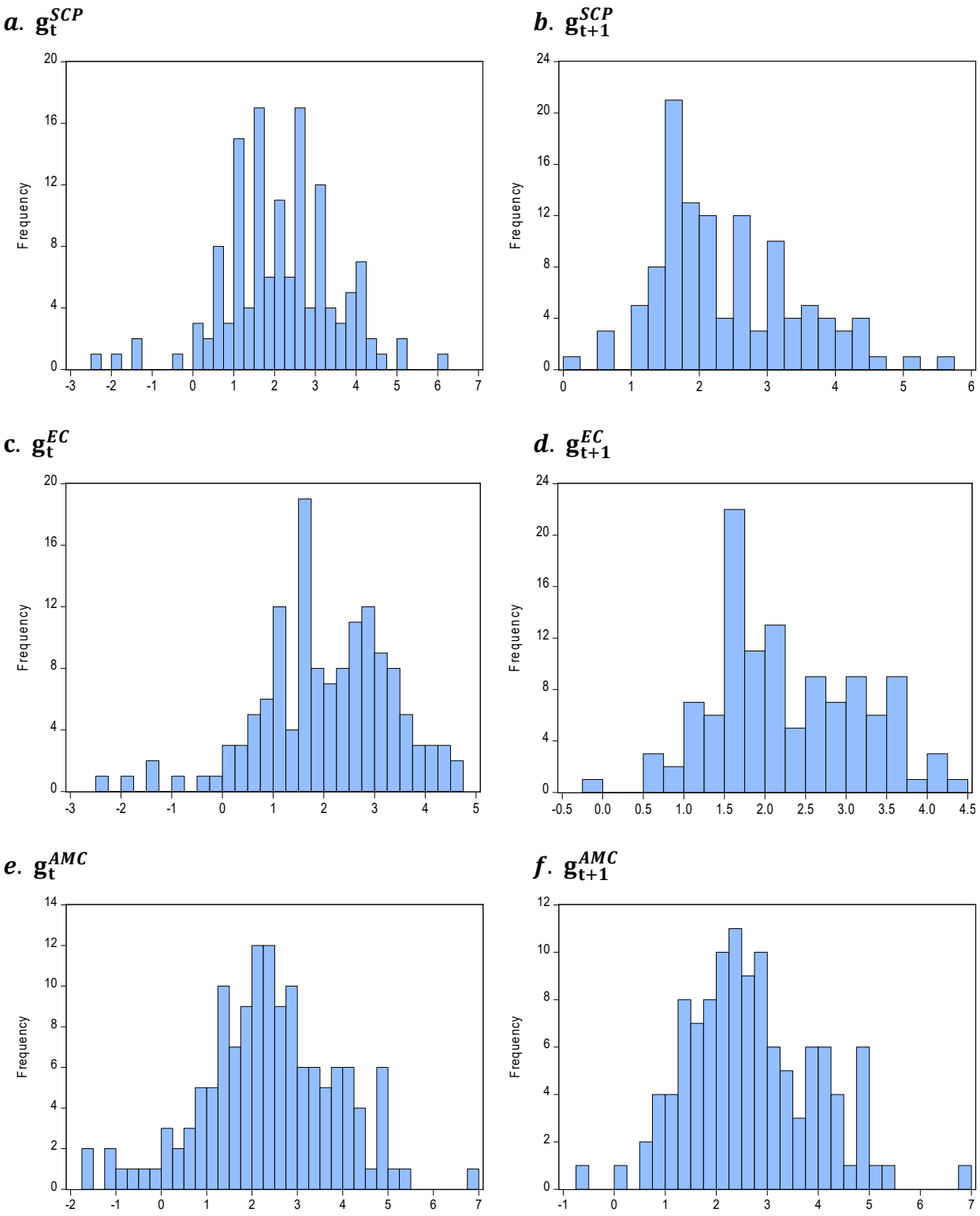
Note: Panel of annual data from 2013 to 2018 (138 observations). Country entries are fixed effect estimates.

Table 6b: Regression of forecast GDP growth rates ($\mathbf{g_t^{EC}}$) on estimated GDP growth rates in $t-1$, contemporaneous GDP projections, and country fixed effects

Variable	Coefficient	Std Error	T-Stat
$\mathbf{g_{t-1}^{EC}}$	0.44	0.06	6.92
$\boldsymbol{ygap_t^{EC}}$	0.18	0.06	2.77
Belgium	0.93	0.27	3.44
Germany	1.06	0.27	3.87
Estonia	1.35	0.27	5.02
Spain	1.62	0.34	4.71
France	1.09	0.30	3.68
Italy	1.08	0.28	3.83
Latvia	1.37	0.29	4.68
Lithuania	1.58	0.29	5.48
Luxembourg	1.96	0.34	5.77
The Netherlands	1.21	0.29	4.24
Austria	1.11	0.27	4.10
Portugal	1.21	0.28	4.26
Slovenia	1.15	0.28	4.19
Slovakia	1.85	0.35	5.28
Finland	0.98	0.28	3.47
Bulgaria	1.19	0.31	3.89
Czech Republic	1.38	0.29	4.69
Denmark	1.51	0.34	4.51
Hungary	1.81	0.30	6.11
Romania	1.75	0.36	4.85
Poland	1.95	0.32	6.01
Sweden	1.63	0.31	5.30
United Kingdom	1.18	0.28	4.20
$\overline{R^2}$	0.78		
Durbin-Watson Statistic	2.38		
F-test (Country Dummies)	3.84 with significance level 0.000		

Note: Panel of annual data from 2013 to 2018 (138 observations). Country entries are fixed effect estimates.

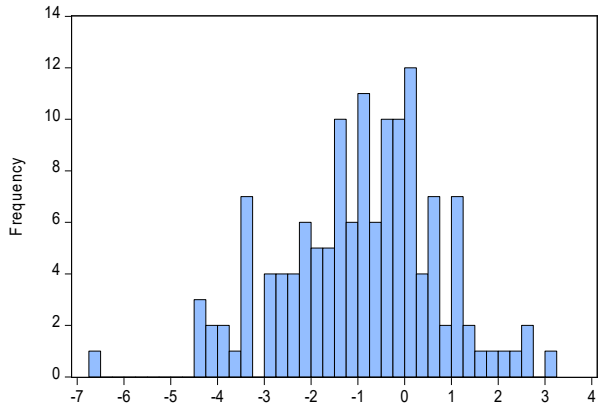
Figure 1: Histogram plots of real GDP growth rate forecasts and outturns



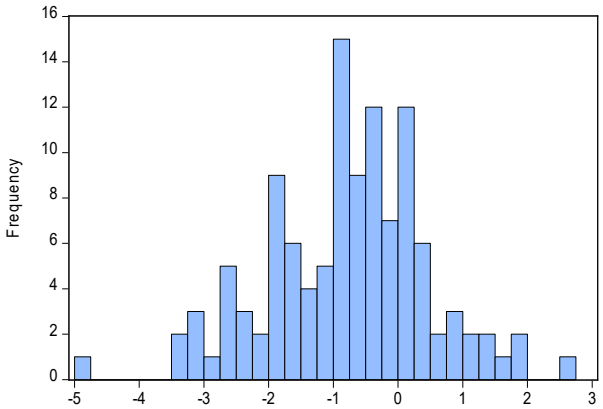
Note: The horizontal axes show real GDP growth rates (%)

Figure 2: Histogram plots of output gap forecasts

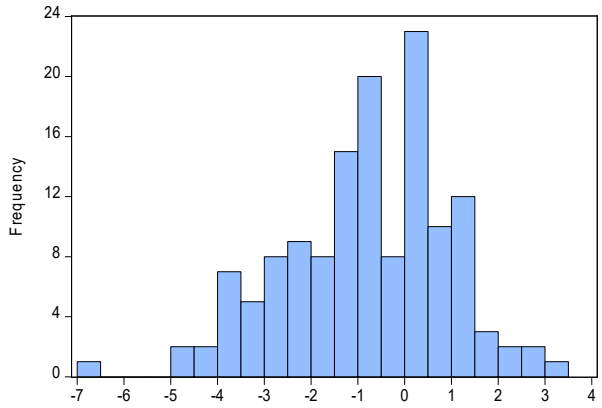
a. $ygap_t^{SCP}$



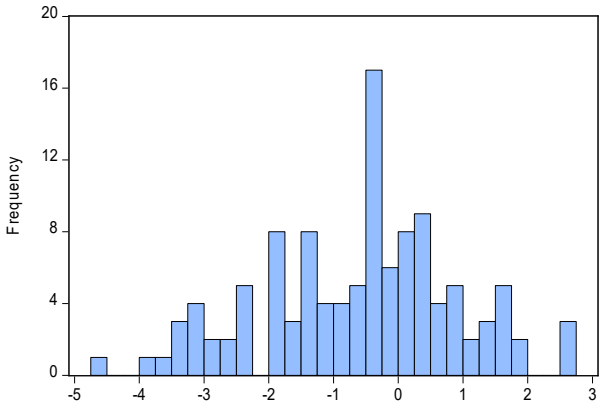
b. $\mathbf{ygap}_{t+1}^{SCP}$



c. $\mathbf{ygap}_t^{EC}$



d. $\mathbf{ygap}_{t+1}^{EC}$



Note: The horizontal axes show output gaps (%)