# III. Fiscal policy implications of uncertain fiscal outcomes

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*This section analyses the impact of the uncertainty that fiscal outcomes can have on expected fiscal efforts. The findings highlight that discretionary fiscal adjustments are subject to large uncertainty, as measured ex post by the forecast errors in EU countries from 2000, even if the forecasts used are unbiased. Results from panel regressions reveal that Member States frequently do not adjust their expected fiscal effort to uncertain fiscal outcomes in the form of forecast errors. We find that Member States react only late and asymmetrically to forecast errors, relaxing the fiscal effort in case of positive surprises and leaving it unchanged in case of negative ones.*

## III.1. Introduction

**Uncertainty is inherent to economic developments**. The Great Recession in 2008/2009 illustrates the effect of unforeseen events on the economy. The risk of contagion effects called into question the very viability of the euro-area project ([229]). However, it does not take a very deep crisis to see that uncertainty is an unavoidable feature of the economy.

**Uncertainty also affects fiscal policy.** In the short and medium term, much of the uncertainty about fiscal policy comes from shocks to the macroeconomic environment and the impact of these shocks on fiscal variables. ([230]) In the longer term, the main sources of fiscal uncertainty stem from potential growth, implicit interest rates on public debt, health-care or ageing expenditure and contingent liabilities ([231]).

**The COVID-19 pandemic clearly highlights the implications of uncertainty for fiscal policy.** According to the Commission 2020 autumn forecast, fiscal deficit and public debt are projected to increase considerably in 2020 and 2021. The outlook covers large differences across Member States and is surrounded by a high degree of uncertainty.

**Against this background, this section analyses the impact of uncertainty of fiscal outcomes on the expected fiscal efforts.** The main objective is to analyse whether and under which conditions Member States react to uncertainty by adjusting their expected fiscal effort. While the analysis is backward looking, its implications are also relevant for the recovery from the COVID-19 crisis.

**It is structured as follows**. Sub-section 2 gives an overview of the main types of uncertainty indicators, which take different perspectives. Sub-section 3 presents stylised facts of the uncertainty measure used for the analysis, namely the forecast error of the fiscal effort. Sub-section 4 describes the empirical strategy, before sub-section 5 presents the main findings. Finally, Sub-section 6 concludes.

## III.2. Uncertainty: different measures and perspectives

**While uncertainty is inherently unobserved, four types of indicators have been used to measure it** ([232]).

**First, dispersion indicators.** They mostly focus on the divergence of opinions of forecasters or

([229]) Buti, M. and P. Padoan, (2013), 'How to make Europe's incipient recovery durable: End policy uncertainty', *VOX*, 12 September.

([230]) Belinga, V., Benedek, M., de Mooij, R. and M. Norregaard (2014), 'Tax buoyancy in OECD countries', *IMF Working Paper* No. 14/110, Mourre, G. and S. Princen (2015), 'Tax revenue elasticities corrected for policy changes in the EU', *European Economy. Economic Papers* 18; Mourre, G., Astarita, C. and A. Maftei (2016), 'Measuring the uncertainty in predicting public revenue', *European Economy, Economic Papers* 39; Fioramanti, M., Gonzalez Cabanillas, L., Roelstraete, B. and S. Ferrandis Valterra (2016), 'European Commission's forecasts accuracy revisited: Statistical properties and possible causes of forecast errors', *ECFIN Discussion Paper* 27; Koester, G. and C. Priesmeier (2017), 'Revenue elasticities in euro area countries', *ECB Working Paper* 1989.

([231]) Auerbach, A. (2014), 'Fiscal uncertainty and how to deal with it', Hutchings Center on Fiscal and Monetary Policy at *Brookings Working Paper* 6, 15 December.

([232]) For descriptions of uncertainty indicators see also Vašíček, B. (2018), 'Impact of uncertainty shocks in the euro area', . European Commission (2018), *Quarterly Report on the Euro Area,* Vol. 16, No.3, pp. 25-40; Meinen, P. and O. Roehe (2017), 'On measuring uncertainty and its impact on investment: cross-country evidence from the euro area', *European Economic Review*, Vol. 92, pp. 161-179 or Jurado, K., Ludvigson, S. and S. Ng (2015), 'Measuring uncertainty', *American Economic Review*, Vol.105, No. 3, pp. 1177-1216. To encompass all dimensions, some authors build synthetic indicators combining different measures (European Central Bank (2016), 'The impact of uncertainty on activity in the euro area', *ECB Economic Bulletin* 8.

survey respondents, but also on the divergence of firm-growth rates within industries. Such indicators assume that a high (low) dispersion indicates a high (low) level of uncertainty ([233]). A positive feature of dispersion indicators is that they are typically based on a large number of observations. Nevertheless, some caveats exist. First, agents' opinions may display systematic biases due to financial incentives ([234]). Second, dispersions across respondents may be explained by differences in available information or in their implications ([235]). Third, dispersion may be caused by time lags in the release of surveys, since forecasters rarely make predictions at the same point in time.

**Second, stock market volatility indicators.** The volatility of stock market data has been frequently used as a proxy for uncertainty. Financial-market data are available at high frequency, which allows measuring their volatility at different periods. Nevertheless, it cannot be ruled out that these indicators change for reasons other than uncertainty, for instance because of changes in risk aversion or economic confidence ([236]). In addition, stock market data can be less relevant in smaller countries.

**Third, forecast errors measures.** These are based on the difference between forecast and outturn data. They assume that a low (high) deviation between forecast and outturn data of macroeconomic ([237]) or financial markets data ([238]) is a sign of a low (high) level of uncertainty. While it is possible to calculate forecast errors for many variables ([239]), they are typically not available at high-frequency level. Furthermore, it cannot be ruled out that these indicators change for reasons other than uncertainty.

**Fourth, news-based indicators.** These are indicators that count words related to uncertainty in media sources. The more often these words occur, the higher the degree of uncertainty ([240]). The main caveats with news-based measures are potential biases due to the subjectivity this entails (e.g. availability of media sources, choice of newspapers, search words). Furthermore, there are limitations to data availability, especially for smaller countries.

**In the following, we show how uncertainty has evolved in the EU using the types of uncertainty measures presented above** (Graph III.1 1). We consider the dispersion of forecasters' opinion (ECB SPF), volatility on the financial market (VSTOXX) and economic policy uncertainty (EPU).

**Uncertainty indicators show marked differences, depending on their perspective: economic, financial or political uncertainty** ([241]). Such uncertainty measures spike at different points in time and exhibit low correlations. The correlation is even negative between the EPU and the dispersion of macroeconomic forecasts (-0.08), and it only reaches a level of close to 0.3 between the ECB SPF and the VSTOXX.

([233]) Bloom, N., Floetotto, M., Jaimovich, N., Saporta-Eksten, I. and S. Terry (2018), 'Really uncertain business cycles', *Econometrica* , Vol. 86, No. 3, pp. 1031-1065, Bachmann, R., Elstner, S., E. Sims (2013), 'Uncertainty and economic activity: Evidence from business survey data', *American Economic Journal: Macroeconomics,* Vol. 5, No. 2, pp. 217-49, Abel, J., Rich, R., Song, J., J. Tracy (2016), 'The measurement and behavior of uncertainty: Evidence from the ECB survey of professional forecasters', *Journal of Applied Econometrics*, Vol. 31, No. 3, pp. 533-550.

([234]) Jurado *et al.* (2015)., *op.cit.*

([235]) Diether, K., Malloy, C. and A. Scherbina (2002), 'Differences of opinion and the cross section of stock returns', *The Journal of Finance,* Vol. 57, No. 5, pp. 2113-2141; Mankiw, N., Reis, R. and J. Wolfers (2003), 'Disagreement about inflation expectations', *NBER Macroeconomics Annual* 18, pp. 209-248; Vašíček (2018), *op. cit*.

([236]) Bekaert, G., Hoerova, M. and M. Duca (2013), 'Risk, uncertainty and monetary policy', *Journal of Monetary Economics,* Vol. 60, No. 7, pp. 771-788.

([237]) Klomp, J. and J. de Haan (2009), 'Political institutions and economic volatility', *European Journal of Political Economy*, Vol. 25, No. 3, pp. 311-326, Mohl, P.and D. Sondermann (2013), 'Has political communication during the crisis impacted sovereign bond spreads in the euro area?', *Applied Economics Letters,* Vol. 20, No. 1, pp. 48-61, Auerbach (2014), *op. cit.,* Abel, J., Rich, R., Song, J. and J. Tracy (2016), 'The measurement and behavior of uncertainty: Evidence from the ECB survey of professional forecasters', *Journal of Applied Econometrics*, Vol. 31, No. 3, pp. 533-550, Rossi, B., Sekhposyany, T. and M. Souprez, (2017), 'Understanding the sources of macroeconomic uncertainty', *Barcelona Graduate School of Economics Working Papers* 920.

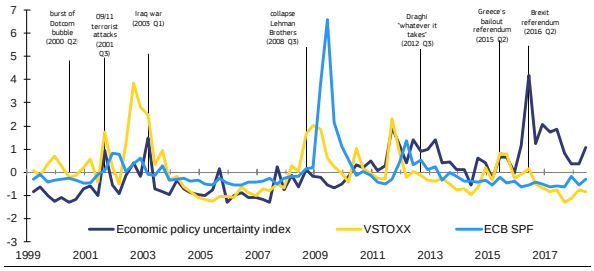
([238]) Brown, K., Harlow, W. and S. Tinic (1988), 'Risk aversion, uncertain information, and market efficiency', *Journal of Financial Economics,* Vol. 22, No. 2, pp. 355-385.

([239]) Jurado *et al.* (2015), *op. cit*.

([240]) Baker, S., Bloom, N. and S. Davis (2016), 'Measuring economic policy uncertainty', *The Quarterly Journal of Economics,* Vol. 131, No. 4, pp.1593-1636.

([241]) For the dispersion of indicators we take data from the ECB's Survey of Professional Forecasters (SPF) and estimate the cross-sectional variance of 1-year rolling forward forecast point predictions of Eurozone GDP growth (Abel *et al.* (2016), op. cit.). In terms of financial-markets measures we use the VSTOXX, which measures the volatility of the EURO STOXX 50, as well as the bond spread between the German and Greek 10-year government bonds. Finally, the news-based measure is shown by the Economic Policy Uncertainty index, which is applied to Europe (Baker *et al.* (2016), *op. cit.*).

Graph III.1: **Evolution of uncertainty indicators for the EU in comparison**




***Source:*** ECB, European Commission, Baker, Bloom and Davis, Bloomberg.

**The VSTOXX and the bond spreads measure specifically the uncertainty of financial markets.** The VSTOXX increased significantly in reaction to the 9/11 terror attacks, the 2003 Iraq war and the collapse of Lehman Brothers. It decreased progressively after ECB President Mario Draghi's 'Whatever it takes' speech in July 2012 and increased again in 2015 in the context of Greece's bailout referendum.

**The economic policy uncertainty (EPU) index focuses on political events.** The EPU index showed significant increases in reaction to the 9/11 terror attacks or the Iraq war; two events which also triggered reaction in the financial uncertainty indicators. By contrast, the EPU index did not spike following the fall of Lehman Brothers but it increased following the Brexit referendum, while the measures of financial market and macroeconomic uncertainty (e.g. dispersion of indicators) remained at low levels.

**Dispersion in the ECB Survey of Professional Forecasts (SPF) primarily measures macroeconomic uncertainty.** This indicator shows a spike of uncertainty right after the collapse of Lehman Brothers. The delay compared to the financial indicators around 2009 and 2012 reflects a difference in their nature: the measure of macroeconomic uncertainty peaked after that of financial uncertainty because risks were first observed on the financial market and their materialisation fuelled the risk of contagion to the real economy. The recent referendums on the UK's membership of the EU and Greece's financial assistance programme were accompanied by increases in measures of political risk but did not trigger sizeable reactions in measures of macroeconomic uncertainty.

## III.3. Stylised facts using our uncertainty measure: forecast errors of the fiscal effort

**Our key measure for uncertain fiscal outcomes is the forecast error of the fiscal effort**. Our analysis focuses on the fiscal effort, as measured by the change in the structural balance, since it is a key indicator of the Stability and Growth Pact (SGP) ([242]). We assess the uncertainty of the fiscal effort with the third type of uncertainty indicator presented above, namely the forecast error (Sub-section 2). Our uncertainty indicator corresponds to the 18-month-ahead forecast error for year *t* and is defined as the difference between the forecast for *t* made in autumn of *t-1* and the actual (outturn) value for *t* as observed in spring of *t+1*. The use of the autumn forecast allows us to take into account Member States' draft budgetary plans. As a result, a positive (negative) forecast error means that the fiscal effort turned out to be smaller (higher) than expected, implying a negative (positive) surprise.

**The forecast error is based on Commission forecast reports**. We compute the forecast errors for Member States using real-time data from Commission forecast vintages between autumn 2000 and spring 2018. Our analysis shows that Commission forecasts represent an unbiased forecast with satisfactory forecasting properties ([243]). By contrast, forecasts produced by domestic authorities may be overly optimistic in order to avoid potential procedural consequences in case of non-compliance with the targets ([244]). For this reason, we argue that our forecast error indicator represents an *ex post* measure of uncertainty for Member States.

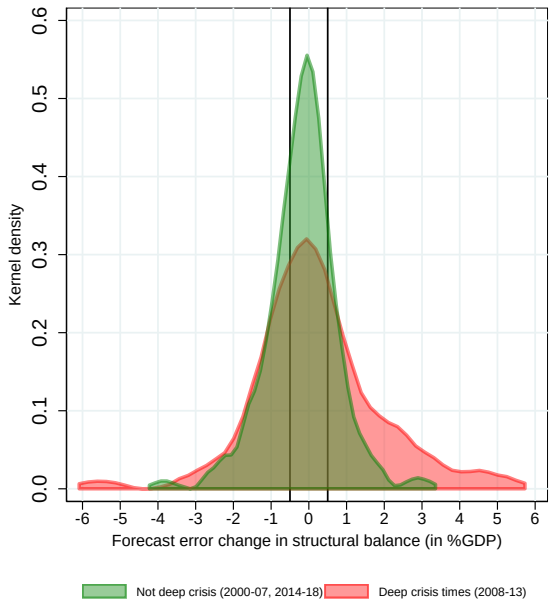
([242]) The structural balance adjusts the overall government balance for the impact of the economic cycle as well as for certain one-off revenues (e.g. sales of telecommunication licences) and one-off capital transfers (e.g. financial assistance to the banking sector). In the preventive arm of the SGP, the required fiscal adjustment is also measured by the expenditure benchmark.

([243]) We ran tests for bias in the Commission's projections, by simply regressing the forecast error on a constant and testing if this constant is statistically different from zero. Our findings show that the forecast of the fiscal effort does not show a bias for country aggregates (EU, euro area, CEEC) and for all 28 Member States apart from Croatia. For Croatia, the number of observations is limited, since it only joined the EU in 2013. The results broadly confirm similar tests (González Cabanillas, L. and A. Terzi (2012), 'The accuracy of the European Commission's forecasts re-examined', *European Economy. Economic Papers* 476, European Commission (2020), 'Performance of spending rules at EU and national level – a quantitative assessment, Report on public finances in EMU', *European Economy, Institutional Paper*, 24 July 2020.

([244]) Frankel, J. and J. Schreger (2013), 'Over-optimistic official forecasts and fiscal rules in the eurozone', *Review of World Economics*, Vol. 149, No. 2, pp. 247-272.

**Our results show that the forecast errors of the fiscal effort can be sizeable, not only in times of deep crisis (Graph** III.2**)**. It is true that the forecast errors were particularly large during the 2008/2009 Great Recession. During this period, more than 70% of the forecast errors exceeded 0.5 pp. of GDP (see white Kernel in Graph III.2). In addition, the forecast errors were mostly positive, explaining the right-skewed distribution. However, also outside times of deep crisis, sizeable forecast errors exceeding 0.5 pp. occurred in around 50% of cases (see green Kernel in Graph III.2).

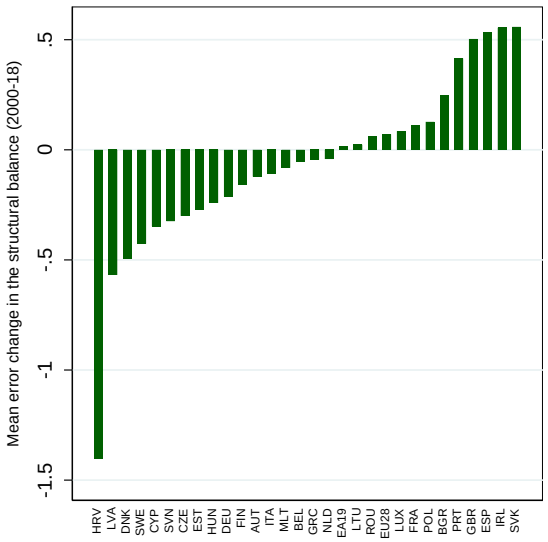
Graph III.2: **Distribution of forecast errors of the fiscal effort (EU-28 Member States)**




(1) Note: Our uncertainty indicator corresponds to the 18-month-ahead forecast error for year t and is defined as the difference between the forecast for t made in autumn of t-1 and the actual (outturn) value for t observed in spring of t+1. A positive (negative) forecast error corresponds to a negative (positive) surprise. The calculations are based on real-time data from Commission forecast vintages from 2000-2019. For data availability reasons, the cyclically-adjusted balance is used before 2006 instead of the structural balance.
***Source:*** Commission forecast from different vintages.

**The forecast error of the fiscal effort was non-negligible for many Member States**. For the EU as a whole, positive and negative 18-month-ahead forecast errors offset each other over the period 2000 to 2018, resulting in a mean error close to zero. However, at country level, the forecast error seems to be more persistent. Over the entire period, on average around 20 (15) percent of the Member States overestimated the fiscal effort by on average 0.25 (0.5) pp. (Graph III.3). The mean error represents only a rough indicator of the forecast quality, since positive and negative errors can offset each other, thus limiting the size of the error.

Graph III.3: **Mean error of fiscal effort by country**




(1) Note: See footnote of Graph III.2 for more information.

***Source:*** Commission forecast from different vintages.

## III.4. Empirical strategy

**Using a panel data approach, we analyse Member States' reaction to uncertainty based on an augmented fiscal reaction function**. The analysis concentrates on all Member States using real-time data from Commission forecast reports between autumn 2000 and spring 2019.

**The analysis is conducted in two steps**. As a first step, the key drivers of the expected fiscal effort are determined using a classical fiscal reaction function, which is augmented with the forecast error of the fiscal effort. This allows us to get a first rough idea of whether Member States learn from past uncertainty (i.e. a 'learning effect'). The specification looks as follows:

$$\Delta sb_{i,t+1}^{AF,t} = \beta_1\, cycle_{i,t+1}^{AF,t} + \beta_2\, \mathrm{debt}_{i,t-1}^{AF,t} + \beta_3\, FE\,(\Delta sb_{i,t-1}) + \beta_4\, X_{i,t}^{t} + \vartheta_t + \theta_i + \varepsilon_{i,t} \quad (1)$$

where the superscript $t$ refers to the time of the publication of the Commission forecast report, while subscript $t$ refers to the year to which the figure applies and $i$ stands for the Member State.

For instance, the dependent variable $\Delta sb_{i,t+1}^{AF,t}$ is the expected fiscal effort for year *t+1* as projected in the Commission autumn forecast report of year *t*.

**The independent variables are selected in line with the literature** ([245]). We control for two key variables used in the fiscal reaction function literature, namely the economic cycle ('cycle' in equation 2), as measured by the change in the output gap, and the government's budget constraint in the form of the debt-to-GDP ratio ('debt'). The setup reflects the rationale of the EU fiscal governance framework, which requires a larger fiscal effort in good economic times and/or in the presence of high public debt for Member States that still need to reach a sound fiscal position (their MTO) ([246]). A key variable of interest is the forecast error of the fiscal effort. Our uncertainty indicator corresponds to the 18-month-ahead forecast error for year *t* and is defined as the difference between the forecast for *t* made in autumn of *t-1* and the actual (outturn) value for *t* as observed in spring of *t+1*. The forecast error of the fiscal effort is denominated in equation 2 as $FE\left(\Delta sb_{i,t-1}\right)$. The remaining independent variables are summarised in vector *X*. They include the forecast error of the output gap, key indicators for EU fiscal rules (dummy variables for Member States who are in EDP and/or have achieved their MTO) and the election year (the percentage share of months of a given year before an election) ([247]). Furthermore, the specification incudes year- ($\vartheta$) and country-fixed effects ($\theta$), while $\varepsilon$ represents an error term.

**In a second step, we refine our specification to find out if the sign, size and/or persistency of the forecast error matters for the reaction of Member States.** Since forecast errors are an unavoidable part of fiscal projections, we do not expect Member States to react to all kinds of uncertainty. However, a myopic disregard of repeated errors or large-scale uncertainty can do serious damage to a Member State's public finances. Therefore, we use the following panel interaction model to find the conditions under which the forecast error becomes significant:

$$\Delta sb_{i,t+1}^{AF,t} = \beta_1\, cycle_{i,t+1}^{AF,t} + \beta_2\, debt_{i,t-1}^{AF,t} + \beta_3\, FE\left(\Delta sb_{i,t-1}\right) + \beta_4\, X_{i,t}^{t} + \beta_5\, FE\left(\Delta sb_{i,t-1}\right).D_{i,t}^{AF,t} + \beta_6\, D_{i,t}^{AF,t} + \vartheta_t + \theta_i + \varepsilon_{i,t} \qquad (2)$$

where *D* represents a dummy variable that is equal to 1 if the forecast error is positive (i.e. representing a negative surprise) and/or large (exceeding 0.25 or 0.5 pp. of GDP) and/or persistent (i.e. repeated forecast errors of up to 3 years). To find out if these elements have an impact on the expected fiscal effort, the dummy variable is interacted with the forecast error. We can then derive the marginal effect, which measures how a marginal change of the forecast error effects the fiscal effort as follows:

$$\frac{\partial\, \Delta sb}{\partial\, \mathrm{FE}(\,\Delta sb)} = \beta_3 + \beta_5\, D_{\mathrm{i,t}} \qquad (3)$$

The equation shows that the marginal effect depends on the value of the dummy variable *D*. The marginal effect is defined as $\beta_3 + \beta_5$ if the dummy variable is equal to 1 (e.g. forecast error shows a negative surprise), whereas it simplifies to $\beta 3$ if the dummy variable is 0 (e.g. forecast error shows a positive surprise) ([248]). In addition, the standard errors for both events can be calculated based on the variance-covariance matrix.

**We apply different estimation techniques**. In terms of the estimation approach, we apply three different techniques. We first estimate the model with simple LSDV estimations using White heteroscedasticity robust standard errors ([249]). In

([245]) See for instance, Bohn, H (1998), 'The behaviour of U.S. public debt and deficits', *The Quarterly Journal of Economics,* Vol. 113(August), pp. 949-963, Checherita-Westphal, C. and V. Žďárek(2017), 'Fiscal reaction function and fiscal fatigue: Evidence for the euro area', *ECB Working Paper* 2036, Combes, J., Minea, A. and M. Sow (2017), 'Is fiscal policy always counter-(pro-) cyclical? The role of public debt and fiscal rules', *Economic Modelling,* Vol. 65, pp. 138-146, European Commission (2011), 'Public Finances in EMU', *European Economy* 3, September.

([246]) European Commission (2019), 'Vade Mecum on the Stability and Growth Pact – 2019 edition', *Institutional Paper* 101, 2 April.

([247]) Election year is defined as the share of month in a given year before the election (e.g. if the election takes place in October 2019, the value of the variable is 10/12 in 2018 and 5/6 in 2019 and 1/6 in 2018. Please note that we tested a range of alternative control variables e.g. the partisanship (left vs. right). We also tested for the sensitivity of the economic cycle by using the level of the output gap and the real GDP growth rate. However, the results do not change.

([248]) For the specification and interpretation of interaction terms see Brambor, T., Clark, W. and M. Golder (2006), 'Understanding interaction models: Improving empirical analyses', *Political Analysis*, Vol. 14, No. 1, pp. 63-82, Braumoeller, B. (2004), 'Hypothesis testing and multiplicative interaction terms', *International Organization,* Vol. 58, No. 4, pp. 807-820.

([249]) White, H. (1980), 'A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity', *Econometrica*, Vol. 48, No. 4, pp. 817-838.

addition, we provide further evidence by running first-difference and system-GMM regressions in order to control for endogeneity ([250]). We consider the forecast error and the output gap to be endogenous. Due to the small sample size, the set of internal instrumental variables is restricted to up to 2 lags and the matrix of instruments is then 'collapsed' ([251]). We test the validity of the GMM specification with AR(1,2) and Hansen tests.

## III.5. Main findings

**Our baseline model largely confirms the findings of the fiscal reaction function literature (Table 1)**. We find strong evidence of pro-cyclical fiscal policy, as shown by the negative and significant coefficient of the change in the output gap. In addition, an increase of the debt-to-GDP ratio tends to lead to a fiscal tightening. Moreover, election years appear to be significantly linked to a loosening of the fiscal effort. The initial years of the Great Recession (2008-09) seem to have resulted in a significant loosening of the fiscal adjustment. Finally, Member States that have achieved their MTOs seem to set looser fiscal adjustment plans, while there is no evidence that an EDP affects the expected fiscal effort. The findings are robust to the estimators used (columns 1-5) ([252]).

**A rough first assessment indicates no significant learning effect (Table 1)**. To get a rough first idea whether Member States learn from past episodes of uncertainty, we augment the model with the forecast error of the fiscal effort. Since the consequences of increased uncertainty may only kick in after repeated forecast errors have occurred, we assess the impact of time lags in greater detail. We run our empirical analyses by adding the lagged forecast error in a stepwise fashion, beginning with a lag of 1 year (column 3) and ending up with specifications comprising the forecast error with a lag of up to 2 (column 4) and 3 years (column 5). The results indicate that an increase (decrease) in the forecast error does not have a statistically significant impact. The findings of the other independent variables remain broadly unchanged.

Table III.1: **Regression results: augmented baseline model**

| | LSDV | SYSGMM | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Δ OG (t+1) | -0.324*** | -0.460*** | -0.345*** | -0.330*** | -0.393*** |
| | (-4.962) | (-3.145) | (-3.325) | (-3.136) | (-3.598) |
| Public debt (t) | 0.009*** | 0.006*** | 0.006*** | 0.003 | 0.006*** |
| | (2.732) | (3.652) | (2.878) | (1.149) | (4.506) |
| Crisis dummy (2008-09) | -0.778*** | -0.763** | -3.060*** | -2.256*** | -1.955*** |
| | (-3.528) | (-2.432) | (-4.743) | (-4.940) | (-6.338) |
| Election year (t+1) | -0.000 | -0.001*** | -0.002*** | -0.001** | -0.001*** |
| | (-1.549) | (-2.622) | (-3.770) | (-2.358) | (-3.648) |
| MTO achievement (t) | -0.279*** | -0.179** | -0.166 | -0.251*** | -0.106 |
| | (-3.140) | (-2.333) | (-1.628) | (-2.704) | (-1.364) |
| EDP (t) | 0.098 | 0.136 | 0.006 | 0.168 | 0.068 |
| | (1.325) | (1.631) | (1.061) | (1.366) | (0.817) |
| Forecast error OG (t-1) | -0.048 | -0.005 | -0.170** | -0.075 | -0.025 |
| | (-1.250) | (-0.083) | (-2.174) | (-1.207) | (-1.030) |
| Forecast error ΔSB (t-1) | | | -0.003 | 0.012 | 0.068 |
| | | | (-0.060) | (0.179) | (1.491) |
| Forecast error ΔSB (t-2) | | | | 0.066 | 0.031 |
| | | | | (1.384) | (0.720) |
| Forecast error ΔSB (t-3) | | | | | 0.030 |
| | | | | | (0.910) |
| # countries | 28 | 28 | 28 | 28 | 28 |
| # observations | 410 | 410 | 399 | 371 | 343 |
| Wald time dummies | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Forecast error ΔSB (size) | | | -0.003 | 0.078 | 0.129 |
| Forecast error ΔSB (p-value) | | | 0.952 | 0.858 | 0.136 |
| AR(1) (p-value) | | 0.004 | 0.005 | 0.007 | 0.023 |
| AR(2) (p-value) | | 0.455 | 0.363 | 0.58 | 0.788 |
| Hansen (p-value) | | 0.520 | 0.476 | 0.274 | 0.245 |
| # instruments | | 24 | 30 | 31 | 32 |

(1) Estimations are based on the least square dummy variable estimator using heteroskedasticity-robust standard errors (LSDV). In addition, the use of system-GMM (SYS-GMM) estimators follows Blundell and Bond (1998), where we consider the output gap and the forecast error variables to be endogenous. Due to the small sample size, the set of internal instrumental variables is restricted to up to 2 lags and the matrix of instruments is then 'collapsed'. The standard errors are corrected following Windmeijer (2005). AR(1,2) and Hansen tests confirm the validity of the GMM specifications (Roodman, 2009a, b). Note that the coefficients and standard errors of the forecast error cannot be interpreted if the variable is included in the regression with several lags (columns 3-5). As a consequence, we report the size of forecast errors coefficients (row 'forecast error ΔSB (size);) We then use a simple Wald test to check whether this short-term elasticity is statistically different from zero ('forecast error ΔSB (p-value)'). ***, ** and * denote statistical significance at 1, 5 and 10% respectively.
***Source:*** European Commission.

**Robustness tests broadly confirm the main findings.** First, we shorten the sample to re-run the regressions for the period since 2005. The reason for this is that the structural balance has been used in fiscal surveillance only since 2005, while the cyclically-adjusted balance was used earlier than that ([253]). Second, we assess the sensitivity of our findings by using different estimation techniques as described above. Overall, our key findings do not change much in both cases.

([250]) Blundell, R. and S. Bond (1998), 'Initial conditions and moment restrictions in dynamic panel data models', *Journal of Econometrics,* Vol. 87, No. 1, pp. 115-143.

([251]) The standard errors are corrected following Windmeijer, F. (2005), 'A finite sample correction for the variance of linear efficient two-step GMM estimators', *Journal of Econometrics*, Vol. 126, No. 1, pp. 25-51.

([252]) We also tested for a broad range of additional independent variables (such as the current account balance, openness, ageing), which, however, turned out to be not statistically significant.

([253]) The structural balance corresponds to the cyclically-adjusted balance excluding one-offs and certain temporary measures.

**We then revise our empirical strategy to find out if Member States learn from past episodes of uncertainty**. A myopic disregard of repeated or large-scale uncertainty can do serious damage to the public finances. In order to take this factor into account, we assess the sign, size and persistence of the forecast error in greater detail. We distinguish between negative surprises (i.e. positive forecast errors) and positive ones (i.e. negative forecast errors). We also test if large or very large negative or positive surprises (0.25 pp. or 0.5 pp. of GDP) had an impact. Finally, we test if repeated (large) negative or positive surprises had an impact on Member States' expected fiscal effort.

Our findings of the refined test of the learning effect can be summarised as follows (Table 2):

- ***Sign of the forecast error***: Our results show that neither negative surprises (i.e. a *positive* forecast error) nor positive surprises of the fiscal forecast (i.e. a *negative* forecast error) have a statistically significant impact on the expected fiscal effort.

- ***Size of the forecast error***: Similarly, *large* or *very large* negative surprises do not cause a significant effect on the expected fiscal effort if they occur only once. This finding holds, irrespective of the sign (positive or negative) and the size (0.25 pp. or 0.5 pp. of GDP) of the forecast error. Similarly, the occurrence of one (very) large forecast error in the past (up to three years) has no statistically significant impact on the expected fiscal effort.

- ***Persistence of forecast errors***: We assess up to three lags to assess the impact of persistent forecast errors. We find evidence that persistent forecast errors have an impact on the expected fiscal effort. The strength of the impact depends, however, on the size of the forecast error: Overall, we find only a weak impact in case of negative surprises, but a strong one for positive ones. To be more precise, in case of negative surprises, only a *repeated and very large negative* surprise (i.e. exceeding 0.5 pp. of GDP) leads to a statistically significant impact in the form of a fiscal tightening. It is important to note, however, that this is a rather rare event that only occurs in around 3% of all observations since 2000 (13 out of 399). The main result is only valid in case of three very large negative surprises that are repeated in a row. By contrast, we cannot find significant results if the very large negative surprise occurred only 2 years in a row or in 2 out of 3 years. At the same time, repeated positive surprises have a rather strong impact, resulting in a fiscal loosening.

## III.6. Conclusions

This section finds that Member States tend to react only very late and asymmetrically to the uncertainty surrounding the fiscal effort. We show that uncertain economic outcomes in the form of the forecast error of the fiscal effort have been an integral part of fiscal projections in the EU since 2000. Nevertheless, the results from panel regressions reveal that Member States frequently do not adjust their expected fiscal effort to economic shocks. We find that Member States only late and asymmetrically react to forecast errors, relaxing the fiscal effort in case of positive surprises and leaving it unchanged in case of negative ones.

Table III.2: **Regression results conditional on forecast characteristics**

| | | Type of surprise | |
|---|---|---|---|
| | | **Negative** | **Positive** |
| **Sign** | | 0,08 | 0,01 |
| **Size** | Large | 0,05 | -0,02 |
| | Very large | 0,01 | -0,03 |
| **Per-sistence** | Repeated | | |
| | • 2 years in a row | -0,02 | -0.16* |
| | • 3 years in a row | 0,02 | -0.20** |
| | Repeated and large | | |
| | • 2 years in a row | -0,11 | -0.02** |
| | • 3 years in a row | -0,07 | -0.49** |
| | Repeated and very large | | |
| | • 2 years in a row | 0,15 | -0.27** |
| | • 3 years in a row | 0,19* | -0,30 |

(1) Forecast errors of the fiscal effort (i.e. the change in the structural balance) are considered to be large (very large) if they exceed 0.25(0.5) pp. The table shows the size and significance level of the marginal effect, which measures the impact of a marginal increase of the forecast error if the forecast characteristic (sign, size, persistence) is fulfilled (see equation (3)). The findings are based on the same sample and estimation techniques as described above. A reading example of the quantitative assessment: a negative surprise tends to have a small positive impact on the expected fiscal adjustment (the size of the coefficient is 0.08), which is, however, not statistically significant at the 10% level. ***, ** and * denote statistical significance at 1, 5 and 10% respectively.

***Source:*** European Commission.