

## Box 1.5: Forecast errors and multiplier uncertainty

The current forecast of a 0.4% fall in euro-area GDP in 2012 is substantially lower than what was expected even 1½ years ago: our spring 2011 forecast projected a rate of growth of 1.8% for 2012. Such over-prediction of euro-area growth in recent years has been common to most forecasters, including other major international institutions. An analysis presented in the latest IMF World Economic Outlook argues that past forecast errors provide evidence that forecasters have significantly underestimated fiscal policy multipliers.<sup>(1)</sup>

Without questioning that fiscal multipliers are probably larger than usual at the current juncture, this box assesses some of the evidence regarding forecast errors, focusing only on the euro area, and argues that much caution is warranted when using past forecast errors as indirect evidence for the true size of the fiscal consolidation multiplier. There are two reasons for that: first, the forecast errors over the 2010-11 period have been predominantly *underestimations* of higher-than-expected growth in 2010, which were in fact associated with stimulus measures in that year; second, when controlling for increases in sovereign-bond yields the correlation between forecast errors and changes in the fiscal stance breaks down.

### Fiscal multipliers in structural macroeconomic models

The general conclusion from macroeconomic models is that there is no single multiplier. The size of the multiplier, defined as the change in GDP following a 1% of GDP change in fiscal deficits, depends on the composition of the fiscal consolidation (or expansion), its persistence and the accompanying monetary and financial conditions. This finding is common to the models used by international organisations (see the comparison in Coenen *et al.* (2012)).<sup>(2)</sup> The fiscal multiplier differs across countries and over time. It is found to be larger (i) for direct government spending and targeted transfers (as opposed to tax cuts and general transfers); (ii) if the share of liquidity-constrained (or 'rule of thumb') and/or credit-

constrained consumers is larger; (iii) if nominal interest rates are invariant, either because they are at their zero lower bound, or in general for small economies within a monetary union; (iv) if economies are less open (unless the fiscal shocks are synchronised across trading partners); (v) if the shock is temporary rather than permanent.

In the Commission's QUEST model, multipliers for *temporary* fiscal shocks are typically between 0.1-0.4 for tax changes, but in the range of 0.7-1.5 for spending changes when credit constraints are high and interest rates are at the zero-lower bound.<sup>(3)</sup> However, it is generally accepted that the impact multiplier associated with *permanent* fiscal consolidations is substantially smaller than the multiplier of temporary fiscal contractions, because of more positive crowding in (confidence) effects of private consumption and investment associated with an expected increase in net income.<sup>(4)</sup> In QUEST the multiplier for a permanent consolidation for the EU aggregate in normal circumstances lies, depending on the instrument, between 0.2-0.8, and is on average for a balanced-composition consolidation around 0.4. However, when interest rates are constrained by the zero rate floor, and in an environment of global fiscal retrenchment, as in the current environment, the average multiplier can rise to 0.5-0.7.

### Analysis of forecast errors: distinguishing between stimulus and consolidation multipliers

Do recent forecast errors really suggest that forecasters have underestimated the fiscal multiplier? To answer this question we conduct a similar exercise as the IMF, and regress the forecast errors for GDP growth on the forecast of the change in the fiscal stance. Under rational expectations, this coefficient should be zero.<sup>(5)</sup> We confine our attention to the euro area. This has the advantage of a 'cleaner' sample: by limiting ourselves to countries in a monetary union we

<sup>(1)</sup> IMF, *World Economic Outlook*, October 2012, box 1.1: Are we underestimating short-term fiscal multipliers?, pp. 41-43.

<sup>(2)</sup> Coenen, G., C. Erceg, C. Freedman, D. Furceri, M. Kumhof, R. Lalonde, D. Laxton, J. Linde, A. Mourougane, D. Muir, S. Mursula, C. de Resende, J. Roberts, W. Roeger, S. Snudden, M. Trabandt, J. van 't Veld, Effects of fiscal stimulus in structural models, *American Economic Journal: Macroeconomics*, Vol. 4, No. 1, January 2012, pp. 22-68.

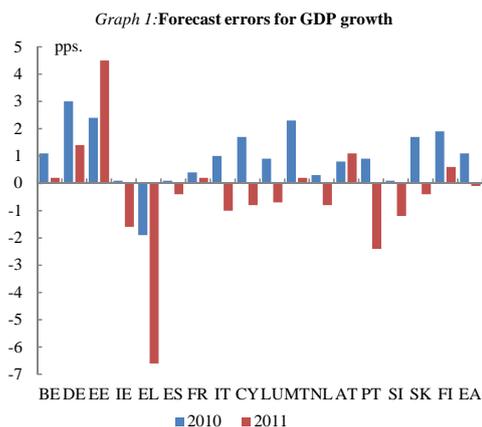
<sup>(3)</sup> In-depth analysis of the specific impact of different revenue and expenditure items on economic activity can be found in the chapter I.2 "The impact of fiscal consolidation on Europe's economic outlook" of European Commission, European Economic Forecast - Autumn 2010, *European Economy* 7/2010.

<sup>(4)</sup> This is a common finding in all structural models in the comparison exercise reported in Coenen *et al.* (2012), pp. 60-65.

<sup>(5)</sup> The IMF authors find this coefficient to be between -0.4 and -1.2 and, assuming a multiplier of 0.5 was used in the forecast process, conclude from this that the actual multiplier lies between 0.9 and 1.7.

remove one source for cross-country multiplier heterogeneity, i.e. differences in the exchange-rate regime. A second advantage is that we can interpret the results better for individual countries.

It is useful to start with a closer look at the forecast errors. Graph 1 takes the Commission's spring 2010 forecast and shows the GDP forecast errors for the years 2010 and 2011 for the euro-area Member States. As is clear from this graph, there was no systematic overestimation of growth, but in fact forecast errors were predominantly positive, i.e. the Commission underestimated growth, in particular in 2010. For the euro-area aggregate, growth turned out 1.0 pp. higher than was forecast in 2010, and only -0.1 lower in 2011.



Note: GDP growth forecast errors for the spring 2010 forecast.

Graph 2.a shows the spring 2010 forecast of the changes in the fiscal stance (concretely, the change in the structural fiscal balance as a percentage of potential GDP) in both years and Graph 2.b depicts the actual changes in the fiscal stance on the basis of the current autumn 2012 estimates. Differences between the actual changes and what was projected in the spring 2010 forecast are significant. Much of the consolidation efforts, in particular those in 2011, were in fact not included in the forecast in spring 2010.<sup>(6)</sup>

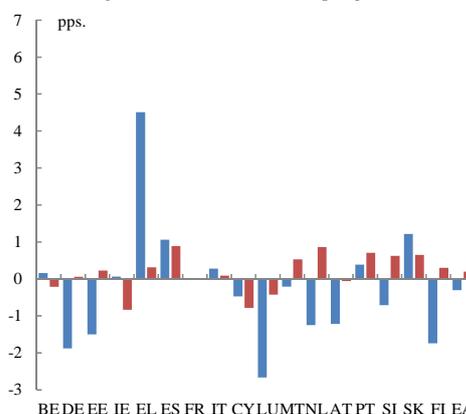
Looking at the actual fiscal stance in Graph 2.b in more detail shows that at least two groups of countries can be distinguished:

<sup>(6)</sup> The Commission's forecast uses a no-policy-change assumption in the forecast process for outer years. Only those policy measures that have been publicly announced, are fully credible and known in sufficient detail are taken into account in the forecast. In times of consolidation when measures have not been fully approved yet at the time of forecast publication, this may lead to a positive bias in the growth forecast for outer years.

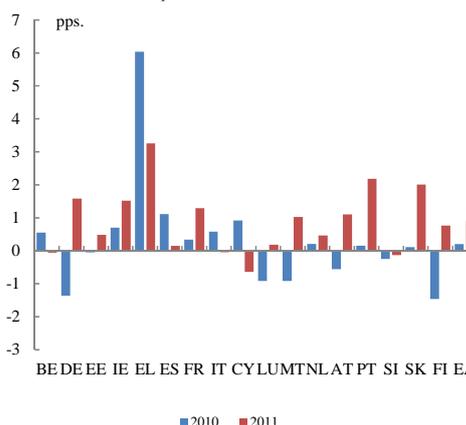
- Countries which have undertaken measures to permanently reduce debt levels (increase in the structural balance in both 2010 and 2011).
- Countries which have undertaken temporary fiscal expansions, especially in 2010, followed by consolidation efforts in 2011 (e.g. Germany, Austria, Finland, Luxembourg and Malta).

As discussed below, however, Greece deserves to be treated apart from other Group 1 countries.

**Graph 2a: Forecast fiscal stance, spring 2010**

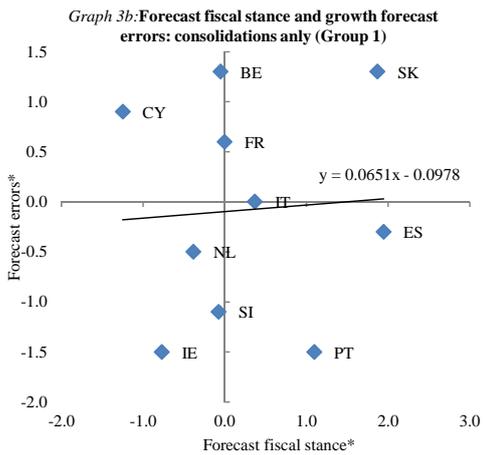
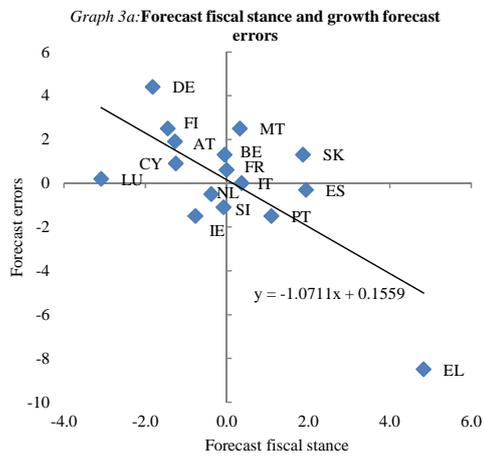


**Graph 2b: Actual fiscal stance**



Note: change in the structural fiscal balance as a percentage of potential GDP: spring 2010 forecast vs. autumn 2012 forecast.

Stimulus measures in the second group in 2010 are associated with large positive forecast errors for these countries. As the impact multiplier associated with temporary fiscal contractions/expansions is substantially larger than the multiplier of permanent fiscal consolidations, combining countries in group 1 and 2 biases the estimate of the permanent consolidation multiplier in an upward direction.

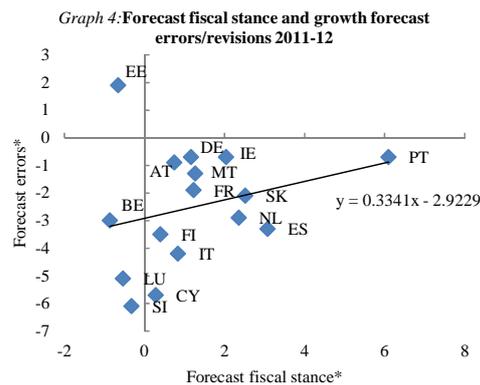


\* Note: Vertical axis displays cumulative forecast errors for GDP growth in 2010-11 (spring 2010 forecast); horizontal axis displays forecast of change in fiscal structural balance as percentage of potential GDP in 2010-11 (spring 2010 forecast).

The largest forecast error is for Greece, which is the country that also has undertaken the largest consolidation efforts. However, one should be careful drawing general conclusions from the case of Greece about the size of the multiplier for permanent consolidations. Just after the finalisation of the spring 2010 forecast, Greece entered an EU/IMF programme while at the same time the euro-area sovereign-debt crisis started to escalate. Later on, serious doubts emerged whether the consolidation measures undertaken would be sufficient to permanently reduce sovereign debt, as manifest in rising government-bond yields (to above 35% at the end of 2011). A sovereign-debt restructuring eventually took place in February 2012, resulting in private investor losses. Thus, the Greek case cannot be considered as a consolidation associated with increasing private sector confidence, a precondition for consolidations being less damaging to growth prospects in the short run

(the role of sovereign-bond yields is further explored in the next section).<sup>(7)</sup>

Graph 3 illustrates the change of the relationship between forecast errors and the fiscal stance when looking at the consolidating countries. Panel (a) displays an analysis based on all countries, while panel (b) only covers the consolidating countries excluding Greece. The estimated coefficient for the whole sample is -1.1 but falls to zero when considering only consolidating countries. The relationship between forecast errors and expected changes in fiscal stance thus breaks down when the 2010 stimulus countries and Greece are excluded from the sample. This suggests that if multipliers were underestimated, the underestimation concerned the multipliers of temporary expansions in 2010, not permanent consolidation in 2011.



\* Note: Vertical axis: cumulative forecast errors for GDP growth in 2011-12; horizontal axis: forecast for a change in fiscal structural balance as percentage of potential GDP in 2011-12; spring 2011 forecast data.

When one shifts the analysis one year forward and considers the forecast errors made in spring 2011 for 2011 and 2012 (current forecast), the sample no longer includes countries undertaking stimulus measures, as all Member States have been tightening their fiscal stance. Graph 4 shows the results for this analysis, where the forecast error (forecast revision in the case of 2012) for real GDP growth during 2011-12 is regressed on forecasts of fiscal consolidation for the same period that were made in early 2011. Although errors in the spring 2011 forecast are much larger than in 2010, we find the coefficient on planned fiscal consolidation to be not significantly different from zero.<sup>(8)</sup> This is consistent with the results above that for a sample

<sup>(7)</sup> A more negative growth impact relative to initial conditions would of course not imply that growth would have been higher without consolidations, as the counterfactual would have been worse.

<sup>(8)</sup> Greece is excluded from this sample for the reasons described above. If Greece is included the coefficient increases from 0.33 to 0.42, but in both cases is not significant.

of only consolidating experiences there is no evidence of a systematic underestimation of the effects of fiscal consolidation.

### Forecast-error decomposition

It is important to separate the effects of fiscal consolidations from other factors related to the sovereign-debt crisis. In principle, the forecast error for GDP growth can be written as a function of the forecast error of all variables which have an impact on GDP plus differences between the actual multipliers of the explanatory variables and the values assumed in the forecast. Like the IMF, it is assumed here that major divergences between actual and assumed elasticities could only occur for the multiplier of fiscal consolidation. We limit ourselves to only two observable explanatory variables for GDP growth, namely fiscal consolidation and changes in sovereign-risk perception (expressed by government-bond yields).<sup>(9)</sup>

Table 1 shows estimation results for the unexpected output loss associated with a 1% of GDP expected fiscal consolidation, for the full sample of euro-area countries.<sup>(10)</sup> While in the estimation without any control variable the coefficient on the forecast of the fiscal stance is negative and highly significant, it becomes smaller and statistically not significant when sovereign yields are added as control variable. The fact that the estimate for the forecast of the fiscal stance is smaller when the change in sovereign yields is included suggests that the Commission's forecast of the fiscal stance (in spring 2010) and the subsequent change in the bond yields are correlated. A plausible explanation, which applies especially to highly indebted countries, is that financial markets regarded the expected path of fiscal consolidation as insufficient to guarantee government solvency and reacted with a more adverse risk assessment. In this case, the negative coefficient for the fiscal stance in the first regression should not be interpreted as an underestimation of the fiscal multiplier but rather as capturing a negative response of investors to possibly insufficient fiscal effort in countries with severe debt problems.

<sup>(9)</sup> Sovereign-debt problems have been a dominant factor hampering growth in the euro area, but one can of course not exclude that results are also sensitive to the omission of other explanatory variables.

<sup>(10)</sup> Due to lack of data on long-term government-bond yields Estonia is excluded from our sample.

Table 1:

GDP forecast errors, fiscal stance and government bond yields				
	(1)		(2)	
Constant	0.16	(0.52)	1.00 **	(0.41)
Forecast of fiscal stance	-1.07 ***	(0.28)	-0.20	(0.29)
Change of sovereign bond yields	-		-0.58 ***	(0.14)
R <sup>2</sup>	0.49		0.78	
GDP forecast error = $\alpha + \beta$ forecast of fiscal stance + $\gamma$ change sov. yields + $\epsilon$				

Note: \*, \*\* and \*\*\* denote significance at the 10, 5 and 1% levels, resp. Forecast errors are cumulative forecast errors for real GDP growth in 2010-11 (spring 2010 forecast); forecast of fiscal change is the change in fiscal structural balance as percentage of potential GDP in 2010-11 (spring 2010 forecast). Change in sovereign-bond yields is the change in 10-year government bond yields, between end-2011 and end-2009. Sample: euro-area countries (16 observations), excluding Estonia.

No strong conclusions should be drawn from these regressions based on a small number of observations, except that they underline the importance of separating the effects of fiscal consolidations from other factors related to the sovereign-debt crisis. Changes in sovereign-risk perceptions are equally likely to be important factors explaining past forecast errors as larger-than-expected multipliers from fiscal consolidations.

### Concluding remarks

The evidence in this box shows that the link between past forecast errors and planned fiscal consolidations is not robust and should not be taken as indirect proof for a larger consolidation multiplier. While it is generally accepted that fiscal multipliers for permanent consolidations are higher now than they would be in 'normal' circumstances, due to higher credit constraints and interest rates constrained at the zero-interest-rate floor, separating the effects on economic activity of fiscal consolidations from other factors related to the sovereign-debt crisis is important. Taking into account the temporary nature of the stimulus in countries like Germany and excluding the special case of Greece, the evidence is consistent with an average multiplier smaller than one.

When discussing the negative short-term output costs of consolidation it is important not to lose sight of what the counterfactual would be. For the most vulnerable countries, exposure to financial market pressures means there is no alternative than to pursue consolidation measures. The alternative of rising risk premia and higher borrowing costs would be worse for these countries, and consolidations are needed to restore fiscal positions and put debt projections back on a sustainable path.

In general, a case-by-case approach to consolidation is warranted, whereby the speed of fiscal adjustment should be differentiated according to country-specific fiscal and macro-financial risks.