

## EFFECTS OF FISCAL POLICY IN DEEP RECESSIONS: SIMPLE AND HOPEFULLY CREDIBLE EMPIRICAL EVIDENCE

### Growth Forecast Errors and Fiscal Multipliers<sup>†</sup>

By OLIVIER J. BLANCHARD AND DANIEL LEIGH \*

This paper investigates the relation between growth forecast errors and planned fiscal consolidation during the crisis. Under rational expectations, fiscal consolidation forecasts should be unrelated to subsequent growth forecast errors. If, on the other hand, forecasters underestimated fiscal multipliers, there should be a negative relation between fiscal consolidation forecasts and subsequent growth forecast errors. This is what we find.

We focus primarily on forecasts made for European economies in early 2010. The reason is simple: A number of large multiyear fiscal consolidation plans were announced then, particularly in Europe, and conditions for larger-than-normal multipliers were ripe.

First, because of the binding zero lower bound on nominal interest rates, central banks could not cut interest rates to offset the negative short-term effects of a fiscal consolidation on economic activity.

Second, lower output and lower income, together with a poorly functioning financial system, imply that consumption may have depended more on current than on future income, and that investment may have depended more on current than on future profits, with both effects leading to larger multipliers.

Third, and consistent with some of the above mechanisms, a number of empirical studies have found that fiscal multipliers are likely to be larger when there is a great deal of slack in the economy.

We find that, in advanced economies, stronger planned fiscal consolidation has indeed been associated with lower growth than expected, with the relation being particularly strong, both statistically and economically, early in the crisis. A natural interpretation is that fiscal multipliers were substantially higher than implicitly assumed by forecasters. The weaker relation in more recent years may reflect in part learning by forecasters and in part smaller multipliers than in the early years of the crisis.

#### I. Estimation

To investigate whether growth forecast errors have been systematically related to fiscal consolidation forecasts, our approach is simple: we regress the forecast error for real GDP growth in years  $t$  and  $t + 1$  on forecasts of fiscal consolidation for  $t$  and  $t + 1$  made early in year  $t$ . We focus on two-year intervals to allow for delayed effects of fiscal policy. Under rational expectations, the coefficient on the forecast of fiscal consolidation should be zero. The equation estimated is therefore

$$(1) \quad \Delta Y_{i,t:t+1} - \Delta Y_{i,t:t+1|t} = \alpha + \beta \Delta F_{i,t:t+1|t} + \varepsilon_{i,t:t+1},$$

where  $\Delta Y_{i,t:t+1}$  denotes cumulative (year-over-year) growth of real GDP ( $Y$ ) in economy  $i$ ;  $\Delta Y_{i,t:t+1|t}$  is the associated forecast of growth conditional on the information set available early in year  $t$ ; and  $\Delta F_{i,t:t+1|t}$  is the forecast of the

\* Blanchard: International Monetary Fund, 700 19th Street, NW, Washington, DC 20431 and NBER (e-mail: [oblanchard@imf.org](mailto:oblanchard@imf.org)); Leigh: International Monetary Fund, 700 19th Street, NW, Washington, DC 20431 (e-mail: [dleigh@imf.org](mailto:dleigh@imf.org)). The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or IMF policy. A longer version of this paper is available at [www.nber.org/papers/w18779](http://www.nber.org/papers/w18779).

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change in the general government structural fiscal balance in percent of potential GDP, a widely used measure of the discretionary change in fiscal policy for which we have forecasts. Under the null hypothesis that fiscal multipliers used for forecasting were accurate, the coefficient  $\beta$  should be zero.

Our data come from the IMF's *World Economic Outlook* (WEO) database. As mentioned, we focus in our baseline on forecasts made for European economies in early 2010. Growth forecast errors thus measure the difference between actual cumulative real GDP (year-over-year) growth during 2010–2011, based on the latest data, taken from the October 2012 WEO (IMF 2012), minus the forecast prepared for the April 2010 WEO. The forecast of fiscal consolidation is the forecast of the change in the structural fiscal balance as a percent of potential GDP during 2010–2011, as prepared for the April 2010 WEO. We use all available data for the European Union's (EU's) 27 member states, as well as for the remaining three European economies classified as "advanced" in the WEO database: Iceland, Norway, and Switzerland. WEO forecasts of the structural fiscal balance made in April 2010 are unavailable for Estonia, Latvia, Lithuania, and Luxembourg. Thus, based on data availability, our baseline sample consists of 26 economies (27 + 3 – 4).<sup>1</sup>

## II. Estimation Results

### A. Baseline

Table 1 reports our baseline estimation results. We find a significant negative relation between fiscal consolidation forecasts made in 2010 and subsequent growth forecast errors. In the baseline specification, the estimate of  $\beta$ , the coefficient on the forecast of fiscal consolidation, is  $-1.10$  ( $t = -4.30$ ), implying that, for every additional percentage point of fiscal consolidation, GDP was about 1 percent lower than forecast. The coefficient is statistically significant at the 1 percent level, and the  $R^2$  is 0.50. The estimate of the constant term, which is not reported, has no natural economic interpretation.

<sup>1</sup> Filling the four missing observations with forecasts from the spring 2010 European Commission (EC) European Economic Forecast (EC 2010) makes little difference to the results.

TABLE 1—BASELINE ESTIMATION RESULTS

	$\beta$	Observations	$R^2$
Europe	$-1.10^{***}$ (0.26)	26	0.50
Excluding IMF programs	$-0.81^{***}$ (0.28)	21	0.24
Quantile regression	$-1.10^{***}$ (0.24)	26	0.26
Liquidity trap economies	$-0.99^{***}$ (0.27)	23	0.60
Emerging market economies	0.01 (0.43)	14	0.00

Notes: Heteroskedasticity-robust standard errors in parentheses.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

Figure 1 illustrates this result using a scatter plot. A natural interpretation of this finding is that multipliers implicit in the forecasts were, on average, too low by about 1.

### B. Robustness

*Outliers and Country Sample.*—As Table 1 reports, excluding from the sample the five economies that had IMF programs in 2010 or 2011—Greece, Iceland, Ireland, Portugal, and Romania—yields an estimate of  $\beta$  of  $-0.81$  ( $t = -2.90$ ), which is statistically indistinguishable from the baseline result. We also reestimate equation (1) using a quantile (median) regression to test whether our results are sensitive to outliers, again finding similar results.

When we change the sample to include all economies, whether in Europe or elsewhere, that were in a liquidity trap during this period (defined as those economies in which the central bank's main nominal policy interest rate reached 1 percent or less during 2010–2011), the estimate of  $\beta$  is  $-0.99$  ( $t = -3.65$ ). Conversely, when we repeat the analysis for the group of 14 (non-European) emerging market economies for which forecasts of the structural fiscal balance made in early 2010 are available, we find no evidence that forecasters underestimated fiscal multipliers. This is consistent with the conditions leading to larger-than-normal fiscal multipliers being currently less relevant for these economies.

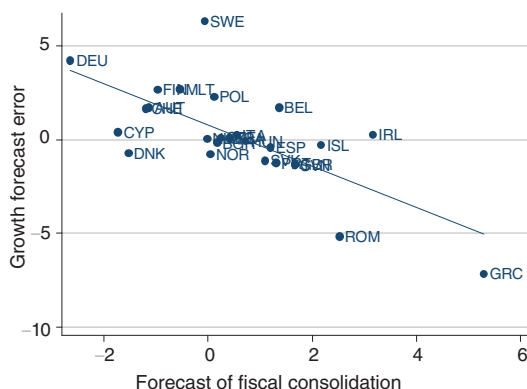


FIGURE 1. EUROPE: GROWTH FORECAST ERRORS VERSUS FISCAL CONSOLIDATION FORECASTS

*Notes:* Figure plots forecast error for real GDP growth in 2010 and 2011 relative to forecasts made in the spring of 2010 on forecasts of fiscal consolidation for 2010 and 2011 made in spring of year 2010; and regression line.

*Controls.*—We investigate the robustness of the results to controlling for additional variables that could plausibly have triggered both planned fiscal consolidation and lower-than-expected growth. In the context of forecast evaluation, controlling for other variables that were in the information set of forecasters is warranted.

Our results are robust to the introduction of such controls. We consider the initial level of financial stress (sovereign and bank CDS spreads); the initial level of external imbalances (current account and net foreign liabilities); the trade-weighted forecast of trading partners' fiscal consolidation forecasts; the initial level of household debt; and other variables. We also control for a summary statistic for economic and financial weaknesses—the IMF's Early Warning Exercise vulnerability ratings prepared in early 2010. In each case, the estimate of  $\beta$  remains statistically significant and close to the baseline, as reported in the online Appendix.

*Actual versus Planned Consolidation.*—Next, we address the concern that, although the assumed multipliers were correct, countries with more ambitious consolidation programs may have implemented more fiscal consolidation than originally planned.

This issue would lead to a biased estimate of  $\beta$  to the extent that the unexpected fiscal

TABLE 2—PANEL OF FORECASTS

	$\beta$	Observations	$R^2$
Europe, 2009–2012	−0.67*** (0.16)	105	0.41
Forecasts for 2009–2010	−0.70*** (0.19)	26	0.21
2010–2011	−1.10*** (0.26)	26	0.50
2011–2012	−0.47 (0.45)	25	0.09
2012–2013	−0.36** (0.15)	28	0.19
Liquidity trap, 2009–2012	−0.65*** (0.21)	94	0.44
EMs, 2009–2012	−0.11 (0.27)	54	0.36
Europe, 1997–2008	−0.08 (0.16)	207	0.64

*Notes:* Newey-West standard errors in parentheses. Time fixed effects included in all regressions. EMs denotes emerging market economies.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level.

consolidation (the fiscal consolidation forecast error) was correlated with the initial fiscal consolidation forecast.

However, a regression of the forecast error of fiscal consolidation on the forecast of fiscal consolidation yields a slope coefficient of 0.06 ( $t = 0.19$ ), suggesting that this source of bias is insignificant in our sample.

*Different Forecast Vintages.*—Table 2 reports estimation results for the panel of two-year forecasts made in each year since the start of the crisis (2009–2012). The equation estimated is the same as equation (1), except that it now includes a vector of time-fixed effects for  $t = 2009$ , 2010, 2011, and 2012. Based on the available data, the size of our European sample size is now 105 observations. Note that for forecasts made in early 2011 and early 2012, the dependent variable is a forecast *revision* rather than a forecast error, since data for 2012 and 2013 are not yet complete. Given our use of two-year overlapping intervals, we correct the standard errors for serial correlation of type MA(1) using the Newey-West procedure.

For the panel of forecasts made during 2009–2012, the estimate of  $\beta$  is  $-0.67$  ( $t = -4.10$ ), which is smaller than the baseline value but is still substantial. Considering years individually, the estimate of  $\beta$  is statistically significant for forecasts made in early 2009, 2010, and 2012, but not for forecasts made in early 2011. The decline in the coefficient in 2011 and 2012 to around  $-0.4$  could reflect smaller multipliers or partial learning by forecasters regarding the effects of fiscal policy on economic activity.

Regarding our two alternative samples, the 2009–2012 panel estimate of  $\beta$  for all economies in a liquidity trap is  $-0.65$  ( $t = -3.04$ ), while the estimate for emerging market economies is again near zero.

Finally, reestimating the equation for the set of two-year intervals during the precrisis decade (1997–2008) yields no evidence of fiscal multipliers being underestimated, on average, during these more normal times. The estimate of  $\beta$  is near zero.

### C. Extensions

Having discussed robustness, we turn to three extensions of our baseline results, for which the regression tables are given in the online Appendix.

First, we check whether the baseline results differ depending on whether the fiscal consolidation reflects changes in government spending or changes in revenue. The results suggest that fiscal multipliers were, on average, underestimated for both sides of the fiscal balance, with a slightly larger degree of underestimation associated with changes in government spending.

Second, we examine forecast errors for the unemployment rate and for the components of GDP. We find that forecasters significantly underestimated the increase in unemployment and the decline in private consumption and in investment associated with fiscal consolidation.

Finally, we compare the baseline results obtained using IMF forecast errors with those obtained using the fiscal consolidation forecasts and the forecast errors of other forecasters, including the European Commission (EC), the Organization for Economic Cooperation and Development, and the Economist Intelligence

Unit. Here, we find that the results hold for all the forecasters considered, with coefficients ranging from  $-1.1$  to  $-0.4$ . The results are strongest, in terms of both economic and statistical significance, for forecasts published by the IMF and, to a slightly lesser extent, by the EC.

### III. Conclusions

What do our results imply about actual multipliers? Our results suggest that actual fiscal multipliers have been larger than forecasters assumed. But what did forecasters assume? Answering this question is not easy, since forecasters use models in which fiscal multipliers are implicit and depend on the composition of the fiscal adjustment and other economic conditions.

We believe, however, that a reasonable case can be made that the multipliers used at the start of the crisis averaged about 0.5. A number of studies based on precrisis data indicate actual multipliers of roughly 0.5. Our finding of no gap, on average, between assumed and actual fiscal multipliers before the crisis, thus provides suggestive evidence that multipliers assumed prior to the crisis were around 0.5.

If we put this together, and use the range of coefficients reported in our tables, this suggests that actual multipliers were substantially above one early in the crisis. The smaller coefficient we find for forecasts made in 2011 and 2012 could reflect smaller actual multipliers or partial learning by forecasters regarding the effects of fiscal policy. A decline in actual multipliers, despite the still-constraining zero lower bound, could reflect an easing of credit constraints faced by firms and households, and less economic slack in a number of economies relative to 2009–2010.

### REFERENCES

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