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Learning about fiscal multipliers during the European sovereign debt crisis: Evidence from a quasi-natural experiment

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Learning about fiscal multipliers during the European sovereign debt crisis: evidence from a quasi-natural experiment

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Abstract

Identifying fiscal multipliers is usually constrained by the absence of a counterfactual scenario. Our new data set allows overcoming this problem by making use of the fact that recommendations under the EU's excessive deficit procedure (EDP) provide both a baseline no-policy-change scenario and a fiscal-adjustment EDP scenario that entails a forecast of the macroeconomic impact of fiscal consolidation over the EDP horizon. For a sample of 24 EU countries to which 48 EDP recommendations were applied between 2009 and 2015, we derive country-specific fiscal multipliers as actually applied by forecasters during the crisis. Our results confirm Blanchard and Leigh's (2013, 2014) presumption that forecasters learned during the crisis. According to our findings, fiscal multipliers as applied by the European Commission increased over time – from about 1/4 in the early years of the crisis to about 2/3 in the later years. However, different from Blanchard and Leigh (2013, 2014), we do not find evidence for the hypothesis that ex-post fiscal multipliers have been substantially above 1 during the crisis.

Keywords: fiscal consolidation, fiscal multipliers, business cycle

JEL codes: E32, E62, H20, H5

Non-technical summary

Fiscal adjustments during the European sovereign debt crisis reignited the debate on the effects of fiscal policies on economic growth. In influential contributions to this debate the IMF (2012) and Blanchard and Leigh (2013, 2014) found, for a sample of European Union (EU) countries, that larger than *expected* fiscal consolidation had been associated with growth rates lower than ex-ante forecasts, particularly so early in the crisis. Based on forecasts made for European countries by different international organisations in early 2010, they concluded that "true" fiscal multipliers were substantially above 1 early in the crisis. At the same time, Blanchard and Leigh (2013) found that the underestimation of fiscal multipliers declined in the later years of the crisis and presumed this to reflect "in part learning by forecasters and in part smaller actual multipliers than in the early years of the crisis".

Our analysis provides novel evidence on fiscal multipliers during the European crisis based on a quasi-natural experiment. Identifying the fiscal multiplier is usually constrained by the absence of a counterfactual scenario. Our new data set allows overcoming this problem by making use of recommendations under the EU's excessive deficit procedure (EDP). Such recommendations are usually issued by the Council of Economic and Finance Ministers to EU Member States that record headline government budget deficits in excess of 3 percent of GDP. Specifically, to correct such excessive deficits the country is recommended to undertake a specified amount of structural consolidation to bring the headline budget deficit to below the 3 percent of GDP reference value by a certain year. Importantly, the EDP provides both a baseline no-policy-change scenario and a fiscal adjustment EDP scenario that entails a forecast of the macroeconomic impact of fiscal consolidation over the EDP scenario.

For a sample of 24 EU countries which were subject to the EDP between 2009 and 2015, we derive country-specific fiscal multipliers as actually applied by forecasters in 48 EDP recommendations during the crisis. According to our findings, fiscal multipliers as applied by the European Commission increased over time – from about 1/4 in the early years of the crisis to about 2/3 in the later years. Our results confirm Blanchard and Leigh's (2013, 2014) presumption that forecasters learned during the crisis. Furthermore, different from Blanchard and Leigh (2013, 2014), we do not find evidence for the hypothesis that ex-post fiscal multipliers have been substantially above 1 during the crisis.

> "*The big problem with empirical work on fiscal policy has always been that you rarely get anything resembling a natural experiment. [..] But Europe after 2009 provided something that, while not a perfect natural experiment, was much closer than anything we're likely to see for a long time.*"
>
> Paul Krugman, New York Times, 2 December 2015

1. Introduction

The impact of fiscal policies on economic growth is a matter of continued debate in the economic literature. It resurfaced at the peak of the euro area sovereign debt crisis, when many euro area countries had to undergo large fiscal retrenchment to retain access to financial markets. Other countries became subject to financial support programmes which contained wide-ranging fiscal measures. In an influential contribution to the policy debate at that time, IMF (2012) and Blanchard and Leigh (2013) found, for a sample of European Union (EU) countries, that larger than *expected* fiscal consolidation had been associated with growth rates lower than ex-ante forecasts, particularly so early in the crisis. Based on forecasts made for European countries by different international organisations in early 2010, they concluded that "true" fiscal multipliers were substantially above 1 early in the crisis.[1] Fiscal multipliers were thus higher than initially assumed by forecasters—with Blanchard and Leigh (2013) presuming that forecasters used a standard fiscal multiplier of 1/2 throughout the crisis.[2] They acknowledged, however, the difficulties surrounding this assumption. At the same time, Blanchard and Leigh (2013) found that the underestimation of fiscal multipliers declined in the later years of the crisis. They conjectured that this could be explained "in part learning by forecasters and in part smaller actual multipliers than in the early years of the crisis".

Our analysis provides novel evidence on fiscal multipliers during the European crisis based on a quasi-natural experiment. Identifying the fiscal multiplier is usually constrained by the absence of a counterfactual scenario. Our new data set allows overcoming this problem by making use of the fact that recommendations under the excessive deficit procedure (EDP) of the EU's fiscal governance framework provide both a baseline no-policy change scenario and a fiscal adjustment EDP scenario that entails a forecast of the macroeconomic impact of fiscal consolidation under the EDP scenario. Under the EDP, countries with a headline deficit

[1] See for a review of empirical literature on fiscal multipliers also Spilimbergo et al. (2009).

[2] Blanchard and Leigh (2013) conduct their analysis primarily for the IMF forecasts. Still, they report results for other forecasters—the European Commission in particular—as well.

above 3 percent of GDP are recommended by the Council of the EU Economic and Finance Ministers to undertake a certain amount of structural fiscal effort to bring the headline deficit below the 3 percent threshold within a specific time horizon. We combine, individually for each EU country subject to an EDP, consolidation scenarios as outlined in the EDP recommendations with information on no-policy change baseline forecasts of the European Commission that were issued at the same time. This allows us to derive country-specific fiscal multipliers as applied by the European Commission when formulating EDP recommendations for a sample of 24 EU countries during the period 2009-2015. This allows us to relax a key assumption underlying the analyses in IMF (2012) and Blanchard and Leigh (2013).

Our results can quantify the magnitude of Blanchard and Leigh's (2013, 2014) presumption that forecasters learned during the crisis. According to our findings, fiscal multipliers as applied by the European Commission in its forecasts increased over time – from about 1/4 in the early years of the crisis, which is half the value assumed by Blanchard and Leigh, to about 2/3 in the later years. This confirms Blanchard and Leigh's conjecture that forecasters have undergone learning about the value of the multiplier, although forecast multipliers remain below 1 throughout the sample. Using this information, we repeat the empirical analysis in Blanchard and Leigh (2013) and find that "true" ex-post fiscal multipliers did not exceed 1 in Europe during the crisis, different from the findings reported by Blanchard and Leigh (2013).

The paper is structured as follows. Section 2 reviews the new dataset and explains our approach to derive the country- and time-specific ex-ante fiscal multipliers as implicitly applied by the European Commission in its EDP recommendations throughout the crisis. Section 3 summarises the results. Section 4 uses the approach in Blanchard and Leigh (2013) to infer from these ex-ante fiscal multipliers, as applied in the European Commission's forecasts, the "true" ex-post fiscal multipliers. Section 5 concludes.

2. Deriving fiscal multiplier assumptions from a new dataset

2.1 The data set

At the heart of our study is a new dataset which collects information released in the context of the EDPs under the EU's fiscal governance framework.[3] According to the Treaty on the

[3] Information on all past and ongoing EDPs can be found on the following European Commission webpage:
http://ec.europa.eu/economy_finance/economic_governance/sgp/corrective_arm/index_en.htm.

Functioning of the European Union, EU Member States shall avoid excessive government budget deficits, defined as headline government budget deficits in excess of 3 percent of GDP.[4] If the Council of Economic and Finance Ministers (Ecofin) decides that an excessive deficit exists in a Member State, it opens an EDP. It recommends the country to undertake a specified amount of structural consolidation to bring the headline budget deficit to below the 3 percent of GDP reference value by a certain year.[5] During the recent crisis—given the large fiscal imbalances that countries incurred—these EDP recommendations usually spanned multi-annual adjustment periods.

The recommendations to correct the excessive deficit are prepared by the European Commission based on its staff's economic forecasts. Specifically, the recommendations under the EDP take the most recent no-policy-change economic forecast of the European Commission as a starting point.[6] A comparison of the expected output gaps and the projected fiscal effort in the EDP recommendation versus the no-policy-change forecast for these variables allows us to derive the fiscal multipliers implicitly used by the European Commission in its EDP scenarios.

We use data from EDPs initiated between 2009 and 2015. During that period, recommendations were sometimes revised and deadlines for correcting the excessive deficit were extended frequently in the light of worse than initially expected macroeconomic developments. Therefore, we treat any revised recommendation under an on-going EDP that contains new fiscal effort targets as a separate procedure. Based on this convention, we find in sum 24 EU countries with excessive deficits, and a total of 48 EDPs between 2009 and 2015. Only Estonia, Luxembourg and Sweden recorded budget deficits below the EU Treaty's reference value throughout this period and thus did not become subject to an EDP. The EDP recommendations in our sample differ in the time horizon over which the excessive deficit is recommended to be corrected, as well as in the size of the recommended fiscal effort. Specifically, they range from one-year to 5-year-long adjustment plans and span from fiscal consolidation recommendations of annual fiscal effort targets of 0.25% to over 5% of GDP.

[4] Since November 2011, with the entry into force of the so-called *six-pack reform*, an EDP can also be based on the breach of the Maastricht debt criterion, which requires countries with general government debt-to-GDP ratios above 60% to reduce the level to this threshold at a satisfactory pace. However, a debt-based EDP has so far been opened only for one country (Malta in June 2013).

[5] See European Commission (2016) for details on the excessive deficit procedure.

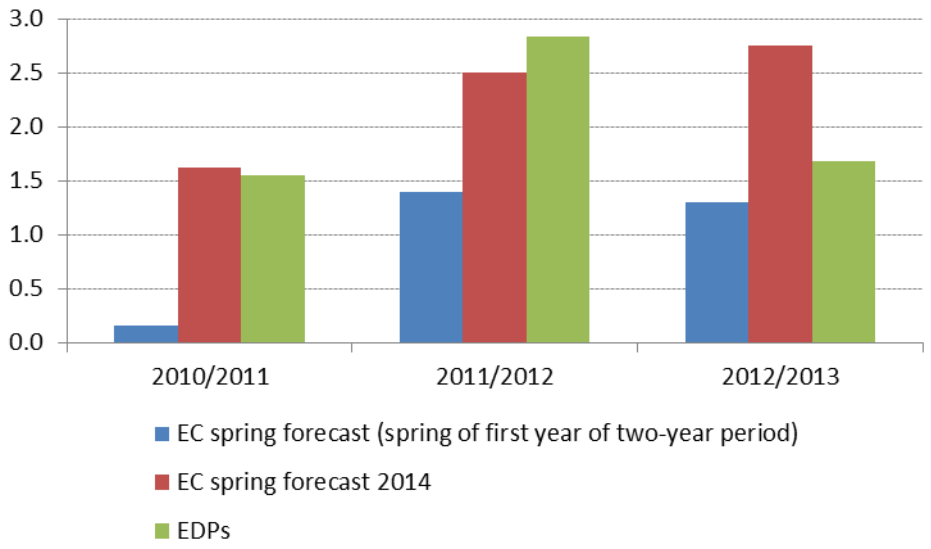
[6] The European Commission publishes economic forecasts twice a year (in spring and autumn). Between 2012 and 2017 the Commission also published a winter forecast. Most EDP recommendations are based on the European Commission's spring economic forecasts as this incorporates validated data for the previous year, which is necessary to attest a past breach of the deficit criterion and/or to assess whether a country is eligible for an EDP deadline extension.

The information provided in EDP recommendations has changed during the sample, with the entry into force of the so-called six-pack reform of the EU governance framework in November 2011. EDP recommendations issued before November 2011 put forward an annual *average* structural effort to correct the excessive deficit by a certain year. From November 2011 onwards, EDP recommendations comprise *annual* headline deficit and structural effort targets. Importantly, since November 2011 EDP recommendations are supplemented by an explicit EDP scenario, which translates these targets into changes in real GDP and potential output growth. Overall, our dataset includes 32 EDP recommendations for the period 2009-11 and 16 EDP recommendations for the period 2012-15.

Chart 1 shows that notably at the peak years of the crisis (2010-2012) the fiscal adjustment that countries were recommended under their EDPs reflected the size of fiscal consolidation that they actually implemented quite well. As indicated in the Chart, the ex-post magnitude of structural fiscal adjustment as captured by the European Commission's 2014 spring forecast turned out to be much closer to the structural effort that these countries were on aggregate recommended to undertake under their EDPs than the Commission's (baseline no-policy-change) spring forecast made early in the year for two consecutive years. This holds notably for the years 2010/11 and 2011/12, where countries appear to have broadly followed the Council's advice at that time of severe market stress. In 2012/13, under the impression of severe financial market stress, governments even undertook far more adjustment than was actually required under the EDPs in order to calm markets. This was again markedly more than what the Commission's no policy baseline forecast had envisaged.

This finding has an important implication. The structural effort embedded in the EDP scenarios is a good predictor for actual consolidation, while the structural effort embedded in the baseline forecast is not. Therefore, the EDP scenario rather than the baseline scenario should be used in analysis of multiplier underestimation.

Chart 1 Projected, planned and actual structural fiscal effort in 24 EU countries subject to an EDP during the crisis



Notes: The graph shows different vintages of structural fiscal effort forecasts (European Commission baseline forecasts and EDP recommendations) made for years 2010/2011, 2011/2012, and 2012/2013 (i.e. the cumulated structural effort over two consecutive years, horizontal axis). The EC spring forecasts refer to those made in the first year of the two-year period for which the cumulated structural effort is depicted. EDPs capture 24 Council recommendations, i.e. one for each country, made around the time of the European Commission's 2010 spring forecast. Ex-post data are taken from the European Commission 2014 spring forecast (EC spring 2014).
Source: AMECO, EDP Council recommendations, own calculations.

2.2. Identification approach for ex-ante fiscal multipliers

We now identify the fiscal multipliers implicitly applied by the European Commission during 2009-15 in the EDPs. We split the analysis in two time periods. One period spans the years 2012-15, for which the identification of fiscal multipliers is straightforward. The other period comprises the years 2009-11, for which we have to make some additional assumptions to derive the fiscal multipliers implicitly applied by the European Commission.

<u>2012-2015</u>

For this period, each of the 16 EDP recommendations that were issued is supplemented by an explicit EDP scenario.[7] The scenario entails—for each year over the EDP horizon—a forecast of the level of the structural balance in percent of GDP, the output gap, potential output growth, real GDP growth as well as the government headline budget balance in percent of GDP. The

[7] EDP scenarios are outlined in the European Commission staff working documents. The latter are released in parallel to the Commission's recommendations under the EDP which are the basis on which the Council subsequently decides on the final EDP recommendations.

forecast for the current year in the EDP scenario is usually the most recent European Commission's baseline forecast—the vintage published just before the EDP was issued.[8] After the current year, the EDP scenario differs from the baseline forecast in the amount of structural adjustment prescribed for each year. This structural effort is shown to translate into changes in the other variables, such as real GDP growth rates and output gap levels (see Table A.1 in the Annex for an example of an EDP scenario and a baseline forecast by the European Commission).

Based on this set of information, we derive country-specific fiscal multipliers underlying the EDP recommendations. For each EDP, a fiscal multiplier is calculated as the quotient of the difference between the EDP and the baseline scenario in output gaps and structural efforts in the final year T of the EDP. It thus captures the impact of the structural effort that goes beyond that entailed in the baseline, on the output gap over the EDP horizon vis-à-vis the baseline scenario:

$$FM_{T|t} = - (OG^{EDP}_{T|t} - OG^{COM}_{T|t})/(SB^{EDP}_{T|t} - SB^{COM}_{T|t}) \quad (1)$$

where $FM_{T|t}$ is the average fiscal multiplier over the EDP horizon, and t is the year in which the EDP is issued. $OG^{EDP}_{T|t}$ represents the output gap in year T as stated in the EDP recommendation issued in year t, $OG^{COM}_{T|t}$ marks the output gap as forecast for year T in the European Commission's no-policy change forecast vintage based on which the EDP was issued in year t. The difference between the two output gaps in year T captures the cumulative output loss due to the additional consolidation embedded in the EDP scenario.[9] Likewise, $SB^{EDP}_{T|t}$ and $SB^{COM}_{T|t}$ corresponds to the structural budget balance in T as included in the EDP and baseline scenario, respectively. The difference between the two structural balances in year T captures the cumulative additional consolidation embedded in the EDP scenario.

<u>2009-2011</u>

For the period before 2012, in the absence of explicit EDP scenarios accompanying the EDP recommendations, we have to construct such scenarios ourselves (see Table A.2. for a comparison of the information provided by the European Commission in pre six-pack versus post six-pack EDP recommendations).

[8] For example, for an EDP issued in July 2013 for 2013-2015, the fiscal effort in the EDP scenario for 2013 will reflect the European Commission's no-policy-change forecast issued in spring 2013.

[9] It should be noted that our approach assumes that the structural effort vis-à-vis the baseline scenario has no impact on potential output growth. This is a valid approach as the EDP scenarios usually display broadly unchanged potential output growth over the EDP horizon compared to the baseline forecasts (see also the example of France in Annex Table A.1.).

We apply a stepwise approach for each of the 32 EDP recommendations that were issued between 2009 and 2011. We start from the vintage of the European Commission forecast based on which the EDP recommendation was issued. This gives us, for the years of the forecast horizon, the baseline forecast for the structural balance and the output gap (as well as potential output growth, real GDP growth and the headline balance). This forecast is also the starting point for the EDP scenario for the year before the fiscal adjustment is recommended to start.

In the second step, we extend the baseline scenario beyond the forecast horizon by making use of one crucial assumption *for the baseline forecast*, which is explicitly referred to in many EDP recommendations from autumn 2009 onwards, namely that the Commission's baseline forecast assumes the output gap to close linearly by 2015.[10] Similarly, for EDP recommendations issued before autumn 2009, we therefore assume that the output gap closes linearly by 2014 in the corresponding baseline forecasts.

We further assume that—under the baseline forecast—the level of the structural balance remains unchanged beyond the European Commission forecast vintage's forecast horizon.[11] This assumption is in line with the no-policy-change character of the baseline scenario.

For the EDP scenario, we derive the structural balance in the final year T by adding the total fiscal effort prescribed in the EDP (calculated as the average annual fiscal effort multiplied by the number of years for which additional fiscal effort is recommended)[12] to the structural balance in the starting year of the EDP. Furthermore, we assume that the headline deficit has to decline to 2.9% of GDP in the final year T of the EDP to ensure a timely abrogation of the EDP by the recommended deadline year:

$$HB^{EDP}_{T|t} = -2.9 \qquad (2)$$

with $HB^{EDP}_{T|t}$ being the headline budget balance in the EDP deadline year T as prescribed in the EDP recommendation issued in year t.

In a third step, for the construction of the EDP scenario, we make use of (2) and the country-specific budget sensitivity to determine the output gap in the final EDP year T:

$$OG^{EDP}_{T|t} = (HB^{EDP}_{T|t} - SB^{EDP}_{T|t})/\varepsilon^* \qquad (4)$$

[10] See as one example the Council recommendation to Belgium (dated 30 November 2009), which states under recital (9) "*The total fiscal effort needed to reach the nominal deficit target of 3 % by the deadline is then calculated by assuming a gradual closure of the output gap by 2015.*"

[11] Whenever the EDP horizon is longer than the underlying European Commission's baseline forecast, the assumption of an unchanged structural balance allows us to obtain $SB^{COM}_{T|t}$ in equation (1).

[12] For some EDPs the annual average structural effort is recommended to start only in the subsequent year while for the on-going year governments are recommended to implement the budgetary measures already foreseen. In these cases we adjust the structural balance in the EDP scenario accordingly.

with ε* being the country-specific budget sensitivity with respect to the output gap as publicly provided by the European Commission and used for the cyclical adjustment of the budget balance (see Mourre, Isbasoiu and Salto, 2013).

In the fourth and final step we derive the implicit fiscal multiplier underlying the EDP scenario, using equation (1), i.e. calculating it as the quotient of the difference in output gaps and structural balances in the final year of the EDP and baseline scenarios.[13]

Our database includes all baseline and constructed EDP scenarios as well as the results for ex-ante implicit fiscal multipliers for the period 2009-15.

3. Estimates of implicit ex-ante fiscal multipliers for 2009-15

3.1 Fiscal multipliers implicitly applied in the early crisis years 2009-11

The results for the country-specific ex-ante fiscal multipliers as implicitly applied in structural adjustment recommendations under the 2009-2011 EDPs are summarised in Table A.3 in the Annex. Based on these results, Table 1 below shows sample *averages*.

Table 1 distinguishes multipliers derived from the EDP recommendations as prepared by the European Commission for the Council, and multipliers derived from the recommendations that were finally adopted by the Council.

The results show that the average fiscal multiplier underlying EDP recommendations as issued by the Council over 2009-11 was 0.21, i.e. well below the "standard value" of 0.5 as assumed by Blanchard and Leigh. The conclusion that the applied ex-ante fiscal multipliers were well below the "standard value" of 1/2 holds when we account for information from all 32 EDP recommendations issued between 2009 and 2011, as well as when we take just one EDP recommendation per country that is closest to the European Commission's spring 2010 forecast (which leaves us with 24 EDP recommendations).

The average ex-ante implicit fiscal multiplier is slightly higher at 0.26, when looking at the EDP recommendations as initially prepared by the Commission for the Council. If we take one EDP recommendation per country that is closest to the European Commission's spring 2010 forecast, the average ex-ante fiscal multiplier turns out to be broadly the same, i.e. 0.27.

[13] See for details on how to complete the construction of the EDP scenario Annex B. These complete EDP scenarios are however not needed for the identification of the implicit fiscal multipliers.

Table 1: Ex-ante implicit multipliers in EDP recommendations (2009-11)

	Ex-ante fiscal multiplier			
	Based on Commission's recommendation to the Council		Based on Council's final recommendation	
Sample	2009-2011 (32 EDPs)	EDP closest to spring 2010 (24 EDPs)	2009-2011 (32 EDPs)	EDP closest to spring 2010 (24 EDPs)
Average Fiscal Multiplier	0.26	0.27	0.21	0.21
Standard deviation	0.44	0.46	0.42	0.43

Notes: The 32 EDPs capture all EDP recommendations issued to countries over 2009-11, the 24 EDPs include only those which are closest to the EC 2010 spring forecast.
Source: AMECO, EDP and Commission recommendations, own calculations.

The differences between ex-ante fiscal multipliers from Commission recommendations and those that were finally adopted by the Council reflect that the Council did not always follow the Commission's proposal for fiscal adjustment under the EDP. In fact, in late 2009 the Council decided to lower the recommended annual average structural effort compared to the Commission recommendation for France and for Spain by 1/4 p.p.; in early 2010 it was lowered by 1/2 p.p. for Cyprus (see Table 2). At the same time, the Council did not shift backwards the deadline for correcting the excessive deficits. Consequently, for all three countries, compared to the Commission's initial proposal, the lower recommended effort to be delivered over an unchanged time horizon led de facto to a reduction in the implicit fiscal multiplier (by about 0.5 per country), as otherwise the reduction in recommended effort would have been inconsistent with the deadline set in the recommendation.

Table 2 Impact of the Council on the implicit ex-ante fiscal multipliers in the EDPs

Country under EDP	Institution issuing recommendation	Date of recommendation	Recommended structural effort	Ex-ante fiscal multiplier
France	Commission	11.11.2009	1.25	0.1
	Council	02.12.2009	1	-0.4
Spain	Commission	11.11.2009	1.75	0.0
	Council	02.12.2009	1.50	-0.5
Cyprus	Commission	15.06.2010	1.75	0.7
	Council	13.07.2010	1.27	0.2

Notes: AMECO, EDP Council recommendations, own calculations.

3.2 Fiscal multiplier assumptions after 2011

We now turn to the ex-ante fiscal multipliers for the later crisis period, as derived from the EDP scenarios for recommendations issued between 2012 and 2015. Our results show that the average implicit ex-ante fiscal multiplier over 2012-15 has been above the "standard value" of

1/2. As Table 3 shows, for the 16 EDPs issued during this period, the average ex-ante multiplier amounts to 2/3.

Table A.4 in the Annex summarises the detailed country-specific ex-ante fiscal multipliers for 2012-15. For 14 of the 16 EDPs issued by the Council during the period, the implicit ex-ante multiplier is above 1/2, for seven of them it is at least 4/5.

Table 3 Ex-ante fiscal multipliers in 16 EDP recommendations (2012-2015)

	Ex-ante fiscal multiplier	
	Based on structural effort change	**Based on measures**
Sample	16 EDPs	14 EDPs
Average Fiscal Multiplier	0.66	0.67
Standard deviation	0.27	0.23

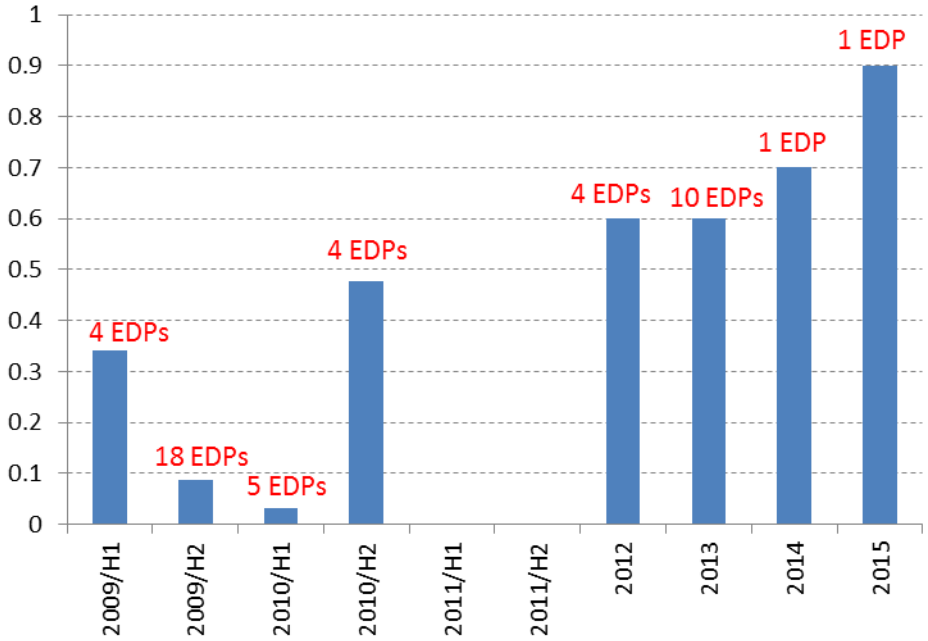
Notes: Not all EDP recommendations entail structural effort recommendations in terms of fiscal measures to be taken; the number of EDPs is consequently smaller.
Source: AMECO, EDP Council recommendations, corrected for outliers, own calculations.

3.3 Learning effects

Our results point to a systematic increase in implicit fiscal multiplier assumptions underlying the recommendations the Council issued to EU Member States in the course of the crisis. While the majority of recommendations for fiscal adjustment in the early years of the crisis were based on assumptions of a fiscal multiplier far below the "standard" value of 1/2, in the later years of the crisis most EDPs were explicitly based on fiscal multiplier assumptions much above this level. We can thus confirm and quantify what Blanchard and Leigh (2013, 2014) could just presume, namely that forecasters learned during the crisis in light of concerns that the applied fiscal multipliers had been too low in the early years of the crisis.

Chart 2 summarizes the results graphically. It shows that in the early years of the crisis a large majority of EDPs was issued based on very low multiplier assumptions. 18 EDPs issued in the second half of 2009 are based on an ex-ante implicit fiscal multiplier of just below 0.1. The five EDPs issued in the first half of 2010 are based, on average, on an even lower implicit fiscal multiplier of close to 0.

Chart 2 Ex-ante fiscal multipliers in EDP recommendations issued between 2009 and 2015



Note: EDP recommendations as issued by the Council. Y-axis reflects the average size of the fiscal multiplier across EDP recommendations issued. For 2010/H2, the average multiplier excludes the outlier Finland, whose EDP rests on an implicit multiplier of close to 2.
Source: European Commission, own calculations

One conjecture is that the extremely stressed financial markets at that time led policymakers to reassure the public and markets that rising budgetary imbalances would be corrected without delay. There was thus particular emphasis on setting ambitious deadlines for correcting the excessive deficits, with a steep path of headline deficit reduction over the EDP horizon. Now, the required structural effort depends, on the one hand, on the desired size of headline deficit reduction and, on the other hand, on the assumed fiscal multiplier, with the non-linear relationship given by equation (5):

$$\Delta SB = \Delta HB / (1 - \varepsilon^* FM), \qquad (5)$$

where ΔSB is the required change in the structural balance needed to achieve the desired change in the headline balance, ΔHB, for given values of the budgetary sensitivity, ε^*, and the ex-ante fiscal multiplier, FM. Assume for example that the desired improvement in the headline budget balance is 1% of GDP and that the budgetary sensitivity is equal to 0.5. Then, the required structural effort will be 1% of GDP for a fiscal multiplier of 0, 1.33% of GDP for a multiplier of 0.5 and 2% of GDP for a fiscal multiplier of 1. Given that starting levels of headline deficits were very high in 2009, infeasibly high levels of structural effort would have been required to achieve the EDP headline deficit targets if the European Commission had assumed higher ex-ante multipliers. Alternatively, of course, longer EDP horizons could have been chosen.

At the same time, low implicit fiscal multipliers may have reflected the idea prevalent at the beginning of the crisis that fiscal consolidation would not harm growth. In fact, given that the private sector was concerned about the state of public finances in light of soaring deficit and debt levels, fiscal tightening was expected by some to raise confidence and ultimately growth. There is evidence that this view was popular among key policy-makers around 2009-2010. For example, Jean-Claude Trichet – the ECB president at that time – declared in an interview for La Republica in 2010: "*The idea that austerity measures could trigger stagnation is incorrect . . . confidence-inspiring policies will foster and not hamper economic recovery, because confidence is the key factor today."*[14] In June 2010, during the press conference on the IMF's Fiscal Monitor, Carlo Cottarelli - the Director of the Fiscal Affairs Department at that time – expressed a similar opinion when stressing that "(...) *if the fiscal adjustment is credible, there could even be a boost to economic activity because people start expecting lower interest rates in the future, and they expect less volatility in the future*."[15] Many observers noticed[16] that European decision-makers were at that time also influenced by Alesina, who based on Alesina and Ardagna (2010) gave a presentation to EU finance ministers at the ECOFIN meeting in Madrid in April 2010. The paper shows that expenditure-based consolidations could have a large and positive impact on economic growth exactly because of beneficial confidence effects.[17]

As Chart 2 shows, ex-ante fiscal multipliers embedded in EDP recommendations remained, on average, at levels below the "standard" value of 1/2 at the end of 2010, when four EDPs were issued based on an average implicit multiplier of just below 0.5.[18] After no EDP had been issued in 2011, the 14 EDPs issued in 2012 and 2013 were based on an average implicit fiscal multiplier of 0.6. The assumed ex ante fiscal multiplier rose to 0.7 for the single EDP issued in 2014 and even to 0.9 for the single EDP issued in 2015.

The pattern of fiscal multipliers declining towards the end of 2009 and/or the beginning of 2010 and increasing thereafter can also be evidenced for individual countries. As Tables A.3. and A.4. in the Annex show, the fiscal multiplier used for the Commission's proposals for EDP

[14] https://in.reuters.com/article/idINIndia-49598120100624

[15] Full transcript of that press briefing is available at www.imf.org/external/np/tr/2010/tr051410.htm

[16] See for example: P. Coy, *Keynes vs. Alesina. Alesina Who?,* Bloomberg BusinessWeek Magazine, June 29th 2010.

[17] The Alesina and Ardagna (2010) results however were later criticized for example for the insufficiently exact identification of fiscal policy changes (see IMF, 2010). At the same time, there is growing literature on confidence effects depending on the type of fiscal consolidations. For example, Alesina et al. (2015) find that spending-based consolidations positively affect producer confidence and investment, as opposed to tax-based consolidations.

[18] This average multiplier excludes the outlier Finland, whose EDP rests on an implicit multiplier of close to 2.

adjustments in France first declined from 0.7 in spring 2009 to 0.1 in autumn 2009, before rising to 0.8 in 2013 and further to 0.9 in 2015. Similarly, in the case of Spain, the fiscal multiplier first declined from 0.9 in spring 2009 to 0 in autumn 2009, before rising to 0.8 in 2012 and staying broadly unchanged at 0.7 in 2013.

Consequently, the broad-based rise in implicit fiscal multipliers during the later years of the crisis is indeed likely to reflect some learning among policymakers. As the crisis continued, it became obvious that fiscal adjustment had a somewhat more detrimental impact on growth than expected in the early years of the crisis. This view that fiscal consolidation has worse implications for economic growth in deep crises than previously thought gained some prominence notably with the discussion triggered by IMF (2012) and Blanchard and Leigh (2013, 2014). Further empirical evidence of larger fiscal multipliers in deep crises was presented at that time, inter alia, in Auerbach and Gorodnichenko (2012) and in Baum, Poplawski-Ribeiro and Weber (2012).[19] At the same time, as financial market pressures decreased in the later years of the crisis, and thus with less need to reassure markets about sound public finances, EDP deadlines appear to have become less ambitious, reducing the incentive to use low implicit fiscal multipliers.

4. Identification of the "true ex-post" multiplier

Now that we have derived ex-ante fiscal multipliers that were implicitly applied under the EU's excessive deficit procedure, we take the approach used by IMF (2012) and Blanchard and Leigh (2013, 2014) to infer about the "true ex-post" fiscal multipliers. We do this in two steps. First, we replicate Blanchard and Leigh's analysis, using fiscal consolidation embedded in baseline scenarios for the analysis. Second, we use fiscal consolidation embedded in the EDP scenarios, which as we argued in Section 2 provides a better predictor of actual consolidation than the consolidation embedded in the baseline.

4.1 Replication Blanchard-and Leigh's (2013) analysis

For a sample of 27 EU countries plus Iceland, Norway and Switzerland, Blanchard and Leigh (2013) regress the forecast errors 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:

$$\Delta GDP_{forecast,t} = \alpha + \beta * SE_{forecast,t} + \zeta_t \qquad (6)$$

[19] See for an overview of different studies Gechert and Will (2012).

where $\Delta GDP_{forecast}$ stands for the real GDP forecast error over t and t+1, $SE_{forecast}$ for the expected structural fiscal effort in the baseline scenario over t and t+1 and β gives the coefficient measuring the scale of under- or overestimation of fiscal multipliers within the forecast. If the forecast were to estimate the impact of the expected fiscal effort on growth correctly, i.e. under rational expectations and if forecasters used the correct model for forecasting, the coefficient would be zero and have no explanatory power for the forecast error. A negative (positive) sign of the β-coefficient implies under- (over-)estimation of the fiscal multiplier underlying the forecast. ζ gives the usual error term. Using forecasts of different international organisations, i.e. the IMF, the European Commission and the OECD, Blanchard and Leigh (2013, 2014) find a strong, negative correlation between the magnitude of the forecasted fiscal adjustment and real growth forecast errors in the early years of the crisis.

In particular, for the European Commission's 2010 spring forecast of planned structural consolidation and using the 2012 autumn forecast for identifying growth errors, they estimate a β-coefficient of about -0.84. This result would indicate that the average fiscal multiplier applied to the forecasts was significantly underestimated.[20] As stated above, Blanchard and Leigh (2013) assume that forecasters applied an ex-ante fiscal multiplier of about 1/2. They therefore conclude that with β at -0.84 the "true" ex-post multiplier amounted to around 1.34, i.e. markedly above 1 for their sample of advanced countries and based on the European Commission's forecast vintages.

As is shown in Table 4a (second row, column AF12), when we adjust the sample to the 27 EU countries (i.e. without Croatia) we get a slightly higher β-coefficient of -0.96. When we look only at the 24 EU countries subject to an EDP around 2010, we arrive at a slightly smaller β-coefficient of -0.9 (see Table 4b – second row, column AF12).

One essential caveat to this approach and its conclusions regarding the size of the "true" ex-post fiscal multiplier applies. Blanchard and Leigh's results are very sensitive to the forecast vintage applied and the years analysed. This is first shown in Table 4a, which presents the results for estimates of equation (6) for the sample of 27 EU countries (excluding Croatia) based on different European Commission forecast vintages between spring 2010 and spring 2014.[21] It shows that Blanchard and Leigh's result of a large and negative β-coefficient (fiscal multiplier underestimation) holds only for the forecast vintage of spring 2010, i.e. the forecast vintage they had applied for their initial analysis. The same conclusion can be drawn using a sample of 24 EU countries with an ongoing EDP around spring 2010 (see Table 4b).

[20] The multiplier is larger (with a coefficient of -1.2) when using IMF forecasts.

[21] We stop the analysis with the Spring Forecast 2014 because of a structural break that occurred thereafter, with the transition from ESA 95 to ESA 2010.

For example, when taking planned consolidation from the European Commission's forecast vintage preceding the 2010 spring forecast – i.e. the 2009 autumn forecast -, the β-coefficient of underestimation turns out to be closer to zero, at around -0.3. Put differently, the coefficient of underestimation based on data available in early 2010, which should be based on more precise information on the planned fiscal adjustment in the ongoing year and in the next year than available in autumn of the previous year, turns out to be much larger. Moreover, for all later forecast vintages, the coefficient on the fiscal effort forecast becomes much smaller and/or statistically insignificant.

Table 4: Blanchard-Leigh regressions: β-coefficient from equation (6)

a) all EU countries except Croatia

Ex-ante vintage	Evaluation period	Ex-post vintage for forecast evaluation (grey: forecast revision rather than ex-post)									Average
		SF10	AF10	SF11	AF11	SF12	AF12	SF13	AF13	SF14	
AF09	2010/11	0.08 (0.13)	-0.49 (0.34)	-0.38 (0.39)	-0.38 (0.45)	-0.33 (0.47)	-0.28 (0.47)	-0.30 (0.45)	-0.28 (0.43)	-0.26 (0.43)	-0.29
SF10	2010/11		**-0.65 (0.17)**	**-0.78 (0.22)**	**-0.79 (0.30)**	**-0.84 (0.36)**	**-0.95 (0.41)**	**-0.95 (0.39)**	**-0.94 (0.39)**	**-0.93 (0.39)**	**-0.85**
AF10	2010/11			**-0.10 (0.06)**	-0.10 (0.11)	-0.12 (0.16)	-0.22 (0.20)	-0.22 (0.20)	-0.21 (0.20)	-0.20 (0.21)	-0.17
AF10	2011/12			-0.23 (0.20)	-0.27 (0.32)	-0.21 (0.30)	-0.23 (0.39)	-0.27 (0.45)	-0.31 (0.46)	-0.31 (0.47)	-0.26
SF11	2011/12				0.03 (0.15)	0.19 (0.18)	0.20 (0.23)	0.17 (0.26)	0.14 (0.28)	0.14 (0.29)	0.15
AF11	2011/12					0.05 (0.15)	-0.01 (0.19)	-0.02 (0.21)	-0.04 (0.22)	-0.05 (0.24)	-0.01
AF11	2012/13					0.09 (0.13)	-0.06 (0.26)	-0.31 (0.33)	-0.15 (0.36)	-0.10 (0.31)	-0.11
SF12	2012/13						-0.20 (0.15)	-0.50 (0.36)	-0.38 (0.37)	-0.16 (0.27)	-0.31
AF12	2012/13							-0.02 (0.10)	0.09 (0.12)	0.12 (0.13)	0.06
AF12	2013/14							0.40 (0.52)	0.44 (0.53)	0.25 (0.46)	0.36
SF13	2013/14								0.12 (0.17)	0.12 (0.27)	0.12
AF13	2013/14									0.08 (0.14)	0.08

b) EDP sample, i.e. all EU countries excluding, Croatia, Luxembourg, Estonia and Sweden

Ex-ante vintage	Evaluation period	Ex-post vintage for forecast evaluation (grey: forecast revision rather than ex-post)									Average
		SF10	AF10	SF11	AF11	SF12	AF12	SF13	AF13	SF14	
AF09	2010/11	0.11 (0.14)	-0.45 (0.35)	-0.32 (0.40)	-0.44 (0.45)	-0.37 (0.49)	-0.34 (0.47)	-0.36 (0.45)	-0.35 (0.42)	-0.33 (0.42)	-0.32
SF10	2010/11		**-0.62 (0.20)**	**-0.67 (0.25)**	**-0.76 (0.32)**	**-0.80 (0.40)**	**-0.88 (0.46)**	**-0.90 (0.44)**	**-0.88 (0.44)**	**-0.87 (0.45)**	**-0.80**
AF10	2011/12			-0.20 (0.20)	-0.18 (0.29)	-0.14 (0.28)	-0.12 (0.37)	-0.15 (0.44)	-0.14 (0.42)	-0.15 (0.42)	-0.15
SF11	2011/12				0.07 (0.12)	0.22 (0.18)	0.28 (0.23)	0.26 (0.26)	0.27 (0.25)	0.28 (0.26)	0.23
AF11	2012/13					0.11 (0.15)	-0.01 (0.29)	-0.21 (0.35)	-0.05 (0.38)	-0.01 (0.33)	-0.03
SF12	2012/13						-0.23 (0.14)	-0.51 (0.42)	-0.36 (0.44)	-0.10 (0.32)	-0.30
AF12	2013/14							0.47 (0.55)	0.55 (0.56)	0.37 (0.48)	0.46
SF13	2013/14								0.09 (0.16)	0.05 (0.25)	0.07
AF13	2014/15									0.06 (0.08)	0.06

Notes: The table shows β-coefficients from regression (6) for different European Commission forecast vintages, with robust standard errors in parentheses. AF stands for European Commission Autumn Forecast, SF for European Commission Spring Forecast. The results highlighted in grey reflect that the assessment based on the respective ex-post forecast refers to revisions to the forecast rather than to a final ex post assessment as validated data for the time period under consideration have at that time not been available yet. The left column denotes the forecast vintage, based on which the structural effort for the evaluation period is gauged. The forecast vintages referred to horizontally denote the forecast vintage against which the forecast error is assessed. Coefficients denoted in bold black are significant at the 1 or 5 percent level, those depicted in bold blue are significant at the 10 percent level.

Source: AMECO, own calculations.

These results give rise to two possible interpretations. First, if one were to base the analysis on the assumption of a constant multiplier of 1/2, one would need to conclude that the fiscal

multiplier was very high in 2010-2011, but fell substantially immediately thereafter.[22] Or, second, as Blanchard and Leigh (2013, 2014) suggest, the finding of declining coefficients of underestimation for later forecast vintages may possibly indicate some learning on the side of forecasters, who may have raised their assumptions regarding the fiscal multiplier over time. This is what we found in section 3, which showed that within the EDP scenarios, the European Commission over 2009-11 used an average fiscal multiplier of about 1/4 and not of 1/2. When we *assume* that forecasters used the same fiscal multipliers in the baseline and EDP scenarios, Blanchard and Leigh's "true" ex-post multiplier in the early crisis would be lower by about 1/4, at slightly above 1.

However, one must concede that the multipliers that forecasters have applied in the EDP scenarios may not necessarily have been equal to those they used in the baseline, as EDP recommendations usually contain a non-negligible amount of judgement. In the following, we therefore make use of the fact that the EDP scenarios provide a consistent set of information regarding the implicit multiplier and the fiscal effort.

4.2 Replication of Blanchard and Leigh's analysis with structural efforts prescribed under the EDP

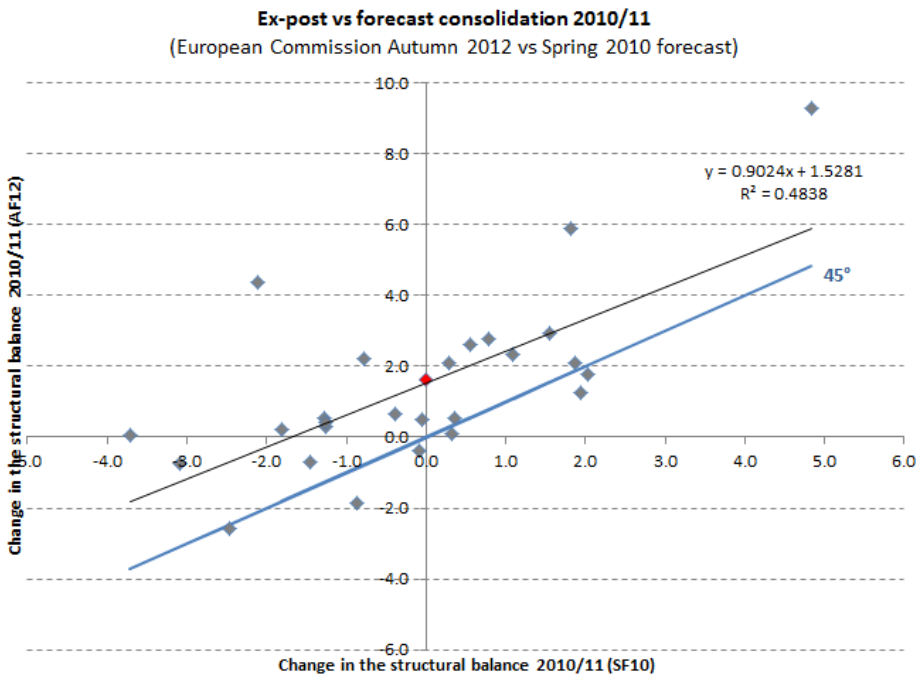
We will now replicate the analysis in the preceding section 4.1. for our sample of 24 EU countries that have been subject to an EDP during the crisis. For this purpose, we regress real growth forecast errors from the European Commission forecasts on the structural effort *as recommended under the EDP*.

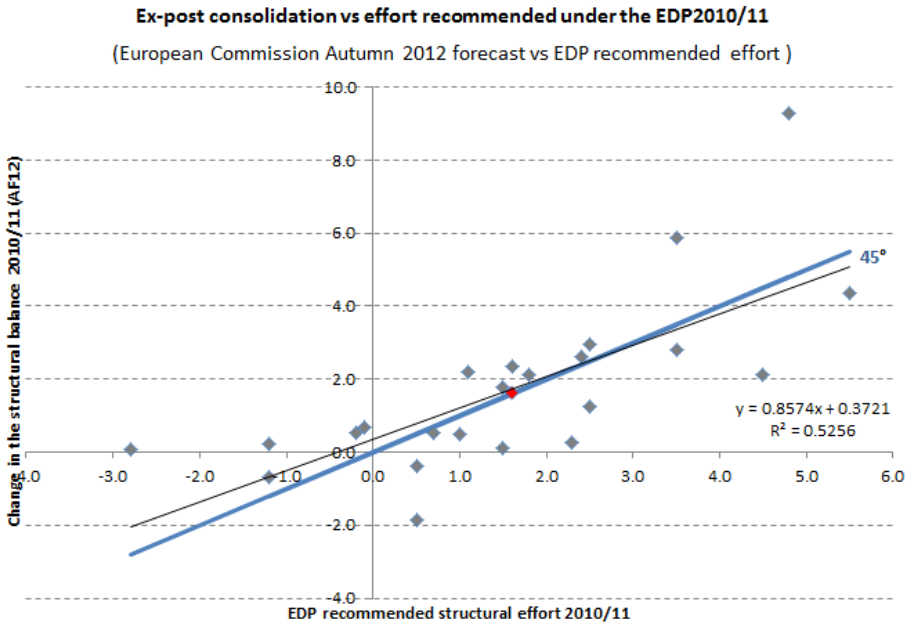
As shown in Chart 1, these recommendations reflected the actual fiscal adjustment that the EU underwent at the peak of the crisis much better than what the Commission foresaw in early 2010 in the baseline forecasts. For example, for the 24 EU countries subject to an EDP, the European Commission's 2010 spring forecast foresaw an improvement in of the EU's structural balance by just 0.1 percent of GDP over 2010/11, whereas actually a strong tightening of 1.6 percent of GDP took place. The magnitude of this tightening was only marginally more than the fiscal effort the EDP recommendations prescribed on average for countries that were subject to excessive deficits during this period. Chart 3 shows that the underestimation of the structural effort over 2010/11 as embedded the in the spring 2010 baseline forecast vintage was broad-

[22] Several other caveats apply to the Blanchard and Leigh (2013) approach. For example, European Commission (2012) cautions against using forecast errors as indirect evidence for the "true" size of fiscal multipliers by showing that the correlation breaks down if controlling for increases in sovereign bond yields at that time that contributed to the growth forecast errors, see also European Central Bank (2012). At the same time, as sovereign yields can be potentially caused by lower realizations of GDP growth, the debate remains unresolved. On the contrary, our approach is free from potential endogeneity issues, as we only use ex-ante information contained in the EDPs.

based across countries, while the structural effort under the EDP reflected the actual adjustment at the country-level well.

Chart 3 Planned, recommended and ex-post fiscal consolidation in 2010/11





Source: AMECO, EDO recommendation, own calculations.

Table 5 shows the β-coefficient from equation (6) for two evaluation periods, i.e. 2010/11 and 2011/12, when using EDP scenarios rather than EU baseline forecasts. The estimates capture that during 2010/11 24 EU countries were subject to an EDP, while only 20 countries were still in EDP by the end of 2012. We did not run the regressions for later years as the number of countries subject to an EDP declined further thereafter, undermining the meaningfulness of the estimates. Our results do not confirm the finding of a very large underestimation of the fiscal multiplier in early 2010. For the forecast vintages that Blanchard and Leigh (2013) used in their original analysis, our results point to a β-coefficient of underestimation of -0.1 (second row, column AF12), which however is not statistically significant.

Table 5: Blanchard-Leigh regressions: β-coefficient from equation (6), where growth forecast error = α +β * EDP recommended effort + error term

(EU countries with EDPs by end-2012: EDP sample excluding Finland, Hungary, Malta, Bulgaria)

Ex-ante vintage	Evaluation period	Ex-post vintage for forecast evaluation (grey: forecast revision rather than ex-post)									Average
		SF10	AF10	SF11	AF11	SF12	AF12	SF13	AF13	SF14	
AF09	2010/11	0.07 (0.23)	-0.13 (0.44)	-0.07 (0.51)	-0.01 (0.60)	0.08 (0.65)	-0.01 (0.70)	-0.04 (0.69)	-0.07 (0.68)	-0.05 (0.69)	-0.03
SF10	2010/11		-0.20 (0.27)	-0.14 (0.32)	-0.08 (0.40)	-0.01 (0.46)	-0.09 (0.50)	-0.11 (0.49)	-0.14 (0.48)	-0.12 (0.49)	-0.11
AF10	2010/11			0.06 (0.12)	0.12 (0.20)	0.21 (0.24)	0.12 (0.29)	0.10 (0.28)	0.07 (0.28)	0.08 (0.29)	0.11
AF10	2011/12			0.02 (0.18)	-0.14 (0.44)	-0.29 (0.61)	-0.13 (0.79)	0.08 (0.89)	0.02 (0.86)	-0.02 (0.90)	-0.07
SF11	2011/12				-0.16 (0.34)	-0.31 (0.53)	-0.15 (0.72)	0.06 (0.81)	-0.004 (0.79)	-0.04 (0.82)	-0.10
AF11	2011/12					-0.15 (0.22)	0.02 (0.41)	0.22 (0.50)	0.16 (0.47)	0.13 (0.51)	0.08

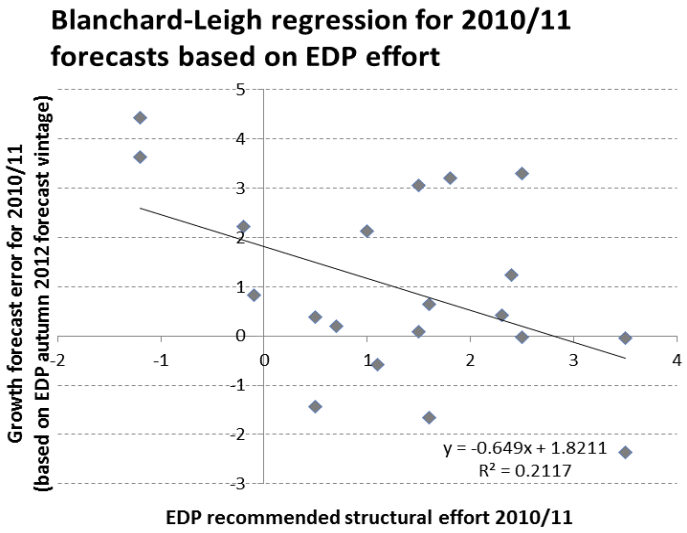
Notes: See table 4 for details on how to interpret the table.
Source: AMECO, EDP recommendations, own calculations.

We also arrive at a comparably low (and non-significant) β-coefficient of underestimation of –0.1 when we apply for each country the forecast error as difference between the European Commission's 2010 autumn forecast and the forecast vintage, based on which the EDP was issued. For most countries concerned this is the forecast vintage of autumn 2009.

Correcting for outliers, i.e. countries for which the absolute size of the forecast error was larger than 5 percentage points (i.e. Greece, Latvia and Lithuania) as well as Denmark, (which stands out as its recommended structural effort is large and negative), increases the β-coefficient to around –0.65 and turns statistically significant (at the 5 percent level – see chart 4). Applying this coefficient of underestimation to the implicit fiscal multiplier of 1/4 leads to a "true" fiscal multiplier of about 0.9, still below Blanchard and Leigh's result of "substantially above 1".

Chart 4 Regression results for 2010/2011: with outlier correction

(20 EU countries, i.e. the EDP sample of 24 EU countries excluding Greece, Lithuania and Latvia and Denmark)



Coefficient	Value	Standard Error	p-value
intercept α	1.82	0.54	0.003
β	-0.65	0.30	0.04

Source: AMECO, EDP recommendations, own calculations.

5. Conclusions

Identifying fiscal multipliers is usually constrained by the absence of a counterfactual scenario. Our new data set allows overcoming this problem by making use of the fact that the excessive deficit procedure (EDP) under the EU's fiscal governance framework provides both a baseline and a counterfactual scenario. Our new dataset allows us to identify – by using a limited set of assumptions – the country- and time-specific fiscal multipliers as implicitly applied by EU policymakers during the crisis for a sample of 48 EDPs for 24 EU countries over 2009-15. We find that the average ex-ante fiscal multipliers assumed by EU policymakers during the crisis when recommending fiscal retrenchment were somewhat below the standard value of 1/2 in the early crisis period and somewhat above this level in the later crisis. Our results can quantify the magnitude of Blanchard and Leigh's (2013, 2014) presumption that forecasters learned during the crisis. According to our findings, fiscal multipliers as applied by the European Commission increased over time – from about 1/4 in the early years of the crisis to about 2/3 in the later years. While we also find some underestimation of fiscal multipliers by forecasters, we however conclude that "true" fiscal multipliers in the early crisis years were not substantially above 1 as implied by Blanchard and Leigh (2013), but according to our conclusions remained

below this level. We acknowledge that this more informed assessment of a potential underestimation of fiscal multipliers remains subject to a number of caveats. "True" ex-post fiscal multiplies remain unobservable. Generally, while we find that in line with the literature fiscal multipliers are country and time-specific (see Warmedinger et al. 2015), one should stress that the usefulness of short-term fiscal multipliers should not be overemphasized.

As illustrated in this paper, the European Commission has increased the transparency regarding the fiscal policy recommendations the Council issues to EU Member States. Since 2012, it complements all EDP recommendations by explicit EDP scenarios, which also allow deriving the size of the implicit fiscal multipliers in a straightforward manner. Going forward, it would be even more helpful for the evaluation of growth forecast errors, if the European Commission and other international organisations producing regular forecasts such as the IMF and the OECD released information on assumptions on fiscal multipliers underlying their baseline projections. This would allow for a systematic evaluation of fiscal multiplier under-/overestimation outside the special context provided by the EDP recommendations issued during the European sovereign debt crisis.

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Annex A Tables and Charts

Table A.1. Deriving fiscal multipliers for post 2011 EDPs (EDP scenario for France, issued on 29 May 2013)

Baseline "no-policy-change" scenario (source: Commission's spring 2013 forecast)				
% of GDP	2012	2013	2014	2015
Structural balance	-3.6	-2.2	-2.3	-2.3
Output gap (%)	-2.4	-3.4	-3.3	-2.6
Potential GDP growth (%)	1.0	0.9	1.0	1.1
Real GDP growth (%)	0.0	-0.1	1.1	1.9
General government balance	-4.8	-3.9	-4.2	-3.9
EDP scenario (source: Commission's SWD underlying the EDP recommendation)				
% of GDP	2012	2013	2014	2015
Structural balance	-3.5	-2.2	-1.5	-0.7
Output gap (%)	-2.5	-3.4	-3.7	-3.5
Potential GDP growth (%)	1.1	0.9	0.9	0.9
Real GDP growth (%)	0.0	-0.1	0.6	1.1
General government balance	-4.8	-3.9	-3.6	-2.8

Notes: The fiscal multiplier is calculated as a quotient of the following differences between the EDP and baseline scenarios: delta output gap in 2015: -0.9 (i.e. -3.5-(-2.6)), delta structural balance in 2015: 1.6 (-0.7-(-2.3)), with -0.9/1.6 implying a fiscal multiplier of 0.6. This is just an exemplary approach and differences to Table A.3 are due to rounding.
Source: European Commission 2013 spring forecast, Commission staff working document (SWD).

Table A.2. Information provided in EDPs and before and after 2011

Variable	Post 2011 EDPs	Earlier EDP recommendations
Headline balance (HB)	Explicit target in % of GDP in the EDP deadline year as well as annual targets	Target of "below 3% of GDP deficit" in the EDP deadline year Assumption in constructed scenario: -2.9% of GDP in final EDP year
Structural balance (SB)	Annual structural effort over the EDP horizon	Average annual structural effort targets Assumption in constructed scenario: even distribution of recommended effort over the EDP horizon
Output gap (OG)	Annual values included	None Assumption in constructed scenario: gradual closure of OG by 2015 (2014) for EDPs issued in autumn 2009 and later (before autumn 2009).
Potential output growth (PO)	Annual values included	None Assumption in constructed scenario: structural effort has no impact on PO.

Table A.3. Ex-ante fiscal multipliers in EDP recommendations issued between 2009 and 2011

	Country	Recommendation	COM/ COUNCIL	First year with fiscal effort	EDP deadline	Ex-ante fiscal Multiplier
1	UK	06.04.2009	Council	2010/2011	2013/2014	-0.2
2	FR	27.04.2009	Council	2010	2012	0.7
3	ES	27.04.2009	Council	2010	2012	0.9
4	IE	27.04.2009	Council	2010	2013	0.0
5	LV	07.07.2009	Council	2010	2012	0.1
6	PL	07.07.2009	Council	2010	2012	-0.1
7	HU	07.07.2009	Council	2010	2011	0.7
8	RO	07.07.2009	Council	2010	2011	0.0
9	LT	07.07.2009	Council	2009	2011	-0.1
10	FR	11.11.2009	Commission	2010	2013	0.1
11	ES	11.11.2009	Commission	2010	2013	0.0
12	FR	02.12.2009	Council	2010	2013	-0.4
13	AT	02.12.2009	Council	2011	2013	0.3
14	BE	02.12.2009	Council	2011	2012	0.0
15	CZ	02.12.2009	Council	2011	2013	0.1
16	DE	02.12.2009	Council	2011	2013	0.3
17	ES	02.12.2009	Council	2010	2013	-0.5
18	IE	02.12.2009	Council	2011	2014	0.2
19	IT	02.12.2009	Council	2011	2012	-0.3
20	NL	02.12.2009	Council	2011	2013	0.0
21	SI	02.12.2009	Council	2011	2013	0.3
22	SK	02.12.2009	Council	2011	2013	0.4
23	PT	02.12.2009	Council	2010	2013	0.2
24	UK	02.12.2009	Council	2010/2011	2014/2015	0.3
25	LT	16.02.2010	Council	2010	2012	0.0
26	RO	16.02.2010	Council	2010	2012	0.0
27	MT	16.02.2010	Council	2010	2011	0.1
28	GR	16.02.2010	Council	2010	2012	0.0
29	GR	10.05.2010	Council	2010	2014	0.0
30	CY	15.06.2010	Commission	2010	2012	0.7
31	FI	13.07.2010	Council	2011	2011	1.9
32	CY	13.07.2010	Council	2010	2012	0.2
33	DK	13.07.2010	Council	2011	2013	0.5
34	BG	13.07.2010	Council	2011	2011	0.7
35	IE	07.12.2010	Council	2011	2015	0.2

Source: AMECO, EDP Council recommendations, own calculations.

Table A. 4 Ex-ante fiscal multipliers in EDP recommendations issued between 2012 and 2015

	Country	Date of Council recommendation	First year with fiscal effort	EDP deadline	Ex-ante fiscal multiplier
1	HU	13.03.2012	2012	2012	0.0
2	ES	10.07.2012	2013	2014	0.8
3	PT	09.10.2012	2012	2014	0.8
4	GR	04.12.2012	2013	2016	1.0
5	CY	16.05.2013	2013	2016	1.0
6	BE	21.06.2013	2013	2013	0.2
7	NL	21.06.2013	2013	2014	0.6
8	PL	21.06.2013	2013	2014	0.7
9	MT	21.06.2013	2013	2014	0.4
10	PT	21.06.2013	2013	2015	0.8
11	FR	21.06.2013	2013	2015	0.8
12	SI	21.06.2013	2013	2015	0.6
13	ES	21.06.2013	2013	2016	0.7
14	PL	10.12.2013	2014	2015	0.6
15	HR	21.01.2014	2014	2016	0.7
16	FR	10.03.2015	2015	2017	0.9

Source: AMECO, EDP Council recommendations, own calculations.

Annex B Completion of constructed EDP scenario

As described in part 2.2 we make use of the assumption that the Commission's baseline forecast assumes the output gap to close linearly by 2015. Similarly, for EDP recommendations issued before autumn 2009, we therefore assume that the output gap closes linearly by 2014 in the corresponding baseline forecasts. We also assume that—under the baseline forecast—the level of the structural balance remains unchanged beyond the European Commission forecast vintage's forecast horizon. This gives us the annual output gaps and structural efforts under the Commission forecast for all EDP years.

We complete then the construction of EDP scenarios by applying the multiplier as calculated according to equation (1), which gives us real GDP growth rates in individual EDP years in four steps:

First, for EDPs that span time horizons which go beyond the Commission's forecast vintage we apply forecasts provided by the EU Economic Policy Committee's output gap working group on potential output growth, which are available for the years beyond the European Commission forecast vintage. We include these potential output growth forecasts for both the baseline and the EDP scenario, thus assuming in the EDP scenario that any fiscal adjustment would not impact on potential output in the EDP scenario. We have conducted robustness checks that allow us to conclude that our results are robust to this assumption.

In the second step we derive real GDP growth for the Commission forecast beyond the forecast horizon

$$g^{COM}_{t+i|t} = PO^{COM}_{t+i} + (OG^{COM}_{t} - OG^{COM}_{t+i})$$

with $g^{COM}_{t+i|t}$ depicting real GDP growth in t+i as deriving implicitly from the forecast vintage issued in year t and PO^{COM}_{t+i} being potential output growth in t+i.

In a third step we can then calculate the real GDP growth rate in year t+i in the EDP scenario:

$$g^{EDP}_{t+i|t} = g^{COM}_{t+i|t} - FM_{t+i}(SE^{EDP}_{t+i|t} - SE^{COM}_{t+i|t})$$

with $g^{EDP}_{t+i|t}$ as real GDP growth in t+i. $SE^{EDP}_{t+i|t}$ and $SE^{COM}_{t+i|t}$ correspond to the structural effort, measured as the change in the structural balance between years t+i and t+i-1 in the EDP forecast and in the baseline forecast, respectively.

This gives us the output gaps still missing in the EDP scenario for the years in which structural effort is taking place as:

$$OG^{EDP}_{t+i|t} = (g^{EDP}_{t+i|t} / PO^{EDP}_{t+i|t} - 1)*100$$

with $PO^{EDP}_{t+i|t}$ as potential output growth in the EDP scenario in t+i.

We conclude the construction of the EDP scenario by deriving the headline budget balance in the individual years over which the EDP spans as:

$$HB^{EDP}_{t+i} = SB^{EDP}_{t+i} + OG^{EDP}_{t+i} * \varepsilon *$$

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