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Working Paper

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ICAE Working Paper Series, No. 41

Provided in Cooperation with:
Johannes Kepler University Linz, Institute for Comprehensive Analysis of the Economy (ICAE)

Suggested Citation: Heimberger, Philipp (2015) : Did Fiscal Consolidation Cause the Double Dip Recession in the Euro Area?, ICAE Working Paper Series, No. 41, Johannes Kepler University Linz, Institute for Comprehensive Analysis of the Economy (ICAE), Linz

This Version is available at:
https://hdl.handle.net/10419/171416

ICAE Working Paper Series - No. 41 - November 2015

Did Fiscal Consolidation Cause the Double Dip Recession in the Euro Area?

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Did Fiscal Consolidation Cause the Double Dip Recession in the Euro Area?[1]

Philipp Heimberger[2]

Abstract

This paper analyzes the short-run effects of fiscal consolidation measures on economic activity in the euro area during the Euro Crisis. It presents new econometric estimates on the link between cumulative GDP growth and fiscal austerity measures during 2011-2013. The main empirical finding is that the depth of the economic crisis in the euro area's economies is closely related to the harshness of fiscal austerity. The natural interpretation of the econometric results is that multipliers were, on average, higher than 1. According to the calculations proposed in this paper, a reasonable approximation of the size of the output losses due to fiscal austerity in the euro area during 2011-2013 is in the range of 5.5% to 8.4% of GDP. Against the background of the macroeconomic and institutional circumstances that prevailed in the euro area over the time period studied, the cause of the euro area's double dip recession is fiscal consolidation.

Key words: Fiscal policy, austerity, euro area

JEL codes: E61, E62, E63

1. Introduction

Since 2010/2011, fiscal consolidation has been a central feature of crisis management in the euro area. Fiscal consolidation measures are defined as cuts in government spending and/or tax increases, motivated by the policymakers' desire to cut the fiscal deficit. What were the short-run effects of fiscal austerity on economic activity in the euro area, with particular focus on the years 2011-2013? The research goal of this paper is to contribute to explaining the role of fiscal policy in the euro area's double dip recession - which started after the third quarter of 2011 - and its growth performance in 2012 and 2013 (CEPR (2015)).

[1] This paper was written as part of the INET-financed research project “Economic Policy and the Performativity of Economic Models: Looking at the Intersection Between Theory and Policy". The author thanks INET for their financial assistance.

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The main contributions of the analysis are as follows: First, we present new econometric estimates on the link between cumulative real GDP growth and fiscal consolidation measures in the euro area. The econometric baseline results are used to obtain estimates on the size of cumulative GDP losses in the euro area during 2011-2013, which are then related to already existing estimates. Second, the paper focuses on the time period of the double dip recession (2011-2013), which has so far received little attention in the macroeconometric literature. Third, this paper looks at a variety of data sources to measure fiscal consolidation. Specifically, we use changes in the structural budget balance, an approach that Blanchard and Leigh (2013) have proposed in a seminal paper; but we also consider the narrative record from budgets and policy documents in the spirit of Romer and Romer (2010) to identify size and timing of fiscal consolidation measures. This multi-data-sources-approach offers the advantage of allowing for an evaluation of whether the econometric results on the effects of fiscal austerity are consistent across different approaches to identifying fiscal consolidation. The fourth contribution of this paper is to provide an integrated discussion on the role of the institutional and macroeconomic circumstances in the euro area with regard to the determinants of the size of fiscal multipliers.

What are the main findings? First, the empirical evidence points to a strong negative correlation between cumulative GDP growth and fiscal consolidation measures in the euro area's economies during 2011-2013: The depth of the economic crisis was closely associated with the harshness of fiscal consolidation. This econometric finding is consistent with reviewing the fiscal multiplier literature, emphasizing key conditions for "higher-than-normal" fiscal multipliers that were fulfilled in large parts of the euro area. Second, using the econometric results as an approximation for the size of cumulative multipliers during 2011-2013 leads to a range of cumulative output losses due to fiscal austerity from about 5.5% to 8.4% of GDP. These numbers are somewhere in the middle of the range of estimates from the existing literature. We argue that under the macroeconomic and institutional circumstances that prevailed in the euro area over the time period studied, fiscal consolidation is the cause of the double dip recession.

The remainder of this paper is structured as follows: Section 2 reviews the literature on fiscal multipliers. Section 3 describes the basic econometric strategy for analyzing the link between cumulative GDP growth and fiscal consolidation measures. Section 4 presents the baseline econometric results and relates them to existing estimates from the literature on the size of GDP losses from fiscal consolidation in the euro area. Section 5 provides several robustness checks, as we account for the role of outliers, vary the country group and control for additional variables. Section 6 summarizes and concludes.

2. Which factors determine the size of fiscal multipliers?

The fiscal multiplier is typically defined as the ratio of a change in real GDP to an exogenous change in the fiscal balance (e.g. Batini et al. (2014)). Several studies demonstrate that multiplier values reported in the literature vary substantially (e.g. Hemming (2002); Fatas and Mihov (2009); Gechert and Rannenberg (2014); Alesina et al. (2015)). The literature suggests that numerous factors affect the size of multipliers: monetary policy accomodation, the composition of fiscal consolidation (spending-based vs. tax-based) and the initial level of public indebtedness, the exchange-rate regime, the openness of the economy, the international business environment etc. (e.g. Barrell et al. (2012); Iltzetzki et al. (2013)). Gechert and Rannenberg (2014) conduct a meta-regression analysis of 98 empirical studies to study whether fiscal multipliers are regime-dependent. They find that multipliers increase by 0.6 to 0.8 units during an economic downturn and report that spending multipliers are markedly higher than tax multipliers, especially during recessions. During "normal" economic times and during booms, fiscal multipliers are not only lower than in downturns; they also vary less across different fiscal instruments. Several multiplier studies from recent years report that multipliers are substantially higher when economic resources are underutilized (e.g. DeLong and Summers (2012); Qazizada and Stockhammer (2014)).

In what follows, we focus on the literature on the size of multipliers in crisis times. The case of severe restrictions in conventional monetary policy effectiveness due to the zero lower bound of nominal interest rates (ZLB) has gained relevance since the outbreak of the financial crisis in 2008. This is also the case in the mainstream New-Keynesian literature, where it is argued that fiscal multipliers are substantially higher than 1 if central banks are constrained by the ZLB in their ability to stimulate the economy with interest rate cuts (e.g. Christiano et al. (2011)).

Another research strand in the multiplier literature investigates how characteristics of financial crises and their aftermaths might influence fiscal policy effectiveness. For example, Corsetti et al. (2012) report that fiscal multipliers are significantly above 2 during times of financial crisis. Eggertsson and Krugman (2012) show that in a New-Keynesian model of debt-driven slumps, where agents in the private sector are forced into rapid deleveraging, the result is a multiplier in excess of 1. Koo (2013) argues that fiscal multipliers are markedly higher than 1 as long as the private sector is collectively minimizing debt after an asset price bubble has burst, because the deleveraging acts as a drag on aggregate demand.

The arguments presented above have implications for the research question on the effects of fiscal consolidation measures on output, because conditions for higher-than-normal multipliers were fulfilled in the euro area during 2011-2013: The ECB was severely constrained in its ability to

stimulate the economy by cutting interest rates because of the ZLB (e.g. Coeure (2012)). In large parts of the European monetary union, the private sector was in the process of deleveraging (see Koo (2015), p. 219ff.), and therefore not in a position to borrow - even at very low interest rates -, which impaired the effectiveness of monetary policy. Furthermore, the monetary union is a fixed exchange-rate regime, in which individual member countries do not have control over the currency in which they issue debt (De Grauwe (2012)). Therefore, currency devaluations were not available to stressed countries in order to increase price competitiveness vis-a-vis main trading partners and stimulate the economy via an increase in exports. Also, the initial position of euro area economies in 2010/2011 was characterized by economic slack. The IMF estimated in real-time that all euro area countries but Malta had negative output gaps (to varying degrees) over the years 2010-2012 (IMF (2011)). Negative output gaps are widely accepted as a standard indication that there are demand-side problems and that in principle it would be possible to increase production and to decrease unemployment by demand-side measures without creating any inflationary pressures.

How does the existing literature estimate the size of fiscal multipliers in the euro area during 2011-2013? European Commission (2012b) assesses the impact of fiscal consolidation as the deviation from a baseline scenario without fiscal consolidation. Using simulations with its DSGE model QUEST, it is estimated that the short-run multiplier of fiscal consolidation is low (around 0.25). Assuming that fiscal plans are fully credible and that monetary policy helps to cushion the contractive effects of fiscal adjustment, the negative impact of fiscal adjustment in 2012 and 2013 is estimated to be very limited (cumulatively 0.5% of GDP; see Table 1).

Table 1: Estimates of cumulative losses from fiscal consolidation in the euro area during 2011-2013 (in % of GDP)

	2011	*2012*	***2013***
European Commission (2012b), p. 45		0.3	**0.5**
Holland and Portes (2012), p. F8	1.5	3.1	**4.0**
in't Veld (2013), p. 10	0.7	2.0	**3.2**
Rannenberg et al. (2015), p. 21			**12.0**
Gechert et al. (2015), p. 6	4.3	6.4	**7.7**

Own illustration, based on the data sources cited in the table

Rannenberg et al. (2015) point out that the assessment of the effects of fiscal consolidation on economic activity in the euro area in European Commission (2012b) does not adequately take into account the restrictions imposed on monetary policy by the ZLB, the tightening of liquidity constraints for households as a result of the financial crisis, and that it has not properly allowed for

the possibility that households do not anticipate that cuts in government spending imply higher future private consumption because of lower future tax burdens. They employ two DSGE models - one is the New Area Wide Model from the ECB, the other the European Commission's QUEST III model - for their simulations, in which they constrain the response of monetary policy, account for liquidity constraints of households and introduce a financial accelerator. They find that in the presence of both the financial accelerator and an increased share of liquidity constrained households, the cumulative multiplier over the 2011-2013 period equals 1.3, implying that fiscal consolidation caused cumulative output losses of about 12% of GDP.

Table 1 lists estimates of the impact of fiscal consolidation on euro area GDP from four additional papers. In't Veld (2013), who also uses the European Commission's QUEST model, finds that fiscal consolidation caused a cumulative GDP loss in euro area output of 3.2% from 2011 to 2013. Holland and Portes (2012) use the National Institute Global Econometric Model (NiGEM), a large scale macroeconometric model, to assess the economic impact of fiscal consolidation plans for the period 2011/13. They report that the cumulative output loss from fiscal adjustment was 4.0%, stressing that fiscal multipliers in 2011-2013 were higher than in "normal times" due to substantial slack in European economies, heightened liquidity constraints because of the financial crisis and the ZLB constraint of monetary policy. Gechert et al. (2015) build on the meta-regression analysis by Gechert and Rannenberg (2014) and find that the fiscal consolidation in the euro area reduced GDP by 4.3% relative to a baseline scenario without fiscal adjustment in 2011, with the deviation from the baseline increasing to 7.7% in 2013.

The next section will present the basic econometric strategy of this paper. Based on the literature review on the size of fiscal multipliers, the main hypothesis is that fiscal consolidation measures and cumulative real GDP growth will be negatively correlated; and strongly so when main conditions for higher-than-normal multipliers are fulfilled.

3. Basic econometric strategy

To investigate whether GDP growth has been systematically related to fiscal consolidation measures in the euro area, we use the following econometric approach: We regress the cumulative growth in real GDP during 2011-2013 on a fiscal variable that is supposed to capture exogenous changes in the fiscal balance.

The baseline equation estimated is:

$$\Delta Y_{i,2011:2013} = \alpha + \beta \Delta F_{i,2011:2013} + \epsilon_{i,2011:2013}$$

where $\Delta Y_{i,2011:2013}$ denotes cumulative growth of real GDP (*Y*) in economy *i* during the time period 2011-2013, $\Delta F_{i,2011:2013}$ captures the exogenous change in the fiscal balance in economy *i* during the time period 2011-2013, and $\epsilon_{i,2011:2013}$ is the error term.

How do we measure $\Delta F_{i,2011:2013}$? This question is highly important because of an endogeneity problem: Ups and downs in economic activity cause automatic changes in the fiscal balance; e.g., a downswing in economic growth will lead to a fall in tax revenues and an increase in unemployment-related government spending - without any actual change in fiscal policy. Such a development would both affect the explanatory variable $\Delta F_{i,2011:2013}$ and the error term in the same direction. In practice, "using the change in the overall fiscal balance to measure changes in fiscal policy would bias estimates toward finding expansionary effects of fiscal consolidation on economic activity" (Guajardo et al. (2011), p. 6), because the fiscal balance improves (worsens) due to the automatic fiscal effects of an improvement (deterioration) in economic activity.

In the macroeconometric literature, one finds two major approaches that try to overcome this endogeneity problem.[3] The first can be called the conventional approach (e.g. Yang et al. (2013)), which looks at changes in cyclically-adjusted fiscal data. The basic idea is to correct the headline fiscal balance for the effects of the business cycle on government revenues and expenditures. The IMF and the European Commission do so by estimating the fiscal balance at which the output gap - the difference between actual and potential output - would be zero. After correcting for the cyclical component of the fiscal balance, they also account for so called budgetary one-off effects, e.g. costs related to bailing-out financial institutions, which yields the structural budget balance (Fedelino et al. (2009); Mourre et al. (2014)). The intensity of fiscal consolidation can then be calculated by looking at changes in the structural budget balance - a strategy followed by Blanchard and Leigh (2013).

A typical criticism in the literature is that changes in the structural budget balance might not only reflect the policymakers' desire to cut the fiscal deficit, which is due to problems related to estimating the fiscal balance at which the output gap would be zero (e.g. Carnot and de Castro (2015)). Therefore, the contribution of this paper is to look at other data sources as well: We also follow the second major strategy in the macroeconometric literature for overcoming the endogeneity problem, called the narrative approach, where size and timing of fiscal measures are obtained from budgets,

3 Other approaches exist, but are not discussed here; see, e.g., Blanchard and Perotti (2002).

budget documents and policy papers, as proposed in a seminal contribution by Romer and Romer (2010).

Taking a variety of data sources into account in order to identify the intensity of fiscal consolidation is an important contribution to the existing literature, because we can check whether the econometric findings for the euro area are robust to using different identification strategies. Table 2 lists the data sources used in this paper. It depicts details on the relevant time period for which data was available during 2011-2013 and shows the number of euro area countries for which data could be included. Regarding the conventional approach, we obtain data from European Commission (2015) and IMF (2015), respectively. Data from the narrative approach is based on European Commission (2015), OECD (2012) and Gainsbury et al. (2011), respectively.

Table 2: Data sources to identify fiscal consolidation measures in the euro area (2011-2013)

	Data	Time period	EA countries
Conventional approach			
IMF (2015)	Structural budget balance in % of potential output	2011-2013	16
European Commission (2015)	Structural budget balance in % of potential output	2011-2013	18
European Commission (2015)	Primary structural budget balance in % of potential output	2011-2013	18
Narrative approach			
European Commission (2015)	Discretionary fiscal measures in % of nominal GDP	2011-2013	18
OECD (2012)	Fiscal consolidation measures in % of nominal GDP	2011-2013	15
Gainsbury et al. (2011)	Fiscal consolidation measures in % of GDP per head	2011	6

Own illustration

4. Baseline results and discussion

The baseline results in this section focus on the euro area.[4] However, robustness checks in the next section will also look at the empirical evidence for other country groups in order to investigate whether the experiences of euro area countries were similar to those of non-euro area countries.

It might be argued that cross-sectional evidence on the link between fiscal consolidation measures and GDP growth strongly depends on the role of outliers. That is why the robustness checks in Section 5 will show that the results are not unduly influenced by outlier observations. Another objection might be that additional variables affect both the intensity of fiscal austerity and economic performance. Accordingly, the subsequent robustness analysis will show that the β coefficient of

[4] The EA-18 country group includes Belgium, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Luxembourg, Malta, Netherlands, Austria, Portugal, Slovenia, Slovakia, Finland.

fiscal consolidation is not unduly affected when we control for additional variables that might have both influenced real GDP growth and fiscal consolidation over the time period studied.

Table 3: OLS baseline results for the euro area

	β	t-value *β*	*α*	Number of countries	R^2
Conventional approach data					
Structural budget balance / IMF	-1.854	-5.683***	7.327	18	0.586
Structural budget balance / EC	-2.075	-5.075***	7.470	18	0.557
Primary structural budget balance / EC	-2.089	-3.626***	7.936	18	0.573
Narrative approach data					
European Commission (2015)	-1.382	-5.183***	8.007	18	0.756
OECD (2012)	-1.906	-2.927**	6.735	15	0.604
Gainsbury et al. (2011)	-1.647	-6.353***	3.733	6	0.833

Author's calculations, based on the data sources mentioned in the table.

Dependent variable: cumulative real GDP growth 2011-2013.

Note that for the specification using data by Gainsbury et al. (2011) we only had fiscal consolidation data for the year 2011. Following De Grauwe and Ji (2013), we use the cumulative growth in real GDP over 2011-2012 as the dependent variable, which we regress on the narrative-based variable obtained from Gainsbury et al. (2011).

T-values are heteroskedasticity-robust (White).

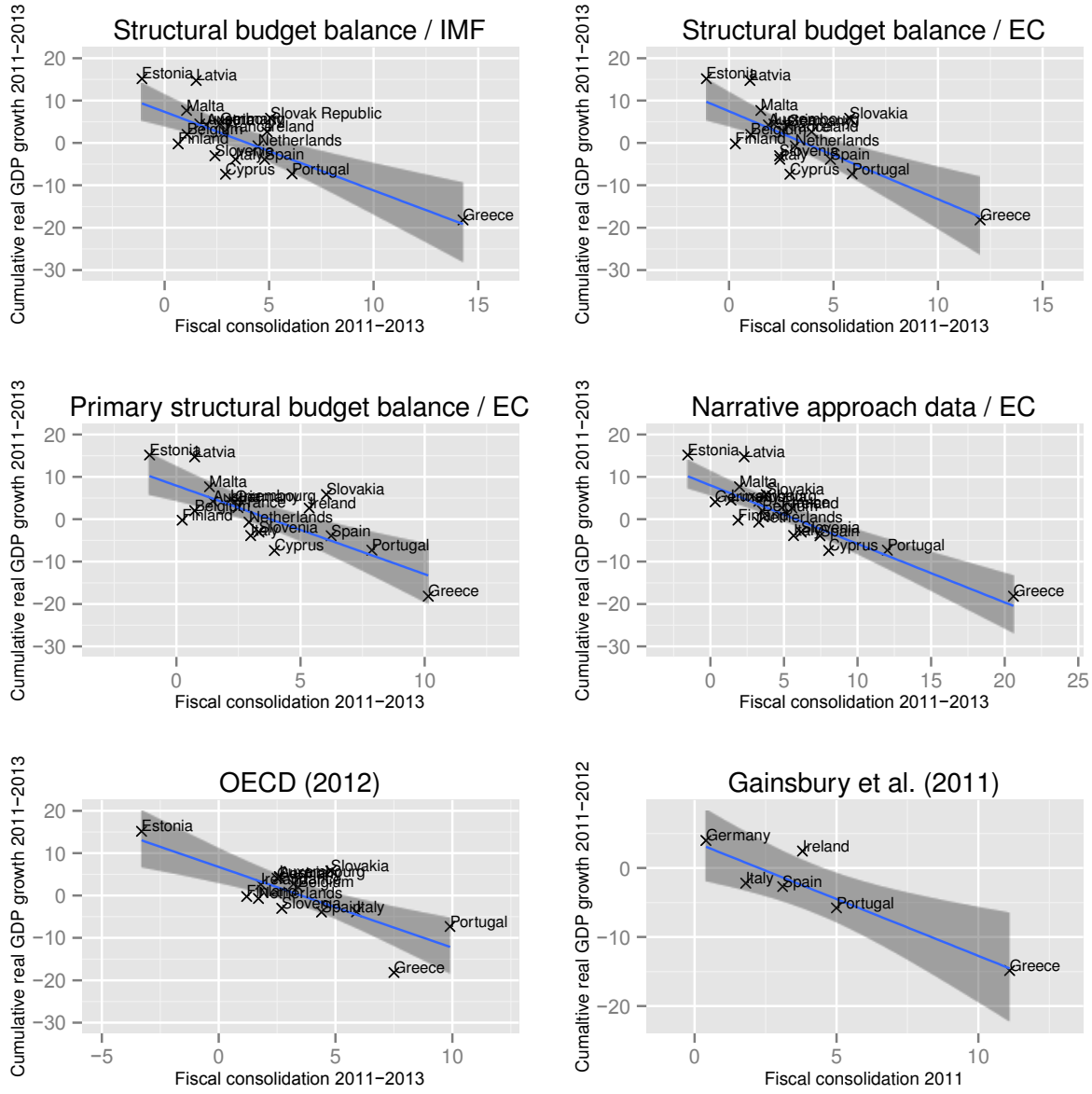
***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

Structural budget balance data for Cyprus and Estonia was not available in IMF (2015). Missing values were filled with structural budget balance data from European Commission (2015).

Table 3 reports the baseline results from Ordinary Least Squares estimation (OLS). Using changes in the structural budget balance as estimated in IMF (2015) in order to identify fiscal consolidations, we find a strong negative correlation between cumulative real GDP growth and fiscal consolidation measures: The β coefficient is -1.85, implying that an increase of 1 percentage point in fiscal consolidation during 2011-13 was associated with a cumulative decline in real GDP during 2011-13 of about 1.85 percentage points. Figure 1 illustrates the statistically significant relationship with a scatterplot for each of the six data sources depicted in Table 3.[5] Plotting the data suggests that those euro area countries that implemented more intense fiscal consolidations suffered more pronounced declines in real GDP from 2011 to 2013 - vice versa, countries which did not adjust (that much), performed markedly better in terms of real GDP. The estimation results based on data from European Commission (2015) are similar when we identify fiscal consolidation measures by changes in the structural budget balance (β coefficient -2.08) and by changes in the primary structural budget balance (which excludes interest payments; β coefficient -2.09), respectively.

[5] Throughout the study, statistical inference is reported based on heteroskedasticity-robust standard errors.

Figure 1: Plotting cumulative real GDP growth against fiscal consolidation measures



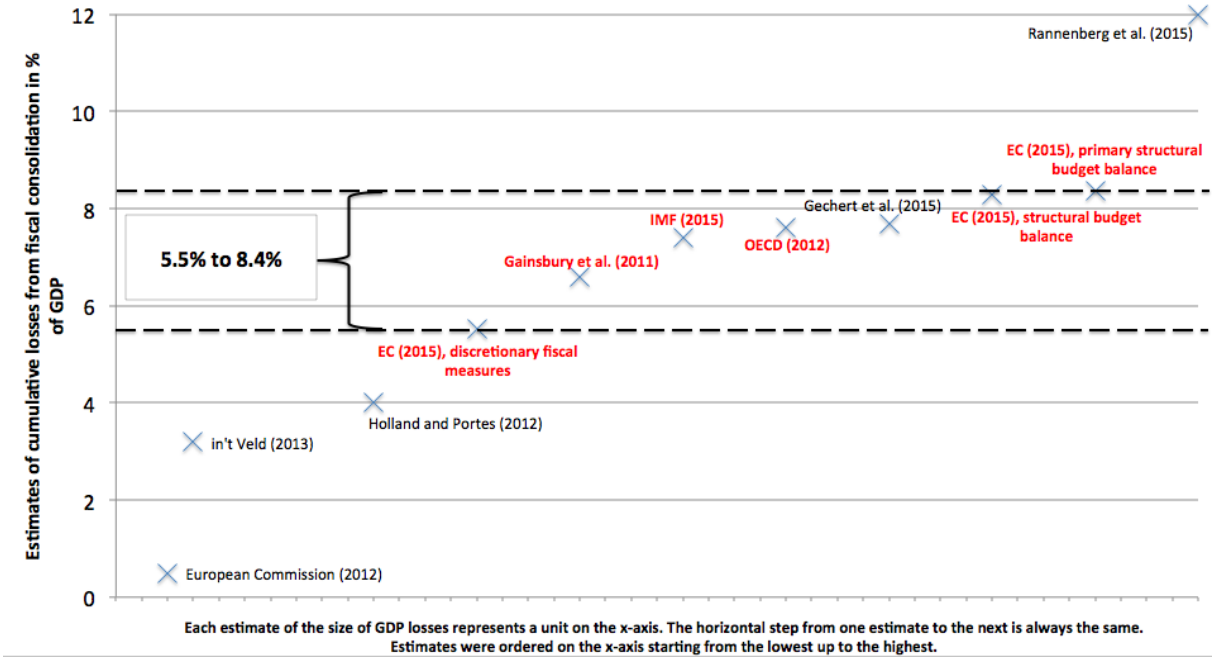
Own illustration. For more details of the econometric results see Table 3; for more information regarding the data sources see Table 2.

Using data on the intensity of fiscal consolidation that was obtained from budgets and other relevant documents (narrative approach), we again find a negative, statistically significant relationship between the cumulative growth in real GDP and fiscal consolidation measures during 2011-2013. OLS estimates based on fiscal consolidation numbers reported in OECD (2012)[6] deliver a β coefficient of -1.91. Looking at data on discretionary fiscal measures from European Commission (2015), we find that a 1 percentage point increase in fiscal consolidation was associated with a cumulative decline in real GDP by 1.38 percentage points. Obtaining consolidation data from Gaisbury et al. (2012), we

6 In the OECD (2012) specification, data for 15 euro area countries was available: the EA18 country group excluding data for Cyprus, Latvia and Malta.

once more find a statistically significant negative association between real GDP growth and austerity measures in the euro area countries under study (β coefficient of -1.65).

Figure 2: Mapping the size of cumulative GDP losses due to fiscal consolidation in the euro area (2011-2013)



Own illustration. Red labeling indicates that the estimates are based on the author's own calculations. Estimates with black labels were obtained from the existing literature. See Table 2 for details on the data sources used to identify fiscal consolidation measures.

The natural interpretation of these econometric findings is that they provide evidence for multipliers that were, on average, higher than 1. In section 2, we have already discussed estimates on the size of cumulative output losses in the euro area during 2011-2013 (see Table 1). How can we use our econometric baseline results in order to contribute to the existing literature? The European Commission estimates that fiscal consolidation in the euro area cumulated to 4.0% of GDP between 2011 and 2013 (see European Commission (2012b), p. 45). Looking at the β coefficients from Table 3 as an approximation of the size of cumulative multipliers in the euro area leads to a range of cumulative output losses due to fiscal consolidation from about 5.5% to 8.4% of GDP during 2011-2013 - in comparison to the unknown baseline scenario without fiscal austerity measures (see Figure 2). The advantages of these calculations are that they require fewer assumptions and that they are way simpler than building a large macroeconomic model, as Rannenberg et al. (2015) and other researchers have done. But still, these back-of-the-envelope calculations can be used as a reasonable approximation of the size of GDP losses in the euro area, which are due to fiscal austerity. As Figure 2 illustrates graphically, the 5.5% to 8.4% numbers are somewhere in the middle of the range of the estimates from the existing literature.

5. Robustness checks

In this section, we perform several tests to assess the robustness of the baseline results reported in the previous section.

5.1 The role of outliers

Our first step of the robustness analysis is to analyze the role of outliers. Since critics might object that the baseline results are driven by data for Greece, which implemented the most intense fiscal austerity measures of all countries, we exclude Greece from our sample. Using data from IMF (2015), the R^2 declines from 0.59 to 0.35 and the β coefficient is now statistically significant at the 5% level (see Table 4). The size of the β coefficient is even larger (-2.05 compared to -1.85). We then test the sensitivity of the baseline results to outliers formally by applying three accepted estimation strategies designed to resist the influence of outliers. First, we reestimate the baseline specification using robust regression, which downweights observations with larger absolute residuals by making use of iterative weighted least squares. Robust regression is less fragile to the influence of outlier observations than OLS; the procedure is a check of whether outliers are influencing the baseline OLS results (see Blanchard and Leigh (2013), p. 9).[7] The robust regression estimate of β (-1.84) is very similar to the OLS estimate (-1.85).

7 The robust regression procedure was implemented in R via the rlm function from the 'MASS' package.

Table 4: Robustness checks: The role of outliers and variations in the country group

	β	t-value *β*	*α*	Number of countries	R^2
EA18 (OLS)	-1.854	-5.683***	7.327	18	0.586
OLS excl. Greece	-2.049	-2.495**	7.803	17	0.351
Robust regression	-1.835	-5.667***	7.098	18	0.585
Quantile regression	-1.799	-2.627**	7.506	18	0.583
Cook's distance	-1.854	-5.683***	7.327	18	0.586
EU27 (OLS)	-1.549	-3.100***	7.184	27	0.404
OLS excl. Greece	-1.133	-1.649	6.156	26	0.134
Advanced European	-1.620	-4.300***	6.834	23	0.454
Robust regression	-1.531	-2.986***	6.989	27	0.403
Quantile regression	-1.826	-2.026*	7.897	27	0.390
Cook's distance	-1.133	-1.649	6.156	26	0.134
Advanced Economies (OLS)	-1.590	-4.727***	7.718	36	0.452
OLS excl. Greece	-1.326	-3.088***	7.270	35	0.228
Liquidity trap	-1.594	-5.002***	7.075	29	0.469
No liquidity trap	-0.279	-0.438	8.291	7	0.044
Robust regression	-1.588	-4.720***	7.666	36	0.452
Quantile regression	-1.831	-3.374***	7.973	36	0.439
Cook's distance	-1.326	-3.088***	7.270	35	0.228
Emerging Market Economies (OLS)	-0.807	-1.309	12.393	35	0.063
Robust regression	-0.662	-0.950	12.077	35	0.060
Quantile regression	-1.355	-1.515	11.192	35	0.001
Cook's distance	-0.859	-1.702*	12.161	35	0.077

Data on fiscal consolidation and real GDP: IMF (2015); author's calculations.

Dependent variable: cumulative real GDP growth 2011-2013.

T-values are heteroskedasticity-robust (White). Fiscal consolidation is measured as the change in the structural budget balance.

***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

Structural budget balance data for Cyprus and Estonia was not available. Missing values were filled with structural budget balance data from European Commission (2015).

The country sample in the specification "Advanced European" is the EU27 excluding Romania, Hungary, Bulgaria and Poland.

In the "Liquidity trap" specification, we excluded Australia, Iceland, Israel, Korea, New Zealand, Norway and Taiwan; these countries comprise the "no liquidity trap" country group.

The second variation in the estimation tequnique is implemented via quantile regression, which is also supposed to make the estimates less affected by the role of outlier observations.[8] The quantile regression estimate of β (-1.80) is again very similar to our OLS estimate. The third variation in the estimation tequnique was introduced as follows: We investigate the role of outlier observations by using Cook's distance method; the approach was to discard observations with Cook's distance greater than 4/N, where N is the sample size (18 countries in case of the EA18). In our euro area sample,

8 Quantile regression minimizes the sum of the absolute residuals about the median, rather than the sum of the squares of the residuals about the mean as in OLS (see Blanchard and Leigh (2013), p. 10). Quantile regression was implemented in R via the rq function in the 'quantreg' package. Standard errors were calculated based on the summary.rq function.

Cook's distance is smaller than 4/N for all euro area countries; therefore, our Cook's distance estimates are identical to the OLS estimates.[9]

5.2 Variations in the country group

The second step of our robustness checks is to vary the country group in order to shed light on whether the experiences of euro area countries are similar to those of non-euro area countries. Table 4 reports regression results not only for the EA18, but also for the EU27,[10] a group of advanced economies (including European and non-European economies)[11] and emerging market economies.[12]

For many of these additional economies, the conditions for higher-than-normal multipliers discussed while reviewing the fiscal multiplier literature (such as the ZLB constraint and slack in the economy) are arguably less relevant than in the euro area, which leads us to expect a smaller absolute value of β for the EA27, the advanced economies sample and the emerging markets country group - compared to the EA18, respectively. This is what we find: The β coefficient of fiscal consolidation is strongly negative and statistically significant in the EA18, EU27 and advanced economies specification, respectively; however, β is markedly larger for the EA18 (-1.9) than in the EU27 (-1.5) and advanced economies country group (-1.6). Furthermore, statistical significance for the EU27 has declined; the quantile regression and Cook's distance estimate point to the role of outliers influencing the EU27 OLS estimates. It is also notable that excluding Greece from the OLS estimation has more impact on the results for the EU27 and advanced economies group than on the EA18. In the advanced economies specification, we also test for the possible role of constraints in monetary policy. We do so by estimating a separate specification in which we only include economies that were, arguably, in a liquidity trap during this period.[13] In this specification of 29 advanced economies, the estimate of β is -1.594 and strongly significant; in the - admittedly small - group of 7 no-liquidity-trap advanced economies, however, β is -0.279 and lacks significance.

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9 Results of the exact same robustness checks, based on OLS estimates from European Commission (2015) data, support the finding that the robust regression, quantile regression and Cook's distance estimates of β are very similar to the OLS estimate, and that they are all statistically significant. Results are available on request from the author.

10 The EU27 consists of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, United Kingdom.

11 The advanced country group consists of 36 countries: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Kingdom, United States.

12 This emerging markets group consists of 35 countries: Argentina, Bosnia, Brazil, Bulgaria, Chile, Colombia, Croatia, Dominican Republic, Ecuador, Egypt, Georgia, Guyana, Hungary, India, Indonesia, Jordan, Lebanon, Malaysia, Mauritius, Mexico, Morocco, Panama, Paraguay, Peru, Phillipines, Poland, Romania, Russia, Serbia, South Africa, Thailand, Turkey, Ukraine, Uruguay.

13 The term liquidity trap describes a situation characterized by the central bank's inability to use interest rate cuts in order to induce investors to lend money. Consistent with Blanchard and Leigh (2013), we define our set of liquidity trap economies as those economies for which the central bank's main nominal policy interest rate reached 1 percent or less during 2011 –- 13.

When we repeat the analysis for the group of 35 emerging market economies for which the IMF provided structural budget balance data, we do find a smaller β coefficient of -0.8. The fiscal consolidation coefficient in the emerging markets specification lacks significance, which also does not change when we perform robustness checks by implementing more robust estimation procedures. This finding points to the importance of accounting for the conditions of higher-than-normal fiscal multipliers, which were less important in emerging market economies during 2011-2013 than in the euro area and other parts of the global economy. It might be explained to a non-negligible extent by differences in the monetary policy regime: For virtually none of the emerging market economies in our sample, the central bank's main nominal policy interest rate reached 1 percent or less during 2011-13.[14] In stark contrast, 24 of the EU27 countries did face such a liquidity trap situation at some point over the same time period.[15]

Additionally, Table 5 reports evidence on the link between cumulative real GDP growth and fiscal consolidation measures before the financial crisis for comparable 3-year periods (2005-2007 and 2002-2004) in a sample of 15 euro area countries[16] and 31 advanced economies.[17] We find for both country groups that the absolute size of the β coefficient of fiscal consolidation is much smaller than during 2011-2013; it also lacks statistical significance in all of the pre-crisis specifications, which is in line with our expectation that conditions for higher-than-normal fiscal multipliers mattered during 2011-2013.

Table 5: Robustness check regarding pre-crisis years

	β	**t-value *β***	***α***	**Number of countries**	**R^2**
EA15 2005-2007	-1.245	-1.670	11.624	15	0.289
EA15 2002-2004	-0.183	-0.205	7.257	15	0.008
Advanced economies 2005-2007	-0.275	-0.352	13.563	31	0.009
Advanced economies 2002-2004	0.308	0.829	9.626	31	0.016

Data on fiscal consolidation and real GDP growth: IMF (2015); author's calculations.

T-values are heteroskedasticity-robust (White). The fiscal variable is measured as the change in the structural budget balance.

***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.

14 Bulgaria is the only notable exception.

15 The three exceptions are: Hungary, Poland and Romania.

16 The 15 euro area countries group in Table 4 consists of Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, Spain.

17 The 31 advanced economies from the country group in Table 4 consists of: Australia, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Kingdom, United States.

5.3 Including control variables

The next step of the robustness checks is to introduce additional control variables, which could potentially both explain the intensity of fiscal consolidation and the evolution of real GDP. The omission of such potentially relevant control variables could bias the analysis towards overestimating the size of the β coefficient. First, critics might point to the literature on the relationship of sovereign debt and economic growth and argue that it is no surprise that economic growth turned out to be so weak in large parts of Europe, given that government debt levels were so high to start with (in countries like Greece and Italy markedly above the 90%-of-GDP-threshould emphasized in Reinhart and Rogoff (2010)).[18] For example, it has been claimed that "[t]he circumstances which help to reduce the short-term costs [of fiscal consolidations] include when [...] the fiscal starting position is particularly precarious and thus confidence in the sustainability of public finances is rather low" (ECB (2010), p. 84). In order to account for this kind of argument, it is relevant to consider the role of sovereign debt in the euro area, by testing whether our baseline OLS results are picking up the effects of debt problems rather than the effects of fiscal consolidation measures. As can be seen from Table 6, the baseline results are robust to controlling for the initial (end-2010) government-debt-to-GDP ratio, for the initial (end-2010) fiscal-balance-to-GDP ratio, and for the initial (end-2010) structural-budget-balance-to-potential-output ratio: The β coefficient of fiscal consolidation stays strongly negative and statistically significant at the 1% level. We then also control for the sovereign credit default swap (CDS) spread in the first quarter of 2011, as it can be argued that CDS spreads take the future debt problems as perceived by financial market actors into account.[19] Again, the baseline results do not change much.

Second, we control for the initial bank CDS spread in the first quarter of 2011 in order to check whether the OLS results are picking up the effects of stress in the financial sector.[20] Third, it has been argued that the build-up of current account imbalances before the crisis has negatively impacted on the economic performance in countries that accumulated considerable current account deficits. Sustained losses in competitiveness and the associated build-up of indebtedness are said to have contributed to the weak growth performance during the Euro Crisis, after capital inflows to deficit countries had abruptly stopped (e.g. European Commission (2012a)). To investigate the role of external imbalances, which might have triggered both fiscal consolidation and headwinds to economic growth, we control for the pre-crisis (2007) current-account-deficit-to-GDP ratio and again

[18] See Herndon et al. (2014) for a critique of the main finding that "across both advanced countries and emerging markets, high debt/GDP levels (90 percent and above) are associated with notably lower growth outcomes" (Reinhart and Rogoff (2010), p. 22).

[19] Data refers to average 5-year sovereign CDS spreads; it was obtained from the companion data set to Blanchard and Leigh (2013).

[20] Data refers to average 5-year bank CDS spreads; it was, again, obtained from Blanchard and Leigh (2013).

find that the link between GDP growth and fiscal consolidation is robust. Results are also similar when we control for the pre-crisis (2007) stock of net foreign liabilities.[21]

Table 6: Robustness checks: additional control variables

	β	t-value *β*	γ	t-value γ	Number of countries	R^2
Initial debt-to-GDP ratio	-1.441	-3.813***	-0.059	-1.434	18	0.622
Initial structural budget balance	-1.684	-3.110***	0.203	0.285	18	0.588
Initial fiscal balance	-2.028	-3.087***	-0.183	-1.799*	18	0.607
Sovereign CDS spread	-2.067	-2.156**	0.004	0.282	17	0.585
Bank CDS spread	-1.921	-1.979*	0.004	0.227	10	0.861
Pre-crisis current account balance	-1.988	-6.033***	-0.191	-0.923	18	0.626
Pre-crisis stock of net foreign liabilities	-2.057	-4.724***	-0.027	-0.853	18	0.613
Pre-crisis household debt-to-income	-1.561	-4.851***	0.023	1.365	12	0.799

Data on fiscal consolidation and GDP growth: IMF (2015).

Dependent variable: cumulative real GDP growth 2011-2013.

The fiscal variable is measured as the change in the structural budget balance.

γ refers to the coefficient of the control variable.

T-values are heteroskedasticity-robust (White).

***, **, and * denotes statistical significance at the 1%, 5%, and 10% level, respectively. Constant term included in specification, but the estimate is not reported. The additional controls appear in the specifications one at a time.

Finally, we control for the role of household debt. We do so because there are concerns that large household debt overhangs have negative effects on GDP growth (e.g. Mian et al. (2013)). We reestimate the baseline equation while controlling for the pre-crisis (2007) level of the household debt-to-disposable-income ratio.[22] We again find that our estimate of the fiscal consolidation coefficient remains largely unchanged.

We conclude our robustness analysis by noting that that the β coefficient of fiscal consolidation is neither unduly affected by the role of outliers nor by additional variables that might have both influenced cumulative real GDP growth and fiscal consolidation over the time period studied.[23] What's more, results from variations in the country group support the hypothesis that conditions for higher-than-normal-multipliers in the euro area mattered during 2011-2013.

[21] Data for stock of net foreign liabilities (in % of nominal GDP) is from the updated and extended version of the dataset constructed by Lane and Milesi-Ferretti (2007).

22 Data on household debt-to-disposable-income ratios is from the OECD (Household accounts, downloaded on May 17th 2015). Due to data constraints, we could only include 12 euro area countries: Belgium, Germany, Ireland, Greece, Spain, France, Italy, Netherlands, Austria, Portugal, Slovenia, Finland.

23 Results for the same robustness checks in terms of including addition control variables, but based on data from European Commission (2015), support this finding. Results are available on request from the author.

6. Conclusions

This paper has investigated the short-run effects of fiscal consolidation measures on economic activity in the euro area, with particular focus on the years 2011-2013. The econometric evidence on the link between cumulative real GDP growth and fiscal consolidation measures points to a strong negative association: The depth of the economic crisis over 2011-2013 in the euro area's economies is closely related to the harshness of fiscal austerity. This finding is in line with previous studies from the relevant empirical literature, which report that fiscal adjustments are typically contractionary, and strongly so during difficult economic times (Batini et al. (2012); Jorda and Taylor (2013); de Cos and Moral-Benito (2013); Yang et al. (2013); Guajardo et al. (2014)). The evidence we find also supports our hypothesis that one has to expect highly contractionary effects of fiscal consolidation on GDP growth when major conditions for "higher-than-normal" multipliers - related to considerable economic slack and constraints in monetary policy effectiveness - are met.

Based on some simple calculations, we argued that an approximation of the size of GDP losses from fiscal consolidation in the euro area over the time period studied is in the range of 5.5% to 8.4%. It is therefore reasonable to state that - against the background of the institutional and macroeconomic circumstances - the cause of the double-dip recession in the euro area, which started after the third quarter of 2011, is fiscal austerity. Critics might argue that some GDP loss from fiscal austerity was inevitable in the euro area, as fiscal deficits in stressed euro area countries had to be reduced. However, this argument downplays the importance of the austerity measures' timing and speed, which were crucial because circumstances in the euro area were very unfavorable over the time period studied, considering that the economic recovery was everything but complete and that policy options for offsetting the contractionary effects of fiscal austerity were severely constrained. Fiscal consolidation measures aggravated macroeconomic troubles via the demand side and triggered a debt-deflationary spiral, characterized by very low inflation, rising real debt burdens and further increases in public debt-to-GDP ratios (e.g. Mastromatteo and Rossi (2015)) - especially in the euro area's periphery countries -, so that front-loading fiscal austerity in the euro area was counterproductive.

References

Alesina, A., Barbiero, O., Favero, C., Giavazzi, F. and Paradisi, M. (2015): Austerity in 2009-2013. NBER Working Papers No. 20827, National Bureau of Economic Research.

Barrell, R., Holland, D. and Hurst, I. (2012): Fiscal multipliers and prospects for consolidation. OECD Journal: Economic Studies, 2012 (1), 71–102.

Batini, N., Callegari, G. and Melina, G. (2012): Successful Austerity in the United States, Europe and Japan. IMF Working Papers No. 12/190, International Monetary Fund.

Batini, N., Eyraud, L., Forni, L. and Weber, A. (2014): Fiscal Multipliers: Size, Determinants, and Use in Macroeconomic Projections. IMF Technical Notes and Manuals September 2014, International Monetary Fund.

Blanchard, O. and Leigh, D. (2013): Growth Forecast Errors and Fiscal Multipliers. IMF Working Papers No. 13/1, International Monetary Fund.

Blanchard, O. and Perotti, R. (2002): An Empirical Characterization Of The Dynamic Effects Of Changes In Government Spending And Taxes On Output. The Quarterly Journal of Economics, 117 (4), 1329–1368.

Carnot, N. and de Castro, F. (2015): The discretionary fiscal effort: an assessment of fiscal policy and its output effect. European Economy - Economic Papers 543, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

CEPR (2015). Euro area business cycle dating committee: Euro area out of recession, in unusu- ally weak expansion. Center for Economic Policy Research Publication on October 1st 2015, http://cepr.org/Data/Dating/Dating- Committee- Findings- 01- Oct-2015.pdf?__utma=1.335144835.1446035292.1446035292.1446035292.1&__utmb=1.2.10.1446035292&__utmc=1&__utmx=-&__utmz=1.1446035292.1.1.utmcsr=google%7Cutmccn=(organic)%7Cutmcmd=organic%7Cutmctr=(not%20provided)&__utmv=-&__utmk=179035940 [last download on October 30th 2015].

Christiano, L., Eichenbaum, M. and Rebelo, S. (2011): When Is the Government Spending Multiplier Large? Journal of Political Economy, 119 (1), 78 – 121.

Coeure, B. (2012): Central banks and the challenges of the zero lower bound. Intervention by Benoıt Cœure, Member of the Executive Board of the ECB, at the ”Meeting on the Financial Crisis”, hosted by the Initiative on Global Markets, at the University of Chicago Booth School of Business, Miami, February 19th 2012, https://www.ecb.europa.eu/press/key/date/2012/html/sp120219.en.html [last download on March 31st 2015].

Corsetti, G., Müller, G. and Meier, A. (2012): What Determines Government Spending Multipliers? IMF Working Papers 12/150, International Monetary Fund.

De Cos, P. and Moral-Benito, E. (2013): Fiscal consolidations and economic growth. Fiscal Studies, 34 (4), 491–515.

De Grauwe, P. (2012): The Governance of a Fragile Eurozone. Australian Economic Review, 45 (3), 255–268.

De Grauwe, P. and Ji, Y. (2013): From Panic-Driven Austerity to Symmetric Macroeconomic Policies in the Eurozone. Journal of Common Market Studies, 51, 31–41.

DeLong, B. and Summers, L. (2012):. Fiscal Policy in a Depressed Economy. Brookings Papers on Economic Activity, 44 (1 (Spring)), 233–297.

European Central Bank (2010): Monthly Bulletin June 2010. ECB publication June 2010, European Central Bank.

Eggertsson, G. and Krugman, P. (2012): Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo Approach. The Quarterly Journal of Economics, 127 (3), 1469–1513.

European Commission (2012a): Alert Mechanism Report 2013. Report from the commission to the european parlia- ment, the council, the european central bank, the europeam economic and social committee, the committee of the regions and the european investment bank, European Commission.

European Commission (2012b): European Economic forecast - Spring 2012. European economy - 1/2012, European Commission.

European Commission (2015): European Economist forecast - Spring 2015. European economy - 2/2015, European Commission.

Fatas, A. and Mihov, I. (2009): Why fiscal stimulus is likely to work. International Finance, 12 (1), 57–73.

Fedelino, A., Ivanova, A. and Horton, M. (2009): Computing Cyclically Adjusted Balances and Automatic Stabilizers. IMF Technical Notes and Manuals November 2009, International Monetary Fund.

Gainsbury, S., Whiffin, A. and Birkett, R. (2011): Financial pain in europe. Financial Times article on October 17th 2011, http://www.ft.com/intl/cms/s/0/feb598a8-f8e8-11e0-a5f7-00144feab49a.html [last download on May 15th 2015].

Gechert, S., Hallett, A. and Rannenberg, A. (2015): Fiscal multipliers in downturns and the effects of Eurozone fiscal consolidation. Center for Economic Policy Research Policy Insight 79, CEPR.

Gechert, S. and Rannenberg, A. (2014): Are Fiscal Multipliers Regime-Dependent? A Meta Regression Analysis. IMK Working Paper 139-2014, IMK at the Hans Boeckler Foundation, Macroeconomic Policy Institute.

Guajardo, J., Leigh, D. and Pescatori, A. (2011): Expansionary Austerity: New International Evidence. IMF Working Papers 11/158, International Monetary Fund.

Guajardo, J., Leigh, D. and Pescatori, A. (2014): Expansionary Austerity? International Evidence. Journal of the European Economic Association, 12 (4), 949–968.

Hemming, R., Mahfouz, S. and Kell, M. (2002): The Effectiveness of Fiscal Policy in Stimulating Economic Activity; A Review of the Literature. IMF Working Papers No. 02/208, International Monetary Fund.

Herndon, T., Ash, M. and Pollin, R. (2014): Does High Public Debt Consistently Stifle Economic Growth? A Critique of Reinhart and Rogoff. Cambridge Journal of Economics, 38 (2), 257–79.

Holland, D. and Portes, J. (2012): Self-defeating austerity? National institute economic review, 222, F4–F10. Ilzetzki, E., Mendoza, E. G. and Vé gh, C. A. (2013). How big (small?) are fiscal multipliers? Journal of Monetary Economics, 60 (2), 239–254.

in ’t Veld, J. (2013): Fiscal consolidations and spillovers in the Euro area periphery and core. European Economy - Economic Papers 506, Directorate General Economic and Financial Affairs (DG ECFIN), European Commis- sion.

International Monetary Fund (2011): Tensions from the Two-Speed Recovery: Unemployment, Commodities, and Cap- ital Flows. World Economic Outlook April 2011 Chapter 3, 89-124, International Monetary Fund.

International Monetary Fund (2015): Uneven Growth: Short- and Long-Term Factors. World economic outlook april 2015, International Mon- etary Fund.

Jorda, O. and Taylor, A. (2013): The Time for Austerity: Estimating the Average Treatment Effect of Fiscal Policy. NBER Working Papers No. 19414, National Bureau of Economic Research.

Koo, R. (2013): Balance sheet recession as the ”Other-Half” of macroeconomics. European Journal of Economics and Economic Policies: Intervention, 10 (2), 136–157.

Koo, R. (2015): The Escape From Balance Sheet Recession and the QE Trap. John Wiley and Sons: Singapore.

Lane, P. and Milesi-Ferretti, G. (2007): The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004. Journal of International Economics, 73 (2), 223–250

Mastromatteo, G. and Rossi, S. (2015): The economics of deflation in the euro area: a critique of fiscal austerity. Review of Keynesian Economics, 3 (3), 336–350.

Mian, A., Rao, K. and Sufi, A. (2013): Household balance sheets, consumption, and the economic slump. The Quarterly Journal of Economics, 4, 1687–1726.

Mourre, G., Astarita, C. and Princen, S. (2014): Adjusting the budget balance for the business cycle: the EU methodology. European Economy - Economic Papers 536, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

OECD (2012): Restoring Public Finances, 2012 Update. OECD Publication November 2012, OECD.

Qazizada, W. and Stockhammer, E. (2014): Government spending multipliers in contraction and expansion. Post Keynesian Economics Study Group Working Paper 1404, Post Keynesian Economics Study Group.

Rannenberg, A., Schoder, C. and Strasky, J. (2015): The macroeconomic effects of the Euro Area's fiscal consolidation 2011-2013: A Simulation-based approach. Central Bank of Ireland Research Technical Paper 03/RT/2015.

Reinhart, C. and Rogoff, K.(2010): Growth in a Time of Debt. NBER Working Papers 15639, National Bureau of Economic Research.

Romer, C. and Romer, D. (2010): The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks. American Economic Review, American Economic Association, 100 (3), 763–801.

Yang, W., Fidrmuc, J. and Ghosh, S. (2013): Macroeconomic Effects of Fiscal Adjustment: A Tale of two Approaches. CESifo Working Paper Series 4401, CESifo Group Munich.