Long-term effects of stimulus packages and austerity measures in Europe

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In the aftermath of the Financial Crisis, growth forecast by key institutions assumed a quick recovery to previous trends. However, forecasts were revised downwards. The revisions concerned not only GDP but also potential GDP forecasts. We analyze whether there are, against conventional wisdom, positive (negative) long-term effects of stimulus packages (austerity measures) on potential output growth. Many studies have convincingly shown the negative short-term effects of consolidation, while the long-term effects remain more uncertain. The contribution of our paper is twofold. First, we follow and extend the approach of Fatás and Summers (2016) in order to check the robustness of their results. They examine the effects of discretionary fiscal policy after the crisis on potential GDP. We use the discretionary fiscal effort figures outlined by the European Commission (EC) in determining the fiscal stance, and we employ a battery of additional control variables in order to avoid biased results. Second, we use our results to conduct counterfactual simulations for the German economy that calculate the growth path Germany would have entered if the government would have abstained from the stimulus package in response to the financial crisis and followed a more contractionary approach similar to the rest of the Euro Area.

Keywords: Fiscal Consolidation; Fiscal Multipliers; Forecast Errors; Hysteresis

JEL classification: E62, H68

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Introduction

Output in many European countries is still below pre-crisis potential. The recession takes considerably longer compared to past downturns and recovery is long overdue. Forecasts by the EC or the IMF in the aftermath of the crisis assumed a quick recovery to previous trends. Contrary to expectations, major parts of the Euro Area even entered a second crisis and GDP again kept on being low afterwards. The forecasts by key institutions were revised downwards several times. The revisions concerned not only GDP but also potential GDP forecasts.

The persistently increasing systematic forecast errors call into question the structure and assumptions of the forecasting models employed by the institutions. Clearly, the financial crisis and the subsequent crisis of the Euro Area were extreme events, whose dynamics and channels of impact might be quite different from more tranquil times. Plausible influential factors that unexpectedly drove the severity of the crisis could be:

- Fragility of the financial system
- Private sector deleveraging
- Increased uncertainty of private agents
- Productivity slowdown
- Current account imbalances
- Monetary policy constraints
- Sustainability of public finances
- Discretionary fiscal policy of the respective country and also of its trading partners

In the present paper, we focus on the last issue. The hypothesis is that the post-2009-shift towards fiscal consolidation had an unexpectedly substantial negative and persistent impact on GDP and potential output, in particular in the EU and the Euro Area, which could be a major explanatory factor for the second recessionary dip that followed in due course and the persistent gap to pre-crisis GDP trend and unemployment levels. This is equivalent to an underestimation of fiscal multipliers and their persistence.

Before the crisis, the general consensus within the economic mainstream was that markets are inherently stable and deviations from equilibrium are transitory. Fiscal policy was downgraded to the provision of the institutional playing field and integrated automatic stabilizers were meant to alleviate economic fluctuations. Monetary policy was seen as in charge of effective discretionary stabilization because it dominates fiscal policy, which was assumed to have long decision and implementation lags, to be less effective, debt biased and distortionary in the longer run (Furman 2016, Born et al. 2015). Nonetheless, the international economic mainstream agreed that if fiscal interaction is needed, it should be timely, temporary and targeted (Elmendorf and Furman 2008). Thus, in response to the crisis many European countries, like Germany for instance, implemented stimulus packages to support aggregate demand. However, policymakers quickly put brakes on fiscal policy with reference to markets contesting public debt sustainability. Indeed, official statements by leading policy makers at the time seemed to assume a strong confidence effect of fiscal consolidation that would imply expansionary effects, i.e. negative multipliers.[2] The fiscal stance in the peripheral countries was early forced towards consolidation in the midst of a phase of soaring unemployment.

[2] "My understanding is that an overwhelming majority of industrial countries are now in those uncharted waters, where confidence is potentially at stake. Consolidation is a must in such circumstances." (Trichet 2010)
"All the eurozone governments need to demonstrate convincingly their own commitment to fiscal consolidation so as to restore the confidence of markets, not to speak of their own citizens." (Schäuble 2010)

While many studies have convincingly shown the negative short-term effects of austerity (Gechert 2015), the long-term effects remain more controversial. The permanent effects of fiscal policy on output, however, are much more important in terms of welfare and public debt sustainability. Fatás and Summers (2016) (FS hereafter) use forecast errors of (potential) output to create a counterfactual of expected policy impact. They then regress the forecast error on planned consolidation in order to test whether the impact of consolidation was underestimated, both in terms of its strength and persistence. They find a strong correlation between consolidation attempts and potential output revisions. The approach by FS follows the influential contribution by Blanchard and Leigh (2013, BL henceforth), who evaluate the short-run fiscal multiplier by regressing the forecast error of real GDP on fiscal consolidation for a broad sample of countries. They find that forecasters systematically underestimated the multiplier effect of discretionary fiscal policy during the crisis.

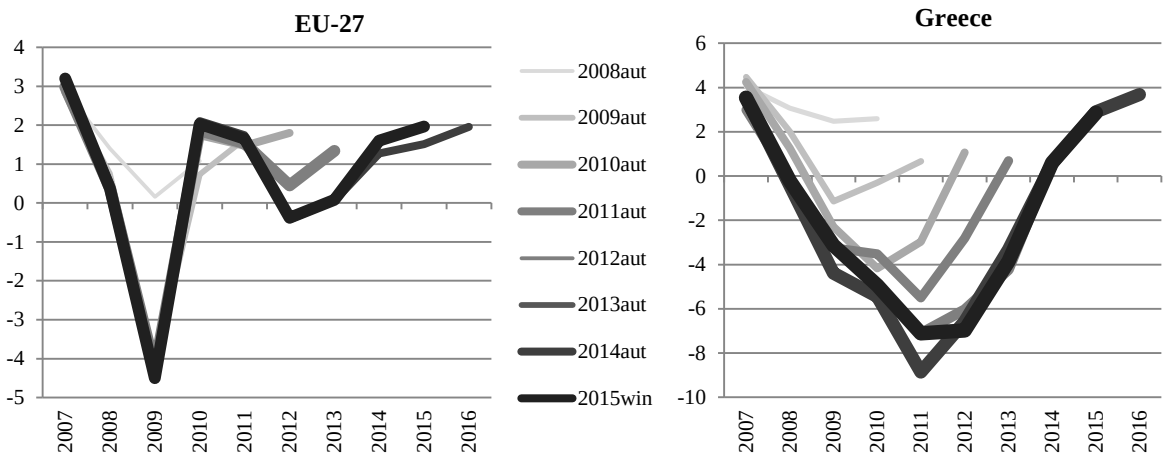
In our paper, we follow and extend the approaches of BL and FS. As opposed to them, we use the discretionary fiscal effort outlined by the EC (2013), a bottom-up method superior to structural balance figures in determining the fiscal stance. Furthermore, we employ a battery of additional control variables in order to avoid biased results. High and persistent effects of fiscal policy on potential output would profoundly question fiscal consolidation as an effective instrument to achieve debt sustainability. Furthermore, we use our results to conduct a counterfactual simulation for Germany that calculates the growth path Germany would have entered if the government would have abstained from the stimulus package in response to the financial crisis and followed an austerity program similar to the rest of the Euro Area.

The remainder of the paper is organized as follows. In section 2 we look on post crisis output and its forecasts in Europe. Section 3 undertakes the econometric task of estimating the long-term effects of fiscal policy on potential output. We extend the methodology by FS and check for further robustness of their results. Lastly we conduct counterfactual simulations for the German economy using our results in section 4. Section 5 concludes.

Post-crisis evaluation of output

Figure 1 shows EU-27 and Greek GDP growth for different vintages of the European Commission's Ameco database from autumn 2008 until the latest actual data of winter 2015. For the aggregate EU-27 level, forecasters have underestimated GDP growth during the financial crisis. The recovery in 2010 was quite strong on impact and was even slightly underestimated. However, only one year later when the second recession started in 2011, GDP growth was again overestimated in several vintages.

Figure 1: Vintages of GDP growth rate forecasts for the EU-27 and Greece, in %, 2007-2016

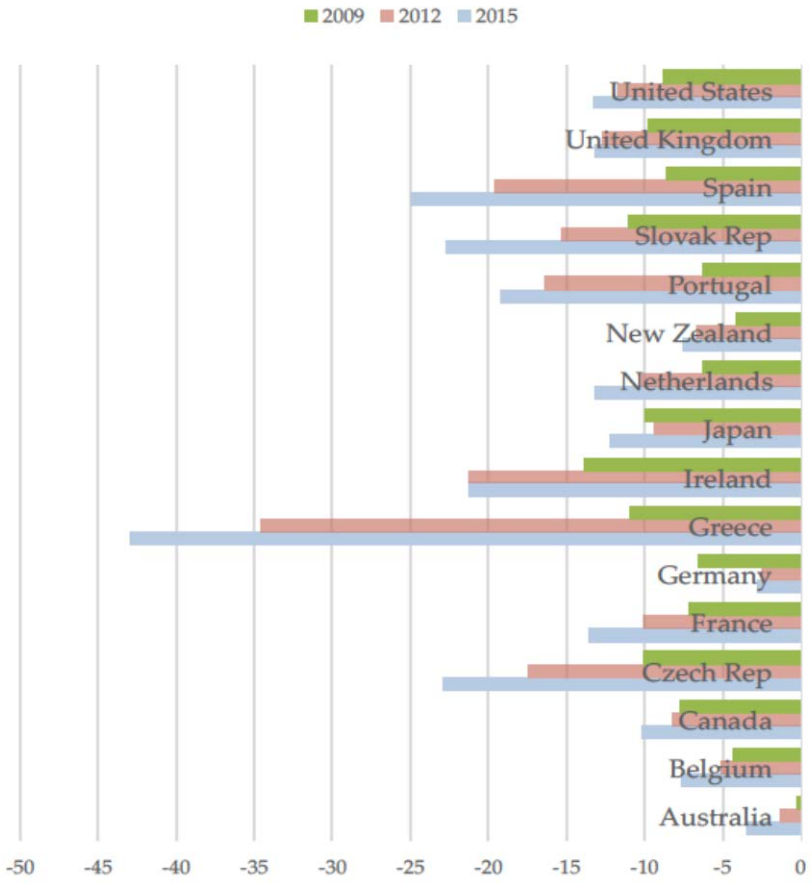


Source: Ameco, Firstrun database "A dataset of fiscal variables", own illustration.

In the more extreme case of Greece, Figure 1(b) shows repeated huge forecast errors from autumn 2008 until autumn 2012. Hence, GDP growth was systematically overestimated[3].

One reason for a continuous overestimation of GDP growth could be that the persistence of the crisis has been underestimated. FS have analyzed how persistent the forecast errors of the financial crisis were for advanced countries. Figure 2 shows forecast errors of real GDP where the latest actual values of the IMF WEO database are compared with pre-crisis forecasts for the years 2009, 2012 and 2015 of the WEO April 2007[4]. In many advanced countries, the financial crisis was very persistent. In some cases GDP has not even yet returned to pre-crisis levels. The forecast error even became bigger in the majority of countries. Those countries which were hit the most by the crisis, hence with a large forecast error in 2009, are also the ones with the largest errors in subsequent years. Regressions of the respective forecast errors of the subsequent years on the forecast error of 2009 by FS (2016; 10) show for every year a significant positive correlation and the coefficient is increasing over time. Hence, the crisis has left a persistent mark in the GDP data of the current information set.

Figure 2: Forecast error real GDP (latest figures compared to WEO April 2007) for 2009, 2012, and 2015



Source: Fatás and Summers (2016; 9)

[3] Figure A1 in the appendix shows the exercise for other selected European countries and the picture is similar. The errors were more severe and systemic in the peripheral countries and less so in the core.

[4] Officially the IMF publishes two year forecasts, but FS had access to internal five year forecast values. The values for 2015 are calculated by extrapolating average GDP growth rates between 2000 and 2012.

What are the consequences of this persistency of real GDP growth for potential output? Figure 3 shows potential output values and forecasts of the EC. Potential output growth rates for the EU-27 average have been considerably revised downwards and are now only slightly above one percent. In Greece the situation has been again much more severe, with much stronger downward revisions and a 3 % negative growth rate at the current stage.

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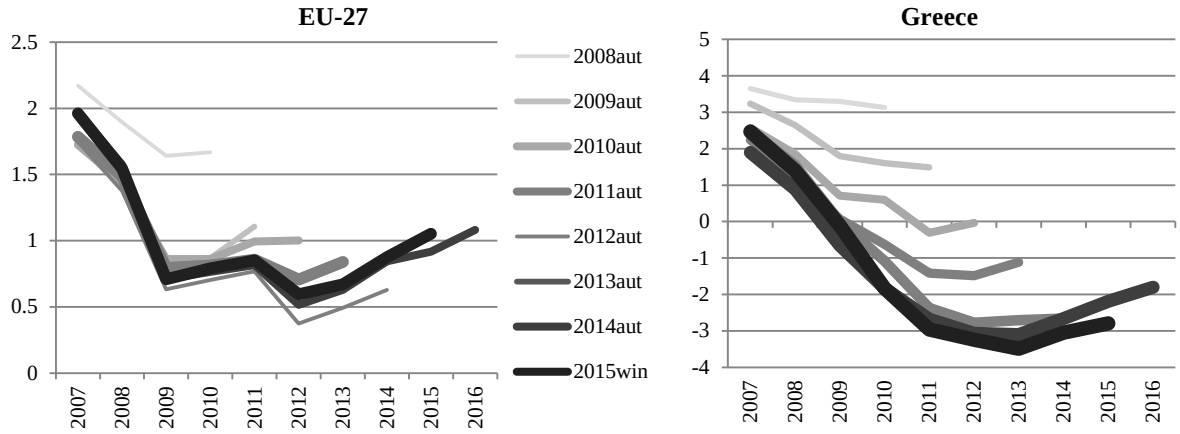
Figure 3: Vintages of potential GDP growth rate forecasts for the EU-27 and Greece, in %, 2007-2016



Source: Ameco, Firstrun database "A dataset of fiscal variables", own illustration.

Table 1: Persistence of forecast errors potential GDP in Europe and the Euro Area

	Europe			Euro		
	2012	2015	2021	2012	2015	2021
Forecast Error	1.136***	1.482***	1.851***	1.802***	2.207**	2.760**
Real GDP 2009	(0.380)	(0.466)	(0.556)	(0.575)	(0.838)	(1.017)
Constant	-1.471	-2.646	-4.603	3.446	2.120	0.759
	(2.894)	(3.368)	(3.890)	(4.069)	(6.089)	(7.650)
Observations	19	19	19	13	13	13
R-squared	0.390	0.361	0.336	0.480	0.400	0.388

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Fatás and Summers (2016; 14)

Figure A2 in the appendix does the exercise for other European countries. Apart from Germany, where potential output is now slightly higher than before the crisis, in all the other major European countries potential output decreased considerably and is now lower than before the crisis. Also the revision process has been severe. Potential output estimations were revised downwards for its forecasts and for past values in most of the European countries, apart from Spain where potential output was forecasted to drop to zero in 2009 and since then has been step per step revised upwards. Again, FS systematically analyze the effect of the forecast error of real GDP in 2009 on later forecast

errors of potential GDP by a regression analysis in order to check whether the persistent GDP effect became permanent (Table 1). The coefficients are above one, increasing over time and highly significant. In the Euro Area they exceed 2. In other words, the revisions to GDP became permanent.

Much of the empirical literature shows that GDP is path-dependent and therefore economic shocks such as a financial crisis are most likely persistent in future GDP developments.[5] The question with persistency, however, is whether we can assume that a long-run technological shock or cyclical fluctuations (hysteresis) drive the deviations. One way to check for hysteresis is to estimate the effect the fiscal consolidation policies in the aftermath of the crisis had on forecast errors of potential output.

Long-term effects of fiscal policy

Underestimation of fiscal multipliers

As laid out above, in this section we test as to whether an underestimation of the size and persistence of the fiscal multipliers of the turn to consolidation in 2010 can be robustly held responsible for the persistent mis-prediction of GDP and potential growth. We build on the contributions by BL and FS. BL regress the forecast error (*fe*) of GDP for the years of 2010 (=*t*) and 2011 for country *i* on forecasted (*f*) fiscal consolidation for the very same period:

$$\Delta Y^{fe}_{i,t:t+1} = \alpha + \beta\, \Delta F^{f}_{i,t:t+1|t} + \varepsilon_{i,t:t+1|t} \tag{1}$$

where

$$\Delta Y^{fe}_{i,t:t+1} \equiv \Delta Y_{i,t:t+1} - \Delta Y^{f}_{i,t:t+1|t} \tag{2}$$

is the forecast error of GDP as given by the difference between current-vintage figures of the cumulated change in GDP over 2010 and 2011 and its forecast in the vintage of spring 2010. Moreover, in our replication of the BL results, planned fiscal consolidation $\Delta F^{f}_{i,t:t+1|t}$ is the cumulated change in the structural balance (*SB*) over 2010 and 2011 (as percentage points of potential output) as forecasted in the vintage of spring 2010. Changes in the structural balance are usually interpreted as a proxy for the fiscal stance. It is derived from the actual budget balance by subtracting a cyclical component, based on assumptions of automatic stabilizers, and one-off events.

The rationale is the following: Using the forecast error of GDP exploits the deviation of the actual situation from a counterfactual scenario given by the expectations of experts, based on their information set, assumptions and model of the economy at the time, where channels work as expected. Regressing this forecast error on planned fiscal consolidation reveals, as to whether the impact of these consolidation plans was over- or underestimated. Under rational expectations, there should not be a systematic error and β thus should not significantly deviate from zero. The multiplier effect would be as expected. BL point to some evidence that official forecasts by the IMF or the European Commission implicitly assume a multiplier effect of 0.5 for changes in the structural balance. If $\beta < 0$, consolidation plans would have had a stronger negative impact on GDP growth than expected, i.e. an underestimation of the fiscal multiplier effect, and vice versa.

In the following, we will replicate the exercise of BL using updated and extended data. In our baseline, we stick to IMF WEO forecast data for GDP and the structural balance, and use the current

[5] FS (2016; 14 ff.) provide an extensive literature review on the persistence of output shocks.

vintage of spring 2016 for the calculation of forecast errors vis-à-vis the relevant spring 2010 forecast.[6] We focus on European countries, but due to missing data end up with 22 observations.[7]

Table 2(a): Underestimation of fiscal multipliers (SB)

Endog: forecast error of GDP 2010-11						
OLS	(1) SB	(2) G+T	(3) noprog	(4) ADVA	(5) LT	(6) Euro
β	-1.341**		-0.9415***	-0.632	-1.326**	-1.534**
	(0.5303)		(0.2428)	(0.6138)	(0.5464)	(0.5781)
β^G		-1.699***				
		(0.4769)				
β^T		-0.9674**				
		(0.3707)				
const	1.150***	1.223***	1.101***	0.919*	0.799**	1.340***
	(0.4016)	(0.3603)	(0.3742)	(0.4932)	(0.3312)	(0.3926)
n	22	22	19	31	21	14
Adj. R^2	0.4754	0.6024	0.3307	0.0749	0.5064	0.5763

Column (1) of Table 2(a) shows the result of the replication. The original finding of BL, a significant underestimation of fiscal multipliers by about 1.1, is even reinforced with $\beta \approx -1.3$. Is the latter effect driven by the assessment of spending or taxation? In line with BL, in column (2) we split the structural balance into spending (*G*) and revenues (*T*), where *SB*=*T*-*G*. In terms of cyclical adjustment, we assume that government spending is acyclical and use its actual value *G*, while calculating cyclical adjusted revenues as the residual *T*=*SB*+*G*. It turns out that the negative impact of government spending cuts was more strongly underestimated than the one from tax hikes. This is consistent with evidence from the meta regression of Gechert and Rannenberg (2014) who show that in particular spending multipliers increase during downturns.

A natural objection to the validity of the effects in columns (1) and (2) is the small sample size and the likely dependence on influential outliers. In order to test this, in column (3) we exclude those countries in our sample that were under a bailout program (Greece, Ireland, Portugal). The effect is somewhat muted but still economically and statistically highly significant. Column (4) shows the results for a widened sample of advanced countries. Interestingly, β is not statistically significant any more, which might point to idiosyncratic effects for European countries. However, in column (5) we focus on advanced countries that were arguably in a liquidity trap during the sample period.[8] The coefficient is close to the baseline estimate, which might be interpreted in the way that underestimation of the impact of austerity was not specific to European countries, but generally to those in an exceptional macroeconomic regime. Narrowing the sample to Euro Area countries in column (6) even slightly increases the effects.

[6] BL compare the IMF autumn 2012 forecast to the spring 2010 forecast.

[7] The sample comprises Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Malta, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

[8] In line with BL, we define a country being in a liquidity trap when the central bank's main nominal policy interest rate reached 1 percent or less during 2010–11. The sample comprises Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, Spain, Switzerland, United Kingdom and the United States.

Some caveats are in order: It would not be useful to look at actual consolidation instead of planned consolidation as the former would not identify the extent of under- or overestimation of multiplier effects. Under such a specification, we could not disentangle, whether the size of multipliers or the size of the consolidation effort was mis-predicted. Moreover, actual consolidation could be endogenous to events that happened during the time period of interest. In a similar vein, using the forecast error of fiscal consolidation (i.e. the difference between actual and planned consolidation) instead would test the impact of mis-prediction of the size of the consolidation. Nonetheless, it might be useful to control for this factor. In general, equation (1) is rather stylized and there are likely omitted variable biases stemming from the other potential influences listed above. We therefore conduct several robustness tests with proxies for these potential influences in Appendix B, Table B2.

Table 2(b): Underestimation of fiscal multipliers (DFE)

Endog: forecast error of GDP 2010-11						
OLS	(1) DFE	(2) G+T	(3) G	(4) T	(5) noprog	(6) Euro
β	-0.861***				-0.9344*	-0.875***
	(0.055)				(0.4977)	(0.05232)
β^G		-0.9277	-1.906***			
		(0.7612)	(0.2094)			
β^T		-0.8116		-1.462***		
		(0.5663)		(0.1221)		
const	2.750***	2.761***	2.840***	2.552***	2.700***	2.835***
	(0.4888)	(0.5161)	(0.5528)	(0.5219)	(0.713)	(0.5728)
n	21	21	21	21	18	16
Adj. R^2	0.6982	0.7135	0.6807	0.6885	0.1306	0.7508

In Table 2(b), we challenge the use of the structural balance as a relevant proxy for the fiscal stance. The "top-down" identification of fiscal shocks via subtracting automatic stabilizer induced changes in the balance and one-off events has been criticized in the literature for being a rather fuzzy measure of the fiscal stance during exceptional times when the assumptions on automatic stabilizers might not be valid (Carnot and De Castro 2015). Thus we exchange the structural balance by the so-called discretionary fiscal effort (DFE), which is a narrative, or "bottom-up" measure of the fiscal stance based on law changes with a substantial financial impact. The series is available in AMECO, but only at its current vintage. As the data are usually based on information from drafts of the respective law, i.e. before execution, the 2010 and 2011 data of the current available vintage should mainly reflect planned amounts in the respective year and should thus not face the endogeneity problems of current structural balance data as described above.

Using the DFE, the qualitative result in columns (1), (5) and (6), are confirmed, even though the effect shrinks somewhat. Separating expenditures and revenues, which are directly available for the DFE, in column (2) gives consistent, though insignificant results; but the wide standard errors may not be trusted due to multicollinearity as the F statistic (=115.39) is extraordinarily large and, as shown in columns (3) and (4), including G and T separately, strongly inflates the coefficients.

In general, we can reconfirm the underestimation of fiscal multipliers found by BL using different datasets and proxies for the fiscal stance in a range of 0.8 to 1.3. Together with the well documented assumption that IMF forecasters implicitly used a multiplier effect of around 0.5, actual multipliers for the crisis period under investigation should lie in a range of 1.3 to 1.8.

Persistence of fiscal multipliers

FS extend the framework of BL and analyze the persistence of the decline in GDP growth that might be explained by fiscal consolidation. They do so by examining 5-year horizon forecast errors of potential output, as given by unpublished vintages of the IMF WEO.[9] They then establish a TSLS regression where the first stage replicates the BL exercise of Table 2 column (1). The fitted values of the first stage - interpreted as the unexpected GDP decline due to a stronger than expected impact of fiscal consolidation - enter the second stage, where the forecast error of potential output is regressed on these fitted values:

$$\Delta \mathrm{Pot} Y^{fe}_{i,t:t+5} = \gamma + \delta\, \Delta \hat{Y}^{fe}_{i,t:t+1} + \theta_{i,t:t+1|t} \quad (3)$$

$$\Delta \hat{Y}^{fe}_{i,t:t+1} = \alpha + \beta\, \Delta F^{f}_{i,t:t+1|t} \quad (4)$$

The relevant coefficient δ can be interpreted as a measure of persistence of changes in output that are caused by changes in the fiscal stance. Table 3(a) shows the second stage results when using the change in the structural balance, including first stage F statistics. According to the latter, the various fiscal stance proxies are weak instruments for the GDP loss, but the values are not too far from an F statistic of 10. Column (1) replicates the first column of table 8 in FS. The factor of persistence is close to one, which could be interpreted such that the GDP losses caused by fiscal consolidation became permanent, at least given the currently available information set. Of course, potential output follows persistent changes in GDP quite closely and might thus not be a perfect metric to investigate structural changes in output (Gechert et al. 2015).[10] Indeed, the results are quite similar when using the 5-year forecast error of GDP instead of potential output. However, a permanent effect on GDP after 5 years still runs counter to conventional assessments of the persistence of demand shocks and is much more in line with theories and evidence of hysteresis (DeLong and Summers 2012, Fatás 2000, Logeay and Tober 2006, Sturn 2014).

Table 3(a): Persistence of fiscal multipliers (SB)

Endog: forecast error of potential GDP 2010-15						
TSLS	(1) SB	(2) G+T	(3) noprog	(4) ADVA	(5) LT	(6) Euro
δ	1.005**	1.046***	1.296**	1.215*	1.059***	1.065***
	(0.4018)	(0.2891)	(0.544)	(0.6249)	(0.4036)	(0.3866)
const	-3.521***	-3.537***	-4.016***	-3.571**	-3.334***	-3.548***
	(0.8686)	(0.8195)	(0.8606)	(0.7962)	(0.8531)	(1.114)
n	22	22	19	31	21	14
Adj. R^2	0.5813	0.5813	0.3346	0.4588	0.6055	0.6866
1st stage F	6.39	6.36	15.04	1.061	5.886	7.044

Again, the results of the TSLS estimation are robust to the changes already discussed for the first stage in Table 2. Splitting the structural balance in spending and revenue components only minimally changes the estimated persistence (column (2)). So do samples, based on liquidity trap countries and Euro Area countries (columns (5) and (6)). Looking at a sample of advanced countries (column (4))

[9] We are grateful to Antonio Fatás for providing us with the WEO data and files for replication of the FS results.
[10] For a critical review see the conference contributions at http://ec.europa.eu/economy_finance/events/2015/20150928_workshop/index_en.htm .

weakens the statistical significance of δ even though the slope even slightly increases. However, the instrumentation is very weak. Excluding program countries reinforces the persistence (column (3)).

Table 3(b): Persistence of fiscal multipliers (DFE)

Endog: forecast error of potential GDP 2010-15				
TSLS	(1) DFE	(2) G+T	(3) noprog	(4) Euro
δ	1.236***	1.273***	1.319*	1.280***
	(0.07193)	(0.09557)	(0.6888)	(0.08599)
const	-3.914***	-3.298***	-4.459***	-3.303***
	(0.7453)	(0.8774)	(1.523)	(0.8715)
n	21	16	18	16
Adj. R^2	0.6807	0.7303	0.6109	0.7303
1st stage F	244.365	115.385	3.525	279.429

Persistence is even stronger when focusing on TSLS estimates instrumented by the DFE measure of fiscal stance in Table 3(b). Moreover, the instrument seems quite strong judging from the first stage F stats. In general, while the estimated multiplier effect is somewhat lower on impact when using the DFE, it is super-persistent and increases over the 5-year horizon by a factor of 1.25, or 1.05 per year.

For a battery of further robustness tests we refer the reader to Appendix B. In general, controlling for other influential channels and estimation approaches we find that the effects are quite robust, but more so for the DFE measure of the fiscal stance.

Counterfactual simulations for the German economy

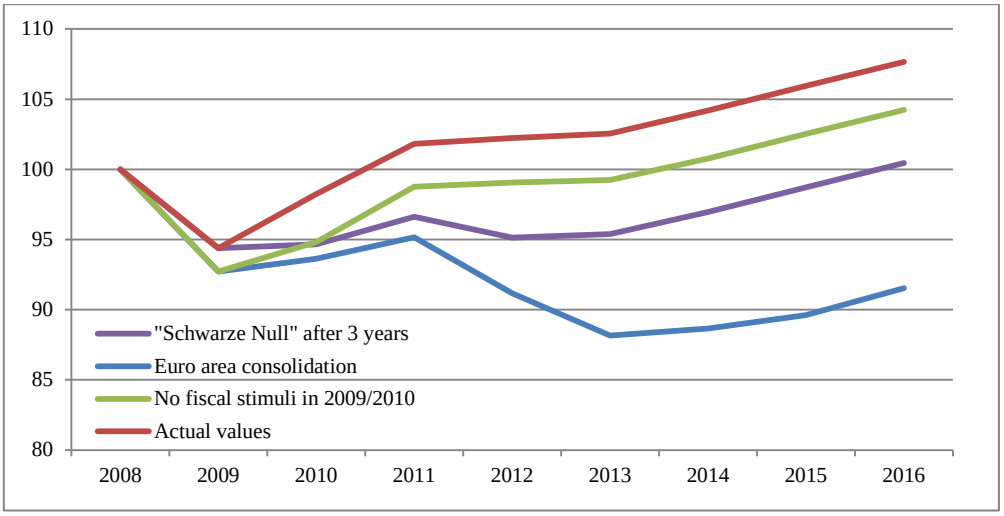
The estimations above have highlighted the persistent effects of fiscal policies in recessionary times and a strong multiplier effect. Consequently fiscal stimuli as well as austerity have major consequences for growth. In this section we apply our results on the long-term effects of fiscal policy on a selected case study. Therefore we run counterfactual multiplier-based simulations of the German economy by manipulating their expansionary fiscal strategy during the crisis in different scenarios. We use the calculations to simulate how certain key fiscal and macroeconomic indicators would have developed under a different fiscal stance.

Table 4: Exogenous assumptions of counterfactual simulation

Independent of scenario:									
Year	t_0	t_1	t_2	t_3	t_4	t_5	t_6	t_7	
Persistence factor									
in recessionary time	1	1	1	1	1	1	1	1	
in normal time	1	0.67	0.33	0	0	0	0	0	
Multiplier									
in recessionary time	1.8								
in normal time	0.5								
Budget semi-elasticity	0.51								
Scenario specific:	Change of fiscal stance compared to actual value (DFE), bn. Euro								Deflator
	2009	2010	2011	2012	2013	2014	2015	2016	
No fiscal stimuli in 2009/2010	24.2	25.7	-19.1	0.0	0.0	0.0	0.0	0.0	DE-Deflator
Euro Area consolidation	24.2	43.0	16.4	62.3	46.6	15.1	11.5	-2.8	Euro Area deflator
"Schwarze Null" after 3 years	0.0	52.3	17.0	26.5	0.0	0.0	0.0	0.0	Euro Area deflator

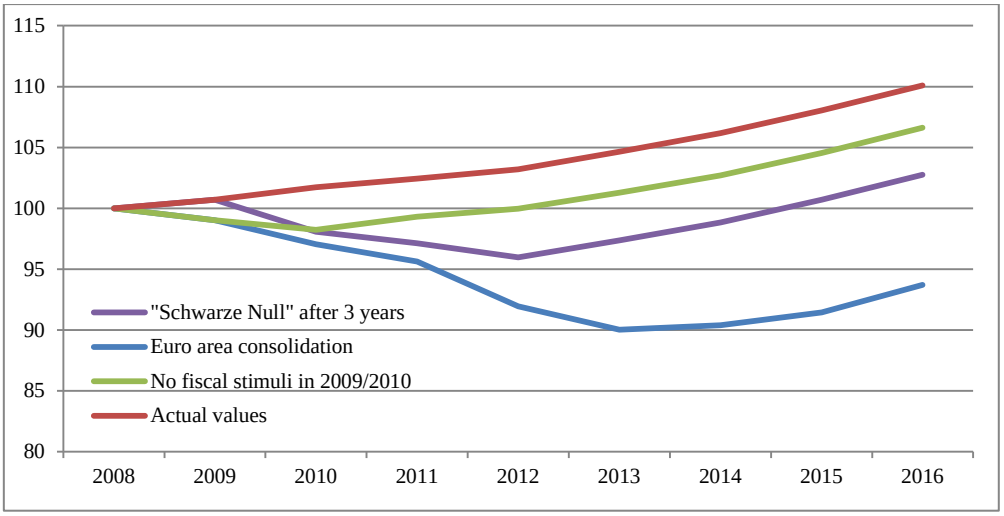
Table 4 summarizes the main exogenous factors for each scenario. The actual values serve as the baseline. We extract the information for the fiscal stance from the discretionary fiscal effort series of the EC[11].

Figure 4: Counterfactual simulation – Real GDP index, 2008=100, 2008-2016



Source: Ameco, own calculations.

Figure 5: Counterfactual simulation – Potential GDP index, 2008=100, 2008-2016



Source: Ameco, own calculations.

In the "No fiscal stimuli"-scenario, we assume that the expansionary fiscal stance in the baseline is set to zero. Hence, in 2009 and 2010 we have contractionary impulses of similar size. It is important to note that the packages were partly temporary; therefore we have to include an expansionary impulse in 2011. The procedure in the "Euro Area consolidation"-scenario starts off identical in 2009 without fiscal stimulus, but from 2010 on we add further consolidation efforts similar to the size of the Euro

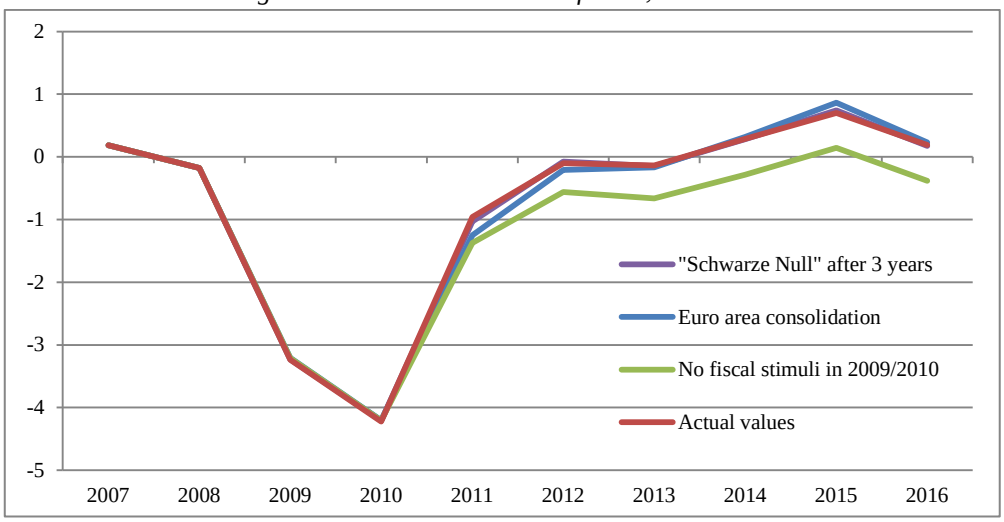
[11] The Joint Economic Forecast Group (Projektgruppe Gemeinschaftsdiagnose, 2009 and 2010) as well as IWH (2015) also published estimates for the stimulus packages 2009 and 2010. These values are very similar to the DFE database, but even slightly higher. Hence, we decided for conservative assumptions regarding the size of the stimulus.

Area on top. Lastly, we integrate a scenario, where there is a fiscal stimulus in 2009, but from 2010 the government decides to consolidate the at that time given fiscal deficit symmetrically within a three year timespan ("Schwarze Null"-scenario).

The persistence factor and the fiscal multiplier are assumed to be regime-dependent like the estimation in section 3 has shown. Therefore, in absence of the stimulus packages the expansionary impulse in 2011 (restrictive impulse in the baseline) has a lower multiplier and a diminishing impact due to decreasing persistence. This treatment particularly influences the fiscal balance (Figure 6). While in the baseline scenario the economic stimulus packages are self-financing through the GDP effect, resulting in a comparatively painless consolidation path from 2011 on, this is not the case in the absence of the stimulus packages. The omission of the stimulus creates a better financial balance, but a lower GDP. The expansive impulse in the simulation is, however, less effective and persistent. As a result, the financial balance in the first scenario remains below the actual level. The debt-to-GDP ratio is correspondingly higher (Figure 7).

In the Euro Area consolidation scenario we add the restrictive impulse of the euro Area, starting from 2010, on top of the first scenario. Obviously, this creates enormous output growth losses and self-defeating effects in terms of debt-to-GDP ratios. As a result of the consolidation efforts and the decreasing persistence, the financial balance improves very slightly over time compared to the baseline, but this understandably comes with enormous losses in output. In the last scenario, it is assumed that the federal government will continue to provide its expansive stimulus in 2009, but make a policy U-turn in 2010. Due to the increased deficit in 2009, the restrictive impulse in 2010 has to be higher than in the other scenarios. Hence, the U-turn puts a break on the recovery. Already in 2010, the output loss is as high as in the scenario with no stimulus packages. The fiscal balance is improving compared to the first scenario; however, it is alarming that there is no improvement compared to the baseline. Accordingly, the debt ratio settles between the other two counterfactual scenarios.

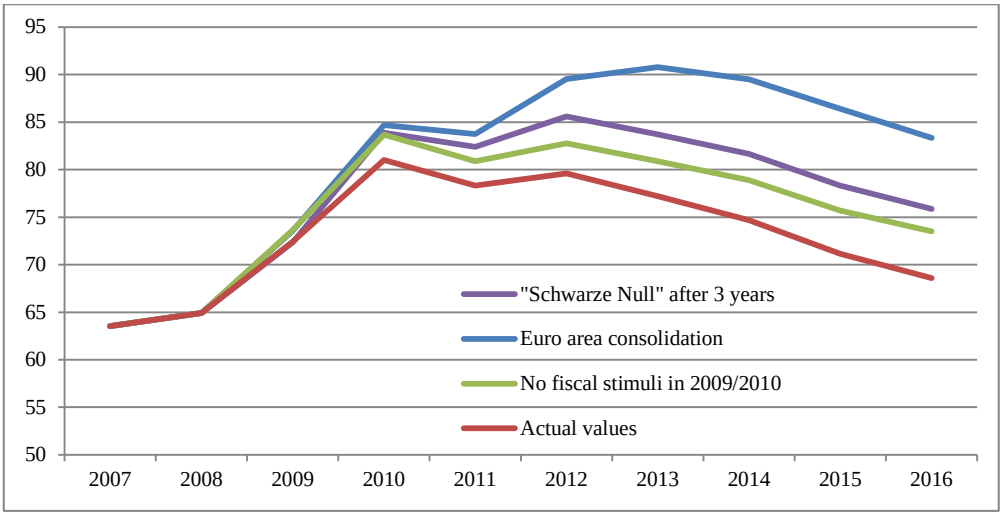
Figure 6: Fiscal balance in % of GDP, 2007-2016



Source: Ameco, own calculations.

Again, the stimulus packages have proven to be very efficient and self-financing. In the absence of stimulus, both the budget balance and GDP would have developed less favorable. In the other two scenarios, there would not have been much improvement of the budget balance, while at the same time the (potential) output losses are severe. Consequently, in all scenarios, the debt-to-GDP ratio would have developed unfavorable compared to what has actually happened with fiscal stimulus in 2009 and 2010.

Figure 7: Public debt level in % of GDP, 2007-2016



Source: Ameco, own calculations.

Concluding remarks

This paper makes two contributions. First we investigate, in the tradition of Blanchard and Leigh (2013) and Fatás and Summers (2016) as to whether the size and persistence of fiscal multipliers was underestimated for the austerity measures that were implemented in Europe after 2009. We can replicate and even reinforce the results for a different dataset, a different measure of structural fiscal consolidation and for a battery of robustness tests. As opposed to conventional wisdom before the crisis, we robustly find that multipliers were high, and, most interestingly, had a permanent effect. That is, the turn to belt tightening was badly timed and therefore much more costly in terms of long-term output loss than expected and necessary.

Second, based on these estimates, we conduct a counterfactual simulation for Germany, which arguably did well during the financial crisis and had a neutral to slightly expansive fiscal stance thereafter. We quantify the impact of several more contractive scenarios and show that the losses to GDP and potential output would have been huge and persistent. Moreover, debt sustainability as measured by public debt-to-GDP ratios would be even weakened. The analysis shows that Germany actually did not follow the Swabian housewife policies, which were forced on many of its European partners, and luckily so.

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Appendix A

Figure A1: Vintages of GDP growth rate forecasts for selected European countries, in %, 2007-2016

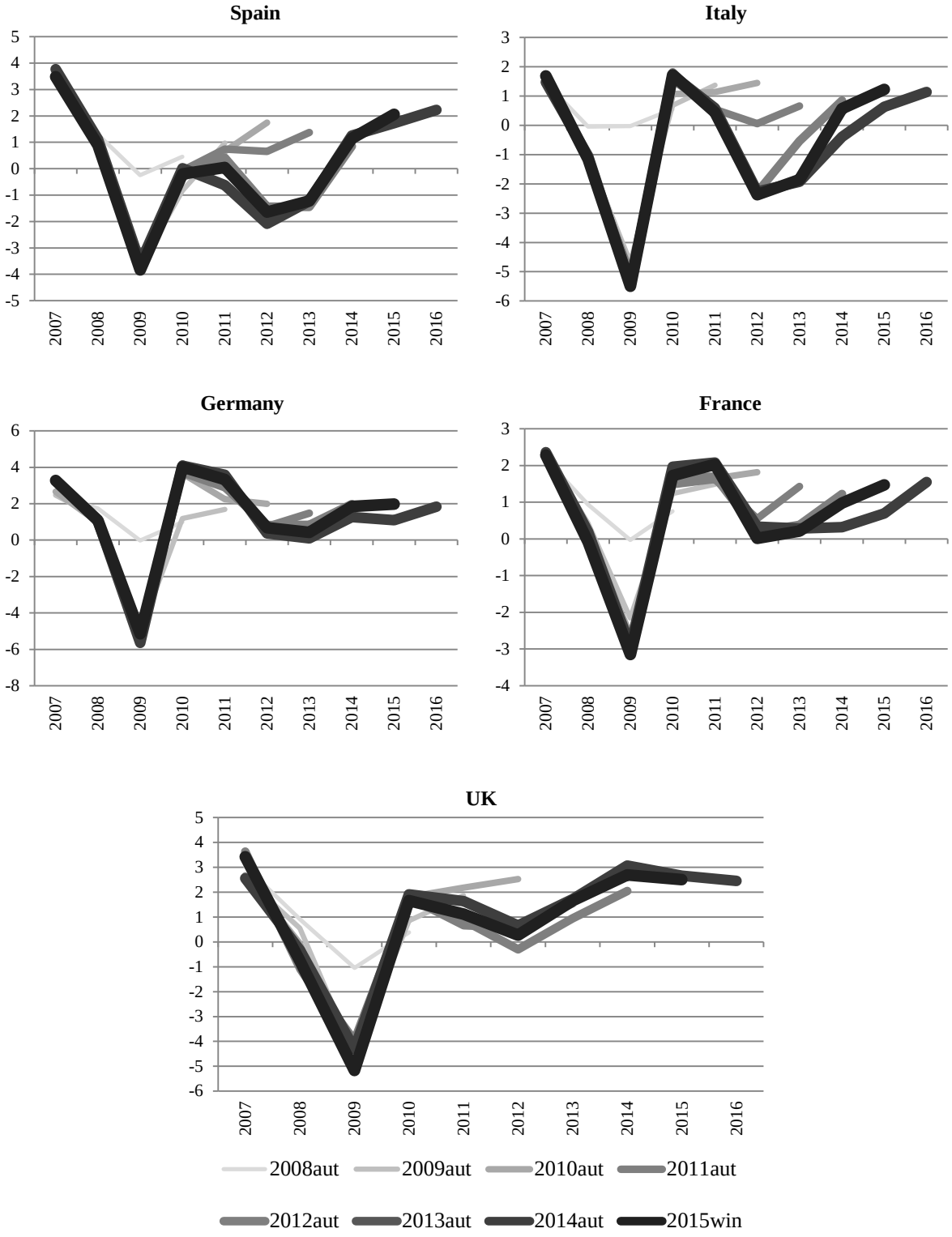
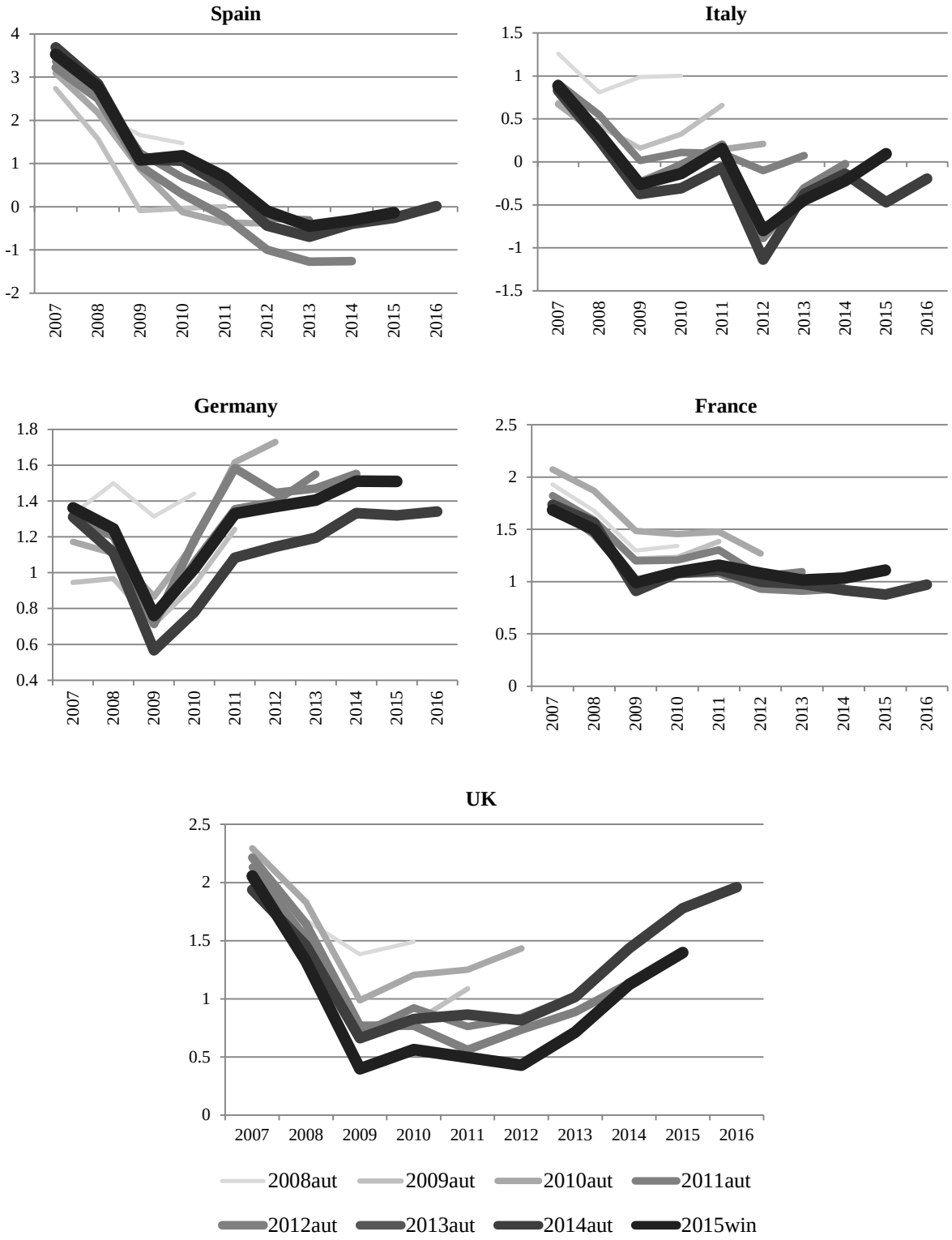


Figure A2: Vintages of potential GDP growth rate forecasts for selected European countries, in %, 2007-2016



Appendix B

This appendix discloses further robustness tests for our regressions. In Table B1, we check for alternative estimators. Columns (1) through (4) stem from a quantile regression, where (1) and (3) are the first stages and (2) and (4) the second stages for the SB and DFE measures, respectively. The quantile regression should be less affected by outliers. The results for the first stages remain largely unaltered as compared to Tables 2 (a,b) in the main text, but the persistence increases for the SB specification. Columns (5) and (6) consider a direct regression of the forecast error of potential output 2010-15 on the fiscal stance measures:

$$\Delta \text{Pot} Y^{fe}_{i,t:t+5} = \zeta + \eta\, \Delta F^{f}_{i,t:t+1|t} + \vartheta_{i,t:t+1|t} \qquad (5)$$

The size of the effect is again large in both cases with $\eta \approx \beta\delta$, but the structural balance becomes statistically insignificant, while the DFE coefficient is very robust to this change.

Table B1: Alternative Estimators

	(1) SB quant fs	(2) SB quant ts	(3) DFE quant fs	(4) DFE quant ts	(5) SB dir	(6) DFE dir
β	-1.272***		-0.8744***			
	(0.3065)		(0.05468)			
δ		1.401**		1.216***		
		(0.6466)		(0.1235)		
η					-1.348	-1.065***
					(1.013)	(0.09984)
const	0.8563	-3.834**	2.573***	-4.304***	-2.364**	-0.515
	(0.62)	(1.356)	(0.6688)	(1.411)	(0.9996)	(1.257)
n	22	22	21	21	22	21
Adj. R^2					0.1218	0.3203

Tables B2(a,b) and B3(a,b) rerun the respective first columns of Tables 2(a,b) and 3(a,b) in the main text, but include control variables for other factors that may have explained the unexpected downturn 2010-11 and its impact on potential output. The added controls are similar in all four tables. Note that we need to control for the variables at the same vintage as these comprise the information set of the forecasters at the time that they did the forecast error. The control variables comprise

(1) the forecast error of GDP during the financial crisis in order to check whether the second dip directly followed from the first one.

(2) the forecast error of the structural balance to test whether it was the size of consolidation instead of its multiplier which was underestimated.

(3) the initial sovereign debt-to-GDP ratio,

(4) the initial structural balance of 2009 and

(5) the initial sovereign CDS spreads of 2010q1 as measures of fiscal sustainability.

(6) a bank crisis indicator (Laeven and Valencia 2012) to test financial stress.

(7) the consolidation effort of trading partners as measured by the export-share weighted change in the structural balance of the respective trading partners which could account for unexpectedly strong negative spillovers explaining the overoptimistic GDP and potential output forecasts.

(8) the pre-crisis current account balance, which has been discussed as a major indicator of the sudden stops of financial flows on the brink of the financial crisis as well as a driver to fiscal consolidation.

(9) the pre-crisis private debt-to-GDP ratios that might have triggered a long-lasting balance-sheet recession (Koo 2013)

(10) the forecast of GDP growth for the years 2010-11 itself, which might have been biased for some reason.

Basically, the results are quite robust to this exercise. There are two exceptions: the second stage coefficients of persistence become insignificant in the case of the structural balance proxy when initial sovereign CDS spreads and the pre-crisis current account are considered as well. When using the DFE as the measure of the fiscal stance, the results remain robust both in terms of statistical significance, size of the coefficients and the strength of instrumentation.

Table B2(a): First stage with controls (SB)

	additional control	β	control	const	n	Adj. R^2
(1)	fe gdp0709	-1.316(0.516)**	0.043(0.143)	1.451(0.915)	22	0.420
(2)	fe sb1011	-1.161(0.427)**	-0.51(0.365)	1.553(0.582)**	22	0.473
(3)	sovereign debt09	-1.29(0.507)**	-0.008(0.018)	1.632(1.284)	22	0.421
(4)	sb09	-1.095(0.621)*	0.141(0.248)	1.689(1.131)	22	0.424
(5)	sovereign cds10q1	-1.199(0.587)*	-0.003(0.006)	1.408(0.639)**	22	0.427
(6)	bankcrisis	-1.324(0.515)**	-0.268(0.881)	1.262(0.481)**	22	0.419
(7)	trade part cons	-1.402(0.488)***	4.495(3.283)	0.964(0.419)**	22	0.481
(8)	current account 07	-1.301(0.685)*	0.013(0.087)	1.143(0.395)***	22	0.418
(9)	private debt 07	-1.312(0.557)**	0(0.008)	1.107(0.955)	21	0.400
(10)	forecast gdp1011	-1.174(0.442)**	0.242(0.238)	0.409(0.842)	22	0.444

Table B2(b): First stage with controls (DFE)

	additional control	β	control	const	n	Adj. R^2
(1)	fe gdp0709	-0.861(0.06)***	-0.06(0.103)	2.186(1.038)**	21	0.675
(2)	fe sb1011	-0.906(0.11)***	0.263(0.326)	2.35(0.473)***	19	0.715
(3)	sovereign debt09	-0.806(0.084)***	-0.015(0.018)	3.507(1.183)***	21	0.677
(4)	sb09	-0.803(0.138)***	0.043(0.198)	2.563(0.812)***	19	0.707
(5)	sovereign cds10q1	-0.966(0.336)**	0.007(0.018)	2.344(0.949)**	20	0.660
(6)	bankcrisis	-0.85(0.053)***	-0.72(0.85)	3.068(0.686)***	21	0.676
(7)	trade part cons	-0.857(0.051)***	4.108(1.329)***	2.557(0.465)***	21	0.708
(8)	current account 07	-0.924(0.125)***	-0.05(0.094)	2.787(0.525)***	21	0.672
(9)	private debt 07	-0.876(0.061)***	-0.004(0.006)	3.17(1.004)***	20	0.684
(10)	forecast gdp1011	-0.864(0.139)***	-0.005(0.305)	2.77(1.195)**	21	0.663

Table B3(a): Second stage with controls (SB)

	additional control	δ	control	const	n	Adj. R^2	1st F
(1)	fe gdp0709	0.845(0.406)**	0.374(0.263)	-0.715(1.792)	22	0.552	6.497
(2)	fe sb1011	1.043(0.508)**	0.145(0.636)	-3.679(1.209)***	22	0.548	7.407
(3)	sovereign debt09	1.124(0.472)**	0.025(0.036)	-5.156(2.78)*	22	0.567	6.466
(4)	sb09	1.567(0.699)**	-0.432(0.54)	-5.816(3.004)*	22	0.605	3.107
(5)	sovereign cds10q1	0.962(0.605)	-0.001(0.01)	-3.364(1.713)**	22	0.525	4.173
(6)	bankcrisis	1.083(0.37)***	1.625(1.41)	-4.291(1.199)***	22	0.572	6.597
(7)	trade part cons	1.135(0.276)***	12.84(3.079)***	-4.203(0.598)***	22	0.692	8.250
(8)	current account 07	0.744(0.76)	0.111(0.166)	-3.286(0.986)***	22	0.477	3.609
(9)	private debt 07	0.763(0.456)*	0.027(0.015)*	-7.345(1.682)***	21	0.639	5.550
(10)	forecast gdp1011	1.382(0.403)***	-0.729(0.275)***	-1.72(1.102)	22	0.667	7.040

Table B3(b): Second stage with controls (DFE)

	additional control	δ	control	const	n	Adj. R^2	1st F
(1)	fe gdp0709	1.236(0.074)***	-0.023(0.121)	-4.131(1.44)***	21	0.643	103.670
(2)	fe sb1011	1.312(0.189)***	0.381(0.537)	-4.582(0.805)***	19	0.611	88.936
(3)	sovereign debt09	1.297(0.144)***	0.014(0.029)	-4.799(2.018)**	21	0.658	128.320
(4)	sb09	1.808(0.263)***	-0.727(0.297)**	-8.094(1.738)***	19	0.739	91.085
(5)	sovereign cds10q1	1.263(0.737)*	0.003(0.036)	-4.404(3.956)	20	0.639	97.635
(6)	bankcrisis	1.286(0.099)***	2.709(1.481)*	-5.249(1.1)***	21	0.716	148.980
(7)	trade part cons	1.22(0.092)***	12.751(3.109)***	-4.469(0.548)***	21	0.767	143.760
(8)	current account 07	1.331(0.13)***	-0.065(0.096)	-4.128(0.707)***	21	0.659	130.570
(9)	private debt 07	1.12(0.083)***	0.019(0.016)	-6.542(1.552)***	20	0.726	122.660
(10)	forecast gdp1011	1.651(0.201)***	-0.859(0.369)**	-1.731(1.251)	21	0.758	115.650