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Austerity in 2009-2013

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1. Introduction

The deficit reduction policies (often referred to as fiscal “austerity”) followed by several OECD countries in 2009-13 were motivated, especially in the European Union, by the bond market reaction to large debts and deficits. They were certainly not meant to cool down overheating economies. On the contrary, several countries had to adopt deficit reduction policies when recessions were not quite over and credit crunches were still retarding the recovery. The aim of this paper is to provide an empirical measure of the effects of these deficit reduction policies on output growth. The summer of 2014, when we write, is probably the earliest time when one can begin to assess the effects of these policies.

We analyze the main features of fiscal adjustment policies, starting from their composition: how they were divided between tax increases and spending cuts, and what has been their cost in terms of output losses. We also examine whether this round of fiscal adjustments, which occurred after a financial and banking crisis, has had different effects on the economy compared to earlier fiscal consolidations carried out in “normal” times. In addition, contrary to previous cases, this time many countries implemented fiscal adjustments at the same time, possibly deepening their recessionary effects due to interdependence of these economies.

We proceed as follows. We start by documenting in detail “how” austerity has been implemented in each country. This is not an easy task: fiscal adjustment plans have often been complex, extending over several years, repeatedly modified in mid-course, sometimes even drastically because of political bickering. Then, we evaluate the effects of such policies on output growth. Since the fiscal

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corrections implemented in the years 2009-2013 (as most fiscal corrections) came, as we said, in the form of multi-year plans, rather than one year moves, we need a model capable of simulating the effects of plans rather than isolated shifts in fiscal variables. We estimate such a model with data running up to (but not including) the years 2009-13. Then we simulate the model out of sample (that is over the years 2009-13) feeding in the actual plans adopted in those five years. This strategy allows us to analyze not only the output effects of austerity as actually implemented, but also to ask what the effect on output growth would have been, had the same fiscal contractions been implemented in a different fashion, *e.g.* relying less on tax increases and more on spending cuts.

Our main finding is that fiscal adjustments based upon cuts in spending are much less costly, in terms of output losses, than those based upon tax increases. Our simulations indicate that the difference between the two types of adjustment is very large. Over our estimation period (1978-2007) the output effect of average tax-based adjustment plans with an initial size of one per cent of GDP is a cumulative contraction in GDP of two per cent in the following three years. On the contrary, spending-based adjustments generate very small recessions with an impact on output growth not significantly different from zero. In this respect the recent episodes of austerity do not look different from previous ones. Out of sample simulations of our model, that project output growth conditional only upon the fiscal plans implemented since 2009, do reasonably well in predicting the total output fluctuations of the countries in our sample over the years 2010-13, particularly, and not surprisingly, for those countries in which the main shock in that period was indeed a fiscal policy one. For example, the tax-based adjustment implemented in Italy in 2010-13 is sufficient by itself to explain the recession experienced by the country over the period 2011-2012 (with negative GDP growth of around 2 per cent in each year).

When we test explicitly the hypothesis that recent fiscal adjustments had the same effect on output growth as past ones, we do not reject the null, although in some cases failure to reject is marginal. In other words, we don't find sufficient evidence to claim that the recent rounds of fiscal adjustment, when compared with those occurred before the crisis, have been especially costly for the economy. This evidence suggests that the fiscal multipliers estimated using data from the pre-crisis period give valuable information about the amount of output loss associated with the post-crisis fiscal consolidation measures. Blanchard and Leigh (2013) argue that the costs of fiscal adjustments have been higher in recent years than previously estimated and therefore expected. The difference between our results and theirs depends upon the fact that we construct forecast errors which are conditional only upon deficit-driven fiscal consolidations. Instead, the forecast errors constructed in Blanchard and Leigh are conditional upon a scenario for all the exogenous variables that enter the IMF forecasting model.

It is important to note from the start that while our evidence raises a natural question on the desirability of the fiscal consolidations adopted over the years 2009-13, this paper has nothing to say on this issue. The question of desirability comes up naturally observing that such consolidations all happened at the trough of a recession, but our exercise cannot answer it. What this paper shows is that there was significant heterogeneity in the effects of such fiscal adjustments depending on their composition, taxes vs. spending and, partly, on their persistence.

This paper builds upon an earlier literature which had tried to assess the cost of fiscal adjustments using data up to 2007, hence before the latest rounds of adjustments. That literature faced two key challenges. One was how to identify exogenous shifts in fiscal policy, namely shifts determined purely by the need to reduce excessive deficits and not as a response to the state of the economic cycle. The second challenge was to isolate the effect of fiscal policy from many other intervening factors like devaluations, monetary policy, labor and product market reforms etc.

This earlier literature, surveyed in Alesina and Ardagna (2010), used large changes in the cyclically-adjusted budget deficit as a measure of exogenous fiscal adjustments. Using various samples and various modeling choices, these papers consistently found that fiscal consolidations based on spending cuts had been much less costly than those based on tax increases. In fact, in some cases, spending cuts were even slightly expansionary, that is associated with almost immediate increases in growth, thus confirming much earlier findings by Giavazzi and Pagano (1990). Concerning the importance of accompanying policies, Alesina and Ardagna (2013) investigated to what extent such policies, in particular labor market reforms, have helped the success of some fiscal adjustments. While devaluations in some cases did help (see Ireland in 1988) they were not consistently the driving force of successful adjustments. Perotti (2013) also emphasizes how critical accompanying policies are, arguing that one should never study budget cuts in isolation from other policy changes.

Cyclically-adjusted budget numbers are unable to filter out all fiscal policy actions correlated with the cycle: for instance, discretionary measures adopted in response to a recession are not filtered out of cyclically-adjusted numbers. This methodology is thus suggestive, but imperfect. The limitations of studies that identify shifts in fiscal policy using cyclically-adjusted budget numbers have been overcome by the “narrative” method pioneered by Romer and Romer (2010). These authors use original sources (budget documents, records of Congressional debates, etc.) to identify episodes of changes in US tax rates, that were not dictated by the cycle, but were motivated either by the aim of improving “long run growth” or of reducing an inherited deficit. Applying this identification strategy, Romer and Romer (2010) estimate large tax multipliers: over the course of three years an increase in taxes equivalent to 1 percent of GDP lowers output by 3 percent.³ Devries et al (2011) have used this methodology to construct a narrative time series of shifts in fiscal policy (in this case both taxes and spending) for 17 OECD countries since the early 1970s. The shifts in taxes and spending identified by these authors are solely motivated by the need to reduce an inherited deficit – a definition which fits precisely the fiscal consolidation episodes adopted in Europe since 2009-10. Guajardo et al (2014) have used these data to estimate fiscal multipliers and also find that tax-based adjustments were more costly, in terms of output losses, than expenditure-based ones, a result consistent with the earlier literature based upon cyclically adjusted deficits.

Alesina, Favero and Giavazzi (2012, AFG in what follows) use the fiscal consolidation episodes identified by Devries et al (2011), but propose a methodological innovation. They start from the observation that the shifts in taxes and spending that contribute to a fiscal adjustment almost never

³ The size of their multipliers has been subjected to many discussions. See in particular Favero and Giavazzi (2012) and the survey by Ramey (2011b).

happen in isolation: they are typically part of a multiyear plan, in which some policies are announced well in advance, while other are implemented unexpectedly and, importantly, both tax hikes and spending cuts are used simultaneously. Also, as these plans unfold, they are often revised and these changes have to be taken into account as they constitute new information available to economic agents. AFG show that ignoring the connections between changes in taxes and expenditures, and between unanticipated and announced changes, might produce biased estimates of the effects of fiscal consolidations. Their results once again confirm a large difference between expenditure-based adjustments and tax-based ones. AFG also show that the shifts in monetary policy that accompany fiscal adjustments cannot explain the results – although this does not rule out the possibility that other contemporaneous economic reforms may make certain plans less costly than others.

The model estimated in AFG is the framework we use in this paper to estimate the effects fiscal consolidations on output growth over the years preceding 2009 (the model is actually estimated using data up to 2007). As mentioned above, we shall then simulate the model out-of-sample (that is over the years 2009-13) feeding in the actual adjustments plans implemented by ten EU countries and by the US in those five years. Finally, we shall run counter-factual experiments asking what the effect on output growth would have been, had the same fiscal contraction been implemented in a different fashion, for instance with less tax hikes and more expenditure cuts.

The paper is organized as follows. In Section 2 we present an overview of the fiscal austerity in Europe after the crisis. In Section 3 we describe the construction of our data and we illustrate the way in which we identify fiscal plans. We describe in detail one case (Portugal) to illustrate our methodology. Detailed information on the plans adopted by all the other countries is in Appendix B. In Section 4 we present our model and our experiments. We first show the output effects of fiscal plans in the sample over which the model is estimated; we then show out-of-sample simulations, that is the results obtained feeding into the estimated model the actual adjustments implemented by each country in 2010-13; next we present the counterfactual experiment, and finally a discussion on robustness. Section 5 analyzes the question of whether recent fiscal adjustments have been more costly than earlier ones. The last Section concludes.

2. Fiscal Policy in the aftermath of the Financial Crisis

Many European economies did not enter the financial crisis with a clean fiscal slate. Before the crisis, debts and deficits were already high in many countries. One reason was the low interest rates of the first decade of the Euro, which had facilitated large debt build-ups in several countries, especially in the European periphery. The country with the largest debt was Italy, with a ratio to GDP of 1.06 in 2008. Among the other, Greece had a ratio of 1. But even countries with apparently better fiscal positions (such as Spain and Ireland) still had budget deficits, notwithstanding an exceptional (and as it turned out unsustainable) level of revenues accruing from a booming construction sector and real estate market. Concerns about fiscal sustainability were not limited to the European periphery. Many countries faced the challenge posed by the rapid aging of their

populations: social expenditure had increased from an average of 18% of GDP in 1980 to 25% and 2009, with a rise of 5 percentage points of GDP in just the last 10 years.⁴ Moreover, total government spending, even if reduced at the end of the 90s to meet the Maastricht criteria, was still high in 2007 (43 percent in 2007 in the EU average). The average share of public spending over GDP had increased from 34% in 1970 to 43% in 2007 in the OECD economies.⁵

Budgets that were already structurally weak worsened very significantly with the start of the financial crisis, in many cases because governments had to foot the bill of distressed financial institutions. The average deficit in the EU almost doubled between 2007 and 2008 reaching 6.4% of GDP in 2009 (See Table 1). In the United States the deficit increased from 2.7 to 13.3 percent of GDP.⁶ As a consequence debt ratios jumped: from 66.5% of GDP in 2007 to a projected 109.2% in 2014 in the US; from 66.5% to 95.3% in the euro area (See Table 2). Besides automatic stabilizers, discretionary fiscal actions, aimed at slowing the rise in unemployment and protecting unemployed workers, played a crucial role, though to a different extent from country to country. For instance, Germany and Italy did not respond much to the crisis, in terms of expansionary discretionary policies, while Spain, Portugal, the UK and France displayed a large increase of cyclically adjusted deficit (See Table 1)⁷. In some countries (*e.g.* Ireland) banking crises vastly contributed to debt accumulation.

[INSERT TABLES 1 and 2 HERE]

Large increases in budget deficits meant that many European countries, around 2009, were subject to the EU *Excessive Deficit Procedure*, that is their fiscal policies started being monitored by the European Commission.⁸ After the start of the Greek crisis, in the spring of 2010, there were renewed anxieties about the unsustainability of public debt in some European countries. Investors demanded higher interest rates on government bonds and yields spiked throughout the European periphery. At the same time, these pressures raised concerns in public opinions. The share of articles discussing fiscal consolidation was marginal during the financial crisis, but rapidly increased in 2010, typically reaching a peak around the end of 2011 (See Figure 1).⁹

[INSERT FIGURE 1 HERE]

Responding to these pressures, most European countries began fiscal consolidations, enacting, starting in 2010, multi-year deficit reduction programs, notwithstanding mediocre growth projections for the years to come.

⁴ Data are from the OECD Social Expenditure Database.

⁵ Data are from the OECD Economic Outlook.

⁶ See IMF Fiscal Monitor 2013 and Table 1.

⁷ See IMF Fiscal Implications of the Global Economic and Financial Crisis, June 2009, p. 12.

⁸ The UK entered the Excessive Deficit Procedure in 2008. In 2009 the countries entering the procedure were: Spain, Greece, Ireland, France, Germany, Italy, Portugal, The Netherlands, Belgium and Austria. Denmark entered in 2010.

⁹ Data on the share of articles regarding the fiscal consolidation debate were gathered from Factiva from January 2006 to January 2014. Details on this procedure are available in Appendix A.

Figure 2 shows how the fiscal policy of Euro Area economies changed overtime, in relation to the economic cycle. For every year we show the change in the cyclically-adjusted primary balance and the level of the output gap. The first and third quadrants represent episodes of counter-cyclical fiscal policy where governments squeeze the public budget while the economy is overheating, and vice versa. On the contrary, the second and fourth quadrants include years in which fiscal policy was pro-cyclical. The majority of the countries in the sample adopted counter-cyclical fiscal policies at the beginning of the recession (2008-09) but turned pro-cyclical after 2009, namely fiscal consolidations started when recessions were not over yet.

[INSERT FIGURE 2 HERE]

As already mentioned in the introduction, while the evidence provided in Figure 2 raises a natural question on the optimality of such countercyclical fiscal actions, this paper cannot answer this question. What the empirical framework we adopt can study is simply whether the effects of such fiscal adjustments were affected, and to what extent, by their composition (taxes vs. spending) and their persistence.

Together with these budget policies, structural reforms were also introduced in some countries. For instance, most of the countries in our sample implemented some labor and product market reforms (see OECD, 2014a); in addition Italy, France and Spain implemented pension reforms in 2010 and 2011.¹⁰

In 2013 the intensity of the fiscal consolidation effort decreased almost everywhere in Europe – in part because some countries, such as Italy, Ireland and Portugal, were able to exit the Excessive Deficit Procedure, in part because Mario Draghi’s famous words, “Whatever it takes”, resulted in a significant reduction in borrowing costs.

Even though not driven by high borrowing costs, fiscal consolidation entered the policy agenda of some non-European economies as well. In the United States the fear for the sustainability of the public debt – and the downgrade of the US government bonds by S&P for the first time in history – was the main motivation behind the adoption of the measures included in the Budget Control Act approved in 2011 and the ensuing debate over the “Fiscal Cliff”.

¹⁰ In Italy the 2010 Budget Law raised the retirement age for old-age pensions for females working in the public sector starting from January 2012, introducing the same retirement age for men and women. In 2011 a new reform increased the old-age retirement age for women in the private sector from 60 to 62 years starting in 2012, with a gradual increase up to 66 years by 2018, whereas the male retirement age was increased to 66 years in 2012. Retirement ages and the seniority rules for early retirement were also indexed to life expectancy. On top of this, pension indexation was suspended for two years. Finally, the reform speeds up the transition from the defined benefit to the defined contribution schemes.

In France various measures were taken with the 2010 Pension Reform to encourage the employment of older workers. The mandatory retirement age was raised from 65 to 70 years; a wider use of the pension premium was introduced and a greater flexibility for combining earned and pension income was guaranteed. Moreover, the extension of the contribution period as a function of rising life expectancy was approved, although indexation is not automatic.

In Spain the pension reform is implemented in 2011 with the first measures entering in office in 2013. The Reform increased the retirement age from 65 to 67 years, while early retirement was delayed from 61 to 63 years. Moreover, the number of years required to reach the 100% of the reference wage increased from 35 to 37 years of contribution.

In Appendix B we analyze these fiscal consolidation actions country by country. In the next section we show, using the example of Portugal, how fiscal plans are constructed.

3. Fiscal Consolidations in 2009-2013

3.1 Constructing and classifying fiscal plans

The fiscal consolidations implemented in 2009-2013 were multi-year fiscal plans. We build such plans extending the database running from 1976 to 2007 that was constructed by AFG for 17 OECD countries. The plans in AFG (2012) were in turn constructed reclassifying the isolated shifts in fiscal policy not driven by the output stabilization motive identified by Devries et al (2011) whose assumptions we discussed in the introduction.

In order to analyze the effects of the fiscal consolidations implemented after the financial crisis, we extend the plans constructed in AFG to include those adopted since 2009. To do this, since the Devries et al (2011) data stop in 2007, we follow their methodology to identify the exogenous shifts in fiscal policy happened after 2009, and then use them to build fiscal plans following AFG.

Fiscal plans are combinations of *unexpected* and *announced* fiscal corrections. When a Parliament votes a deficit reduction policy at time t and implements it in the same year, we call it unexpected: e^u .¹¹ The latter represents a reduction of the deficit over GDP ratio. This reduction may come from a *reduction* in spending over GDP ratio (denoted by g) or an *increase* in the tax revenues over GDP ratio (denoted by τ). When a correction is voted in year t but is implemented in year $t+k$ (where k is the anticipation horizon), it is called announced, with horizon k : $e_{t,k}^a$. As time goes by, and a correction announced in year t for year $t+k$, $e_{t,k}^a$, comes closer to the date of implementation, its horizon is correspondingly reduced: $e_{t+1,k-1}^a$. The shift in the index of the announced adjustment continues until the adjustment is actually implemented in year $t+k$. In that year it is labeled $e_{t+k,0}^a$. All the deficit reduction policies, both announced and implemented, can be divided in tax increases and spending cuts, both measured as fraction of GDP. In doing this we follow the same methodology as AFG.

After plans have been constructed we distinguish between Tax-Based (TB) and Expenditure-Based (EB) plans. We label fiscal adjustments respectively as TB and EB if the sum of the unexpected plus the announced tax (expenditure) changes (measured as percent of the GDP of the year the plan is introduced) is larger than the sum of the unexpected plus the announced expenditure (tax) changes. Note that since plans sometime change in mid-course – due to political bickering or because a government falls and is followed by a new one – a plan which started, say, as EB may turn into a TB one, or the other way around. In Section 4.3.3 we explore a different way of

¹¹ In principle even a policy announced and implemented immediately might have been expected, but without an official announcement it is virtually impossible to measure the degree of surprise of a new policy, as disused in more detail in AFG.

classifying fiscal adjustments abandoning the TB and EB dummy definitions and exploiting separately the magnitude of revenue and expenditure changes. The empirical results are robust.

The countries which we consider are Austria, Belgium, Denmark, France, Germany, Great Britain, Ireland, Italy, Portugal, Spain and the United States.¹²

We now show how, using this framework, we have constructed fiscal consolidation plans over the years 2009-2013 for each country in our sample. We start, in Table 3, providing some descriptive statistics.

[INSERT TABLE 3]

3.2 Fiscal consolidation plans after the financial crisis

The countries in our sample can be divided into three groups. The first includes the countries in the core of the Euro area that on average experienced less serious financial trouble; the second is composed by the periphery. Finally, the third group includes three countries outside EMU, which we use as representative examples of advanced economies with flexible exchange rates.

To identify exogenous shifts in fiscal policy we used the Stability and Convergence Reports of the European Commission, national budget reports, Central bank reports, and Congressional Budget Office documents and Economic Reports of the President for the US. The detailed motivations for the deficit-driven fiscal consolidation plans from 2009 to 2013 and a description of *how* we retrieved the data are available in the Web Appendix. In Appendix C we use the case of Italy to provide a detailed illustrative example of our procedure. Box 2 discusses the differences between our narrative shocks and the cyclically adjusted measures, and compares our data to other narrative measures.

We illustrate our methodology with the example of Portugal. In Appendix B we show the same procedure applied to all other countries in our sample.

Portugal

¹² Greece and Cyprus have been excluded because the data required to include these countries in the panel used to estimate the model were not available – and if they were, as could be the case of Greece, such data have since been extensively revised

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2010	0.6	0	1.4	0	0	0.5	0	1.4	0	0	1	0
2011	0.5	1.4	1.1	0.4	0	0.6	1.4	2.9	1.4	0	0	1
2012	0.4	1.1	2.1	0	0	0.8	2.9	0.8	0	0	0	1
2013	0.4	2.1	-0.4	0	0	0.1	0.8	0	0	0	1	0

Portugal started a very aggressive fiscal consolidation plan in 2010, under financial pressure on government bonds and liquidity concerns. Between 2010 and 2013 the measures adopted amounted, on average, to 4 percentage point of GDP per year for four consecutive years: this can be seen in the table above summing the terms e^u and $e_{t+k,0}^a$ thus computing the direct impact on the budget of each year of the measures adopted. In 2010 the budget deficit was reduced by 1.16% of GDP, of which 0.63 percent of revenues increase (τ_{2010}^u in the table above) and 0.53 of spending cuts (g_{2010}^u). Expenditure cuts involved wage restraints for civil servants, some cuts to social benefits and reductions to operating expenditure of ministries. Revenue increases included an increase in the VAT rate and an increase in personal and corporate income taxes. The same 2010 Budget also introduced new expenditure cuts of 1.41 percent of GDP and new tax increases of 1.43 percent to be implemented in 2011 (they are respectively $\tau_{2010,1}^a$ and $g_{2010,1}^a$). These announcements anticipated a further tightening of the 2010 expenditure measures and limitations to benefits and allowances related to the personal income tax. The first row of the above table illustrates the way in which we use this narrative record to construct the 2010 fiscal plan.

The sovereign debt crisis began in Portugal in November 2010, when the yield on country's 10-year government bonds reached 7 percent. On April 2011, Prime Minister José Sócrates, who had resigned and was heading a transition government, announced that the country would request financial assistance. On May 2011 when the interest rates on debt had reached 10%, Eurozone leaders approved a € 78 billion bailout package for Portugal. As part of the deal, the country agreed to cut its budget deficit from 9.8 percent of GDP in 2010 to 5.9 percent in 2011, 4.5 percent in 2012 and 3 percent in 2013.

Note, in our table, that in 2011 a more comprehensive and longer adjustment program was designed as a condition for economic and financial assistance. The 0.6 percent of GDP of unexpected expenditure cuts focused on public sector wages and public investments. The 0.5 percent of GDP of unexpected tax consolidation mainly involved a personal income tax surcharge on 13th salary.

The fiscal consolidation plan included more spending-based measures to be implemented by 2013. However, in both 2012 and 2013, the plan was modified with unexpected changes in the anticipated components of previously decided budgets.

The last two columns of the table show that this classification strategy leads to label the Portuguese plan in 2010 and 2013 as tax based, and in 2011 and 2012 as expenditure based. It is not uncommon

for a plan to change its nature over time. In the case of Portugal, the change from EB to TB in 2013 was mostly due to the ruling out of some announced expenditure cuts (mostly reductions in public sector wages) by the Constitutional Court in June 2012. In order not to miss the deficit targets, the Portuguese government compensated these expenditure cuts with new tax measures involving a revision of the personal income tax structure resulting in a reduction in the number of brackets, combined with a general surcharge of 4 percent of taxable income and a 2.5 percent solidarity tax on the highest tax bracket. This is clearly visible in the change from $\tau_{2011,2}^a = 0.4$ to $\tau_{2012,1}^a = 2.1$ and from $g_{2011,2}^a = 1.4$ to $g_{2012,1}^a = 0.8$ that in turn causes the plan to be predominantly tax based in 2013.

In 2013, the government implemented a debt recovery scheme for overdue tax and social security contributions, to be implemented before the end of the year and coded as an unexpected 0.4 shock. Given the one-off nature of this scheme, we code its reversal in the following year as a negative announcement: $\tau_{2013,1}^a = -0.4$. Moreover, even though in April 2013 a further Constitutional Court decision ruled out cuts for 0.8 percent of GDP, these were totally compensated by the frontloading of 0.8 percent of GDP from the expenditure review program.

In Appendix B we go over each country's experience as we did for Portugal. Below we report a few main observations, which are in order.

- 1) The size of the fiscal adjustments in many countries was large, especially in Spain, Ireland and Italy, in addition to Portugal as we have seen. In other countries, like Great Britain or Belgium, it was more moderate. In others (Germany and the US) it was relatively small. Ireland hit a 30% deficit over GDP ratio in 2010 as a result of the bail out of banks, but even leaving this episode aside, the Irish adjustment was very large.
- 2) Even in those countries with large adjustments (say Spain and Portugal) the size of them was not unprecedented in recent history. As shown in Table 3, column 3, the average consolidation impact is 3.4% of GDP per year in Portugal, a size a size that has been observed on several occasions in our estimation sample, e.g. Italy 1992, Denmark 1983, Sweden 1995, Ireland 1982.
- 3) In certain countries (Ireland and Spain for instance) banking crises were the main determinants of the fiscal imbalances. In others (Portugal or Italy for instance) deficits and accumulated debts were the main drivers. In either case however the key exogeneity assumption regarding the cycle is preserved.
- 4) The composition of adjustments between spending cuts and tax hikes varied across countries. For instance in the case of Italy the adjustments were all tax based (at least until 2013). In the case of Ireland and Great Britain they were largely all spending based. Spain was somewhere in between but more on spending than on taxes.
- 5) The plans are generally a combination of expected and unexpected fiscal changes. Only in the case of Ireland there were no announcements of future policies during the adjustments.
- 6) Many plans were revised in mid-course several times, as a result of political bickering. In Italy for example three different governments were in office in between 2009 and 2013,

including a “technical” one appointed with the specific task of improving the fiscal stance of the country at a moment when it was on the verge of fiscally imploding.

- 7) In Italy, Spain and France there were pension reforms implemented with potential savings accruing in future years. Probably the sharpest one, in terms of expected fiscal savings, was in Italy.
- 8) Spain introduced a reform to liberalize the labor market. Hardly any other structural reforms were implemented in any other country, at least until 2013 included.
- 9) In the US the discretionary fiscal measures were implemented as a result of the extremely hot debate over the so called “fiscal cliff”. Despite the rhetoric in the debate, in the end the discretionary actions taken were very small.

Finally in Appendix C, using the example of Italy, we illustrate the methodology and the sources which we used to construct our fiscal plans. Similar details about all the other countries are available from the authors.

4. The output effects of fiscal consolidations

The analysis of the output effects of economic policy requires – for the correct estimation of the relevant parameters – identifying policy shifts that are exogenous. In the context of fiscal policy the concepts of exogeneity and identification are illustrated in Box 1 and further discussed in Appendix D. As we already mentioned, for the sample used to estimate our model (1978-07) we identify exogenous actions using the “narrative” data collected by Devries et al (2011) and revised by AFG. There is evidence that fiscal adjustments identified with the narrative methods are predictable from their own past (see the Appendix D). We interpret this evidence as a consequence of the fact that fiscal policy is conducted through multi-year plans and we show that plans can be simulated starting from an impulse not predictable from its own past. Predictability and exogeneity are not the same concept as we explain in Box 1.

When fiscal policy is conducted in country i through multi-year plans, narrative exogenous fiscal adjustments in each year are made of three components: the unexpected adjustments (announced upon implementation at time t), the past announced adjustments (implemented at time t but announced in the previous years) and the future announced corrections (considering, for simplicity, the case in which the horizon of the plan is only one year, these corrections are announced at time t for implementation at time $t+1$).

$$f_{i,t} = e_{i,t}^u + e_{i,t,0}^a + e_{i,t,1}^a$$

A fiscal plan is specified by making explicit the relation between the unpredictable component of the plan and the other two components. In particular, we consider:

$$e_{i,t,1}^a = \varphi_{1,i} e_{i,t}^u + v_{1,i,t}$$

$$e_{i,t+1,0}^a = e_{i,t,1}^a$$

The first relationship is a behavioral relation that captures the style with which fiscal policy is implemented. More permanent plans will feature significantly positive $\varphi_{1,i}$, while temporary plan (to be reversed, at least partially in the future) will feature a significantly negative $\varphi_{1,i}$.

The second relationship simply states that the announced correction implemented at time t is equal to what was announced in the previous period with a fiscal foresight of one period. Note that this does not imply that all announced corrections are effectively realized but it does imply that deviations of implemented corrections from those announced are always considered as surprises by all agents.

In the next section we illustrate how we insert plans in a model for measuring their effect on output and how estimation and simulation are implemented. Finally we shall use the estimated model to perform out-of-sample simulations over the years 2010-13 using the data presented in the previous section.

Box 1: The identification of exogenous fiscal plans

Exogeneity of the shifts in fiscal policy for the estimation of their output effect requires that they are not correlated with news on output growth.

The traditional steps to identify such exogenous shifts were to first estimate a joint dynamic model for the structure of the economy and the variables controlled by the policy-makers (typically estimating a VAR). The residuals in the estimated equation for the policy variables approximate deviations of policy from the rule. Such deviations, however, do not yet measure exogenous shifts in policy because a part of them represents a reaction to contemporaneous information on the state of economy. In order to recover structural shocks from VAR innovations some restrictions are required. In the case of monetary policy identification can be achieved exploiting the fact that central banks take their policy decisions at regular intervals (*e.g.* there are eight FOMC meetings every year) and there is consensus on the fact that it takes at least one period between two meetings before the economy reacts to such decisions. This triangular structure – innovations in the monetary policy variable reflect both monetary policy and macroeconomic shocks, but macroeconomic variables are not contemporaneously affected by monetary policy shocks – is sufficient for identification.

Fiscal policy is different, in the sense that it is conducted through rare decisions and is typically implemented through multi-year plans. A fiscal plan typically contains three components: (i) unexpected shifts in fiscal variables (announced upon implementation at time t), (ii) shifts implemented at time t but announced in previous years, and (iii) shifts announced at time t , to be implemented in future years. Considering, for simplicity, the case in which the horizon of the plan is only one year, these are corrections announced at time t for implementation at time $t+1$:

$$f_t = e_t^u + e_{t,0}^a + e_{t,1}^a$$

These features of fiscal policy generate “fiscal foresight”: agents learn in advance future announced measures. The consequence of fiscal foresight is that the number of shocks to be mapped out of the VAR innovations is too high to achieve identification: technically the Moving Average representation of the VAR becomes non-invertible.

As a consequence of this specific feature of fiscal policy, after some initial effort of adapting the identification scheme used for monetary policy, attempts at mapping VAR innovations into fiscal shocks have become less successful, and an alternative strategy has been preferred, which is based on a non-econometric, direct identification of the shifts in fiscal variables. These are then plugged directly into an econometric specification capable of delivering the impulse response functions that describe the output effect of fiscal adjustments. In this “narrative” (Romer and Romer 2010) identification scheme a time-series of exogenous shifts in taxes or government is constructed using parliamentary reports and similar documents to identify the size, timing, and principal motivation for all major fiscal policy actions. Legislated tax and expenditure changes are classified into endogenous (induced by short-run countercyclical concerns) and exogenous (responses to an inherited budget deficit, or to concerns about long-run economic growth or politically motivated). In this paper we concentrate on fiscal measures designed to deal with inherited budget deficits. Therefore we concentrate on the effect of a subset of the exogenous adjustments.

Starting from narratively-identified shifts in fiscal variables we then build fiscal plans, recognizing that fiscal plans generate inter-temporal and intra-temporal correlations among changes in spending and revenues. The inter-temporal correlation is the one between the announced (future) and the unanticipated (current) components of a plan – what we shall call the “style” of a plan. The intra-temporal correlation is that between the changes in revenues and spending that determines the composition of a plan. As argued by Ramey (2011a, b) distinguishing between announced and unanticipated shifts in fiscal variables, and allowing them to have different effects on output, is crucial for evaluating fiscal multipliers. This approach, introduced in AFG, is an advance on the literature which so far had studied (see *e.g.* Mertens and Ravn 2011) the different effects of anticipated and unanticipated shifts in fiscal variables assuming that they are orthogonal.

A fiscal plan is specified by making explicit the relation between the unpredictable component of the plan and the other two components. In particular, with reference to a specific country i , we consider:

$$e_{i,t,1}^a = \varphi_{1,i} e_{i,t}^u + v_{1,i,t}$$

$$e_{i,t+1,0}^a = e_{i,t,1}^a$$

The first equation is a behavioral relation that captures the style with which fiscal policy is implemented. Countries that typically implement “permanent” plans will feature a positive $\varphi_{1,i}$, while temporary plans (in which a country announces that an initial fiscal action will be reversed, at least partially, in the future) will feature a negative $\varphi_{1,i}$.

Within this framework we also allow for the infra-temporal correlations of plans, that are for heterogeneous effects of tax-Based and expenditure-Based fiscal adjustments.

Our approach thus constructs the output response to a fiscal plan by allowing for a different effect between unanticipated and anticipated corrections, and by recognizing their interdependence within plans. Note that the very nature of a plan makes shifts in fiscal variables predictable.

The fiscal plans studied in the paper are constructed expanding the data put together, using the narrative method, by Devries et al (2011). Devries et al, however, differ from us in that they opt for aggregation summing up anticipated and unanticipated components. Jordà and Taylor (2013) have observed that such aggregated shifts in fiscal variables (hereafter referred to as “IMF shocks”) are not exogenous, and therefore are not valid instruments because they can be predicted using their own past (strongly), past values of output growth (very weakly) and past values of debt dynamics (weakly). We show in Appendix D that this claim is incorrect because while the aggregation undoubtedly generates predictability, predictability is different from exogeneity. We also argue that the restriction that the effect on output of anticipated and unanticipated corrections is the same is very strong, and that our proposed method, based on the simulation of plans in which the correlation between anticipated and anticipated corrections is measured and exploited in the constructions of the relevant impulse response functions, is more flexible.

4.1 The data

The pre-2009 data used in estimation

The AFG panel on which we run the within sample estimation includes 14 countries: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Italy, Japan, Portugal, Spain, the United Kingdom, and the United States.¹³ The frequency of the data is annual and the sample runs from 1978 to 2007.

In the Devries et al (2011) data, tax increases are measured as the expected revenue effect of each change in the tax code as a percent of GDP of the year the announcement is made. Spending cuts are measured as changes in expenditure relative to the level that was expected absent the policy shift, thus not relative to the previous year. This means that a spending cut for year $t + 1$ does not necessarily imply a reduction in government spending relative to year t , but only relative to what would have happened in year $t + 1$ with no policy changes.¹⁴ Announcements are assumed to be fully credible. A few measures that were announced but for which "*the historical record shows that they were not implemented at all*" are dropped from the Devries et al (2011) database. There are only five instances in our sample in which this happened – that is individual announcements were not recorded because never implemented – one each in Japan, Italy, Germany, the UK and the Netherlands (a case which is irrelevant for us since, as we discuss below, we drop this country). In these cases we have not questioned the Devries et al (2011) data call. All other announcements are assumed to be credible and, thus, recorded.

The data after 2009 used in out-of-sample simulations

In order to simulate the effects of the fiscal consolidations implemented after the financial crisis we extended the Devries et al (2011) panel following exactly the same methodology they employed. As discussed in Section 3, our new data cover 11 countries in the period 2009-2013. The countries are: Austria, Belgium, Denmark, Germany, France, Ireland, Italy, Portugal, Spain, United Kingdom, and United States. The total number of years during which, in the various countries there has been an episode of fiscal consolidation is 43 (see Table 3).

¹³ Finland, Sweden and the Netherlands were dropped in the estimation in AFG. Euro Area countries such as Greece and Cyprus were also excluded for lack of (reliable) data. See that paper for more details.

¹⁴ The US "Sequester" of March 2013 is one example.

Box 2: Comparison with Cyclical Adjusted Measures and Other Narrative Data

Cyclically-adjusted and narrative measures of fiscal consolidation

Our narrative measure of fiscal policy notably differs from the cyclically-adjusted measures employed in some part of the literature. In Figure 3 we plot our measure against the change in the cyclically-adjusted structural balance and the change in the primary balance for every country in the sample, as constructed by the IMF. The trend in the IMF structural measure is similar to ours and obviously less volatile than the uncorrected change in primary balance. Notice that in 2009 our measure is almost always equal to zero given that no exogenous consolidation policies were implemented. The discretionary policies implemented in 2008-09 were part of fiscal stimulus plans intended to recover from the crisis and thus must be considered endogenous. Hence, contrary to our measure, the change in the cyclically-adjusted structural deficit in 2009 is negative for almost every country. This raises a major concern about the use of changes in the cyclically-adjusted structural balance for the identification of exogenous shifts in fiscal policies. Note in particular that the smallest differences between our data and the structural cyclically-adjusted primary balance appear in countries which did not implement significant fiscal stimuli in response to the crisis, like Germany and Italy.

For the years after 2009-10 the trend in the IMF cyclically-adjusted structural measure is very similar to our narrative data. However, it almost always lies below our narrative changes. This is due to several factors. First, implemented consolidation measures were sometimes mitigated by discretionary anti-cyclical measures (which we exclude from our analysis because endogenous). Second, our data refer to ex-ante predictions of policy impacts, while the IMF measures refer to ex-post deficit outcomes.

In general the cyclically-adjusted structural balance works well – at least in our sample – only when no (endogenous) stimulus actions are implemented, and consolidation policies are the core part of discretionary policies. The reason is that the IMF measure does not exclude discretionary actions implemented in response to the economic cycle.

[INSERT FIGURE 3 HERE]

Other narrative measures

Dell’Erba et al (2013) and Ađca and Igan (2013) have also constructed narrative data for the countries in our sample for the years 2010 and 2011. Dell’Erba et al (2013) base their construction on the estimates provided by the 2011 OECD publication “Restoring Public Finances”. Ađca and Igan (2013) complement the Dell’Erba et al (2013) using IMF Article IV Staff Reports, OECD Country Reports and national budgets. Both these works, however, do not take into account the multi-year feature of fiscal plans and thus do not collect data about announcements. Moreover, they only cover the years 2010 and 2011 when fiscal consolidations were not as relevant as in 2012 and 2013. Indeed, only a few countries started fiscal adjustments in 2010, while all countries in our sample implemented fiscal actions in 2012 and 2013. Furthermore, the average size of fiscal consolidations in 2012-13 is around 2%, against 1.3% for 2010-11. Our narrative episodes for 2010 and 2011 do not differ significantly from their estimates. We provide in the web appendix a comparison between our data and the data constructed by these two papers.

4.2 The estimated model

In order to measure the output effect of fiscal consolidation plans, we estimate a multivariate system of Seemingly Unrelated Regressions in which the output growth of each country is projected on the three (exogenous) components of a fiscal plan. This reduced form specification is a truncated moving average representation for output growth where the only innovations included are the fiscal ones. Of course we are omitting many other shocks relevant to explain output growth. But under the validity of our identifying assumption, all omitted shocks are orthogonal to those that we include in the regression.¹⁵

The estimated system (i denotes the country) is the following:

$$\begin{aligned} \Delta y_{i,t} &= \alpha + B_1(L)e_{i,t}^u * TB_{i,t} + B_2(L)e_{i,t,0}^a * TB_{i,t} + C_1(L)e_{i,t}^u * EB_{i,t} + C_2(L)e_{i,t,0}^a * EB_{i,t} \\ &+ \sum_{j=1}^3 \gamma_j e_{i,t,j}^a * TB_{i,t} + \sum_{j=1}^3 \delta_j e_{i,t,j}^a * EB_{i,t} + \lambda_i + \chi_t + \mu_{i,t} \\ e_{i,t,j}^a &= \varphi_{i,j} e_{i,t}^u + v_{i,t,j} \quad j = 1,2,3 \\ e_{i,t,0}^a &= e_{i,t-1,1}^a \\ e_{i,t,j}^a &= e_{i,t-1,j+1}^a + (e_{i,t,j}^a - e_{i,t-1,j+1}^a) \quad j > 1 \end{aligned}$$

Per capita GDP growth in each country, $\Delta y_{i,t}$, is affected by three different deficit reductions (as a percentage of GDP):

- approved and implemented in year t (unanticipated, e_t^u);
- shifts that had been announced in the past, but come into effect at time t ($e_{t,0}^a$);
- announced at time t that will be implemented in the future. We call these “anticipated” shifts in fiscal variables and consider a three-year horizon ($e_{t,j}^a$). Three years is the average horizon of the fiscal plans in our sample.

$B(L)$ and $C(L)$ polynomials are truncated after 3 years: they represent the coefficients of the associated lagged variables from time t to $t - 3$.¹⁶ The model is estimated by Seemingly Unrelated Regressions (SUR) imposing cross-country restrictions on the coefficients in B , C and on the γ 's and δ 's. We also include year and country fixed-effects. We gain in efficiency on the estimates of B ,

¹⁵ This assumption could be tested by adding to the model some variables as proxies for the introduction of accompanying reforms potentially related to the narrative episodes. By doing so we could check whether such reforms, rather than the character of the fiscal plans, are what drives our estimates. AFG provide such a robustness check for labor market reforms.

¹⁶ This truncation does not generate any omitted variable distortion under the assumption that fiscal shocks do not affect output for more than 3 years ahead. Indeed, since the shocks at $t - 4$ are correlated with those at $t - 3$ and $t - 2$ by construction, the omitted variable bias is eliminated by assuming that they do not influence our dependent variable.

C and on the γ 's and δ 's by pooling together the data from several countries, thus building a panel.¹⁷ We allow for the possibility of heterogeneity in the response of output growth to tax-based and spending-based adjustments interacting overall fiscal shocks with TB and EB dummies.

Once the model is estimated we simulate the effect of an unanticipated shift in fiscal variables preserving the inter-temporal dimension of fiscal plans. That is, when we simulate the effects on output growth of an unanticipated shift, say in taxes, we recognize that a country's typical fiscal plan accompanies unanticipated shifts in taxes with the announcement of future shifts in taxes and/or spending. We build such "artificial" announcements adding to the estimated model the following country-specific additional equations:

$$e_{i,t,j}^a = \varphi_{i,j} e_{i,t}^u + v_{i,t,j} \quad j = 1,2,3$$

Where i refers to the country, t is the period and $j = 1,2,3$ is the horizon (limited to 3 years) of fiscal announcements. Allowing the φ 's to differ across countries (*i.e.* allowing for countries to implement fiscal plans that are on average different from one country to another) we introduce an additional source of heterogeneity: "between" countries heterogeneity which relates to the "style" of fiscal plans, meaning the correlation between their unexpected and announced components. The estimation of a country's style allows distinguishing between countries that pursue consistent stabilization efforts over time, countries with one-year horizon plans and finally countries in which the $\varphi_{i,j}$'s are negative, *i.e.* where announcements tend to undo the effects of unanticipated shifts in policy.

In the specification illustrated above we interact overall fiscal shocks with the TB and EB dummies, rather than introducing τ_t and g_t separately. We do so because this version of the model is more suitable for simulating average plans: the reason is that it avoids the problem of estimating the contemporaneous correlation between taxes and spending measures. In other words, introducing τ_t and g_t directly into the specification, we could correctly simulate an average plan only estimating a very large number of $\varphi_{i,j}$ parameters, in order to keep track of how taxes and spending move together. This drawback would be magnified if we also wanted to simulate the inter-temporal dimension of a plan, as we do. On the other hand, the model with the TB and EB dummies may be sensitive to the categorization of plans into EB and TB, especially when the share of spending and taxes over the total consolidation is around 50%. Reassuringly, the vast majority of the plans in our

¹⁷ The specification generalizes the MA representation estimated by Romer and Romer (2010) allowing different coefficients on the unanticipated adjustments (announced at time t and implemented at time t), on the anticipated correction currently implemented (announced before time t , and implemented at time t), and on the future corrections (announced at time t , to be implemented in the future). The possibility of different effects of announced, anticipated and unanticipated corrections is well grounded in the theoretical literature and has already been introduced in empirical work (Mertens and Ravn 2011, Perotti 2013). Our MA representation is augmented by a number of auxiliary equations that capture the nature of the plan via the correlation between the unanticipated and announced components of fiscal plans. As discussed in the text, to save on degrees of freedom we take into account the intra-temporal correlations between the revenue side and the expenditure side of the adjustment interacting the total adjustment in the primary surplus with TB or EB dummies.

sample are far from a fifty-fifty split: there are only 2 cases (over 43) where the share of spending is between 49 and 51% of the total consolidation, and 8 cases where the share is between 45% and 55%. In any event, in section 4.3.3 below we present estimates of the model in which we introduce τ_t and g_t separately. The results are qualitatively very similar to the ones obtained with the benchmark model.

To sum up, the model can serve two different purposes. First, as in AFG, we can estimate within-sample the output effect of the average consolidation plans occurred during the estimation period. In other words, we compute impulse responses of output with respect to plans, in order to measure their effects. These impulse responses are computed as the difference between the simulated output growth conditional on the *average* EB and TB plan, and the simulated output growth when no fiscal stabilization is implemented. Second, once the model is estimated, we can run out-of-sample simulations of *specific* adjustment plans feeding directly into the model the announced and realized components of a given plan – rather than using the estimated $\varphi_{i,j}$ to simulate the average within-sample plan. This second exercise produces projections of output growth conditional to the specific fiscal plan studied.

Our specification uses a parsimonious representation to simulate the output effect of fiscal plans. The same problem has been addressed using a different methodology (the Local Projections Method) in Jordà and Taylor (2013) and Jordà (2005). We illustrate and evaluate the two alternative approaches in Appendix D. The main difference between the two is that Jordà and Taylor attempt to collapse plans into exogenous single-period corrections, while our method preserves the inter-temporal, multi-period aspect of fiscal adjustments. For this reason we believe that our approach has some advantages.

4.3 Results

We organize the presentation of our empirical results in two sub-sections. First, we describe the estimation and impulse response function of the average plan implemented during 1978-2007. We then concentrate on the main contribution of the paper: the out-of-sample simulations of the output effect of the consolidation plans adopted after the crisis.

4.3.1 Output effects of fiscal plans: pre-crisis (in-sample results)

Estimated coefficients for our model over the period 1976-2007 are reported in Table 4. Note the negative sign on all significant TB (tax based) adjustments implying that tax hikes have a negative and significant effect on output. The positive and in some cases statistically significant coefficients on the EB (expenditure based) adjustments mean that spending cuts are correlated with an increase in output (only one of the EB coefficients is negative and then only marginally significant: the effect of the implementation today of a spending cut announced in the past).

We summarize the results reporting, in Figure 4, the response of output to a one percent unexpected fiscal consolidation shock. We consider EB and TB adjustments separately (in blue and red, respectively). When simulating an unexpected shock, we accompany it with “artificial” announcements of future policy shifts constructed using the estimated style of each country’s plans (the $\varphi_{i,j}$'s). Different styles depend on the typical persistence of a shock, *i.e.* on the correlation between unexpected and anticipated shifts in fiscal variables within a plan. For instance, in the case of Ireland, fiscal plans are typically purely unexpected and contain no announcements of future actions, while Italian plans are often reversed after one year.¹⁸

[INSERT TABLES 4, 5 AND FIGURE 4 HERE]

The results clearly show that fiscal consolidations implemented mainly by raising taxes entail large output costs.¹⁹ AFG show that the component of GDP which explains a large part of the difference between EB and TB adjustments is private investment.^{20 21} In the next sub-section we explore whether this feature of fiscal adjustments extends to the more recent period, *i.e.* to the adjustments implemented over 2010-2013.

4.3.2 Output effects of fiscal austerity in 2010-13

Effects of the plans adopted in 2009-13

The recent years offer an interesting opportunity to evaluate the predictions of our empirical model. There has been considerable cross-section and time-series variability in output growth during this period among the 11 countries in our sample. It is thus interesting to compare the model projection of output growth – conditional upon fiscal adjustment plans – with its observed path.

There are two questions we can attempt to answer: *i)* how much of the recent recessions can be attributed to fiscal austerity; and *ii)* how much of the heterogeneity in the severity of the crisis across countries can be explained by the different styles of fiscal corrections. The reader should remember, however, that the tool we are using is not a forecasting model. Our model projects output growth conditional on fiscal shocks only, overlooking all other exogenous factors that have affected output growth in 2009-10, importantly, but not exclusively, financial shocks). Overlooking such factors does not affect the estimation of the model (since fiscal shocks are exogenous by construction) but certainly affects the ability of our model to track the observed output growth.

¹⁸ Details about each country’s style of fiscal adjustment are provided in Table 5.

¹⁹ The impulse response functions in Figure 4 show the cumulated effects on GDP per capita.

²⁰ AFG also find significant asymmetries in the responses of inflation and interest rates in the response to TB and EB plans. Differently, the responses of term spreads do not feature a significant asymmetry.

²¹ This result is consistent with the evidence in Alesina and Ardagna (2010)

We compute out-of sample simulations by feeding directly into our estimated model the actual plans adopted over the period 2009-2013. We assess the effects of a fiscal consolidation comparing the simulated path of output growth, with the observed one. In Section 5.1 we shall discuss whether such an out-of-sample simulation makes sense, testing for a regime change between in sample estimates (up to 2007) and out-of-sample simulations (after 2009). The results are supportive of our counterfactual exercise.²²

The results of our simulations are presented in Figures 5, 6 and 7. On the left hand side of each figure we plot a histogram describing the size and composition of the fiscal adjustments happening in that year. Red columns represent years of tax-based consolidations, while spending-based years are colored in blue. In each histogram we report the yearly impact (unexpected plus announced for time t) and the future announced shifts in fiscal variables, measured as a fraction of GDP. The impact is represented by the full-colored columns, while the announcements correspond to the cross-hatched columns of each figure. On the right hand side panels we report:

- the actual GDP growth (in black);²³
- the simulated GDP growth conditional on the implemented fiscal plan (in green with 64% confidence bounds);
- what output growth would have been, according to the model, had the plan been totally expenditure-based (in blue line with squared symbols);
- what output growth would have been, according to the model, had the plan been totally tax-based (in red with circles).

Obviously, in countries like Germany, Spain or the USA, where the plans actually implemented were almost totally expenditure-based, the green and blue lines virtually coincide.

Our model matches the realized growth path quite well, especially for those countries, such as Italy, where fiscal shocks were the main determinants of GDP growth. However, several caveats are in order.

First, as we already repeated a number of times, our model projects GDP growth only conditional upon fiscal consolidations. Therefore, we should expect a closer fit between actual and projected GDP growth in years where there are no other significant shocks (*e.g.* economic, political, etc.). The evidence from 2012 and 2013 illustrates this point, as these years are more distant from the financial and economic shocks of 2008 and 2009. There are also a few specific non-financial shocks that could explain why predictions do not match actual growth. The most relevant ones occurred in Portugal in 2010 and in Germany in the years closer to the crisis. For Portugal our predicted growth

²² In principle the estimated model could have also been used to simulate the effect fiscal austerity in Greece over 2010-2013. What stops us from doing this is that, as a consequence of the fact that Greece is not in the estimation sample, it is impossible to check that the adjustment over 2010-2013 is not too different from those implemented in the past.

²³ In the case of Ireland we also ran simulations for GNP, instead of GDP, and the results (available upon request) are essentially unchanged.

rate for 2010 is considerably lower than realized growth. One possible reason is stated in the EU “Council Recommendation (with a view to bringing an end to the situation of an excessive government deficit in Portugal)” (p. 5), which claims that in 2010 “positive growth of 1.4% was largely due to exceptional factors that boosted exports and private consumption”. In Germany, our projected growth rate is almost flat, which is distant from the growth rates realized right after the crisis. The IMF claimed that “the [German] uptick started in the second quarter of 2009, led by exports and aided by policy support and restocking of inventories”.²⁴ Not surprisingly, the model cannot account for export-led growth. In general, given the features of our model, it is reasonable to expect a better fit in countries subject to impressive amounts of fiscal adjustment because these shocks were more likely to dominate other shocks.

Second, note that in some countries like Ireland, Spain and the US, the model projections and the actual growth rate are set at different levels, especially when the fiscal adjustments are small. These are the countries where the average GDP growth before the crisis was significantly different (higher) from the one after the crisis. Remember that the model is estimated including a country fixed-effect, which is the average GDP per capita growth over the years 1978-2007 (net of fiscal shocks) and represents a counterfactual growth in absence of fiscal shocks. Since the model simulations assume that fiscal policy affects GDP only relatively to the level of the fixed-effect, this may lead to an overestimation of growth, especially when the fiscal adjustment is small, and for countries that in the post crisis years could not catch up with their per-capita growth rates in the 80s and 90s.

Conversely, as shown in Table 6, the projected growth for Ireland, Italy, Portugal and Spain show that the different nature of the fiscal adjustments contributes significantly in explaining growth differentials among these countries.

[INSERT TABLE 6]

The results confirm that EB adjustments have been much less costly than TB ones.

Compare for example Ireland and Italy. The former had a draconian adjustment on the expenditure side and a small recession in 2010-13 after the disastrous banking collapse of 2009. Italy had a smaller adjustment but virtually all on the revenue side, at least up to 2013. The result was a deep recession which is still ongoing. Portugal and Spain also feature a good match between observed output growth and that projected on the basis of predominantly expenditure based fiscal adjustments. Note that in the case of Spain the burst of the housing bubble contributed to the recession and the high unemployment above and beyond the effects of the fiscal adjustments. In fact, even though the Portuguese and Spanish governments implemented some of the largest consolidations of the whole sample, most of them were through spending cuts and the effect on GDP was low compared to the amount of deficit reduction implemented. The UK had a moderate

²⁴ “Germany: 2010 Article IV Consultation-Staff Report; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for Germany”, p. 4.

EB adjustment and a small and short-lived recession. France had a moderate and mixed type of adjustment, and a moderate recession.

The size of the 64% confidence bounds on our out-of sample simulations differ across countries.²⁵ There are two reasons for this. First, the uncertainty of the fixed effect, which captures the equilibrium rate of output growth in the absence of shocks, differs significantly across countries. Second, some plans may include elements (for example two-year-ahead announcements) whose effects are less precisely: this makes the uncertainty of the simulation dependent on the style of a plan. As a result in some cases, such as Italy, confidence intervals are relatively narrow; in other, such as Germany or Ireland, they are much larger. In the case of Italy the plans adopted over 2010-13 include components whose coefficients were precisely estimated. Moreover, Italy has a small standard error associated with its fixed-effect. The German plans of 2010-13, instead, typically contained components (for example two-year ahead announcements of a spending cut) not as precisely estimated and a high standard error on the fixed-effect. In the case of Ireland, the significant size of each adjustment exacerbates the large standard error on the coefficients on unexpected EB shocks. Moreover, Ireland displays the largest standard error on the fixed-effect among all countries in the sample.

Counterfactuals

Turning now to the counterfactual results (the red and blue lines respectively) notice that in countries like Spain, Italy, Ireland and Portugal, which implemented the largest fiscal consolidations (and where the model predictions best fit the actual growth), the nature of the fiscal plans plays a prominent role in determining the growth experience. For example, if Spain had implemented exactly the same adjustment but had chosen to mostly raise taxes, instead of cutting expenditures, it would have had a lower GDP growth of around 5 percent in 2013. On the other hand, had Italy chosen to mostly cut expenditures rather than raise taxes, it would have had a GDP growth 2 percent higher in every single year since 2011, with a cumulative “additional” 6 percent points of growth.

Finally, notice that, as anticipated above, the model does not succeed in projecting growth in countries where the fiscal consolidation effort was small, since other shocks probably dominated. Hence in Germany or the USA, given the small magnitude of the adjustments implemented, it does not make a big difference whether the plans were predominantly TB or EB.

[INSERT FIGURE 5, 6, 7 HERE]

²⁵ Confidence bounds differ also compared to the impulse response functions presented in Section 4.3.1. The main reason is the inclusion of the country fixed-effects uncertainty in the out-of sample simulations. Secondly, impulse response analysis is based on the simulation of the average plan in which several adjustment plans are pooled together, while out of sample projections consider instead a specific plan.

4.3.3 Robustness of the EB and TB dummy definitions

In the specification used so far fiscal shocks were interacted with the TB and EB dummies. As discussed above this specification may be sensitive to the categorization of plans into EB and TB. As a robustness check we run our model with a different specification in which we introduce τ_t and g_t separately. That is we do not “label” fiscal adjustments as TB and EB but we simply use in the regressions the actual announced and unexpected tax hikes and spending cuts. We discussed above the pros and cons and this approach relative to our previous specification based upon a classification of plans in EB and TB. One advantage of this approach is to avoid potential misspecifications in cases where the allocation of spending cuts and tax increases is close to fifty-fifty. The new specification of our dependent variables is as follows:

$$\Delta y_{i,t} = \alpha + B_1(L)\tau_{i,t}^u + B_2(L)\tau_{i,t,0}^a + C_1(L)g_{i,t}^u + C_2(L)g_{i,t,0}^a + \sum_{j=1}^3 \gamma_j \tau_{i,t,j}^a + \sum_{j=1}^3 \delta_j g_{i,t,j}^a + \lambda_i + \chi_t + \mu_{i,t}$$

The estimated coefficients are shown in Table 7 and are qualitatively very similar to the ones obtained with the benchmark model. This is not surprising: the share of spending cuts in the average EB plan (in which the total annual adjustment of 1.36 of GDP) is 84 per cent, while in the case of TB plans (in which the total annual adjustment of 0.89 of GDP) such a share is 76 per cent. The coefficients on taxes, when significant, are all negative, the coefficient on spending, when significant (which happens only marginally for one of them) are positive. Note however that inferring the response of output growth to taxes and expenditure from these coefficients only is warranted in the case tax and expenditure adjustments are orthogonal to each other, a condition that it not usually satisfied. Figures 8, 9 and 10 reproduce, using the new specification, the results shown in Figures 5, 6 and 7. The new results are consistent with those obtained using the EB/TB dummies. For some countries, such as Spain and Portugal, the model above delivers projections closer to realized GDP growth than those in our baseline specification.

[INSERT TABLE 7 HERE]

[INSERT FIGURE 8, 9, 10 HERE]

5. Were the recent fiscal adjustments especially costly?

The recent episodes of austerity happened under special conditions. They followed the Great Recession (in fact they started during its tail end) and the financial crisis, which lead to credit crunches. In some cases market conditions forced European countries to start deficit reduction polices when the recession was not yet over and financial markets were still experiencing a credit crunch. In addition, many countries implemented fiscal contractions at the same time. All of these factors might suggest that the recent fiscal consolidations might have been more costly than those of

previous decades.²⁶ Blanchard and Leigh (2013) argue that this was indeed the case. We investigate their finding that fiscal multipliers were larger than anticipated in the recent round of fiscal adjustments and we find that the evidence in favor of a change in fiscal multipliers is very weak.

In addressing this question it is important to distinguish between two possibilities. One is that fiscal multipliers were larger in these recent rounds of fiscal adjustments than estimated using pre-crisis data: this is the question asked by Blanchard and Leigh (2013). The other is that fiscal multipliers were not different but additional shocks (like credit crunches for instance) created deep recessions regardless of the size of fiscal multipliers. Within the framework of this paper we can only investigate the first of these questions.

We begin by testing whether our model implies a regime change between in-sample estimates (up to 2007) and out-of-sample simulations, after 2009.

5.1 Testing for a Regime Change

Test on joint equality of coefficients

We first test for the joint stability of our parameter estimates between the two samples 1981-2007 and 2008-2013. In order to run the test we interact each of the 20 coefficients measuring the output effects of fiscal shocks with a time dummy taking the value of 1 after 2008.²⁷ The joint significance of each of these stability parameters is evaluated using the Wald test.

The hypothesis of structural stability is not rejected with $\alpha = 0.01$ but rejected with $\alpha = 0.05$. Hence we are at the margin of structural instability. However, the Wald test for the joint significance of so many parameters could be driven by transitory movement in just a single parameter. This is indeed the case given the fact that dropping the coefficient for $e_{t-3,0}^a$ from the test, we do not reject stability even with $\alpha=0.1$. As a consequence, we consider the estimates in the pre-crisis period to give valuable information about the amount of output loss due to the post-crisis fiscal consolidation measures. An additional caveat is that we are looking at a structural break rather close to the end of the sample, thus with very few observations after the break, which makes the test less precise.

²⁶ All of these factors were outlined (among others) by Christiano, Eichenbaum and Rebelo (2011), Eggertsson and Krugman (2012), Auerbach and Gorodnichenko (2012), OECD (2014b).

²⁷ Our test can be thought of as a version of the Chow Test that allows for the presence of country fixed effects in the panel data.

Changing the estimation sample

To further support this point, we next provide a visual comparison (with confidence intervals) between the simulations produced using parameters estimated in the two samples: 1980-2007 and 1980-2013.

To do this, we re-estimate our model over the extended sample (1979-2013) and we then use the new estimated coefficients to simulate GDP growth inputting post-crisis shocks. Figure 11 plots the predicted growth rates using the new estimates (orange) against those computed in the previous section (Figures 5, 6 and 7) (green). The new projections track actual GDP growth closer, as expected, but they do not differ significantly from those based on within-sample estimation.

[INSERT FIGURE 11 HERE]

5.2 Did Fiscal Multipliers Change After the Crisis?

Blanchard and Leigh (2013, hereafter BL) address the stability of fiscal multipliers using a different approach. They investigate the relation between the IMF growth forecast errors and the total amount of fiscal consolidations expected to be implemented in 2011, based on IMF forecasts. In practice, they run an OLS regression on a cross-section of 27 advanced economies employing a cyclically adjusted measure of changes in structural balance. They find that “*stronger planned fiscal consolidation has been associated with lower growth than expected, with the relation being particularly strong, both statistically and economically, early in the crisis*”. Their results suggest that for every additional percentage point of GDP of fiscal consolidation, GDP was about 1 percent lower than forecasted. They interpret the result as implying that fiscal multipliers in 2011 were higher than those predicted by forecasters.²⁸

In order to assess this evidence it is important to realize that the forecast errors constructed in BL are conditional upon a scenario for all the exogenous variables that enter the IMF forecasting model. Their forecast errors could therefore reflect surprises in such scenario and in the response of all endogenous variables to all surprises. Our approach instead delivers a projection of GDP growth conditional only on the fiscal adjustment. As a consequence, a regression of the residuals of our model – produced by projecting GDP growth only on the announced fiscal adjustment – run on the fiscal adjustment itself, can provide more direct evidence on the potential structural instability of fiscal multipliers.

To illustrate this point, we run the following regression

$$\Delta y_{it} - E\{\Delta y_{it}|e_{it}\} = \alpha + \beta e_{it} + \varepsilon_{it}$$

²⁸ BL investigate the robustness of their results replacing IMF forecasts with those of other forecasters: the EC, the OECD, and the EIU. They find that their results are robust. These alternative forecast, however, suffer of the same weakness we have pointed out for IMF forecasts.

The dependent variable is the discrepancy between the actual growth rate and the growth rate projected by our model, and e_{it} is the total impact of deficit-driven fiscal consolidation actions (unexpected and announced). If fiscal multipliers are stable, the estimated coefficient linking the real growth projection error and our narrative measure of fiscal episodes (β) should be centered on zero.

Notice the difference with the BL specification. In the BL specification the forecast error is the difference between realized growth and growth as predicted by the IMF forecasting model thus is conditional on all the exogenous variables forming the scenario of such model, not only fiscal variables.

We first estimate the model using OLS and restricting the sample to the cumulated forecast errors in 2010-2011, in order to exactly replicate BL. Results are reported in Table 8. The estimate of β (0.24) is small, not significantly different from zero, and about one third of the value estimated in BL. Extending the estimation period to include the single observations in 2010-13 the magnitude of the estimated coefficient does not change but is now significant at the 1% level (column 2). However, introducing country-fixed effects the coefficient becomes again insignificant while not changing in magnitude (column 3). In other words, for each additional percentage point of fiscal consolidation after the financial crisis, GDP turned out to be 0.3 percent lower than accounted by our model, a value only marginally significant. Results do not change when we include the sum of fiscal announcements in the specification to account for a potential problem of omitted variable bias (column 4). Summing up, our results suggest, differently from BL, that probably only minor or no changes in the multiplier have occurred after the crisis.

[INSERT TABLE 8]

The difference of our results with respect to the ones in BL might be due to many factors. First, as we said, our structural break test uses a model conditional only on fiscal policy, and not conditional on the whole information set of IMF forecasters. Second, if the composition of the fiscal adjustments post 2010 differed from the average composition in the past, this could explain why models that impose identical effects of TB and EB adjustments, such as the IMF forecasts, find a break in the estimated multiplier.²⁹ Finally, there are fewer countries in our sample, compared to that of BL.

Given the feature of our data, we can further investigate whether the small change in fiscal multipliers we detect is due to compensating changes in tax or spending multipliers. Indeed, our results do not exclude the case in which EB and TB events were both unstable after the crisis, but with opposite effects, resulting in a lower “average” effect of -0.3. However we did not find

²⁹ To investigate whether their baseline results are driven primarily by spending cuts or by revenue increases, BL split their measure of fiscal consolidation – the change in the cyclically-adjusted fiscal balance – into the change in government spending and revenue and estimate the model separating between the change in spending and the change in revenue. They find that overall fiscal multipliers were, on average, underestimated for both sides of the fiscal balance, with a slightly larger degree of underestimation associated with changes in government spending. Once again, however, it is impossible to separate, within this framework, between overall forecast errors and forecast errors signaling a change in fiscal multipliers.

evidence that the possible under- or over-estimation of multipliers is specifically driven by either EB or TB events.

6. Conclusions

The conventional wisdom is first that fiscal austerity was the main culprit for the recessions in many countries, especially in Europe and, second, that this round of fiscal consolidation was much more costly than the past ones. The contribution of this paper is a clarification of the first point and, if not a clear rejection, at least doubts on the second.

On the first point our main finding is that, as in the past, in the recent episodes there has been a very big difference between tax-based and expenditure-based fiscal adjustments. The former have indeed been very costly in terms of output losses. The latter much less so. These results are very similar to those obtained by many authors who have studied the effects of fiscal adjustments preceding the period 2010-2013. Indeed, from a comparison between our results on these recent adjustments and the ones up to 2007, we did not find strong evidence against the hypothesis that fiscal multipliers – large tax multipliers and very small spending multipliers – were stable across the two sub-samples.

Our results however are mute on the question whether the countries we have studied did the right thing implementing fiscal austerity at the time they did, that is 2009-13. Consolidations, as illustrated in Figure 2 at the beginning of the paper, all happened at the trough of a recession. Moreover, in some countries, such as Spain, Ireland and Portugal, fiscal consolidation appears to have been accompanied, at least in 2012-13, by other (non fiscal) shocks to the economy that have depressed output growth, raising the question whether the timing of the fiscal contraction was “optimal”. This is an important question, but one that, within the framework adopted in this paper, we cannot answer. We would need a structural model capable of tracking the effect of several shocks.

In order to obtain these results we constructed a detailed ‘narrative’ data set which documents the actual size and composition of the fiscal plans of several countries in the period 2009-2013. The plans are composed by preannounced and unexpected policy changes often with many revisions in mid-course, which incidentally added much uncertainty in expectations, an uncertainty which may have had negative effects on investments. Thus, an additional contribution of this paper is a clarification of these complex dynamic evolutions and the provision of a new narrative data set on recent fiscal adjustments. We have then estimated the output effects of these fiscal plans simulating out-of-sample a model that allows for anticipated and unanticipated shifts in fiscal variables, as well as for differences in the response of output to tax and spending changes.

Two criticisms could be raised to our analysis. First, our out-of-sample simulations are constructed under the assumption that fiscal multipliers did not change during the financial crisis, when monetary policy hit the zero lower bound. When we test explicitly the hypothesis that recent fiscal adjustments had the same effect on output growth as past ones, we find it hard to reject the null, although in some cases failure to reject is marginal. This result appears inconsistent with some

recent empirical findings (discussed in the paper) where the costs of fiscal adjustments are found to be higher in recent years. One reason for this difference is the assumption – made in most studies of fiscal multipliers, but relaxed in this paper – that tax and spending multipliers are identical, and thus that one can estimate the output effects of “a fiscal consolidation”. If, as the data strongly suggest, fiscal multipliers depend on the composition of a fiscal correction, imposing that the effects of tax-based and spending-based consolidations are identical is likely to result in distorted estimates of the multiplier. Such distortion will depend on the composition of average fiscal adjustments, which occurred over the estimation sample. If the composition of the fiscal adjustments post-2007 differed from the average composition in the past, this could explain why models that impose identical effects of tax-based and spending-based consolidations find a break in the estimated multiplier.

The second, and in this case warranted, criticism is our failure to consider accompanying policies and to ask whether countries that accompanied fiscal austerity with structural reforms experienced better output growth than countries which did not. As noted in the introduction, and as documented in Alesina and Ardagna (2010, 2013) and Perotti (2013), multi-year fiscal adjustments rarely occur in isolation. They are often accompanied by other policies (devaluation, a labor market reform, a pension reform) and their effects will vary depending on these policies. These policy packages have in the past delivered cases of “expansionary fiscal consolidations” in which countries have managed to avoid any recessionary cost of fiscal contractions. In the current rounds of adjustments, except for the few pension reforms which we documented (with benefits accruing with several years of delay) and of the Spanish labor market reform, the fiscal corrections of 2010-13 were mostly implemented in a rush under market pressure and governments rarely had the time to design and get Parliaments to approve significant reforms. For instance only now Italy is considering a major labor market reform in the context of a pro-growth medium term package. More research is warranted on this point.

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Appendix A

Using the newspaper archive Factiva we searched for keywords which are connected to fiscal policy and debt crisis. The words included in our search are: “austerity”, “fiscal consolidation”, “fiscal compact”, “Maastricht”, “excessive deficit procedure”, “public debt”, “fiscal policy”, “budget deficit” and “debt crisis”. We collect monthly data for the countries in our sample from January 2006 to January 2014. Since newspapers vary greatly in size overtime (total number of pages, stories, and words) we normalize the absolute number of articles dividing by the total number of published articles. In order to do so, we proxy the total number of articles in each newspaper in each month by searching the most common word for each country.³⁰ We selected the first five national newspapers for circulation in every country excluding sport newspapers, free newspapers and tabloids. The newspapers included in our analysis are presented in Table 9 divided per country. The only exceptions are the United States where there are only three national newspapers with the above stated characteristics and Ireland where we were able to find only three national newspapers in Factiva.

[INSERT TABLE 9]

Appendix B

Ireland

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2009	2.4	0	0	0	0	2.4	0	0	0	0	0	1
2010	3.4	0	0	0	0	1.3	0	0	0	0	1	0
2011	0.9	0	0	0	0	2.5	0	0	0	0	0	1
2012	0.6	0	0	0	0	1.3	0	0	0	0	0	1
2013	0.9	0	0	0	0	1.2	0	0	0	0	0	1

Among the countries hit by the sovereign debt crisis, Ireland was the first to experience a dramatic financial shock since its banks had financed a property bubble that put them in dire straits. By the second quarter of 2009 Irish GNP had fallen by 13.6% with respect to its peak (the most severe contraction in Europe). At the burst of the property bubble, the government announced the intention to recapitalize the banking system, and in November 2010 Ireland asked for the help of the EU and

³⁰ For English-speaking countries we searched “the”; for Italy “il”; for France “le”; for Portugal “o”; for Spain “el”; for Germany “das”.

the IMF. Alongside the bailout, the government started a process of fiscal consolidation motivated by the serious deterioration of the fiscal stance: the public deficit had gone from balance in 2007 to a deficit of 14% of GNP in 2009 (spiking to 31% in 2010 because of the bailout of banks) and so did public debt, doubling between 2007 and 2008. Fiscal consolidation started in 2009 and continued until 2013. Year after year shifts in fiscal policy were always unannounced in advance. The consolidation was as intense as in Portugal but longer, lasting five years. Between 2010 and 2013 the measures adopted amounted, on average, by 4 percentage point of GDP per year for four consecutive years.

In 2009 the government implemented a spending-based fiscal adjustment with measures amounting to 5% of GDP in that year. But current and capital expenditure were cut, while revenue hikes were on income taxes, changes to social security (PRSI) and health. In 2010 the consolidation was again fully unexpected (namely it was not announced in advance) and was tax-based (along the previous similar lines): total spending cuts were 1.3% of GDP and tax increases 3.4%.

In 2011 revisions in Social Welfare and further capital spending cuts were introduced, with an impact of 2.5% of GDP. On the revenues side 0.9% of GDP was raised through changes in Household Charges, in the Capital Gains Tax, in the Capital Acquisitions Tax, in the tax on the interest rate on bank deposits) and in the Corporation Tax. The composition of the fiscal consolidation was reversed once again and became spending-based.

The consolidations in 2012 and 2013 were also unanticipated and implied spending savings for 1.3% and 1.2% respectively. Revenues were also increased in the two years by 0.6% and 0.9% respectively, with measures on personal and indirect taxes.

Italy

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2010	0.4	0	-0.3	0	0	0	0	0	0	0	1	0
2011	0.7	-0.3	1.3	0.9	0.2	1.0	0	0.6	0.7	0.1	1	0
2012	1.2	1.3	0.8	0.1	0	0.3	0.6	1.1	0.5	0	1	0
2013	0.3	0.8	0.1	0	0	0	1.1	0.5	0	0	0	1

The current very high level of the Italian public debt has its roots in the fiscal policies of the 70s and in the country's slowness in responding to the increase in world real interest rates which occurred in the 80s. During the 90s and the 2000s, many governments implemented fiscal consolidation policies but the debt level remained high: it was 106 percent of GDP before the economic crisis hit in 2008. The chronic lack of growth and productivity during the 2000s raised concerns about the long term sustainability of the public debt – a concern exacerbated by the subprime and the euro zone crisis.

Italy started to introduce measures aimed at improving the budget in 2010, mainly with a one-off income tax increase amounting to 0.3 percent of GDP.

The Budget Law of 2011 approved at the end of 2010 introduced a more ambitious fiscal adjustment path, two-thirds of which consisted of cuts in public wages, Ministries' and local governments' spending. Later in 2011 (approved in July and August³¹, respectively) the Berlusconi government added mainly revenue-side measures with increases in deposit stamp duties, gaming taxes and in the VAT rate. The total fiscal amount of these three measures reached 1.47 percent of GDP, of which 0.44 (0.74 unexpected minus 0.30 expired from the previous year) in tax-increases, and 1.03 percent in expenditure cuts. Further consolidations were planned for the following three years. Notice that, although the impact in 2011 fell mainly on the expenditure side, the measures announced for the following years mainly involved tax increases. That is why we classify 2011 as a tax-based plan.

In November 2011, the Berlusconi government was replaced by the “technocratic” government led by Mario Monti. The new executive added many additional measures for 2012 and 2013, almost exclusively on the tax side, especially on composed of property and value added taxes. Spending measures mainly involved reductions in central government transfers to Local Government Bodies³² and a pension reform providing substantial savings in the long-term but virtually nothing immediately. The impact of the tax increases introduced by the new government, together with the ones previously announced by the Berlusconi Government, amounted to 2.5 percent of GDP, while the expenditure cuts equaled 0.9 percent of GDP.

In 2013 the continuation of the previously announced expenditure savings (mainly including de-indexing of all those pensions whose amount exceeded three times the minimum) started to have their effects, changing the definition of the plan from TB to EB. On the tax-side, the announced measures with impact in 2013 were decided by the Berlusconi government in 2011 and mainly involved reductions of tax reliefs (DL 138/2011), gaming revenues and increases in stamp duties (DL 98/2011). The unexpected tax measures are instead due to a raise in excise taxes ad advance payment of income taxes from July 2013, and to an increase in VAT rate from October 2013.

³¹ Another Law (183/2011) was implemented in October 2011 but it had no net effects in the 2011 budget and negligible impact for the following budget years.

³² We classify these as spending cuts even though some local governments may compensate them issuing more debt in the short run and then with tax hikes but it is very difficult to link directly such policies at the local level with the budget cuts from the central government.

Spain

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2009	0.3	0	0	0	0	0	0	0	0	0	1	0
2010	1.1	0	0	0	0	1.8	0	0.5	0	0	0	1
2011	0	0	0	0	0	2.0	0.5	0.9	0.9	0.5	0	1
2012	1.8	0	0.9	0	0	1.1	0.9	1.9	0.5	0	0	1
2013	2.1	0.9	0.7	0.3	0	1.5	1.9	1.4	1	0	0	1

In Spain the policies needed to fight high unemployment and support the banking system after the financial crisis led to a significant increase in the level of the debt that reached 84% of GDP in 2012 from 36.3% of 2007. Notwithstanding the poor growth performance starting from 2008, as early as 2009 the government embarked on policies aimed at reducing the deficit. The consolidation was even more intense than in Portugal and in Ireland: during 2012 and 2013 the measures amounted to almost 5 per cent per year each year. Between 2010 and 2013 the budget was cut, on average, by 4% of GDP per year for four consecutive years

The first measures were implemented in July 2009 for a total of 0.3% of GDP from an increase in excise taxes. This is the only tax-based episode which occurred in Spain over our sample. From 2010 on all fiscal plans were spending-based.

In 2010 the consolidation started during the previous year continued thanks to the effects of both the Budget of the year and an Immediate Action Plan. The latter cut spending by 0.5% of GDP in 2010 and announced further 0.5% cuts in 2011. In addition the Budget prescribed spending cuts on current expenditure, infrastructures and public sector wages for 1.3% that led to a total unanticipated spending reduction of 1.8%. Revenues were increased with the elimination of tax credits on personal income taxation and significant increases in VAT and excises for a total of 1.4% of GDP.

In 2011 the government approved an Expenditure Review Plan for the years 2011-13. The impact on spending measures was 2% of GDP of cuts, comprehensive of some other savings derived from a commitment by the Autonomous Communities and Local Government. The Expenditure Review Plan prescribed the freezing of public sector salaries, changes of the replacement rate, cuts to social transfers and social benefits, reduction of subsidies to private investment for infrastructures and cuts in central government investment. The effects of the Expenditure Review Plan announced for subsequent years are 0.9% in 2012, 0.9% in 2013 and 0.5% for 2014.

In June 2012 the yield on 10-year Spanish government bonds reached 7%. In the same month the Euro group granted the country a financial support package of up to € 100 billion, aimed at recapitalizing the banking sector. Conditional on the bailout of 2012, Spain had to implement

additional corrections in 2012 and 2013 that were almost equally distributed between revenues increases and spending cuts. In 2012 the Budget introduced new measures on personal income and corporate taxation that were worth 1.8% of GDP, with announcements worth 0.9% for 2013. On the spending side, unexpected policies were introduced amounting to 1.1% of GDP with major cuts in transfers and some cuts to government department expenditure. The departments that experienced the biggest cuts were healthcare and education. The Budget also changed the announcements for 2013 by adding 1.4% of spending savings.

The Budget 2013 followed the consolidation path started in the previous years and introduced some unexpected policies on both taxes and spending. Tax hikes were centered on the Personal Income Tax, non-resident taxes, Social Security contributions and VAT, for a total of 1.5% of GDP. The same measures were expected to generate additional revenue worth 0.7% of GDP in 2014 and 0.3% in 2015. On the expenditure side the unexpected measures amounted to 2.1% of GDP and were based on cuts to social spending and employment policies. The cuts to public wages that were announced in the Expenditure Review Plan were in part reversed in the 2013 Budget with a spending increase of 0.2% of GDP. The spending measures introduced in 2013 were expected to yield savings worth 1.9% in 2014 and 1% in 2015.

Austria

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2011	0.4	0.0	0.2	0.1	0.1	0.3	0.0	0.2	0.1	0.1	1	0
2012	0.4	0.2	0.4	0.0	0.0	0.2	0.2	0.5	0.6	0.5	0	1
2013	0.0	0.4	0.0	0.0	0.1	0.0	0.5	0.6	0.5	0.4	0	1

The Austrian federal government introduced in 2009 a package of discretionary stimulus measures to counterbalance the weak economic prospects. These measures contributed to a worsening of the budget deficit that increased from 0.9% of GDP in 2008 to 4.6% in 2010.

In December 2009 Austria entered the Excessive Deficit Procedure and a four-year consolidation plan was designed in the autumn of 2010. Most of the measures were to be implemented in 2011. Spending cuts amounted to 0.3% of GDP and consisted in savings from pensions, reduction in transfers, subsidies and social spending, but were partially offset by the extension of some special priority funds (in particular for education and R&D). The plan also envisaged some measures on the revenue side worth 0.4% of GDP including a special stability levy on banks and an increase in environmental and tobacco taxes. The announced impact of the plan in 2012 was about 0.2% on spending and 0.2% on the revenue side. It was about 0.05% and 0.1% respectively in both 2013 and 2014.

A second round of consolidation was announced in early 2012 with a greater emphasis placed in reducing spending. The plan included structural reforms in the field of pensions (an increase in the retirement age, stricter eligibility criteria for disability pensions), health (introduction of an expenditure cap), subsidies and administration (pay freeze and better management). Moreover, it foresaw changes in the taxation of high-income individuals and business groups and measures against tax avoidance, such as a special withholding tax on capital gains from assets held in Switzerland and the closure of VAT loopholes. The impact of the spending measures was expected to be increasing over time – only 0.17% in 2012, but 0.4% in 2013, 0.5% in 2014 and 2015 and 0.4% in 2016. Revenue measures totaled 0.4% in 2012 and 0.3% in 2013 but a small tax cut (due to the expiration of the withholding tax) was announced for 2014.

Belgium

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2010	0.4	0.0	0.3	0.0	0	0.6	0.0	0.1	0.0	0	0	1
2011	0.2	0.3	0.0	0.0	0	0.1	0.1	0.0	0.0	0	1	0
2012	1.3	0.0	0.2	0.2	0	1.2	0.0	0.4	0.6	0	0	1
2013	0.6	0.2	0.2	0.0	0	0.5	0.4	0.6	0.0	0	0	1

After a period of fiscal stimulus (and substantial capital injections to save the main players in the financial sector), in 2010 the Belgian government returned to the consolidation path that was in place before the crisis (the Belgian public debt had fallen from close to 140% of GDP in 1990 to just above 80% in 2006). In December 2009 Belgium was subject for the first time to the Excessive Deficit Procedure and the European Council recommended taking actions to restore fiscal balance by 2012. The Belgian fiscal strategy consisted in short and frequent plans: between 2010 and 2013 a new plan was adopted each year.

The fiscal package implemented in 2010 was mostly on the revenue side, including hikes in corporations and environment related taxes, a special contribution on the nuclear energy and financial sectors and increased efforts to fight tax evasion. These measures generated an impact of 0.4% of GDP in 2010 and 0.3% was announced for 2011. Spending cuts at the federal government level consisted in a reduction of health care and social security expenditure and cuts to personnel and other primary expenses. These measures, along with some additional spending cuts introduced by regional governments, amounted to 0.6% in 2010 and 0.1% in 2011.

A new set of unexpected measures was introduced in 2011 totaling 0.2% of GDP on the revenue side (abolition of banking secrecy, regularization of evaded taxes) and 0.1% on the spending side (health care and anti-social security fraud).

The 2012 package implemented by a new coalition government marked discontinuity and principally consisted in reductions in primary and social security expenditures. Cuts of 1.2 were implemented immediately and additional 0.4% and 0.6% were announced for 2013 and 2014. On the revenue side, environmental taxes were raised and some changes were made in corporate taxation. The impact of these measures was 1.3% in 2012, but only 0.2% in 2013 and 2014. An additional consolidation was introduced in 2013 with a roughly equal impact on the spending and on the revenue side (0.6% and 0.5% respectively).

France

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2011	1.16	0	0.66	0	-1.1	1.32	0	0.44	0.41	0.05	0	1
2012	0.39	0.66	0.25	0.45	0	0.63	0.44	0.59	0.3	0	0	1
2013	1.4	0.25	0.45	0	0	0.6	0.59	0.7	0	0	1	0

In France the forecasted deficit for 2009 was 4%. The intention to start a multi-year plan of fiscal consolidation appears clear in the budget reports of the government. In December 2010 the Initial Budget Act and the Social Security Budget Act were approved and generated revenues for 0.6% of GDP mainly from measures financing social security debt, with a few minor changes to VAT on “triple pay”. Additional revenue increases were announced for 2012 with an impact of 0.6%, while in 2013 the impact is negligible and a cut in taxes of 1.1% was announced for 2014. These announcements were also the result of new measures announced on the 24th of August and 7th November 2011. Additional proceeds of 0.52% of GDP came from a package of measures approved before the 24th of August.

The two Acts of late 2010 were complemented by the Pension Reform of 2010, programmed to increase the retirement age and make the pension system sustainable over the long-run. The latter one generated savings from 2011 to 2013. Additional expenditure savings came from reductions in National Healthcare expenditure, wage bill savings and cuts in state operating costs for a total amount of 0.6% of GDP and an extra 0.75% came from the withdrawal of previously planned stimulus measures. Further measures for 0.4% were announced for 2012 and 2013, while 0.1% worth of savings was announced for 2014. The consolidation in 2011 turned out to be spending-based.

In 2012 unexpected tax measures for 0.4% of GDP were implemented, accompanied by announcements of 0.3% for 2013 and 0.5% for 2014. On the spending side, the government implemented the measures announced in November 2011 and additional cuts approved in the Budget Bill and in the Supplementary Budget Act promulgated in March for a total of 0.6%. The

announcements for 2013 and 2014 were updated with a further cut of 0.2% in both years introduced on November 9th. The consolidation of 2012 was again spending-based.

In 2013 there were new unannounced tax increases in personal income taxes, wealth tax, social levies on capital income and capital gains, and increases in indirect taxes. Moreover, spending cuts for 0.6% were implemented and regarded the compensation of employees, running costs in central government and social transfers to households. Part of the 0.6% of savings was raised thanks to the introduction of some constraints such as a freeze to real and nominal spending growth that was worth € 1 billion of savings a year from 2013 on. Further spending curtailments coming from the MAP (*Modernisation de l'Action Publique*) spending review and cuts in transfers to local authorities added 0.4% of savings to the measures already announced for 2014. Given the total amount of new tax measures decided in 2013, the style of the consolidation in France reversed to tax-based.

Germany

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2010	0.0	0.0	0.0	0	0	0	0	-0.12	0	0	0	0
2011	0.3	0.0	-0.1	0	0	0.27	-0.12	0.29	0	0	0	1
2012	-0.1	-0.1	-0.2	0	0	0.57	0.29	0.09	0	0	0	1
2013	0.0	-0.2	0.0	0	0	0	0.09	0	0	0	0	1

In Germany the fiscal consolidation started in 2011 when the fiscal stance deteriorated due to the expansionary measures implemented after the crisis. Stimulus packages and bank support measures had led to a 4% budget deficit in 2010 starting from a substantial balance in the pre-crisis period. In addition, the debt to GDP ratio had increased by 20% between 2007 and 2010. In response, the government in 2009 introduced a constitutional amendment (*Schuldenbremse*) that would impose a commitment to balanced budgets year by year by 2020. In light of the amendment, the government announced its intention to reduce the central government deficit to 0.35% of GDP by 2016. In order to meet the goal, a four-year consolidation plan was announced in 2011, estimated to have a cumulative impact of € 80 billion, two thirds of which were measures designed to curtail spending. However, we cannot consider this plan to be announced in 2011 in its full extent because details about single measures and true commitments were only delivered with a single year horizon. Moreover, summing up all the measures implemented so far, we notice that the total fiscal consolidation effectively occurred was much lower than the € 80 billion initially announced.

The government in 2010 introduced some strategic investments for long-run growth (*e.g.* investments on education). The latter were equally split over the years 2010-13 and led to an announced expansion of 0.1% of GDP in 2010. We label the 2010 as neither tax nor spending-based

since there is no actual consolidation, but only an announced expansion. In 2010 the executive also announced a tax reform aimed at constructing a growth-friendly tax structure, but no estimates of the impact of these measures on the budget was produced.

In 2011 the fiscal consolidation started introducing spending reduction measures falling mainly on the health and energy sectors, changes in the pension formula and discretionary measures at both central and local government levels. These measures had an unexpected impact of 0.3% of GDP in 2011 and an additional announced impact of 0.3% for 2012. On the revenues side, the main interventions were an increase in the contribution rate to the statutory health insurance and an increase in unemployment insurance contributions for a total impact of 0.3% in the year. Other tax measures were announced for 2012 with a total negative impact of 0.1 mainly due to a reduction in the contribution rate to the public pension and a reduction of the rate of insolvency benefit contributions. The 2011 consolidation turned out to be spending-based.

In 2012 new spending and tax measures were introduced. Unexpected cuts in spending for 0.6% occurred and regarded interventions in the pension formula and the phasing out of investment that had been introduced as part of the stimulus package. The same measures are expected to generate an additional consolidation of 0.1% of GDP in 2013. Taxes were further cut by means of changes in dividend taxation and a new reduction in the contribution rate to the public pension with a total impact of 0.1%. Additional tax cuts of 0.2% were announced for 2013. Both the years 2012 and 2013 are classified as spending-based.

United Kingdom

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2010	0.1	0.0	0.7	0.4	0.3	0.3	0.0	0.3	0.4	0.4	0	1
2011	0.0	0.7	0.4	0.3	0.1	0.0	0.3	0.6	0.6	0.4	0	1
2012	-0.1	0.4	0.4	0.3	0.0	0.0	0.6	0.6	0.5	0.1	0	1
2013	-0.1	0.4	0.1	0.0	0.1	0.1	0.6	0.6	0.2	0.1	0	1

The projected budget deficit for the United Kingdom reached 11.4% of GDP in 2009 after recovery packages were implemented.

Fiscal consolidation started in 2010 with the 2010 Budget titled “Securing the recovery”, which was introduced in March. The March Budget announced further measures for the next three years, but no measures for the current year. In May 2010 the newly elected government by David Cameron entered in office and approved in June a new Budget with measures for the year amounting to 0.1% in tax hikes (mainly VAT taxes with the increase of the rate to 20%) and spending reductions of 0.3% of GDP with curtailments to both current and capital spending.

The 2010 Budget also included announcements on the revenues side for future years. A 0.7% increase was announced for 2011 due to the introduction of a levy on banks and some changes in personal income tax credits; 0.4% of revenues increases were announced for 2012 and 0.3% for 2013 with additional effects from the change in the bank levy and measures on capital allowances. Spending cuts were also announced on current and capital spending with impacts of 0.3% in 2011 and 0.4% in both 2012 and 2013. The fiscal consolidation in 2010 was spending-based.

At the end of October 2010 an Expenditure Review Plan was approved with spending cuts of 0.06% in the fiscal year 2011-12. Expenditure cuts fell mainly on transfers. A few months later, the March 2011 Budget prescribed tax hikes for 0.04% of GDP and spending increases for 0.04% having no effect on government net borrowing for the fiscal year 2011-12. The total calendar year allocation of unexpected policies in 2011 was a 0.03% of tax hikes and a 0.01% of spending cuts. For what concerns the announcements for the years to come, the government revised to a minor extent the revenue measures designed for 2012 and 2013, while the 0.1% announcement for 2014 was already part of 2011 announcements. On the spending side, the Expenditure Review added some additional spending cuts for 2012, 2013 and 2014. They came mainly from changes in contributory employment and support allowance, cuts to households' benefits and reductions in civil service pensions. The overall plan was again spending-based.

The unexpected measures implemented in 2012 came from the autumn 2011 Statement and the March 2012 Budget. On the revenues side, stamp duties were raised as well as some personal taxes, but increased tax reliefs and corporate tax cuts led to an overall decrease in taxes. The total impact of measures in the year was negative (i.e. there was an unexpected expansion) with tax cuts of 0.1% and small spending cuts of 0.01%. However, the expansion was more than compensated by the implementation of the previous years' announcements. Some increases in revenues announced for 2014 were introduced, with an estimated impact of 0.3%. They fell in particular on income taxes, capital and age related allowances. Spending announcements implied only minor revisions with almost no impact. Overall the plan remained spending-based.

Compared to the measures adopted in some euro area countries (Spain, Ireland and Portugal in particular) those adopted by the Cameron government were relatively mild, amounting to about 1% of GDP per year from 2010 to 2013.

The March 2013 Budget announced some spending cuts with a calendar year impact of 0.1%. On the tax side there was a small reduction in revenue worth of 0.1% due to the cancellation of some duties. 2013 is still a consolidation year thanks to the announcements coming from previous Budgets. Further tax cuts were announced for 2014 and the estimated impact for the year changed from 0.3% to 0.1%. Spending cuts for 2014 and 2015 were accompanied by additional announcements that led to estimated impacts of 0.6% in 2014 and 0.2% in 2015. The composition of the consolidation plan was reversed and became tax-based.

United States

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2011	0	0	0	0	0	0.04	0	0.14	0.12	0.1	0	1
2012	0	0	0	0	0	0	0.14	0.12	0.1	0.08	0	1
2013	0.16	0	0.12	0	0	0.25	0.12	0.1	0.08	0.05	0	1

In 2011, the US fiscal policy was subject to an abrupt change and shifted from providing huge emergency fiscal stimuli to the attempt of reducing the fast accumulating public debt. In 2010, the country was running a federal public debt of almost 70% of GDP, with a fiscal deficit of over 10% of GDP. The weakening of public finances was not only due to the fiscal stimulus implemented right after the sub-prime crisis, but also to previous policies such as the Bush tax cuts and increased appropriations for defense, homeland security and Medicare. In 2012, the Economic Report of the President wrote that, “*recognizing the economic risks associated with sustained large budget deficits, the Obama Administration has made deficit reduction a priority*”. Indeed, in 2011, fears of exploding public deficit also triggered the downgrade of the US public Debt by S&P for the first time in history. Hence, in both 2011 and 2013, the congress pushed and obtained deficit consolidation measures as a condition to confirm the raise in the debt-ceilings. In 2011 the Administration and Congress agreed on a \$ 1 trillion (over ten years) deficit reduction package in the Budget Control Act of 2011, introducing statutory caps on most discretionary spending from FY2012 through FY2021. Expenditure restraints started to have an impact from FY2012, hence from October 2011 on. According to our calendar year allocation the total amount of spending cuts amounted in \$ 5.5 billion in 2011, equivalent to 0.04 percent of GDP. The same act was planned to achieve around 0.1 percent of GDP in additional savings for each of the following years, only involving spending measures (see lines 2011 and 2012 in the table for the US Fiscal Plan above).

On January 2, 2013 a long debate about the so called “fiscal cliff” came to an end. The fiscal cliff was a combination of expiring tax cuts and across-the-board government spending cuts scheduled to become effective on Dec. 31, 2012. However, on January 2013 the American Taxpayer Relief Act 2012 was passed, avoiding some of the automatic sunset provisions scheduled to take effect in January. Hence, the actual impact of the fiscal consolidation was \$ 28 billion in 2013 and 20 billion in 2014, equivalent to 0.16 and 0.12 percent of GDP respectively, mainly including tax increases in income and capital gains and dividend tax rates for certain high-income taxpayers. We do not code the automatic expiration of the Bush Tax cuts as an announced shock, since its actual implementation was a very uncertain event.

As for the “Sequester” automatic spending cuts, after delaying the decision until March 2013 the reductions in outlays equivalent to 0.25 percent of GDP were indeed implemented. Since the exact amount of the effect in 2013 was highly uncertain (it was not even computed in the CBO cost estimate of the Budget Control Act 2011) as well as its actual enactment, until March 2013, we

code this shock as unanticipated. We sum to these cuts the anticipated cuts in discretionary and mandatory spending announced in the Budget Control Act 2011 of 0.12% of GDP.

Denmark

Year	τ_t^u	$\tau_{t,0}^a$	$\tau_{t,1}^a$	$\tau_{t,2}^a$	$\tau_{t,3}^a$	g_t^u	$g_{t,0}^a$	$g_{t,1}^a$	$g_{t,2}^a$	$g_{t,3}^a$	TB	EB
2010	0	0	0.4	0.1	0.5	0	0	0.6	0.6	0.6	0	1
2011	0	0.4	0.1	0.5	0	0	0.6	0.6	0.6	0	0	1
2012	0.3	0.1	0.6	0	0	0	0.6	0.6	0	0	0	1
2013	0	0.6	0	0	0	0	0.6	0	0	0	0	1

Denmark put in place countercyclical fiscal policies in 2009 and 2010. In particular, a labor-tax reform (“Spring Package 2.0”) was announced in 2009 and consisted of an immediate reduction of taxes on labor income financed with an increase in other duties (environmentally related, unhealthy food, individual business sectors) that only became effective starting in 2011. Denmark entered the crisis having sound public finances with a debt-to-GDP ratio below 50% and a general government deficit lower than 3% in 2010. However, large automatic stabilizers and discretionary measures caused a significant increase in public spending and made the deficit likely to deteriorate.

Denmark was thus subject to the Excessive deficit procedure and consolidation measures were introduced... In May 2010 the government adopted a package that was expected to lead to a budgetary improvement of 2.1% of GDP by 2013. Targeting public expenditure was the main objective and was pursued by imposing a real-term freeze in public consumption growth, better control of budgetary execution at the local level and a reduction in the duration of unemployment benefits. The plan also included some tax measures. The announced impacts of the plan were, on the spending side, 0.6 for 2011, 2012 and 2013; on the revenue side measures for 0.3 were announced for 2011 and 0.1 for 2012 and 2013. Some of the financing elements of the Spring 2.0 package came into operation in 2011 (0.1%) and 2013 (0.4%).

An additional but small increase in taxes and excise duties was introduced in the 2012 Budget Bill (0.2% of GDP in 2012 and 0.1% announced for 2013).

Appendix C

In this Appendix we provide an example on how we derived our information regarding fiscal plans for all countries reported in the text. We use Italy as an example of our procedure.

Italy 2010³³

Fiscal consolidation amounted to 0.42 percent of GDP, fully tax-based. As stated in the Italy Stability Programme, January 2010 (p. 32), measures improving the primary balance (i.e. lower expenditures and higher revenues) intended “to prevent a worsening of the deficit- and debt-to-GDP ratios”. However, part of the fiscal measures “focused on reallocating resources to measures that would have the strongest positive impact on the economy in the short term, so as to counter the most painful social and economic consequences of the crisis, while waiting for evidence of a solid economic recovery”. Thus, we conclude that the specific measures envisaged to fend off the impact of the crisis and to sustain growth are endogenous and we exclude them from our estimates. Another reason why this year should be included in the analysis is that Italy was under Excessive Deficit Procedure since December 2009, hence any fiscal policy decision was under a strict obligation to bring down the deficit at 3% by 2012 (Council Decision of 19 January 2010 on the existence of an excessive deficit in Italy). Tax hikes amounted to 0.42% of GDP, while there were no net expenditure reductions.³⁴ The 2010 Budget Law included one-off revenues for around 4 billion euros (0.26% of GDP) from the increased IRPEF balance and the recovery of illegal State subsidies (Italy Stability Programme, January 2010, p. 38). Anticipated consolidation measures for 2011 and 2012 are negligible as a percentage of GDP.

Italy 2011

Fiscal consolidation amounted to 1.47 percent of GDP, of which 0.44 in tax-increases and 1.03 in expenditure cuts. As stated in Italy Stability Programme 2011: “The consensus reached is that the principal objective of economic policies - a fair and sustainable growth - is not attainable, except with the essential requirement, and within the context, of financial stability and solidity”. And again: “The measures with the 2011-2013 budget package are acknowledged for the purpose of ensuring the planned decrease in the deficit with the timetable to which the Government has committed” (Italy Stability Programme, May 2011, p. 32). Fiscal consolidation measures motivated by deficit reduction amounted to 1.56% of GDP, with tax policy measures of 0.54% and spending cuts of 1.02% (p.71-72). Expansionary measures accounted for 0.8% of GDP, with tax reductions of 0.29% and spending increases of 0.51% but we exclude them from our estimates due to their countercyclical nature.³⁵ In addition to the 2011 Budget Law, the Decree Law 98/2011 (July 2011) and the Decree Law 138/2011 (August 2011) had a fiscal consolidation impact in the second half of 2011 of 2.8 billion, of which 2.6 billion (0.16% of GDP) of revenue increase and 0.2 billion of spending cuts (0.01 % of GDP) (see tables VI.4, VI.5 and VI.6 of Italy’s Stability Programme ,

³³ 2009 is not included in the analysis because contained “measures fending off the impact of the intense financial and real crisis” (Italy Stability Programme, February 2009, p. 1).

³⁴ For details about the composition of the adjustment, see page 35 and 38 of Italy Stability Programme (January 2010). Note that the tax hike and the expenditure cuts result from the difference in shock between 2009 and 2010 in the Decree law 78/2009 and taking into account of the compositional change introduced later in DL 191/2009 (See page 35 and 38). None of the fiscal expansionary measures were taken into account because considered endogenous.

³⁵ There is no explicit motivation for the expansionary measures in the package. However, most of them appear to be motivated by countercyclical objectives, e.g. concessional tax regimes and income tax advance payments IRE (2.3 billion lower revenues), employment fund (CIG, 0.6 billion) and social policy fund (0.2 billion).

April 2012). Hence, the total impact of unanticipated measures in 2011 was of 0.7 percent of GDP (0.54+0.16) in higher revenues and of 1.03 percent of GDP (1.02+0.01) in lower spending. The revenue impact must be discounted for the expiration of one-off taxes introduced in 2010 of 0.26 percent of GDP. The 2010 stability and budget laws are also calculated to have a substantial effect in 2012 (0.26 percent of GDP) equivalent to 5.2 billion of euros (see Table 10).

Italy 2012

Fiscal consolidation amounted to 3.2 percent of GDP, with 2.5 percent in tax increases and 0.9 percent in expenditure cuts. The plan for consolidation was “*based on two elements: fiscal consolidation and promotion of growth. And an agenda of reforms based on three underlying principles: rigor, growth and equity*” (Italy Stability Programme, April 2012, p. V). The timeline of the fiscal consolidation was as described in Table 10

[INSERT TABLE 10]

The cumulative impact of the 2011 Budget packages totaled 48.9 billion euros, i.e. 3.1% of GDP. Tax hikes amounted to 49.5 billion (3.14% of GDP) and spending cuts to 24.5 billion (1.55% of GDP). Growth-enhancing measures entailed tax cuts motivated by reducing labor costs, improving youth and women employment and stimulating investment of private capital, for a total of 9.2 billion (0.58% of GDP). Additionally, incremental expenditure aimed at enhancing public infrastructure and the use of resources under the Fund for Structural Economic-Policy Actions amounted to 15.8 billion (1% of GDP). Therefore, the 48.9 billion fiscal consolidation entailed an overall decrease in spending of 8.7 billion (24.5-15.8), i.e. 0.55% of GDP, and an overall increase in revenues of 40.3 billion (49.5-9.2), i.e. 2.55% of GDP. Additionally, the Decree Laws 98/2011 and 201/2011 included one-off measures for around 3.1 billion euros (0.2% of GDP), of which 3.3 billion higher revenues from increased VAT rates³⁶ and 0.2 billion lower revenues from reduced charges for cottage-industry businesses (Italy Stability Program, January 2012, p. 61-63). Anticipated measures for 2013 include increased revenues from gaming, the municipal tax on waste and service (TARES) and the realignment of value of equity holding (substitute tax) for a total of 5.9 billion (0.37% of GDP), and spending cuts from the domestic stability pact, the streamlining of healthcare expenditure and measures covering the public-sector employment for 5.8 billion (0.36% of GDP). Anticipated measures for 2014 consist in higher revenue from gaming, the revision of depreciation rates, the TARES and equity taxes, for 24.2 billion (1.46% of GDP). Lower spending from several public expenditure cuts amount to 12.5 billion (0.79% of GDP). In July 2012, a new Decree Law (95/2012) was introduced, mainly to find resources necessary to avoid an increase in

³⁶ The DL 201/2011 provided, as of October 2012, an increase of two percentage points to the existing VAT rates of 10 percent and 21 per cent, and another increase of one-half percentage point as of 2014. However, Table VI.7 p.63 of Italy Stability Programme 2012 does not report these announced increases in taxes for 2013 and 2014. The reasons why these measures were not included directly in the Table VI.7 is that these increases were supposed to be implemented only if the government did not find alternative spending cuts to avoid this increase (see *Indagine conoscitiva sul decreto legge recante disposizioni urgenti per la crescita, l'equità e il consolidamento dei conti pubblici* by Visco and footnote 5 at http://documenti.camera.it/leg16/dossier/Testi/d016.htm#_ftn5). Hence, we do not include these VAT rate increases as announcements for the following years because their introduction was very uncertain, not even the budget documents provided precise estimates of the expected returns and they were indeed avoided for the most part.

VAT rates. This turns in our model to an unexpected shock of € 4 billion in spending cuts³⁷ in 2012, and € 3 billion both in 2013 and 2014 (see Tavola VI.4 of *Documento di Economia e Finanza 2013*).

For the purposes of the analysis, we distinguish between unanticipated and anticipated components of the many different bills setting the plan and derive the total:

[INSERT TABLE 11]

Italy 2013

Fiscal consolidation amounted to 2.2 percent of GDP, with 1.1 percent in tax increases and 1.1 percent in expenditure cuts. The fiscal plan for 2013 aimed at maintaining the stability of public balances, easing off fiscal pressure and providing for a structural correction of public spending trends. The 2013 budget entailed a weak expansion of 2.3 billion (0.1% of GDP) mostly due to lower revenues (see Tavola VI.5 p.71 of *Documento di Economia e Finanza 2013*). However, the effects of this budget are computed in the official documentation as if the delayed increase in VAT rate (to July 2013) was a decrease in tax, and we cannot do the same because we did not include these measures as an announcement in previous years (see footnote). Hence, we compute the total amount of this budget by dropping the “sterilization of the VAT increase”. This turns the budget to be a consolidation based on higher taxes by 2.5 billion and 400 millions of spending increases. The increase in VAT rate was further delayed from July 2013 to October 2013 by DL n.76 of 2013. To cover the €1 billion expected revenues from VAT of one quarter, the government implemented higher excise taxes and an increase in advance income tax payments³⁸. In October 2013 a new decree to delay the VAT increase until 2014 was in preparation when the government fell and the increase from 21 to 22 percent of the VAT rate was indeed implemented. The annual amount of this measure was computed to be of € 4 billion. Given that we are interested only in the impact in 2013, we introduce this unexpected introduction as an additional € 1 billion tax shock. Hence, we consider this budget to give a 0.3% unexpected tax shock (and a negligible spending expansion). Taking into account measures anticipated in 2012, the fiscal package leads to a consolidation of 2.1% of GDP. Specifically, tax hikes amount to 1.1% of GDP (0.8+0.3), while spending increases to 1.1% of GDP.

Appendix D: Plans and the Measurement of their Effects of Output

The fiscal plans studied in the paper are constructed expanding the data put together, using the narrative method, by Devries et al (2011). Jordà and Taylor (2013) argue that the episodes of fiscal consolidation identified by Devries et al (hereafter referred to as 'IMF shocks') are not exogenous,

³⁷ We do not introduce the “higher revenues” due to the delayed implementation of VAT raises because previous budget of the governments did not included them as announced shocks and hence it would be a mistake to count them as lower revenue if before it was not introduced as announced higher revenue.

³⁸ <http://www.ilsole24ore.com/art/notizie/2013-06-26/tassa-sigarette-elettroniche-acconti-121721.shtml?uuid=AbWWac8H&fromSearch>

and thus are not valid instruments because they can be predicted using their own past (strongly), past values of output growth (very weakly) and past values of debt dynamics (weakly). This claim is incorrect.

First, exogeneity is different from predictability. The correct estimation of the effects on output of a fiscal adjustment requires – within our framework, as in similar work e.g. Romer and Romer (2010) – the use of exogenous fiscal shocks for the estimation of their effect on output, *i.e.* shocks that cannot be predicted from past output growth. The fact that fiscal shocks can be predicted from their past realizations or from the realization of other variables, different from output growth, does not invalidate exogeneity.

Exogeneity is satisfied by the original IMF narrative identified corrections. It can be violated, however, if one transforms those shocks, which are continuous, into a 0/1 dummy variable, as in Jordà and Taylor (2013). The reason, as a simple regression shows, is that transformation into a 0/1 dummy, and the loss of information it implies, introduces correlation with past output growth. Notice that the exogeneity required to estimate fiscal multipliers within a dynamic model – as we do in this paper – is different from the condition required if one were to estimate these parameters from an average treatment effect (ATE). What matters in our model is weak exogeneity for the estimation of the parameters of interest, not the random assignment of a treatment.

As a matter of fact the IMF shocks can be predicted from past debt dynamics by construction: they are defined as shifts in fiscal policy “motivated by the objective of stabilizing or reducing the debt ratio”. Predictability in this sense is not inconsistent with exogeneity with respect to past output growth: for this reason Romer and Romer (2010), for instance, include tax shocks motivated by the objective of stabilizing or reducing the debt among their exogenous (for the estimation of the output effect of fiscal policy) shocks.

Finally, IMF shocks are predictable by their past realizations also by construction and, as in the previous case, this predictability is not inconsistent with exogeneity with respect to past output growth.

Consider our analysis of fiscal adjustment plans:

$$f_{i,t} = e_{i,t}^u + e_{i,t,0}^a + e_{i,t,1}^a$$

$$e_{i,t,1}^a = \varphi_{1,i} e_{i,t}^u + v_{1,i,t}$$

$$e_{i,t+1,0}^a = e_{i,t,1}^a$$

Where $f_{i,t}$, the narrative exogenous fiscal adjustments in each year, are made of three components: the unexpected adjustments (announced upon implementation at time t), the past announced adjustments (implemented at time t but announced in the previous years) and the future announced corrections (considering, for simplicity, the case in which the horizon of the plan is only one year these corrections are announced at time t for implementation at time $t+1$).

The IMF corrections are defined as follows:

$$e_{i,t}^{\text{IMF}} = e_{i,t}^u + e_{i,t,0}^a$$

Based on this definition, the fact that the $e_{i,t}^{\text{IMF}}$ are correlated across time is not surprising. In fact, as we shall now show, if fiscal policy is implemented through plans, $e_{i,t}^{\text{IMF}}$ are correlated by construction.

$$\text{Cov}(e_{i,t}^{\text{IMF}}, e_{i,t-1}^{\text{IMF}}) = \text{Cov}(e_{i,t}^u + e_{i,t,0}^a, e_{i,t-1}^u + e_{i,t-1,0}^a) = \varphi_{1,i} \text{Var}(e_{i,t-1}^u)$$

In AFG and in this paper we deal with this problem in the following way. Going to the source of the IMF construction of narrative corrections, we decompose the fiscal adjustment in each year in its three components, then we simulate the effects of a fiscal plan, by using a moving average representation of output growth that projects it on each of the three types of fiscal action, supplemented by the set of equations describing the country-specific style of the plan.

$$\begin{aligned} \Delta y_{i,t} &= \alpha + B_1(L)e_{i,t}^u * TB_{i,t} + B_2(L)e_{i,t,0}^a * TB_{i,t} + C_1(L)e_{i,t}^u * EB_{i,t} + C_2(L)e_{i,t,0}^a * EB_{i,t} \\ &\quad + \sum_{j=1}^3 \gamma_j e_{i,t,j}^a * TB_{i,t} + \sum_{j=1}^3 \delta_j e_{i,t,j}^a * EB_{i,t} + \lambda_i + \chi_t + \mu_{i,t} \\ e_{i,t,j}^a &= \varphi_{i,j} e_{i,t}^u + v_{i,t,j} \quad j = 1,2,3 \\ e_{i,t,0}^a &= e_{i,t-1,1}^a \\ e_{i,t,j}^a &= e_{i,t-1,j+1}^a + (e_{i,t,j}^a - e_{i,t-1,j+1}^a) \quad j > 1 \end{aligned}$$

Note that the first two components of the fiscal correction $e_{i,t}^u$ and $e_{i,t,0}^a$ have a direct effect on year t national accounts, while the third components has only an indirect effect that works through an expectations channel. The coefficients capturing the effect of unexpected and anticipated components are not restricted to be the same. We also allow for between country heterogeneity in the style of the plans and within country heterogeneity in the effect of a plan according to its TB or EB nature.

Correlated Innovations and Local Projections

The autocorrelation of $e_{i,t}^{\text{IMF}}$ is problematic for the application of the Local Projections Method to construct impulse response functions. To illustrate the point consider the following simple VAR(1), augmented with the observable, narratively identified, IMF fiscal shocks

$$Y_t = AY_{t-1} + \beta_1 e_t^{IMF} + v_t$$

The impulse response:

$$E(Y_{t+i} | \tau_t^u = 1, I_t) - E(Y_{t+i} | \tau_t^u = 0, I_t) = \frac{\partial Y_{t+i}}{\partial \tau_t^u} = A^i \beta_1$$

can be validly obtained by a series a regressions:

$$y_{t+i} = \pi'_i Y_{t-1} + h_i e_t^{IMF} + \vartheta_{t+i}$$

In general, if e_t^{IMF} were not correlated, this regression would deliver unbiased estimates of the parameters of interest

$$plim h_i = A^i \beta_1$$

Consistency depends on the fact that the MA representation of the DGP , is

$$Y_{t+i} = A^{i+1} Y_{t-1} + A^i \beta_1 e_t^{IMF} + \vartheta_{t+i}$$

$$\vartheta_{t+i} = \beta_1 e_t^{IMF} + A \beta_1 e_{t+i-1}^{IMF} + \dots + A^{i-1} \beta_1 e_{t+i}^{IMF} + \varepsilon_{t+i} + A \varepsilon_{t+i-1} + \dots + A^{i-1} \varepsilon_t$$

and therefore e_t^{IMF} is orthogonal to v_{t+1} , if they are orthogonal to the other structural shocks and not autocorrelated.

Unfortunately, this orthogonality is lost when fiscal policy is implemented through plans because, as shown above, the very nature of plans generates a correlation in e_t^{IMF} .

Our solution vs. Jordà and Taylor (2013)

Our solution to simulating the effects of a fiscal plan is to decompose adjustments into their expected and unexpected part, give an impulse to the unexpected (and not predictable) component, use the estimated style of the plan (the φ 's) to track down the response of announcements to unanticipated shocks, and eventually construct the response of output to the plan.

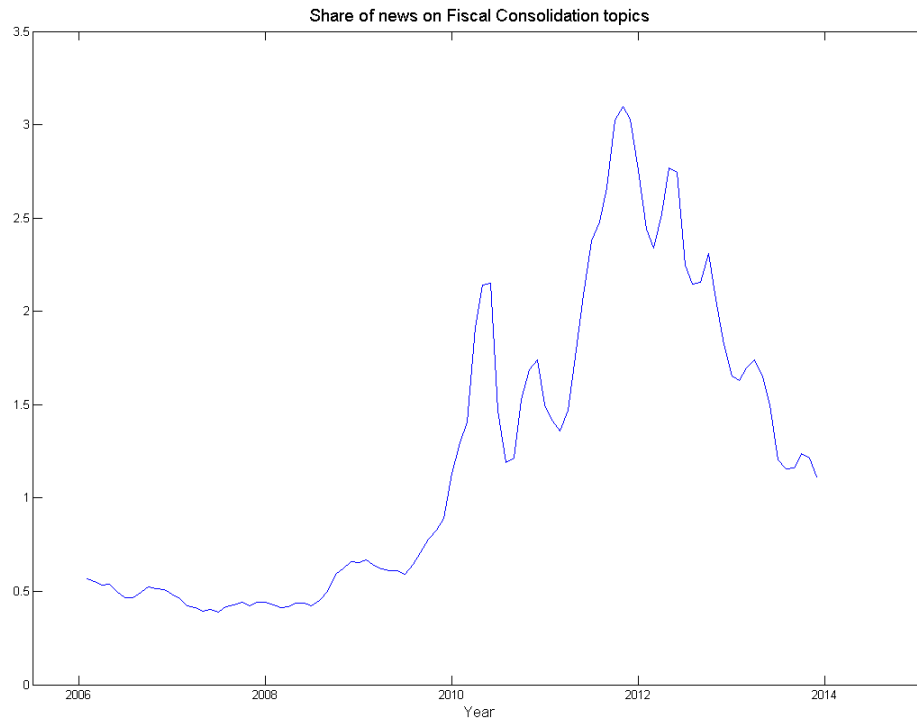
Jordà and Taylor (2013), instead, use the e_t^{IMF} innovations and address the fact that they are correlated over correcting them in three steps:

- redefine e_t^{IMF} innovations as a 0/1 dummy variable
- estimate a propensity score deriving the probability with which a correction is expected by regressing it on its own past and predictors

- use the propensity score to derive an Average Treatment Effect based on Inverse Probability Weighting

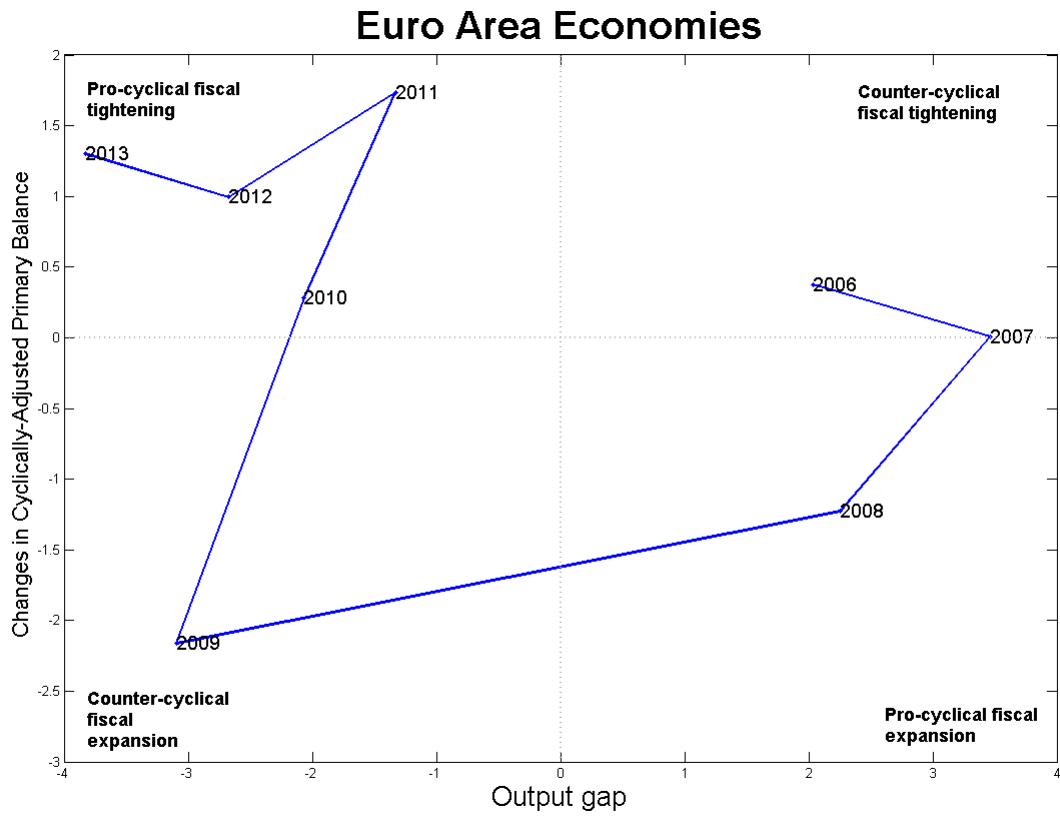
This method has, in our view, a number of limitations. First, replacing e_t^{IMF} innovations with a 0/1 dummy variable only gives up relevant info on the intensity of the adjustment. Second, the links between the announced and anticipated part of a stabilization plan are lost. Third, the presence of the forward looking component – which is omitted from the specification – introduces a bias in the local-projections-computed impulse responses whenever there is a systematic relation between the forward looking component and the unexpected component of the adjustment. Fourth fiscal plans are different across countries because of a style of fiscal adjustment and so by their nature they cannot be assimilated to the same common treatment administered to many patients.

Figure 1: Fiscal Policy in Media



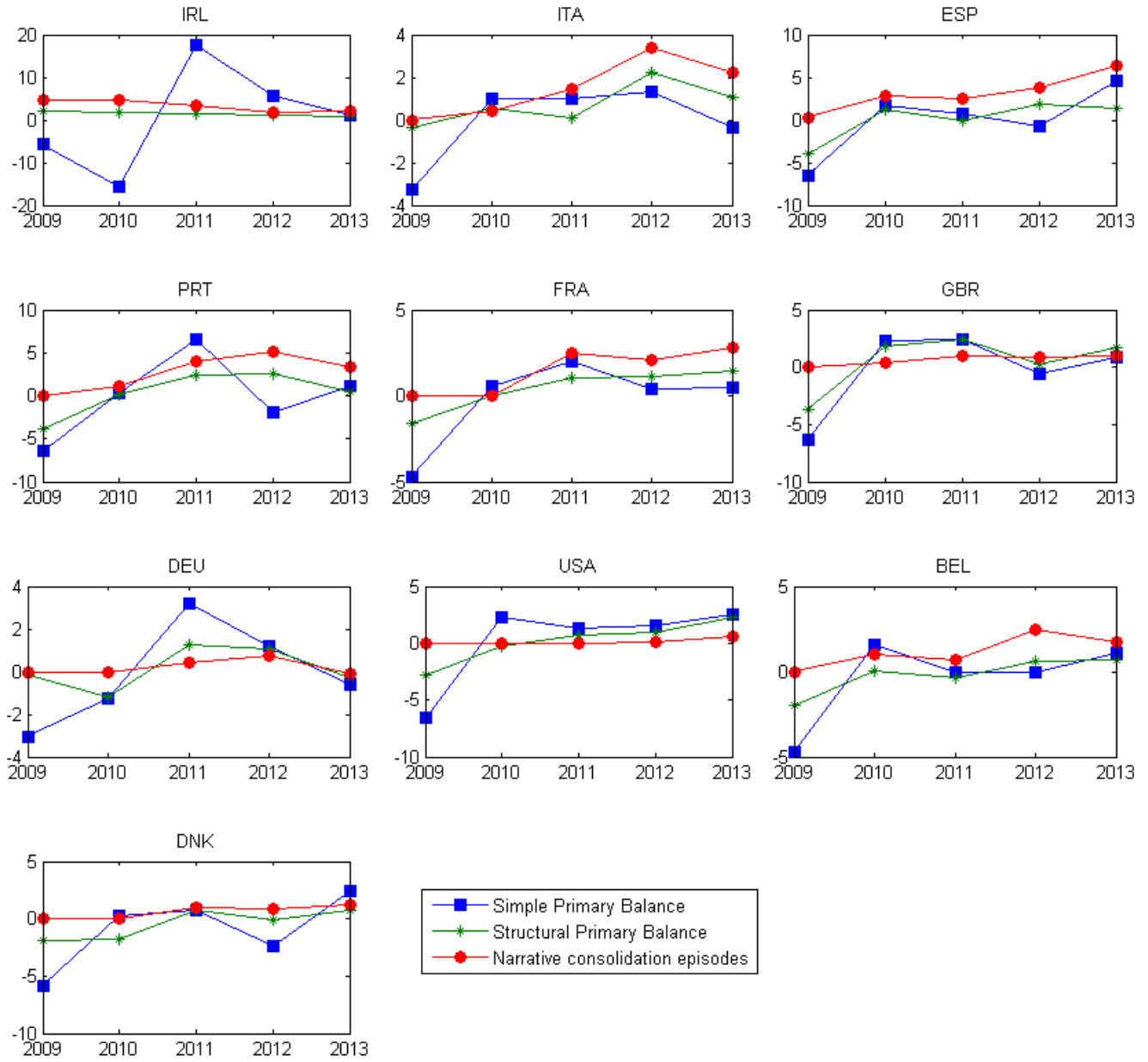
The extent to which fiscal policy was debated in media is measured through the share of articles concerning fiscal policy over the total number of published articles. Data are monthly and the plotted series is a 5-year centered moving average of the measure in our sample. For more details about the construction of the variable see Appendix A. Numbers along vertical axis are the percentage over total articles published.

Figure 2: Extent of Pro-cyclical polices in Advanced Economies during and after the financial crisis



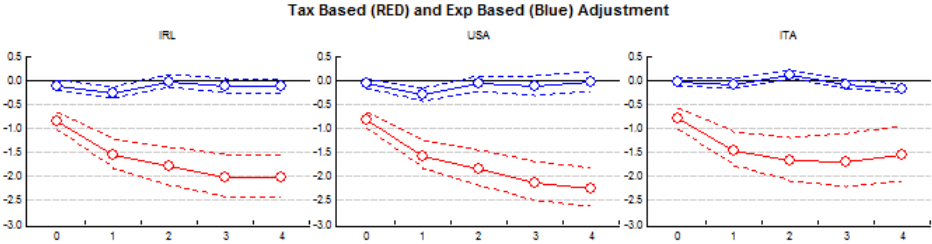
We plot the change in the cyclically adjusted primary balance against the output gap registered in the same year. A negative (positive) change in the primary balance means that the cyclically adjusted deficit is increasing (decreasing). As a consequence, years of countercyclical fiscal policy are those in the first and third quadrants, while years of procyclical policies lie in the second and fourth quadrants. Source: OECD Forecasting, Analysis and Modeling Environment.

Figure 3: Comparison between Simple Primary Balance, Structural Primary Balance and Narrative Changes in fiscal policy



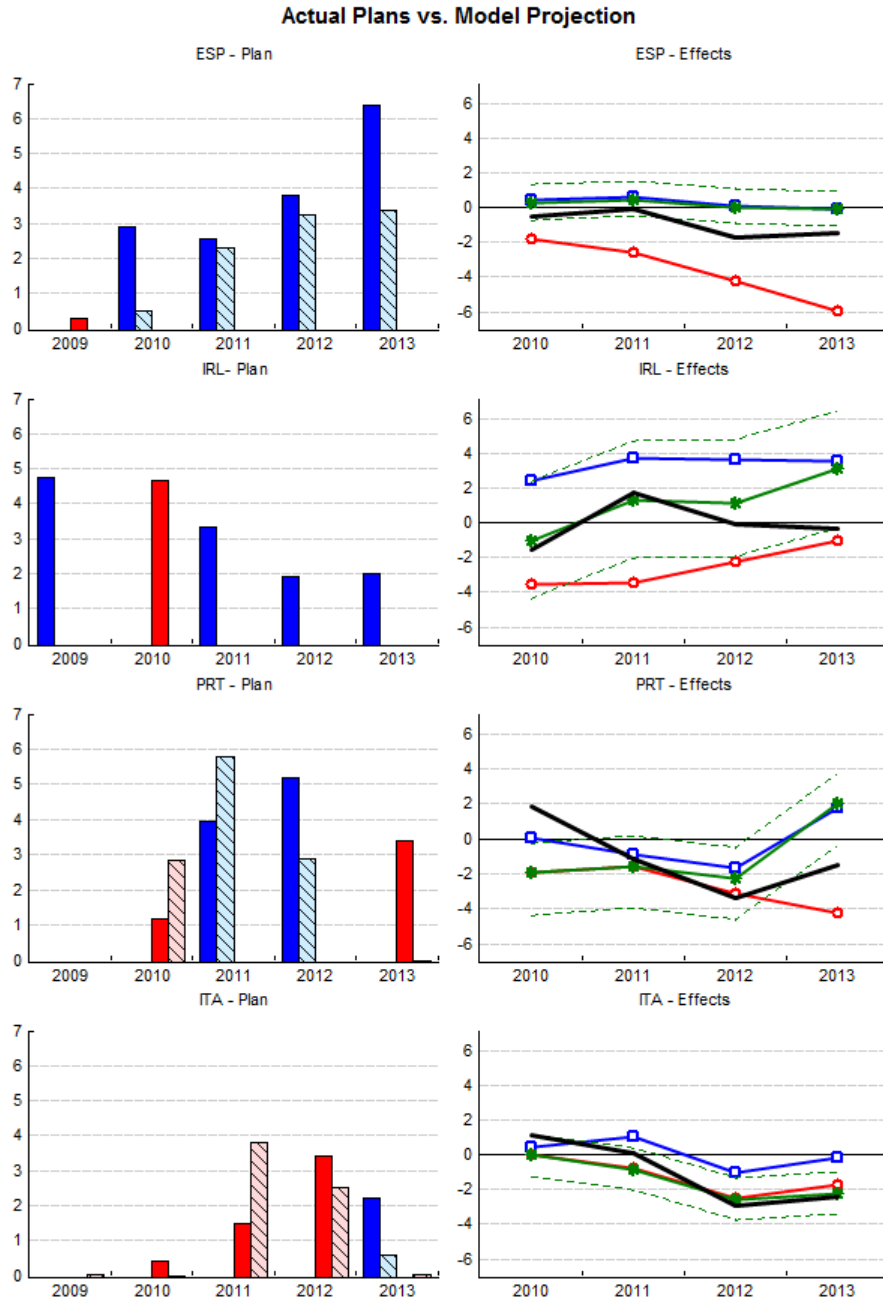
Sources: data on simple primary balance and structural primary balance are taken from IMF World Economic Outlook Database, October 2013; narrative consolidation episodes are our extension of Devries et al. (2011) data.

Figure 4: Fiscal Consolidation Examples



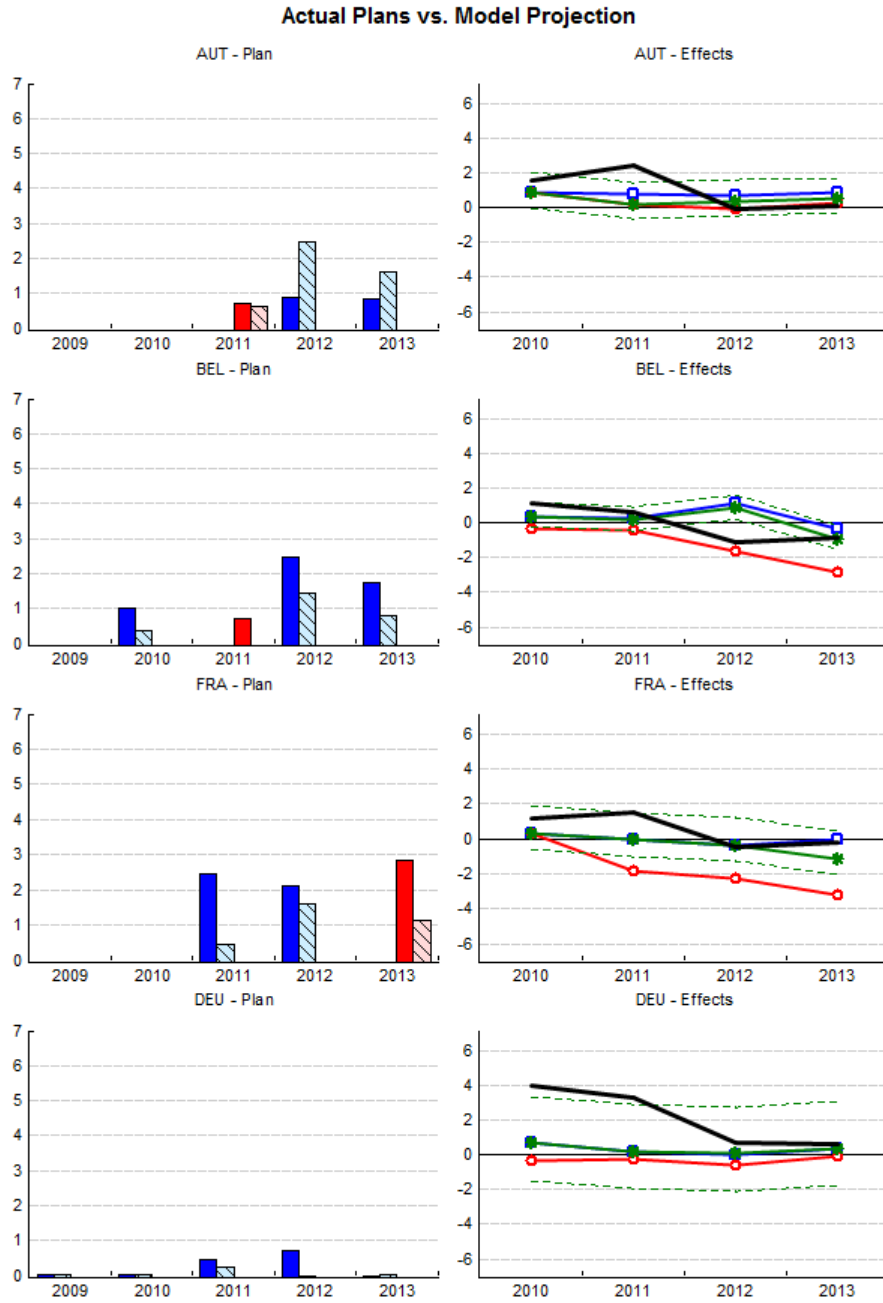
Impulse responses for tax-based (red) and spending-based consolidations (blue). Numbers along the vertical axis report the cumulated effect on GDP per capita in percentage points.

Figure 5: Benchmark and Counterfactual Simulation



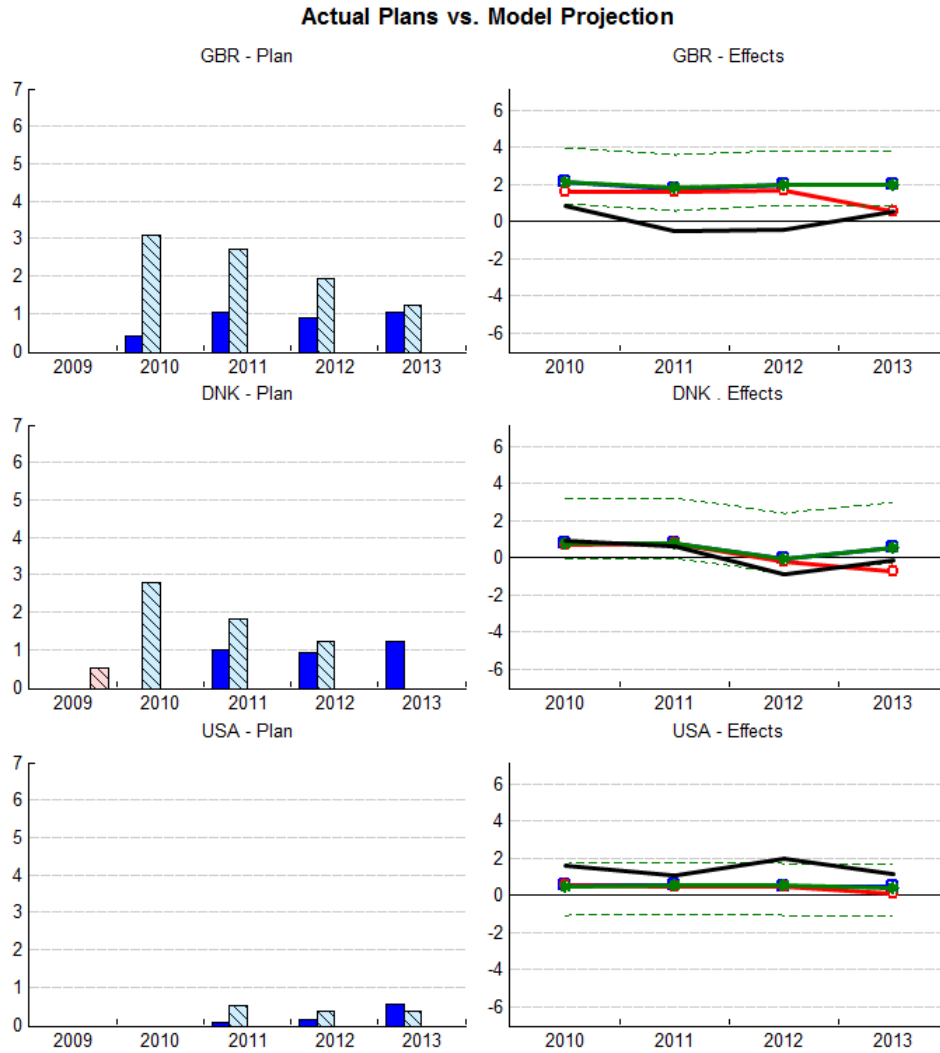
Histograms on the left hand side of the graph represent the planned fiscal consolidations in every year. Red columns represent years of tax-based consolidations, while spending-based ones are colored in blue. In each histogram we report, the yearly impact ($e_t^u + e_{t,0}^a$) and all the future announced shifts in fiscal variables, measured as a fraction of GDP. The impact is represented by the full-colored columns, while the announcements correspond to the cross-hatched columns of each figure. On the right hand side panels we report the corresponding simulated GDP growth (in green with 64% confidence bounds) against the actual one (in black). Counterfactual GDP growth paths for totally tax and spending-based plans are respectively in red and blue.

Figure 6: Benchmark and Counterfactual Simulation



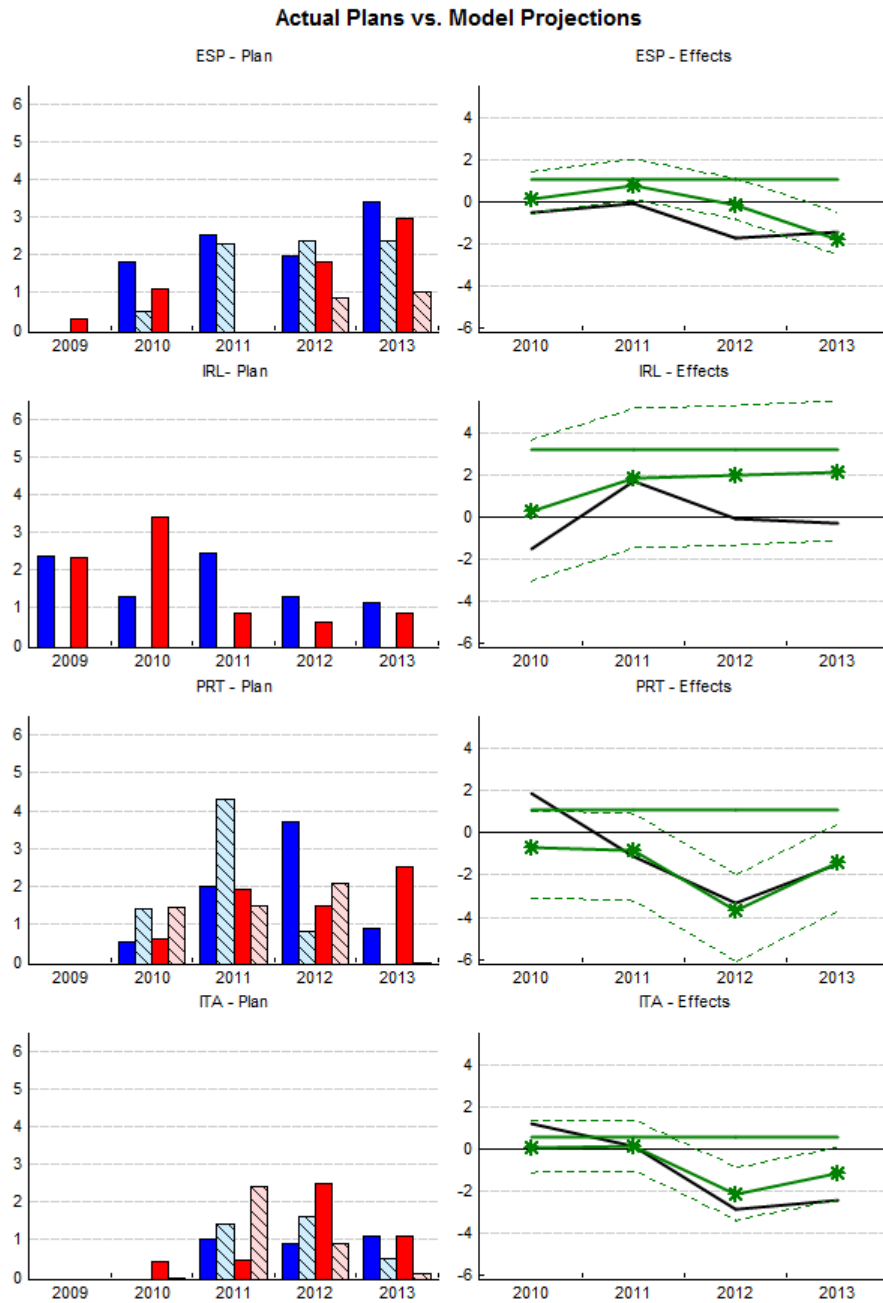
Histograms on the left hand side of the graph represent the planned fiscal consolidations in every year. Red columns represent years of tax-based consolidations, while spending-based ones are colored in blue. In each histogram we report, the yearly impact ($e_t^u + e_{t,0}^a$) and all the future announced shifts in fiscal variables, measured as a fraction of GDP. The impact is represented by the full-colored columns, while the announcements correspond to the cross-hatched columns of each figure. On the right hand side panels we report the corresponding simulated GDP growth (in green with 64% confidence bounds) against the actual one (in black). Counterfactual GDP growth paths for totally tax and spending-based plans are respectively in red and blue.

Figure 7: Benchmark and Counterfactual Simulation



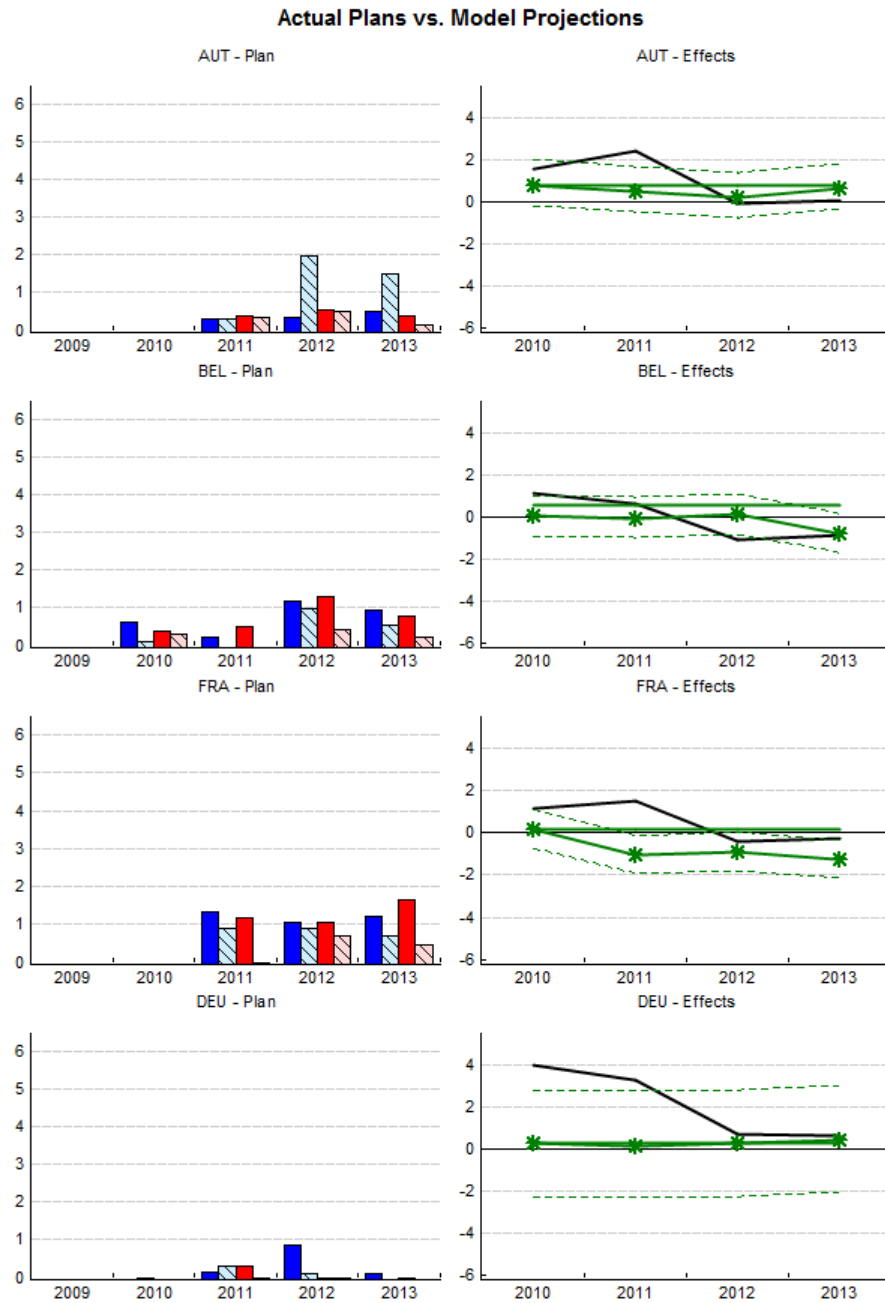
Histograms on the left hand side of the graph represent the planned fiscal consolidations in every year. Red columns represent years of tax-based consolidations, while spending-based ones are colored in blue. In each histogram we report, the yearly impact ($e_t^u + e_{t,0}^a$) and all the future announced shifts in fiscal variables, measured as a fraction of GDP. The impact is represented by the full-colored columns, while the announcements correspond to the cross-hatched columns of each figure. On the right hand side panels we report the corresponding simulated GDP growth (in green with 64% confidence bounds) against the actual one (in black). Counterfactual GDP growth paths for totally tax and spending-based plans are respectively in red and blue.

Figure 8: Model Simulation after direct estimation of τ and g , separately



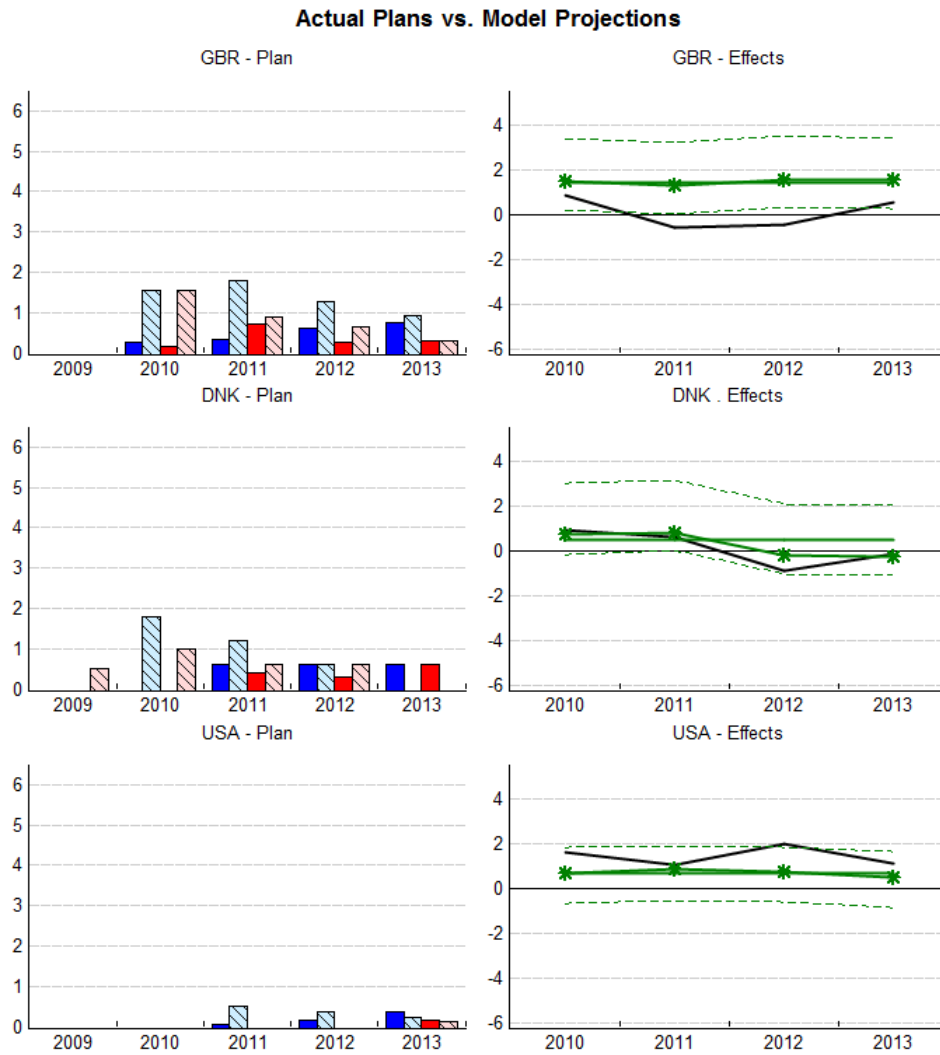
Histograms on the left hand side of the graph represent the total impact of fiscal consolidations in every year. The announcements for future years are not represented. Blue columns mean spending-based consolidations, while tax-based ones are in red. The right hand side of the graph plots the simulated growth (green) against the actual growth (black). The model used to simulate plans employs spending and tax shocks separately. No tax and spending-based dummies are included.

Figure 9: Model Simulation after direct estimation of τ and g



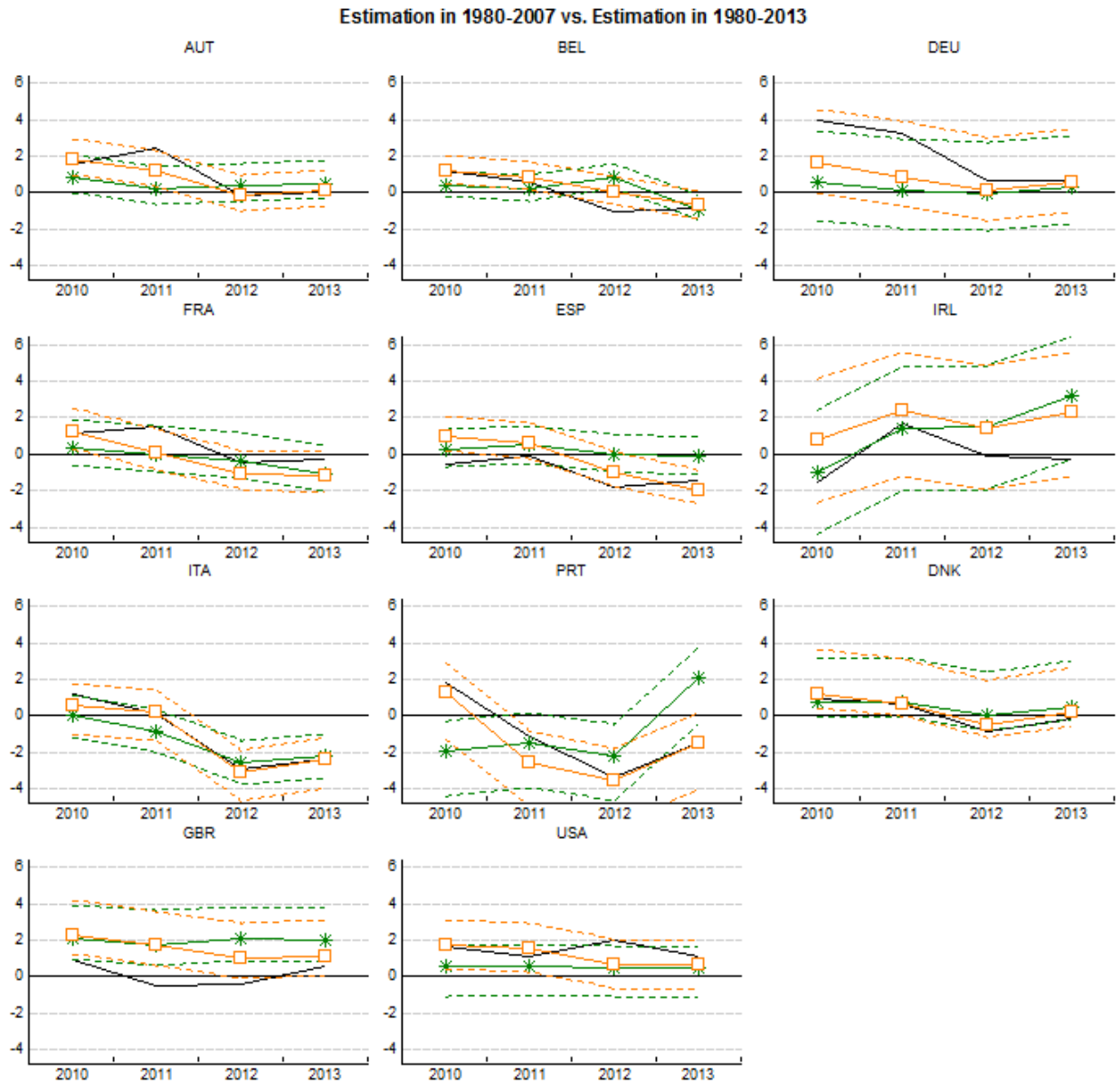
Histograms on the left hand side of the graph represent the total impact of fiscal consolidations in every year. The announcements for future years are not represented. Blue columns mean spending-based consolidations, while tax-based ones are in red. The right hand side of the graph plots the simulated growth (green) against the actual growth (black). The model used to simulate plans employs spending and tax shocks separately. No tax and spending-based dummies are included.

Figure 10: Model Simulation after direct estimation of t and g



Histograms on the left hand side of the graph represent the total impact of fiscal consolidations in every year. The announcements for future years are not represented. Blue columns mean spending-based consolidations, while tax-based ones are in red. The right hand side of the graph plots the simulated growth (green) against the actual growth (black). The model used to simulate plans employs spending and tax shocks separately. No tax and spending-based dummies are included.

Figure 11: Pseudo-out-of-sample simulation



The figure plots the predicted growth rates using the estimates on the sample 1980-2013 (orange) against those computed in the sample 1980-2007 (green).

Table 1: Public Balance

	2007	2008	2009	2010	2011	2012	Projections		Change
							2013	2014	2010-14
Overall balance (% GDP)									
World		-2.2	-7.4	-6.0	-4.5	-4.3	-3.5	-3.0	2.4
Adv. economies	-1.1	-3.5	-9.0	-7.8	-6.6	-5.9	-4.7	-3.8	3.1
EM economies	1.2	0.0	-4.6	-3.1	-1.7	-2.1	-2.2	-2.2	0.9
US	-2.7	-6.7	-13.3	-11.1	-10.0	-8.5	-6.5	-5.4	4.6
Euro area	-1.3	-2.1	-6.4	-6.2	-4.1	-3.6	-2.9	-2.6	3.3
France	-2.8	-3.3	-7.6	-7.1	-5.2	-4.6	-3.7	-3.5	3.4
Germany	0.2	-0.1	-3.1	-4.1	-0.8	0.2	-0.3	-0.1	3.8
Ireland	0.1	-7.4	-13.9	-30.9	-13.4	-7.7	-7.5	-4.5	23.3
Italy	-1.6	-2.7	-5.4	-4.3	-3.7	-3.0	-2.6	-2.3	1.8
Portugal	-3.2	-3.7	-10.2	-9.8	-4.4	-4.9	-5.5	-4.0	4.4
Spain	1.9	-4.5	-11.2	-9.7	-9.4	-10.3	-6.6	-6.9	3.1
UK	-2.9	-5.1	-11.4	-10.1	-7.9	-8.3	-7.0	-6.4	3.1
Cyclically adjusted balance (% GDP)									
Adv. economies	-2.2	-3.7	-6.2	-6.3	-5.5	-4.7	-3.6	-2.9	2.8
EM economies		-1.7	-3.7	-2.8	-1.9	-2.1	-2.0	-2.0	0.8
US	-2.8	-5.1	-8.1	-8.5	-7.7	-6.4	-4.6	-3.9	3.9
Euro area	-2.4	-3.1	-4.6	-4.8	-3.4	-2.4	-1.3	-1.3	3.5
France	-3.0	-3.1	-5.1	-5.1	-3.9	-3.1	-1.9	-1.8	3.2
Germany	-1.1	-1.3	-1.2	-3.5	-1.0	0.1	0.0	0.1	3.5
Ireland	-8.6	-11.9	-10.3	-8.7	-7.0	-6.0	-5.5	-3.7	3.3
Italy	-3.5	-3.6	-3.4	-3.4	-2.8	-1.2	-0.2	-0.2	3.2
Portugal	-4.2	-4.3	-9.4	-9.7	-3.6	-3.0	-3.0	-2.0	6.7
Spain	-1.1	-5.6	-10.2	-8.3	-7.6	-5.1	-4.2	-5.1	4.1
UK	-5.2	-7.3	-9.7	-8.6	-6.5	-5.4	-4.3	-3.4	4.3

Source: IMF World Economic Outlook, April 2013 and IMF Fiscal Monitor, October 2013.

Advanced economies are G20 countries, while EM economies are the G20 countries among the emerging ones.

Table 2: Gross Government Debt

	2007	2008	2009	2010	2011	2012	Projections		Change
							2013	2014	2010-13
Gross debt (Percent of GDP)									
World		65.7	75.8	79.5	79.7	81.1	79.3	78.6	-0.1
Advanced economies	76.4	81.3	94.9	101.5	105.5	110.2	109.3	109.5	7.8
Emerging market economies	34.5	33.5	36.0	40.3	36.7	35.2	34.3	33.6	-6.1
United States	66.5	75.5	89.1	98.2	102.5	106.5	108.1	109.2	9.9
Euro area	66.5	70.3	80.0	85.6	88.1	92.9	95.0	95.3	9.4
France	64.2	68.2	79.2	82.3	86.0	90.3	92.7	94.0	10.4
Germany	65.4	66.8	74.5	82.5	80.5	82.0	80.4	78.3	-2.1
Ireland	25	44.5	64.9	92.2	106.5	117.1	122.0	120.2	29.8
Italy	103.3	106.1	116.4	119.3	120.8	127.0	130.6	130.8	11.3
Portugal	68.3	71.6	83.1	93.2	108.0	123.0	122.3	123.7	29.1
Spain	36.3	40.2	53.9	61.3	69.1	84.1	91.8	97.6	30.5
United Kingdom	43.7	52.2	68.1	79.4	85.4	90.3	93.6	97.1	14.2

Source: IMF World Economic Outlook, April 2013 and IMF Fiscal Monitor, October 2013.

Advanced economies are G20 countries, while EM economies are the G20 countries among the emerging ones.

Table 3: Descriptive Table of Fiscal Plans

Country	Cumulated Fiscal Consolidation 2010-2013	Average Consolidation Impact	Share of Announced Consolidation	Number of EB Years	Number of TB Years	Share of EB Events, Weighted for Size of Consolidation
IRL	16.67	3.33	0%	4	1	72%
ESP	15.915	3.18	26%	4	1	98%
PRT	13.7	3.43	71%	2	2	67%
ITA	7.49	1.87	47%	1	3	29%
FRA	7.435	2.48	26%	2	1	53%
BEL	5.92	1.48	17%	3	1	88%
GBR	3.334	0.83	89%	4	0	100%
DNK	3.2	0.64	91%	4	1	100%
AUT	2.43	0.81	50%	2	1	72%
DEU	1.05	0.35	0%	3	0	100%
USA	0.71	0.24	37%	3	0	100%

The column "Average Consolidation Impact" displays the average impact computed only over the total number of episodes in each country between 2009 and 2013. The last columns weights each EB event employing the size of the consolidation. The total number of events is 44 and only 9 of them are TB.

Table 4: Estimation Result of within Sample Estimation (1980-2007)

	Coefficient	Std. Error	t-Statistic	Prob.
$e_{i,t}^u * TB_{i,t}$	-0.879723***	0.114489	-7.683905	0
$e_{i,t}^u * EB_{i,t}$	-0.115265	0.075279	-1.531166	0.1268
$e_{i,t}^a * TB_{i,t}$	-0.484525*	0.285855	-1.695002	0.0911
$e_{i,t}^a * EB_{i,t}$	-0.344987*	0.179673	-1.920084	0.0558
$e_{i,t-1}^u * TB_{i,t-1}$	-0.623768***	0.116860	-5.337734	0
$e_{i,t-1}^u * EB_{i,t-1}$	-0.117574	0.079345	-1.481801	0.1394
$e_{i,t-1}^a * TB_{i,t-1}$	-0.174587	0.298896	-0.584108	0.5596
$e_{i,t-1}^a * EB_{i,t-1}$	0.306099*	0.169529	1.805586	0.0720
$e_{i,t-2}^u * TB_{i,t-2}$	-0.118379	0.118397	-0.999852	0.3182
$e_{i,t-2}^u * EB_{i,t-2}$	0.209932**	0.083388	2.517537	0.0123
$e_{i,t-2}^a * TB_{i,t-2}$	0.082704	0.357215	0.231525	0.8171
$e_{i,t-2}^a * EB_{i,t-2}$	0.505489***	0.172553	2.929471	0.0036
$e_{i,t-3}^u * TB_{i,t-3}$	-0.348970***	0.122697	-2.844161	0.0048
$e_{i,t-3}^u * EB_{i,t-3}$	0.017926	0.078940	0.227081	0.8205
$e_{i,t-3}^a * TB_{i,t-3}$	0.118452	0.339582	0.348817	0.7275
$e_{i,t-3}^a * EB_{i,t-3}$	0.256666	0.170707	1.503546	0.1337
$e_{i,t,1}^a * TB_{i,t}$	-0.206790	0.263327	-0.785297	0.4329
$e_{i,t,1}^a * EB_{i,t}$	-0.125764	0.174064	-0.722519	0.4705
$e_{i,t,2}^a * TB_{i,t}$	0.576258	0.844609	0.682277	0.4956
$e_{i,t,3}^a * EB_{i,t}$	0.552432	0.848592	0.650998	0.5155

Table 5: Styles of plans as in AFG (within-sample estimation)

	<i>AU</i>	<i>OE</i>	<i>BG</i>	<i>CA</i>	<i>DK</i>	<i>DEU</i>	<i>FR</i>
$\varphi_{1,i}$	0.85 (0.12)	0.31 (0.06)	0.04 (0.09)	0.99 (0.19)	0.14 (0.07)	0.12 (0.12)	0.18 (0.08)
$\varphi_{2,i}$	-0.14 (0.08)	0	0	0.59 (0.097)	0	-0.096 (0.08)	-0.02 (0.04)
$\varphi_{3,i}$	-0.02 (0.01)	0	0	0.022 (0.04)	0	0.03 (0.01)	-0.03 (0.03)

	<i>IR</i>	<i>IT</i>	<i>JP</i>	<i>NL</i>	<i>PT</i>	<i>SP</i>	<i>UK</i>	<i>US</i>
$\varphi_{1,i}$	0	-0.22 (0.04)	0.27 (0.03)	-0.09 (0.02)	0.07 (0.14)	0.06 (0.06)	0.34 (0.02)	0.07 (0.23)
$\varphi_{2,i}$	0	0	-0.0005 (0.003)	0	0	0	0.04 (0.02)	0.07 (0.16)
$\varphi_{3,i}$	0	0	0	0	0	0	0	-0.1 (0.12)

Coefficients above are estimated through the following equations:

$$\begin{aligned}
 e_{i,t,1}^a &= \varphi_{1,i} e_{i,t}^u + v_{1,i,t} \\
 e_{i,t,2}^a &= \varphi_{2,i} e_{i,t}^u + v_{2,i,t} \\
 e_{i,t,3}^a &= \varphi_{3,i} e_{i,t}^u + v_{3,i,t}
 \end{aligned}$$

Table 6: Fiscal Adjustments and GDP growth in Southern Europe

	IR		IT		SP		PT	
	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected
2010	-1.5	-1.04 (-4.38, 2.37)	1.17	0.01 (-1.25, 1.15)	-0.51	0.28 (-0.73, 1.3)	1.87	-1.97 (-4.43, -0.28)
2011	1.71	1.20 (-2.07, 4.68)	0.14	-0.84 (-2.07, 0.34)	-0.06	0.49 (-0.51, 1.52)	-1.1	-1.6 (-4.01, 0.12)
2012	-0.06	1.40 (-1.97, 4.77)	-2.9	-2.53 (-3.79, -1.38)	-1.74	0.04 (-0.96, 1.06)	-3.35	-2.23 (-4.67, -0.53)
2013	-0.29	3.06 (-0.3, 6.45)	-2.41	-2.19 (-3.45, -1.04)	-1.44	-0.14 (-1.13, 0.89)	-1.45	2.05 (-0.38, 3.75)

In brackets, 95% confidence bounds for projected GDP growth.

Table 7: Direct Estimation of of t and g within Sample (1980-2007)

	Coefficient	Standard Error	T-statistics	
τ_t^u	-0.648793***	0.153449	-4.228065	0
$\tau_{t,0}^a$	-1.021318***	0.248409	-4.111446	0.0001
τ_{t-1}^u	-0.436015***	0.147131	-2.963445	0.0033
$\tau_{t-1,0}^a$	-0.094866	0.250728	-0.378363	0.7054
τ_{t-2}^u	-0.120252	0.155715	-0.772256	0.4406
$\tau_{t-2,0}^a$	0.099802	0.257854	0.387051	0.6990
τ_{t-3}^u	-0.352745**	0.157988	-2.232727	0.0263
$\tau_{t-3,0}^a$	0.354216	0.231010	1.533334	0.1262
$\tau_{t,t+1}^a$	-1.104238***	0.249919	-4.418380	0
$\tau_{t,t+2}^a$	1.053898	0.912886	1.154468	0.2492
g_t^u	-0.087041	0.141932	-0.613258	0.5402
$g_{t,0}^a$	-0.293784	0.373823	-0.785892	0.4325
g_{t-1}^u	-0.027610	0.140893	-0.195964	0.8448
$g_{t-1,0}^a$	0.153334	0.387605	0.395594	0.6927
g_{t-2}^u	0.297646**	0.140203	2.122964	0.0346
$g_{t-2,0}^a$	0.047956	0.400446	0.119758	0.9048
g_{t-3}^u	0.037966	0.136347	0.278456	0.7808
$g_{t-3,0}^a$	-0.150175	0.368451	-0.407585	0.6839
$g_{t,t+1}^a$	0.506932	0.389358	1.301969	0.1939
$g_{t,t+2}^a$	0.337680	1.180079	0.286150	0.7750

Table 8: Check on multiplier stability after the Financial Crisis

VARIABLES	(1) BL-style	(2) Pooled	(3) FE	(4) FE
$e_{i,t}$	-0.243 (0.277)	-0.400*** (0.122)	-0.392 (0.297)	-0.472 (0.374)
Constant	2.095 (1.258)	0.632 (0.466)	0.620 (0.491)	0.441 (0.379)
$\sum_j e_{i,t,j}^a$				0.254 (0.286)
Observations	11	44	44	44
R-squared	0.051	0.153	0.093	0.139

The first column shows the OLS results for 2011. Column 2 extends the sample to the period 2010-2013 and employs an OLS. In column 3 and 4 we include country fixed-effects.

Robust standard errors in parentheses.

Table 9: Newspapers Used in the Research

Country	Newspapers
France	Le Figaro; Le Monde; Liberation; L'Humanite; La Croix
Germany	Süddeutsche Zeitung; Frankfurter Allgemeine Zeitung; Die Welt; Frankfurter Rundschau; Der Tagesspiegel
Ireland	Irish Independent; The Irish Times; Irish Examiner
Italy	Corriere della Sera; La Repubblica; Il Giornale; La Stampa; Il Sole 24 Ore
Portugal	Diário de Notícias; Jornal i; Jornal de Notícias; Público; Primeiro de Janeiro
Spain	El País; El Mundo; ABC; La Vanguardia; El Periódico de Catalunya
United Kingdom	The Sun; The Daily Mirror; The Daily Mail; The Daily Telegraph; The Guardian
USA	The Wall Street Journal; The New York Times; USA Today

Table 10: Italian Budget Laws having effect in 2011

Law	Objective	Impact on net borrowing	Total impact
Decree Law 78/2010, law No. 220/2010 and No. 221/2010 (Dec. 2010)	Prevent a worsening of the deficit- and debt-to-GDP ratios	Correction measures of 5.2 billion euros (0.26 percent of GDP)	Structural correction of 54.1 billion in 2012 (3.4% of GDP)
Decree law 98/2011 (July 2011)	Aimed at achieving a balanced budget in 2014	Correction of net borrowing by 2014 equal to 60 billion euros (3.4% of GDP)	
Decree law 138/2011 (August 2011)	Designed to move forward the achievement of a balanced budget to 2013 and to maintain the target in subsequent years		
Stability law 183/2011 (December 2011)	Established a different allocation of resources	No alteration of public finance balances	
Decree law 201/2011 (December 2011)	Given the further weakening of the macro scenario and the deterioration of European sovereign debt, further correction of net borrowing in 2014, so to guarantee achievement of budget balance in 2013	Further correction of net borrowing by 2014 of 21 billion euros	

Data from the "Italian Stability Program, May 2011" and "Italian Stability Program, April 2012".

Table 11: Magnitude of Fiscal Consolidation in Italy and its subdivision across 2010 and 2011

Law	Revenue (million euros)				Expenditure (million euros)			
	τ_{2012}^u	$\tau_{2012,0}^a$	$\tau_{2012,1}^a$	$\tau_{2012,2}^a$	g_{2012}^u	$g_{2012,0}^a$	$g_{2012,1}^a$	$g_{2012,2}^a$
DL 78/2010		3013				2227		
DL 98/2011		4738	6677	15009		-1268	12152	8556
DL 138/2011		13336	8053	-11600		8630	-892	-6437
SL 183/2011	206		-228	-47	185		390	149
DL 201/2011	19366		-2404	-2071	879		3479	2182
DL 95/2012					3994		2859	3411
Announced in 2011		21087	14730	3409		9589	11260	2119
(% of GDP)		1.3	0.9	0.2		0.6	0.7	0.1
Impact 2012	19572	21087	12098	1291	5058	9589	17988	7861
(% of GDP)	1.2	1.3	0.8	0.1	0.3	0.6	1.1	0.5

Data from the "Italian Stability Program, May 2011" and "Italian Stability Program, April 2012".