The debate on the effects of fiscal consolidations

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Many European countries have high levels of public debt, and are going through periods of budget austerity. Many economists and policymakers fear that these austerity programs might exacerbate the recession; others argue that properly designed austerity programs can even be expansionary. This essay is in two parts. I briefly review what we know about the likely effects of these fiscal consolidations.

Fiscal consolidations: the mean comparison approach

A first method to investigate the effects of a fiscal consolidation is simply to extrapolate from current estimates of tax and spending multipliers, from time series Vector Autoregression studies. There are several recent surveys of existing results, mostly based on US data. Therefore, I will concentrate on studies that focus explicitly on episodes of fiscal consolidations.

Focusing especially on fiscal consolidations introduces a larger cross country set of events; it is also useful if nonlinearities are important, and the results depend on the size of the initial government debt or deficit, the size of the fiscal adjustment, or even less easily defined things like the "sense of crisis".

Two statistical approaches have been used to study   large fiscal consolidations. The first consists of a simple comparison of means of variables over time. Specifically: (i) define a "fiscal consolidation", for instance as a country-year when the discretionary [1] decline in the primary deficit is more than, say, 1.5 percent of GDP,

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[1] The "discretionary" change in the deficit is that part of the change in the deficit that is not due to the automatic response of the deficit to the economic cycle. In this sense, it can be interpreted as the part of the change in the deficit that is due to intentional actions by the policymakers, like changes in tax rates, in replacement rate for unemployment benefits, in defense spending etc. The same definition applies to each individual budget component.

or two consecutive country-years when it is at least 1 percent each year; (ii) take a macroeconomic variable of interest, like private consumption, and compare the average of that variable in the two years after (or during) the consolidation with the average in the two years before the consolidation. This "mean comparison" approach would provide unbiased estimates of the average effects of consolidations if the latter were completely random events (in which case it is essentially a difference – in – difference estimator).

This is the methodology applied by Alesina and Perotti (1995) and Alesina and Ardagna (2010) with cyclically adjusted data, and by Alesina and Ardagna (2012) with the narrative IMF data of Devries et al. (2011).[2] The typical result is that spending-based consolidations (where the discretionary decline in the deficit consists of at least 50 percent spending cuts) tend to be longer-lasting and are associated with an increase in GDP growth or a small recession, while tax-based consolidations are short-lived and are associated with a slowdown in growth or even a recession. With some variations, all of private consumption, investment, and exports display this pattern. Also, in general these variables are particularly responsive to cuts in social spending or spending on public wages and salaries – the two largest government spending items in all OECD countries.

Fiscal consolidations are typically multi-year events. In this methodology, a fiscal consolidation lasting four years would appear as three consecutive two-year consolidations; moreover, a given year can appear in all of the "pre", "during" and "post" groups at different dates. It is not clear what the "mean comparison" method delivers in these cases.

A second problem with this approach is that it is difficult to control for concomitant effects. For instance, one typical result is that spending-based consolidations are associated with real depreciation of the

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[2] There are two methods to obtain "discretionary" measures of a change in a budget variable. First, the "cyclical adjustment" method: estimate the elasticities of that budget variable to, say, output and inflation, and subtract from the actual change in the budget variable the change in output multiplied by the output elasticity and the change in inflation multiplied by the inflation elasticity. Second, the "narrative" method, pioneered by Romer and Romer (2010) for revenues changes: use budget documents to infer the discretionary change in tax revenues or spending enacted by any law that has consequences for the budget. Devries et al. (2011) compute yearly discretionary changes in government spending and revenues during periods of deficit reductions in 15 countries.

exchange rate and improvement in relative unit labor costs. Is this a consequence of spending-based

consolidations, or is this the result of policies typically implemented together with spending based

consolidations? As always, causality is difficult to ascertain.

The accompanying policies might take several forms which might be difficult to capture with one or

two variables: consider for instance labor market reforms, or changes in exchange rate or monetary policy

regimes. Finally, the government budgets and accompanying technical documents need to be studied in

depth in order to determine the discretionary measures with a minimum of confidence.

Fiscal consolidations: case studies

For all these reasons, it is useful to complement the existing evidence with a different approach.

Perotti (2012) presents a detailed discussion of the four largest spending-based consolidations - Denmark

1983-87, Ireland 1987-89, Finland 1992-96, Sweden 1993-97 - based on the original budget documents and on

contemporary discussion, like OECD or IMF annual reports, and country-specific sources.[3] I focus on two

questions. First, is there evidence that large budget consolidations can have expansionary effects in the short

run? Second, how useful is the experience of the past as a guide to today's Eurozone countries?

The main conclusions of the case studies I present are:

(i) **Actual consolidations were smaller than previously thought, and not spending-based**. All these

consolidations have long been considered quintessential cases of large, "spending-based consolidations". Two

of these were truly enormous: as shown in Table 1, columns 3 and 6, in Finland the discretionary primary

deficit fell by 11.5 percent of GDP over 5 years (all of them spending cuts) , according to the IMF narrative

measure of Devries et al. (2011), and in Sweden by 10.6 percent of GDP over 5 years (of which almost 7 pps of

GDP spending cuts).

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[3] The pros and cons of case studies vs. an econometric approach are well known. Hence, I will not revisit this debate here.

Table 1: Large Fiscal Consolidations in Europe

Denmark 1983-87	Actual	IMF	Ireland 1987-89	Actual	IMF
Spending	-4.0	-4.3	Spending	-3.0	-2.5
Revenues	4.9	2.4	Revenues	-0.1	0.4
Surplus	8.9	6.7	Surplus	2.9	2.9
Finland 1992-96	Actual	IMF	Sweden 1993-97	Actual	IMF
Spending	-0.9	-12.1	Spending	-4.2	-6.8
Revenues	3.8	-0.6	Revenues	4.6	3.8
Surplus	4.9	11.5	Surplus	8.8	10.6

Source: Perotti (2012)

But a closer look at the budget documents shows that in many cases the announced spending cuts were not implemented, or were undone by supplementary budgets during the fiscal years. As a result, the decline in the budget deficit in Finland was only about 5 pps of GDP; moreover, nearly all consisted of revenues increases (see Table 1, columns 2 and 5). In Sweden my estimate of spending cuts is about half the IMF estimate. Only in Ireland were spending cuts larger than revenue increases.[4] These conclusions are corroborated by contemporary policy documents and discussions, that do not show any consciousness of living through a "budget bloodbath".[5]

(ii) **Depreciation and the role of the exchange rate and monetary regimes.** Tables 2 and 3 display the behavior of the multilateral nominal exchange rate and of multilateral unit labor costs in manufacturing,

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[4] All this still excludes bank support measures. For instance, in Finland the government spent about 10 percent of GDP to support the banking sector.

[5] For instance, an official in the Irish administration at the time later wrote: "Briefly, there was no significant reduction in the real volume of current spending as a result of [the expenditure review set up by the new government in 1987]. There was a further squeeze on capital spending, a mistake in retrospect, but most of the adjustment came on the revenue side. The 'slash and burn' stories about 1987, references to the finance minister as 'Mac the Knife', decimation of public services and so forth are just journalistic invention. It never happened." (McCarthy 2010, p. 45). There is another reason why the existing, enormous estimates of the budget declines are almost certainly inflated: as we'll see, one or two years after the beginning of these consolidations these countries entered a boom. Yet, the primary budget deficit fell by less than the IMF measures of the discretionary primary deficit. This would imply that the automatic component should have caused an increase in the deficit despite the very substantial increase in GDP growth. The IMF has since amended their numbers to reflect the findings of my paper.

respectively. During the consolidations, Denmark and Ireland used the exchange rate as a nominal anchor, by committing to a hard peg within the European Exchange Rate Mechanism. Denmark had repeatedly devalued its currency before the consolidation, thus entering the consolidation with a depreciated exchange rate, but at the cost of very high interest rates (up to 23 percent). During the consolidation phase Ireland also benefitted from the large appreciation of the currency of its main trading partner, the UK, which was not part of the ERM.

Finland and Sweden also devalued repeatedly, but then floated the currency just before the consolidation, experiencing a further depreciation. Overall, their currencies depreciated by between 15 and 25 percent multilateral terms in the first two years of the consolidation. As a nominal anchor, Finland and Sweden introduced instead inflation targeting. There is some evidence that, while almost completely new at the time, this approach was regarded as credible from the start: according to insiders' accounts at the time, it "had a profound impact on the behavior of labor market participants" (Jonung et al. 2008, p. 37).

Table 2: Nominal effective exchange rate

	t-1	t	t+1	t+2	t+3	t+4	t+5
Denmark	-3.4	0.9	-2.3	2.2	5.7	3.6	-1.1
Ireland	8.0	-.4	-1.9	-.7	8.6		
Finland	-2.9	-12.2	-10.0	13.4	15.0	-2.4	-2.1
Sweden	2.4	-17.7	1.2	0.4	10.1	-3.3	-0.2

Source: Perotti (2012). Shaded area corresponds to years of consolidation

Table 3: Relative unit labor costs in manufacturing

	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5
Denmark	-4.9	-1.2	1.6	0.9	4.1	8.8	11.5	-0.2
Ireland	1.5	9.3	-6.2	-7.3	-6.8	0.3		
Finland	5.3	-0.9	-20.7	-24.2	5.2	16.0	-5.5	-5.9
Sweden	2.9	-2.7	-26.8	-6.4	-4.1	12.8	-7.2	-6.4

Source: Perotti (2012). Shaded area corresponds to years of consolidation

(iii) **Incomes policies were key.** Fiscal consolidations were accompanied by explicit incomes policies. whereby the government, trade unions, and the industrialists' organizations reached an agreement to exchange wage moderation for lower income taxes and social security contributions. Ireland returned to a

tripartite wage settlement in 1987 (see Table 3), which set a maximum increase in wages by 2.5 percent in 1988, 1989 and 1990. Finland and Sweden signed tripartite wage agreements at the start of the consolidations, and then, after some wage slippage three years into the consolidation (see Table 3), the government summoned the unions and industrialists' association again to sign other wage agreements. These developments were regarded as very significant by contemporaries: as Jonung, Kiander and Vartia (2008) write, based on contemporary accounts, "perhaps the biggest change in the 1990's in Finland was the adoption and wide acceptance of a policy of long term wage moderation" (p. 35).

Incomes policies were particularly explicit in Denmark. Here, the government renounced any depreciation of the exchange rate and relied instead on an internal devaluation: it suspended wage indexation, capped contractual wage increases, froze unemployment subsidies and transfers, all in exchange for lower income taxes and social security contributions.

Wage moderation, that was made possible by incomes policies, was instrumental in maintaining the benefits of the nominal depreciations and in reducing inflation expectations and interest rates.

(iv) **Recoveries were mostly export driven.** All stabilizations were associated with large increases in GDP growth, typically at about 4 percent for a few years (see Table 4).

The source of the recovery is crucial in trying to shed light on the mechanism. Most models posit that a fiscal consolidation raises consumers' and investors' confidence, via a wealth effect or other channels, and therefore should cause a quick increase in private consumption and investment. However, except in Denmark (where the recovery was already under way at the time of the consolidation), private consumption typically started recovering 6 to 8 quarters after the beginning of the consolidation; in Sweden, in the first year domestic demand collapsed, with investment falling by 15 percent   (see Tables 5 and 6). Initially, and again with the exception of Denmark, the recovery was export driven (see Table 7): in Finland, Ireland and Sweden exports increased at rates around 10 percent for several years after the consolidation. This was made possible

by the combination of nominal depreciation and wage moderation: between 1992 and 1995, multilateral unit

labor costs in Sweden fell by almost 40 percent (see Table 3).

Table 4: GDP growth

	t-2	t-1	T	t+1	t+2	t+3	t+4	t+5
Denmark	-0.9	3.7	2.7	4.2	4.0	4.9	0.3	-0.1
Ireland	1.9	0.4	3.6	3.0	5.6	7.7		
Finland	0.5	-6.0	-3.5	-0.8	3.6	4.0	3.6	6.2
Sweden	-1.1	-1.2	-2.1	4.0	3.9	1.6	2.7	4.2

Source: Perotti (2012). Shaded area corresponds to years of consolidation

Table 5: Private consumption growth

	t-2	t-1	T	t+1	t+2	t+3	t+4	t+5
Denmark	-1.7	1.4	2.0	3.8	4.3	7.5	-1.9	-1.7
Ireland	2.7	2.8	2.1	3.6	3.3	3.2		
Finland	-1.1	-3.7	-3.8	-3.5	2.4	4.5	3.8	3.3
Sweden	0.9	-1.3	-3.6	2.1	1.1	1.8	2.8	3.3

Source: Perotti (2012). Shaded area corresponds to years of consolidation

Table 6: Private investment growth

	t-2	t-1	T	t+1	t+2	t+3	t+4	t+5
Denmark	-17.6	10.3	4.3	11.2	15.3	19.3	2.3	-6.4
Ireland	-7.9	-0.5	-2.3	-0.2	13.5	13.9		
Finland	-5.7	-20.6	-17.9	-13.0	-1.6	18.5	9.3	9.2
Sweden	-8.5	-11.3	-14.6	7.0	9.9	4.7	0.6	8.8

Source: Perotti (2012). Shaded area corresponds to years of consolidation

Table 7: Export growth

	t-2	t-1	T	t+1	t+2	t+3	t+4	t+5
Denmark	8.5	3.2	4.6	3.5	6.0	1.3	4.9	8.8
Ireland	6.6	2.7	13.9	8.1	11.4	9.2		
Finland	1.7	-7.2	10	16.3	13.5	8.5	5.9	13.9
Sweden	-1.9	2.0	8.3	13.5	11.3	4.4	13.8	9.0

Source: Perotti (2012). Shaded area corresponds to years of c

Denmark, which alone did pursue a hard peg policy, experienced all the hallmarks of the "exchange rate based stabilizations" studied in a large literature in the eighties and nineties (see e.g. Ades, Kiguel and Liviatan 1993): domestic demand initially boomed as inflation and interest rates fell fast; but as incomes policies by themselves proved untenable after about two years, competitiveness and the current account worsened; eventually growth ground to a halt and consumption declined for three years. The slump lasted for several years (see Table 4).

(v) **High and declining interest rates.** In all countries the consolidations were accompanied by large and fast declines in nominal interest rates, from very high levels. In Denmark the 10-year interest rate fell from 21 percent in 1982 to 11 percent in 1987, in Finland from 12 percent in 1992 to 7 percent in 1996, and by similar amount s in the other two countries (see Table 8). This was made possible by wage moderation, which in turn made the nominal anchors credible.

Table 8: Long-term interest rates

	t-1	t	t+1	t+2	t+3	t+4	t+5
Denmark	21.2	15.0	14.4	11.6	10.1	11.3	9.9
Ireland	11.2	11.3	9.4	9.2	10.3		
Finland	11.7	12.0	8.8	9.0	8.8	7.1	6.0
Sweden	10.0	8.6	9.7	10.3	8.1	6.7	5.0

Source: Perotti (2012). Shaded area corresponds to years of consolidation

In Denmark and Ireland the declines in interest rates led to large increases in house prices and possibly a large wealth effect on households. According to Giavazzi and Pagano (1990), this was largely responsible for the spur in private consumption.

Lessons for the Eurozone today

Causality is difficult to establish in economics, all the more so from a few case studies. But a few patterns can be detected that could provide useful insights – and caveats - for the current Eurozone situation.

(i) The oft-cited expansionary consolidations of Europe in the 1980s and 1990s were smaller and less spending-based than previously thought.

(ii) All started at very high levels of nominal and real interest rate, which then declined fast. Interest rates are at historical lows today, except in those countries at the periphery where they include a default risk premium.

(iii) Wage moderation was the key to a credible peg in Denmark and Ireland, and to maintaining the benefits of devaluations in Finland and Sweden. But wage inflation is hardly a problem in today's low inflation scenario. In addition, incomes policies were in turn instrumental in achieving wage moderation. But for political and perhaps cultural reasons, incomes policies are not on the agenda today.

(iv) Except in Denmark, exports were the prime factor of the recovery for several quarters, and thereafter kept growing at a sustained pace for several years; domestic demand initially stalled or even fell. All countries (including Denmark and Ireland that pegged the exchange rate during the consolidation - the more

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relevant case for today's Eurozone members) devalued repeatedly before the consolidations. This option is obviously not available to Eurozone members, except vis-à-vis non-Eurozone members. Ireland also benefitted from the appreciation of the currency of its main trading partner, the UK. On the other hand, the Danish expansion was short lived, as it quickly ran into a loss of competitiveness that hampered growth for several years.

In this paper, I do not want to enter the debate of whether fiscal austerity is needed, how much, and where. But the observations above suggest that the notion of "expansionary fiscal austerity" *in the short run* is probably an illusion: a trade-off does seem to exist between fiscal austerity and short-run growth.

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Figure I: Sovereign and bank CDS premia.

Graph A4.5

Sovereign and bank CDS premia in selected advanced countries[1]

In basis points
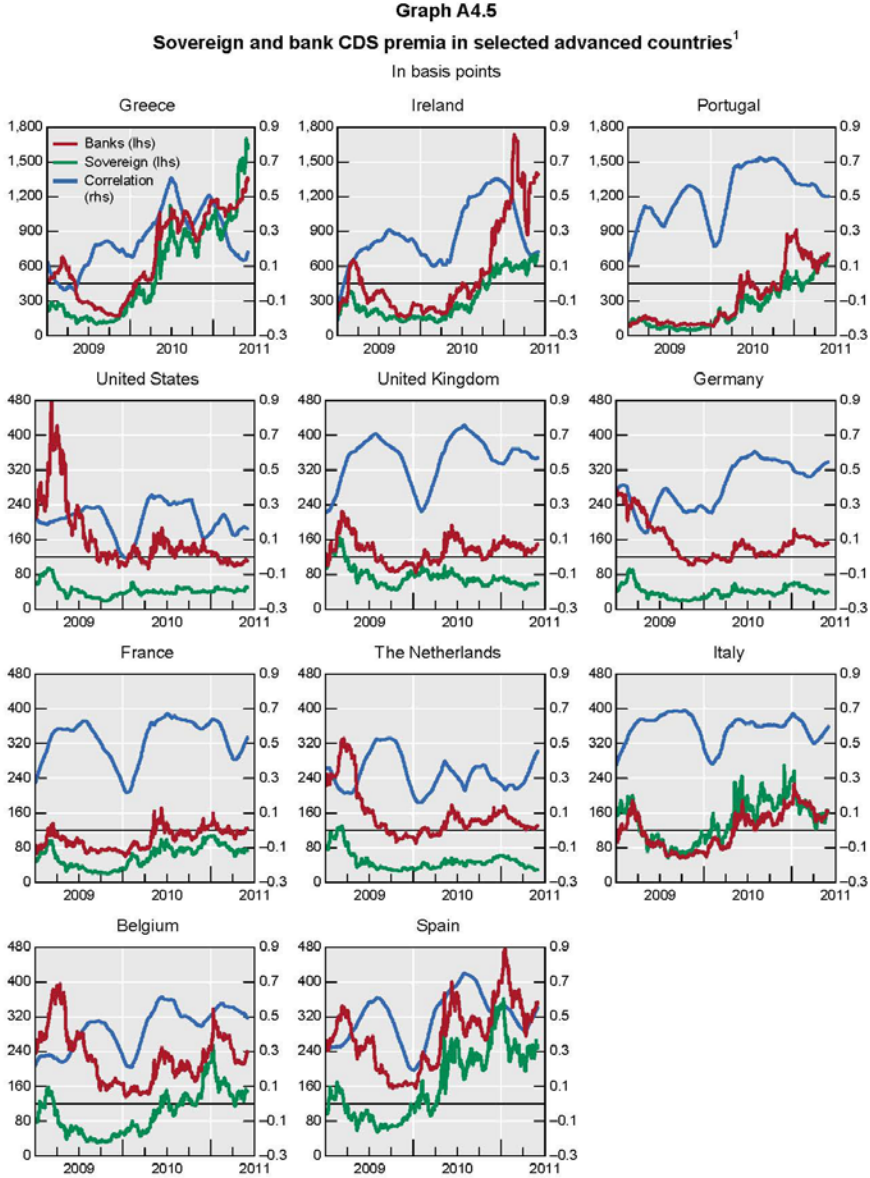
[1] Premia on five-year CDS on senior bonds issued by sovereigns or banks. The correlation index is equal to the three-month moving average of the correlation between changes in the two time series of CDS spreads, calculated on the basis of a GARCH (1,1) statistical model, using daily data.

Source: Datastream.

CGFS – The impact of sovereign credit risk on bank funding conditions

Source: CGFS (2011)

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LARGE CHANGES IN FISCAL POLICY:
TAXES VERSUS SPENDING

Alberto F. Alesina
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ABSTRACT

We examine the evidence on episodes of large stances in fiscal policy, both in cases of fiscal stimuli and in that of fiscal adjustments in OECD countries from 1970 to 2007. Fiscal stimuli based upon tax cuts are more likely to increase growth than those based upon spending increases. As for fiscal adjustments, those based upon spending cuts and no tax increases are more likely to reduce deficits and debt over GDP ratios than those based upon tax increases. In addition, adjustments on the spending side rather than on the tax side are less likely to create recessions. We confirm these results with simple regression analysis.

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1 Introduction

As a result of the fiscal response to the financial crisis of 2007-2009 the US will experience the largest increases in deficits and debt accumulation in peacetime. Virtually all other OECD countries will also face fiscal imbalances of various sizes. After the large reduction in government deficits of the nineties and early new century, public finances in the OECD are back in the deep red.

Only a few months ago the key policy question was whether tax cuts or spending increases were a better recipe for the stimulus plan in the US and other countries as well. By and large these decisions have been taken, and we are in the process of observing the results. The next question which governments all over the world will face next year, assuming, as it seems likely, that a recovery next year will be under way, is how to stop the growth of debt and return to more "normal" public finances.

The first question, namely whether tax cuts or spending increases are more expansionary is a critical one, and economists strongly disagree about the answer. It is fair to say that we know relatively little about the effect of fiscal policy on growth and in particular about the so called fiscal multipliers, namely how much one dollar of tax cuts or spending increases translates in terms of GDP. The issue is very politically charged as well, since right of center economists and policymakers believe in tax cuts and the left of center ones believe in spending increases. While the differences are often rooted in different views about the role of government and inequality, not so much about the size of fiscal multipliers, both sides also wish to "sell" their prescription as growth enhancing and more so than the other policy. Unfortunately both sides can't be right at the same time!

As far as reduction of large public debts the lesson from history is reasonably optimistic. Large debt/GDP ratios have been cut relatively rapidly by sustained growth. This was the case of post WWII public debts in belligerent countries; it was also the case of the US in the nineties when without virtually any increase in tax rates or significant spending cuts, a large deficit turned in a large surplus.[1] In the UK the debt over GDP ratio at the end of WWII was over 200 percent but that country did not suffer a financial crisis due to its historically credible fiscal stance and the debt was gradually and relatively rapidly reduced. However, it would be probably too optimistic to expect another decade like the nineties ahead of us; that kind of sustained growth would certainly do a lot to reduce the debt/GDP ratio but the lower growth which we will most likely experience will do much less. Inflation also has the effect of chipping away the real value of the debt but it may be a medicine worse than the disease. While a period of controlled and

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[1]See Alesina (1998) for a discussion of the budget surplus in the nineties in the US.

moderate inflation would have the potential to reduce the real value of outstanding debt, pursuing such a strategy would run the risk of uncontrolled inflation. It took a sharp recession in the early eighties to eliminate the great inflation of the seventies, and the last thing we need is another major recession in the medium run. The post WWI hyperinflations are certainly not in the horizon, but we should keep them in the back of our mind as an extreme case of debt induced runaway inflation.

If growth alone cannot do it and inflating away the debt carries substantial risks, we are left with the accumulation of budget surpluses to reign in the debt in the next several years in the post crisis era. But then the same question returns: is raising taxes or cutting spending more likely to result in a stable fiscal outlook?

This is precisely what this papers is about. We focus upon large changes in fiscal policy stance, namely large increase or reduction of budget deficits and we look at what effects they had on both the economy and the dynamics of the debt. In particular, for the case of budget expansions (increase in deficits or reduction of surpluses) we look at which have been more expansionary on growth. On fiscal adjustments (deficit reductions) we consider their effect on a medium term stabilization/reduction of the debt over GDP level and their cost in terms of a downturn in the economy. We focus only on large fiscal changes because we try to isolate changes in fiscal policy which are policy induced as opposed to cyclical fluctuations of the deficits, which in any event we try to cyclically adjust. Our methodology is rather simple. We identify episodes of large changes in fiscal policy. Obviously the decision of when to engage is such policy changes is not exogenous to the state of public finances and of the economy. But up to a point the decision of whether to act upon the spending side or the revenue side is largely political and due to bargaining amongst political and pressure groups. The uncertainty about the size of fiscal multipliers make this discussion even less constrained by solid economic arguments. Thus we cannot offer new measures of fiscal multipliers, but we can look at what effects have different approaches (spending versus revenue side) have had during and after large fiscal changes.

Our results suggest that tax cuts are more expansionary than spending increases in the cases of a fiscal stimulus. For fiscal adjustments we show that spending cuts are much more effective than tax increases in stabilizing the debt and avoiding economic downturns. In fact, we uncover several episodes in which spending cuts adopted to reduce deficits have been associated with economic expansions rather than recessions. We also investigate which components of taxes and spending affect the economy more in these large episodes and we try uncover channels running through private consumption and/or investment.

The present paper is more directly related to several ones written in the early nineties using a similar approach to ours. Giavazzi and Pagano (1990) were the first to argue that fiscal adjustments (deficit reductions) large, decisive and on the spend-

ing side could be expansionary. This was the case of Ireland and Denmark in the eighties which were the episodes studied by Giavazzi and Pagano (1990), but there were others as then discussed and analyzed by Alesina and Ardagna (1998). The same authors and Alesina and Perotti (1997) investigate various episodes of fiscal adjustments reaching conclusions similar to that of the present paper. But in this paper we have many more episodes and we use more compelling techniques. There is quite a rich literature that studies the determinants and economic outcomes of large fiscal adjustments. A non exhaustive-list includes Ardagna (2004), Giavazzi, Jappelli and Pagano (2000), Huges and McAdam (1999), Lambertini and Tavares (2000), McDermott and Wescott (1996), Von Hagen and Strauch (2001), Von Hagen, Hughes, and Strauch (2002), and more recently, OECD (2008) and IMF (2009). Theoretically, expansionary effects of fiscal adjustments can go through both the demand and the supply side. On the demand side, a fiscal adjustment may be expansionary if agents believe that the fiscal tightening generates a change in regime that "eliminates the need for larger, maybe much more disruptive adjustments in the future" (Blanchard (1990)).[2] Current increases in taxes and/or spending cuts perceived as permanent, by removing the danger of sharper and more costly fiscal adjustments in the future, generate a positive wealth effect. Consumers anticipate a permanent increase in their lifetime disposable income and this may induce an increase in current private consumption and in aggregate demand. The size of the increase in private consumption would depend, however, on the presence or absence of "liquidity constrained" consumers. An additional channel through which current fiscal policy can influence the economy via its effect on agents' expectations is the interest rate. If agents believe that the stabilization is credible and avoids a default on government debt, they can ask for a lower premium on government bonds. Private demand components sensitive to the real interest rate can increase if the reduction in the interest rate paid on government bonds leads to a reduction in the real interest rate charged to consumers and firms. The decrease in interest rate can also lead to the appreciation of stocks and bonds, increasing agents' financial wealth, and triggering a consumption/investment boom.

On the supply side, expansionary effects of fiscal adjustments work via the labor market and via the effect that tax increases and/or spending cuts have on the individual labor supply in a neoclassical model, and on the unions' fall-back position in imperfectly competitive labor markets (see Alesina and Ardagna (1998) and Alesina et al. (2000) for a review of the literature). In the latter context, the composition of current fiscal policy (whether the deficit reduction is achieved through tax increases or through spending cuts) is critical for its effect on the economy. On the one hand, a decrease in government employment reduces the probability of finding

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[2]For models that highlight this channel, see Bertola and Drazen (1993) and Sutherland (1997).

a job if not employed in the private sector, and a decrease in government wages decreases the worker's income if employed in the public sector. In both cases, the reservation utility of the union members goes down and the wage demanded by the union for private sector workers decreases, increasing profits, investment and competitiveness. On the other hand, an increase in income taxes or social security contributions that reduces the net wage of the worker leads to an increase in the pre-tax real wage faced by the employer, squeezing profits, investment, and competitiveness.

This is not the place to review in detail the large literature on the effect of fiscal policy on the economy. It is worth mentioning that Romer and Romer (2007) also follow an event approach even though they identify events of large discretionary changes in fiscal policy in a very different way from ours. Using a variety of narrative sources, they identify changes in the US federal tax legislation that are undertaken either to solve an inherited budget deficit problem or to achieve long-run goals and estimate the effect of such changes on real output in a VAR framework. They find that an increase in taxation by 1% of GDP reduces output in the next three years by a maximum of about 3% and that the effect is smaller when the only changes in taxes considered are those taken to reduce past budget deficits. As Romer and Romer (2007), we also find that tax increases are contractionary, but the magnitudes of our results are difficult to compare to theirs. In our estimates, we find that a 1% increase in the cyclically adjusted tax revenue decreases real growth by less than one-third of a percentage point. However, we estimate a very different specification and, contrary to Romer and Romer (2007), our approach also controls for changes in government spending undertaken to reduce budget deficits as well as for changes in taxation.

Blanchard and Perotti (2002) use structurally VAR techniques to identify exogenous changes in fiscal policy and estimate fiscal multipliers both on the tax and on the spending side of the government. They find that positive government spending shocks increase output, consumption and decrease investment, while positive tax shocks have a negative effect on output, consumption and investment. Mountford and Uhlig (2008) use a very different identification approach and, while they also find that both taxes and spending increases have a negative effect on private investment (as previously shown by Alesina et al. (2002)), they show that spending increases do not generate an increase in consumption and that deficit-financed tax cuts are the most effective way to stimulate the economy. The result of a positive effect of government spending shocks on private consumption is also challenged by Ramey (2008). She finds that, capturing the timing of the news about government spending increases with a narrative approach and not with delay as in a VAR approach, consumption declines after increases in government spending. Our results on the negative correlation between both spending and tax increases on GDP

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growth are clearly consistent with the results of these papers using quite different methodological approaches than ours.

A substantial literature has investigated political and institutional effects on fiscal policy and in particular on the propensity of different parties in different institutional settings to prolong fiscal imbalances, or to reign them in promptly. On delayed fiscal adjustments see Alesina and Drazen (1999), on politico institutional effects, like the role of electoral laws, on the occurrence of loose or tight fiscal policy see Persson and Tabellini (2003) and Milesi Ferretti, Perotti and Rostagno (2002). Alesina Perotti and Tavares (1998) using an approach similar to that of the present paper and based upon "episodes", investigate which parties are more or less likely to run in fiscal stimuli or fiscal adjustments. One criticism that one could raise to the literature on voting rules and institutions on fiscal imbalances is that rules are not exogenous and third factors may indeed explain both the adoption of certain voting rule (like proportional representation) and fiscal policy, a point discussed in Alesina and Glaeser (2004) informally and Aghion Alesina and Trebbi (2007) more formally. We do not pursue in the present paper this politico economic analysis.

This paper is organized as follows. Section 2 discusses our data and the definition of episode which we adopt. Section 3 presents basis statistics on the episodes showing rather striking results. Section 4 shows some regression analysis, which although it has no pretence of having solved causality problems reinforces the results obtained by the simple statistics of Section 3. The last section concludes.

2 Data, Methodology and definitions

2.1 Methodology

Our approach is very simple. We identify major changes in fiscal policy, either expansionary (deficit increases or surplus reductions) or the opposite. Obviously the decision about whether to engage in this policy changes is endogenous to the state of the economy and of the finances However we assume that at least up to a point the decision of whether or not to act on the spending side or the revenue side of the government is dictated by political preferences and political bargain which is, at least to a point, exogenous to the economy and generated by ideological or policy preferences. Looking at the debates proceeding major fiscal changes, and considering the high degree of uncertainty about the size of fiscal multipliers this assumption holds some water. Thus our only emphasis is on the effects of different composition of fiscal stimuli and adjustments. We cannot and do not compute the size of fiscal multipliers. We only compare the effects of different compositions of major fiscal changes.

2.2 Data and Sources

We use a panel of OECD countries for a maximum time period from 1970 to 2007. The countries included in the sample are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States. All fiscal and macroeconomic data are from the OECD Economic Outlook Database no. 84.

Our approach identifies episodes of large changes in the fiscal stance and studies the behavior of fiscal and macroeconomic variables around those episodes to investigate whether different characteristics of fiscal packages are correlated with different macroeconomic outcomes. More specifically, we focus both on the size of the fiscal packages (i.e.: the magnitude of the change of the government deficit) and on its composition (i.e.: the percentage change of the main government budget items relative to the total change) and we investigate whether large fiscal stimuli and adjustments that differ in size and composition are associated with booms or economic recessions (as defined below) and whether governments that implement different types of fiscal adjustments are successful / unsuccessful in reducing government debt.

We use a cyclically adjusted value of the fiscal variables to leave aside variations of the fiscal variables induced by business cycle fluctuations. The cyclical adjustment is based on the method proposed by Blanchard (1993). It is a simple method and rather transparent, which corrects various component of the government budget for year to year changes in the unemployment rate. More precisely, the cyclically adjusted value of the change in a fiscal variable is the difference between a measure of the fiscal variable in period t computed as if the unemployment rate were equal to the one in $t - 1$ and the actual value of the fiscal variable in year $t - 1$.[3] We prefer this method to more complicated measures like those produced by the OECD because the latter are a bit of a black box based upon many assumptions about fiscal multipliers upon which there is much uncertainty. Based on our previous work (Alesina and Ardagna (1998)) we are confident that for the large episodes which we consider the details of how to adjust for the cycle do not matter much for the qualitative nature of the results. In fact, even not correcting at all would give similar results.[4]

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[3]To calculate the measure of the fiscal variable in period t as if the unemployment rate were equal to the one in $t - 1$, we follow the procedure in Alesina and Perotti (1995). Specifically, for each country in the sample, we regress the fiscal policy variable as share of GDP, on a time trend and on the unemployment rate. Then, using the coefficients and the residuals from the estimated regressions, we predict what the value of the fiscal variable as a share of GDP in period t would have been if the unemployment rate were the same as in the previous year.

[4]More on this is available from the authors.

2.3 Definition of the episodes

To identify episodes of fiscal adjustments and fiscal stimuli we focus on large changes of fiscal policy and use the following rule.

Definition 1 *Fiscal adjustments and stimuli*

A period of fiscal adjustment (stimulus) is a year in which the cyclically adjusted primary balance improves (deteriorates) by at least 1.5 per cent of GDP.

These are rather demanding criteria, which rule out small, but prolonged, adjustments/stimuli. We have chosen them because we are particularly interested in episodes which are very sharp and large and clearly indicate a change in the fiscal stance. This definition misses fiscal adjustments and stimuli which are small in each year but prolonged for several years. It would be quite difficult to come up with a definition that captured the many possible pattern of multi years small adjustments. Thus, the study of these episodes gives a clue on what happens with sharp and brief changes in the fiscal stance.

We use the primary deficit, (i.e.: the difference between current and capital spending, excluding interest rate expenses paid on government debt, and total tax revenue)[5] rather than the total deficit, to avoid that episodes selected result from the effect that changes in interest rates have on total government expenditures. Using these criteria we try to focus as much as possible on episodes that do not result from the automatic response of fiscal variables to economic growth or monetary policy induced changes on interest rates, but they should reflect discretionary policy choices of fiscal authorities. Needless to say, there can still be an endogeneity issue related to the occurrence of fiscal adjustments and expansions, because, in principle, discretionary policy choices of fiscal authorities can be affected by countries' macroeconomic conditions. However, note that the budget for the current year is approved during the second half of the previous year and, even though additional measures can be taken during the course of the year, they usually become effective with some delay, generally toward the end of the fiscal year.

Definition 1 selects 107 periods of fiscal adjustments (15.1% of the observations in our sample) and 91 periods of fiscal stimuli (12.9% of the observations in our sample). Table A1 in appendix lists all of them. Of the 107 episodes of fiscal adjustments, 65 last only for one period, while the rest are multiperiods adjustments. The majority of the latter (13) last for two consecutive years, 4 are

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[5]See the appendix for a detail definition of each variable used in the empirical analysis.

three years adjustments and the Denmark 1983-1986 fiscal stabilization is the only episode lasting 4 consecutive years. As for fiscal stimuli, 52 episodes last one period, in 12 cases the stimulus continues in the second year as well, and in 5 cases definition 1 selects fiscal stimuli that last for 3 consecutive years.

We are interested in two outcomes of very tight and very loose fiscal policies: whether they are associated with an expansion in economic activity during and in their immediate aftermath and whether they are associated with a reduction in the public debt-to-GDP ratio. Thus, an episode is defined expansionary according to definition 2 and successful according to definition 3; we define contractionary/unsuccessful all the episodes of fiscal stimuli and adjustments that are not expansionary/successful according to these definitions.

Definition 2 *Expansionary fiscal adjustments and fiscal stimuli*

An episode of fiscal adjustment (fiscal stimulus) is expansionary if the average growth rate of GDP, in difference from the G7 average (weighted by GDP weights), in the first period of the episode and in the two years after is greater than the value of 75th percentile of the same variable empirical density in all episodes of fiscal adjustments (fiscal stimuli). This definitions selects 26 years of expansionary periods during fiscal adjustments (3.7% of the observations of the entire OECD sample) and 20 years of expansionary periods during fiscal stimuli (2.8% of the observations of the entire OECD sample). See table A2 for a list.

Definition 3 *Successful fiscal adjustments*

A period of fiscal adjustment is successful if the cumulative reduction of the debt to GDP ratio three years after the beginning of a fiscal adjustment is greater than 4.5 percentage points (the value of 25th percentile of the change of the debt-to-GDP ratio empirical density in all episodes of fiscal adjustments).[6] This definitions selects 17 periods of successful fiscal adjustments (2.7% of the observations of the entire OECD sample). In Table A3 in Appendix we list all the episodes.

We have experimented with variation of the threshold of these definitions but the results are robust, that is they do not change significantly as result of small

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[6]If an episode of tight fiscal policy takes place in 2005, the cumulative change of the debt-to-GDP ratio is computed over a two years horizon, not to loose too many observations at the end of the sample. If the episode occurs after 2005, we cannot determine whether it is a successful or an unsuccessful one.

changes of the definitions. A value of 1.5 change in deficits in a year is sufficiently high to eliminate years of "business as usual" in which fluctuations of the deficits may just be only cyclical. However it is not so large as to have very few data points. Also, our "horizon" for the definition of "expansionary" and "success" is relatively short. Choosing a longer horizon has two problems. First, one looses many observations at the end of the sample; second, and more importantly, choosing a longer horizon makes the connection between the episodes and economic outcomes several years later more tenuous, given the extent of intervening factors. Finally, note that according to definition 2 and 3, multiyears fiscal adjustments and stimuli are considered as a "single" episode because the length of the time horizon chosen for the definition of "expansionary" and "success" starts from the first year of the episode. Alesina and Ardagna (1998), Alesina, Perotti and Tavares (1998), instead, consider each year of a multiyear period as a single episode. This implies that, in a multiyear episode, some years can be expansionary, some contractionary, some can be successful, some unsuccessful. While we have no reason to prefer one choice over the other, we find reassuring that results are robust to these alternative methods used to select expansionary and successful episodes that last more than one consecutive year.[7]

3 Basic Statistics

3.1 Fiscal stimuli

Let's begin by analyzing what happens with fiscal stimuli, namely whether we can detect differences in the effects of fiscal packages depending on their composition on the economy. Table 1 shows the composition in terms of spending components and revenue components of the 20 years of expansionary fiscal stimulus packages versus the others. In Tables 1-6, the period $[T-2, T-1]$ is the two year period preceding the first year of a fiscal stimulus/adjustment. The period $[T]$ is the first year and the period $[T+1, T+2]$ is the two year period following the beginning of an episode.[8] All the variables in the tables are yearly averages.

The most striking result of this table is that in expansionary episodes total spending increases by roughly 1 per cent of GDP while revenues fall by more than 2.5 per cent of GDP. In contractionary episodes total spending goes up by

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[7]More details on these sensitivity analysis are available from the authors.

[8]The Denmark fiscal contraction is the only episode lasting 4 years. We have included the values of the variables in 1986 in the column $[T+1, T+2]$. We checked and confirm that the qualitative nature of the results does not change if the period $[T]$ inlcudes all the years of a tight/expansionary episode of fiscal policy and the period $[T+1, T+2]$ is the two year period following the last year of an episode.

close to 3 per cent of GDP while revenues are roughly constant in terms of GDP. This correlation seems to suggest that stimulus packages used upon the spending side do not work or at least not as well as those based upon spending increases. In terms of components of spending we note that there is no difference between expansionary and contractionary episodes regarding public investment which goes up by roughly the same amount in ratios of GDP. All the other components of primary spending and, in particular transfers, go up much more in contractionary episodes. This suggests that the non public investment components of the budget are those which explain the different correlation with growth. As for revenues note the large cut in income taxes in expansionary stimuli and the slight increase in contractionary ones. Not surprisingly the debt over GDP ratio goes up less in expansionary episodes since the denominator increases more.

Figure 1 offers a striking visual image of the different compositions in terms of revenues and spending of expansionary and contractionary episodes. The first two comparison of total spending and revenues are rather striking even visually. In Table 2 we look at the different components of GDP to check whether there are difference in composition between expansionary and contractionary episodes. The first two lines which refer to GDP growth are somewhat obvious since they reflect the selection criteria of these episodes. All the components of aggregate demand grow more after the stimulus in expansionary episodes. This result is a bit different than that reported in Alesina and Ardagna (1998). In that sample the difference between the two types of episodes seemed concentrated on investment rather than consumption.[9] In this sample both consumption and investment behave differently, both increasing in expansionary cases and declining in contractionary ones. This table also allows us to check whether the state of the economy before the adjustments was different in the two groups. In terms of domestic growth and relative to G7 average, expansionary episodes occurred when growth was higher. As for the other components the only significant difference seem to be in the trade balance. It is obviously cavalier to draw broad conclusions from this but enormous differences in the preexisting state of the economy do not jump out from this table.

3.2 Fiscal adjustments

Fiscal adjustments can be judged in two ways, as discussed above. One is about whether they have been successful in significantly reducing deficits and the debt over GDP ratios and second whether they have been associated with a reduction in growth or not. Obviously, the two criteria are correlated since a growth enhancing adjustment is more likely to be successful in reducing the debt-to-GDP

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[9]See Also Alesina, Ardagna Perotti and Schiantarelli (2002) for related work on the effect of fiscal policy on investment.

ratio. However, the correlation is not perfect since a fiscal adjustment may lead to a sharp reduction of the debt/GDP ratio because the numerator drops faster than the denominator. Episodes with this characteristic, that is the ability to reduce the debt-to-GDP ratio exist, for example Netherlands in 1993, Norway in 1989, and Sweden in 1986-1987.

Table 3 is organized in the same way as Table 1 above. The expansionary episodes of fiscal adjustments are mostly characterized by spending cuts. Primary spending as a percent of GDP falls by more than 2 per cent. Total revenues instead increase slightly by about 0.34 per cent of GDP. On the other hand, in the case of contractionary fiscal adjustments primary spending is cut by about 0.7 per cent of GDP, while revenues increase by about 1.2 per cent of GDP. Thus, fiscal adjustments occurring on the spending side have superior effects on growth than those based upon increases in tax revenues. As far as the composition in components probably the most striking difference between the two types of adjustments has to do with the role of transfers. In contractionary cases transfers continue to growth as a percentage of GDP of almost half of a percentage point. In expansionary episodes, instead, transfers fall by roughly the same amount. Thus, in between the two types of episodes there is a very large difference of 1 per cent of GDP in the share of transfers. Looking at the composition of revenues one is struck by income taxes: they go down quite significantly in expansionary adjustments and go up in contractionary ones. The difference between the two is almost 1 percentage point of GDP. This difference is by far the largest among revenue components.

Figure 2 is organized in the same way as figure 1 and even in this case visually the contrast between the two types of fiscal adjustments is quite obvious. When we look at the different components of GDP, we find that both consumption and investment grow more during expansionary episodes. We did not uncover any remarkable composition effects, along the same line a Table 2 displayed for fiscal stimuli. These sample statistics are reported in Table 4 which is organized as Table 2. The other interesting observation is that at least in terms of GDP growth and growth of its components the preexisting conditions of expansionary and contractionary episodes look remarkably similar. One rather remarkable observation comes from comparing the growth performance during expansionary stimuli and expansionary adjustments: they are quite similar!

Let's now consider successful versus unsuccessful adjustments as shown in Table 5. The comparison between the two is especially striking. In successful episodes total primary spending as a percentage of GDP falls by about 2 per cent of GDP. Total revenues actually decline of about half of percentage point of GDP. Thus, successful fiscal adjustments are completely based on spending cuts accompanied by modest tax cuts! On the contrary, in unsuccessful adjustments total revenue goes up by almost 1.5 per cent of GDP and primary spending are cut by

about 0.8 of GDP. Once again this comparison points in the direction of spending cuts as the more successful ways of fixing budget problems.

Regarding the composition of spending and revenue the most striking comparison is given by the transfers item. In successful adjustments transfers fall by 0.83 per cent of GDP, while in unsuccessful adjustments they grow at about 0.4 per cent, a huge difference between the two episodes of 1.2 percent of GDP. This comparison points in a clear direction: it is very difficult if not impossible to fix public finances when in trouble without solving the question of automatic increases in entitlements. Regarding the composition of revenues, again as above the most striking difference is on income taxes. Figure 3, once again, gives a striking visual image of these results.

4   Some regressions

In this section we present some simple regressions on GDP growth as a function of changes of fiscal policy in the recent past. We should put up-front the fact that causality issues are all over the place here and we do not claim to have solved them. These regressions should be viewed as correlations, but we find them instructive and the message which they send is on the same line of that emerging from our descriptive analysis above.

Let's begin with fiscal stimuli. In Table 7, columns 1-4, we regress real GDP growth in a year of fiscal stimulus on its one period and two period lagged values, on the lagged value of the weighted average of the real GDP growth of the G7 countries, on the lagged value of the ratio of public debt to GDP ratio and on a set of fiscal policy variables measuring the size and the composition of the fiscal stimulus. Columns 5-8 are analogous to the previous 4 columns except for the lhs variable, now equal to the average of real GDP growth in a year of fiscal stimulus and in the two following ones.

We find that, controlling for initial conditions, a one percentage point higher increase in the current spending to GDP ratio is associated with a 0.75 percentage point lower growth. The effect is statistically significant at the 5% level. Instead, larger increases in spending on capital goods or larger cuts in taxes do not have statistically significant effects on growth (see column 2). When we try to investigate whether the size of the fiscal stimulus or its composition is relevant for economic growth, we find more evidence in favor of the composition. We measure the size of the fiscal stimulus with the change in the cyclically adjusted primary balance. We measure the composition of fiscal stimuli with two different variables: (i) the ratio between the change in current spending to GDP ratio and the change in the primary balance (columns 3 and 7), and (ii) the sum of the change in current spending and

tax revenue to GDP ratios (column 4 and 8) to account for the fact that both current spending increases and tax increases can be negatively associated with growth. Both measures of composition are statistically significant at the 5% level in all specifications. In column 3, the sign of the ratio between the change in current spending to GDP ratio and the change in the primary balance indicates that the larger the share of the worsening in the primary balance due to spending increases the lower GDP growth. On average, during years of fiscal stimuli about 54% of the deterioration in the primary balance is due to increases in current spending items. A one standard deviation increase in this variable (equal to 51%, undoubtedly a very large number) would reduce growth by 1 percentage point. Finally, a larger increase in the primary deficit to GDP ratio is associated with lower growth, however, the effect is statistically significant only in column 3.

Table 8 is very similar to Table 7 but we replace the change in current spending and taxes with their respective components. Consistent with the evidence in Table 7, our regressions show that fiscal stimuli more heavily based on increases in current spending items (government wage and non-wage components, subsidies) are associated with lower growth, while fiscal stimulus packages based on cuts in income, business and indirect taxes are more likely to be expansionary.

When we turn to the sample of fiscal adjustments (Tables 9 and 10), our results still point in the same direction: namely, the composition of the fiscal adjustment, more than its size, matters for growth and fiscal adjustments associated with higher GDP growth are those in which a larger share of the reduction of the primary deficit-to-GDP ratio is due to cuts in current spending, to the government wage and non-wage components, and to subsidies. All this evidence is consistent with the previous literature on fiscal stabilizations and is robust if we introduce among the regressors the change in the short-term interest rate as a control for the stance of monetary policy or the rate of change of the nominal exchange rate to control for exchange rate devaluations that can occur at the same time of large changes in the fiscal stance (results are not shown but are available upon request).

Finally, we have estimated the same specifications as in Tables 7 and 9, columns 1, 2, and 4 for the entire sample of OECD data that, hence, includes episodes of fiscal adjustments, stimuli and years in which the cyclically adjusted primary balance changes between -1.5% and 1.5%. We have also checked whether there are non-linearities associated with times of large fiscal adjustments and stimuli. Table 11 shows the results.[10] Results are in line with the evidence shown so far: we find that larger reductions in current spending and in taxation are associated with higher GDP growth, while changes in capital spending do not show any significant effect on growth. Moreover, the specifications in columns 4-9, do not support any

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[10]Regressions in Table 11 include country and year dummies among the rhs variables.

evidence of non-linearities in episodes of fiscal adjustments or stimuli. Both the coefficients of the dummy variables *Tight* and *Loose* and the coefficients between the interaction terms of these variables and the fiscal policy indicators are not statistically significant. As suggested by Alesina, Ardagna, Perotti, and Schiantarelli (2002), there seems to be nothing special around such episodes that can explain the behavior of growth relatively to normal times.

5 Conclusions

Rather than reviewing again our result it is worth elaborating, or perhaps speculating on the current and future fiscal stance in the US. As we well know a very large portion of the current astronomical 12 percent of GDP deficit is the result of bailout of various types of the financial sector. This is an issue on which this paper has nothing to say. But part of the deficit is the result of the stimulus package that was passed to lift the economy out of the recession. About two third of this fiscal package is constituted by increases in spending, including public investment, transfers and government consumption. According to our results fiscal stimuli based upon tax cut are much more likely to be growth enhancing than those on the spending side. Needless to say when considering a single episode many other factors jump to mind, factors which are difficult to capture in a multi country regressions. For instance, American families were saving too little before the crisis. An income tax cut might have just simply been saved and might have had not a big impact on aggregate consumption. However, more saving might have reinforced the financial sector, think of the credit card crisis for instance. In addition, one could have though of tax cuts that stimulate investment. The benefit of infrastructure projects which have "long and variable lags" is much more questionable.

After the "perfect storm" of this current crisis the US will emerge with an unprecedented (for peace time) increase in government debt. As we argued in the introduction it is unlikely that these deficits and debt will disappear simply because growth will resume at very rapid pace very soon. Primary suppresses would be needed since interest rates cannot go other than up from the close to zero actual levels. The analysis of the present paper suggests that unless primary spending is cut, it is difficult to acheive fiscal stability because spending may rise faster than tax revenue. But what can be cut? Hopefully improvements in the peace process in Afghanistan and Iraq might allow a reduction of military expenditure, but given the instability in the region one cannot count on that for sure. Health care reforms seem to imply large increases in spending, the retirement of the baby boomers is not too far, and in the pressing time of the crisis the issue of Social Security has been in the background, but it has not disappeared A relatively high unemployment for a

15

couple of more years will require spending on subsidies. The budget outlook looks rather grim on the spending side. The Congressional Budget Office predicts deficit of 7 per cent of GDP up to 2020. This is not a rosy scenario.

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6 Data Appendix

- *Debt*.= government gross debt as a share of GDP

- *Total deficit* = cyclically adjusted total deficit as a share of GDP = *primary deficit* + (interest expenses on government debt/GDP)

- *Primary deficit* = cyclically adjusted primary deficit as a share of GDP = *Primary expenses - Total revenue*

- *Primary expenses* = cyclically adjusted primary expenditure as a share of GDP = *Transfers + ((Government wage expenditures + Government non wage expenditures + Subsidies + Government investment)/GDP)*

- *Curr. G* = cyclically adjusted current expenditure as a share of GDP = *Transfers + ((Government wage expenditures + Government non wage expenditures + Subsidies)/GDP)*

- *Transfers* = cyclically adjusted transfers as a share of GDP

- *Government wage expenditures* = government wage bill expenditures

- *Government non wage expenditures* = government non wage bill expenditures

- *Subsidies* = subsidies to firms

- *Government investment* = gross government consumption on fixed capital

- *Total revenue = Tax* = cyclically adjusted total revenue as a share of GDP = *Income taxes + Business taxes + Indirect taxes + Social security contributions + (Other taxes/GDP)*

- *Income taxes* = cyclically adjusted income taxes as a share of GDP = cyclically adjusted direct taxes on household as a share of GDP

- *Business taxes* = cyclically adjusted business taxes as a share of GDP = cyclically adjusted direct taxes on businesses as a share of GDP

- *Indirect taxes* = cyclically adjusted indirect taxes as a share of GDP = cyclically adjusted indirect taxes as a share of GDP

- *Social security contributions* = cyclically adjusted social security contributions paid by employers and employees as a share of GDP

- ΔCurr.G/ΔPr.Deficit; ΔGov.Inv/ΔPr.Deficit; ΔSpending item/ΔPr.Deficit; = an increase in these variables means that a larger share of the increase (reduction) of the primary deficit is obtained by increasing (cutting) current spending/gov. investment/spending item

- ΔTax Revenue Item/ΔPr.Deficit = an increase in these variables means that a larger share of the increase (reduction) of the primary deficit is obtained by cutting (increasing) a revenue item of the government budget

- ΔCurr.G+ΔTax is actually equal to the negative of this variable. If both taxes and spending are cut during the episode of loose or tight fiscal policy, the variable has the "highest positive" value. If, instead, both spending and taxes increase the variable has the "highest negative value".

- *G7 GDP Growth* = average growth rate of real GDP (with GDP weights) of the seven major industrial countries

- *GDP Growth* = growth rate of real capita GDP

- *Trade Balance* = Trade balance as a share of GDP = (Exports of goods and services - Imports of goods and services)/GDP.

Figure 1
Contribution of expenditure and revenue items to the fiscal stimuli
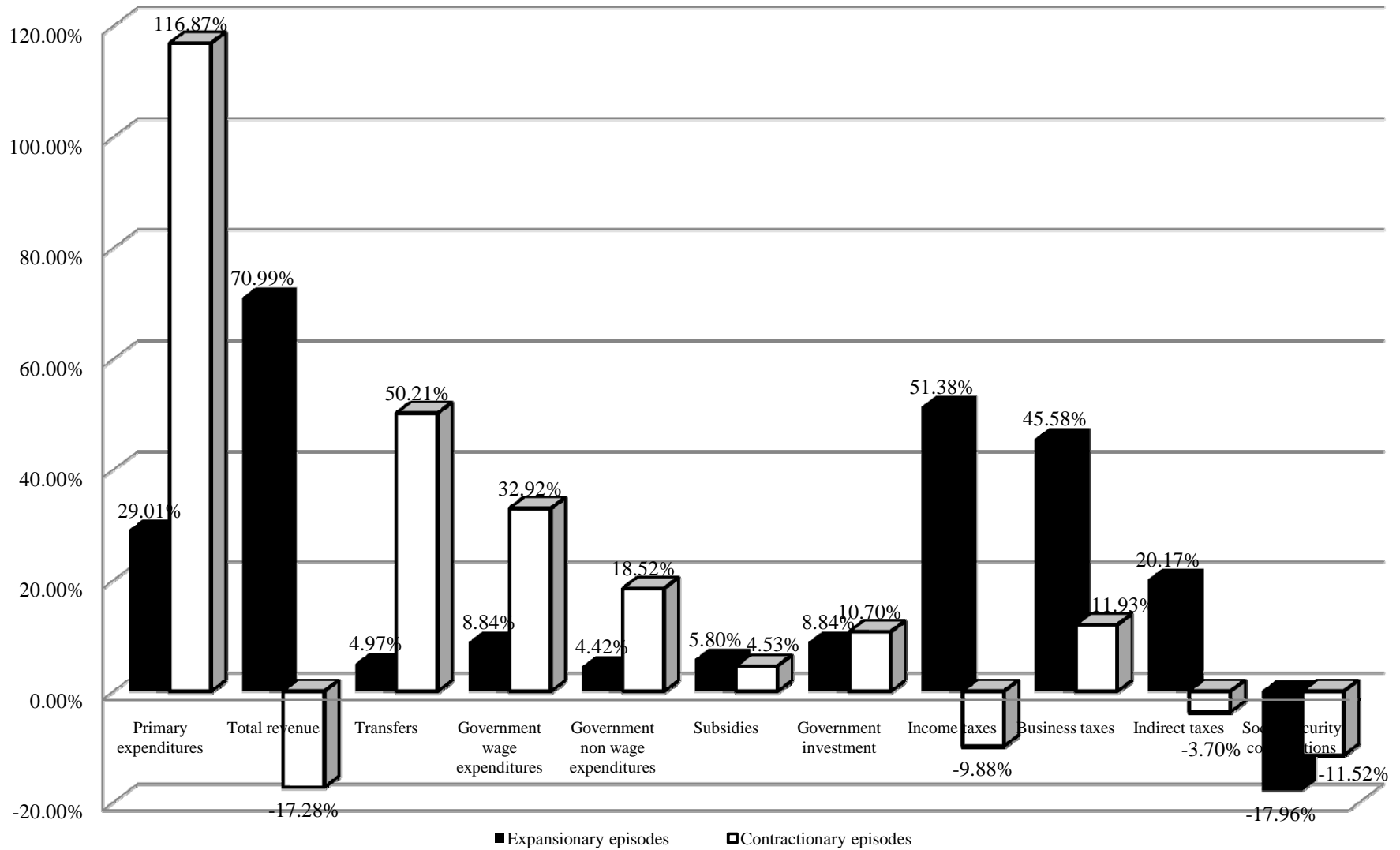
Note: Figure 1 shows the percentage of the increase (reduction) in the primary deficit (surplus) due to changes in spending and revenue items of the government budget. Positive values indicate that expenditure items increase and revenue items decrease, contributing to a worsening of the primary balance. Negative values indicate that expenditure items decrease and revenue items increase, contributing to an improvement of the primary balance.

Figure 2
Contribution of expenditure and revenue items to fiscal adjustments
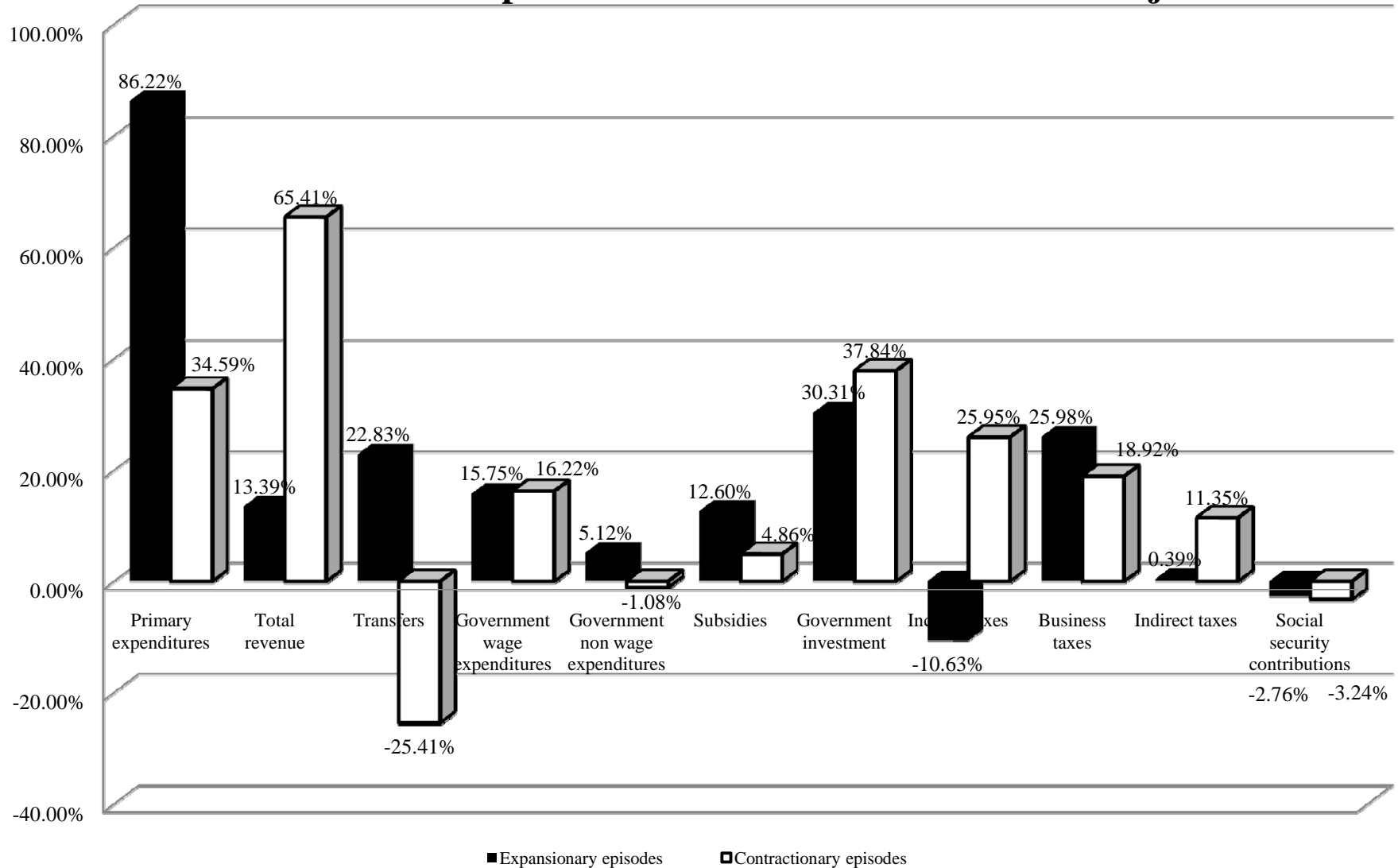
Note: Figure 2 shows the percentage of the decrease (increase) in the primary deficit (surplus) due to changes in spending and revenue items of the government budget. Positive values indicate that expenditure items decrease and revenue items increase, contributing to an improvement of the primary balance. Negative values indicate that expenditure items increase and revenue items decrease, contributing to a worsening of the primary balance.

Figure 3
Contribution of expenditure and revenue items to fiscal adjustments
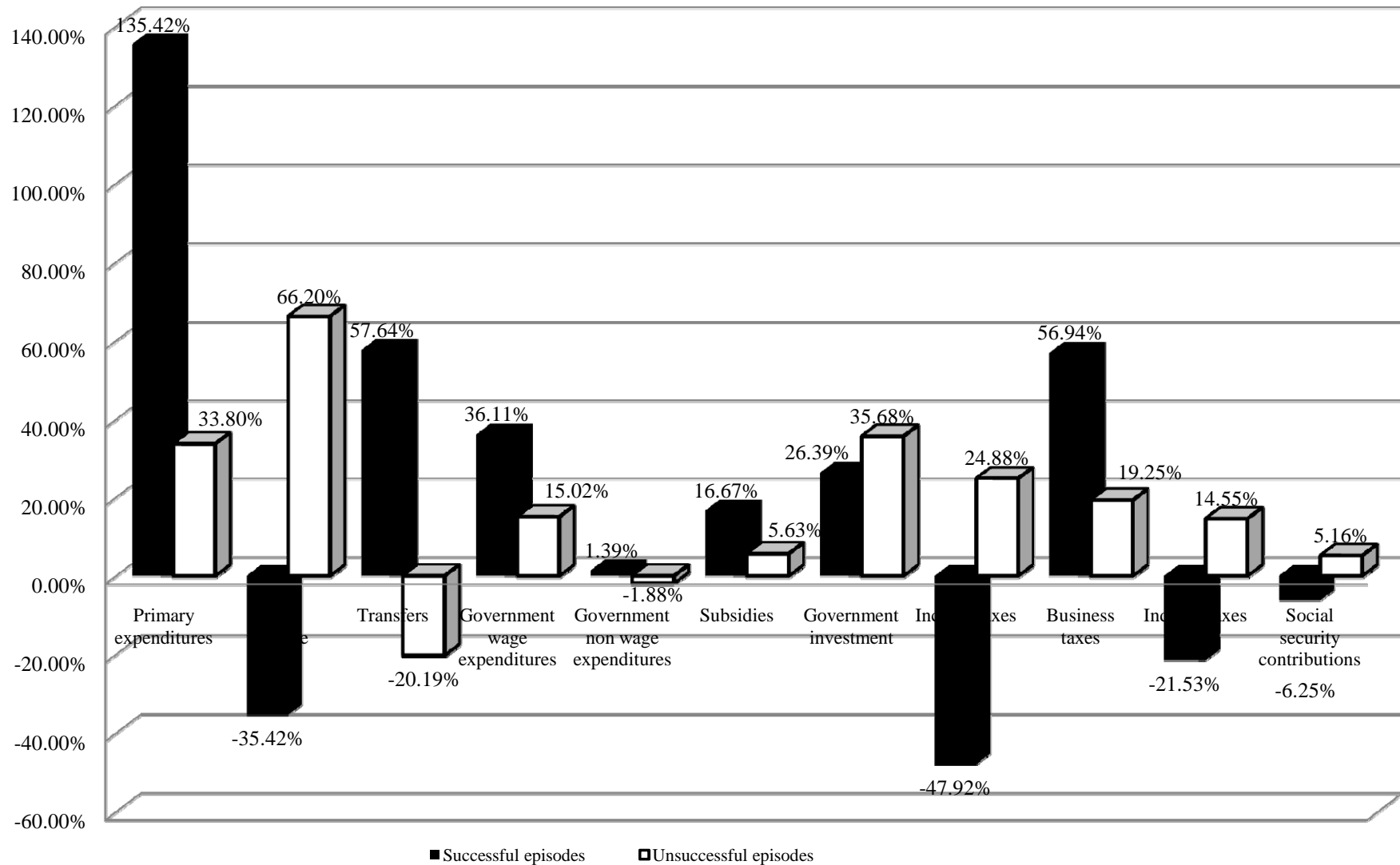
Note: Figure 3 shows the percentage of the decrease (increase) in the primary deficit (surplus) due to changes in spending and revenue items of the government budget. Positive values indicate that expenditure items decrease and revenue items increase, contributing to an improvement of the primary balance. Negative values indicate that expenditure items increase and revenue items decrease, contributing to a worsening of the primary balance

Table 1: Fiscal stimuli: size and composition

	Expansionary				Contractionary			
	[T-2 - T-1] (a)	T (b)	[T+1 - T+2] (c)	(c) - (a)	[T-2 - T-1] (a)	T (b)	[T+1 - T+2] (c)	(c) - (a)
Debt	50.28	50.52	51.1	0.82	60.79	62.38	63.3	2.51
	(9.03)	(9.09)	(9.48)		(5.18)	(5.18)	(4.46)	
Change in debt	-1.02	0.48	0.53	1.55	-0.29	2.24	2.21	2.50
	(1.47)	(1.12)	(1.24)		(0.59)	(0.67)	(0.68)	
Total deficit	-1.04	2.19	3.27	4.31	1.5	3.79	3.97	2.47
	(1.62)	(1.65)	(1.24)		(0.72)	(0.74)	(0.71)	
Primary deficit	-2.01	1.16	1.61	3.62	-0.3	1.99	2.13	2.43
	(0.82)	(0.92)	(0.91)		(0.45)	(0.48)	(0.41)	
Primary expenditures	36.79	37.72	37.84	1.05	40.08	42.22	42.92	2.84
	(1.73)	(1.64)	(1.66)		(0.94)	(0.94)	(1.00)	
Transfers	14.93	14.88	15.11	0.18	16.83	17.28	18.05	1.22
	(1.03)	(1.01)	(1.04)		(0.60)	(0.58)	(0.57)	
Government wage expenditures	10.62	10.74	10.94	0.32	11.78	12.2	12.58	0.80
	(0.52)	(0.47)	(0.50)		(0.41)	(0.43)	(0.46)	
Government non wage expenditures	6.81	6.96	6.97	0.16	7.73	8.15	8.18	0.45
	(0.49)	(0.49)	(0.55)		(0.29)	(0.28)	(0.31)	
Subsidies	2.03	2.09	2.24	0.21	1.82	1.93	1.93	0.11
	(0.33)	(0.32)	(0.37)		(0.13)	(0.14)	(0.15)	
Government investment	2.26	3.05	2.58	0.32	1.95	2.67	2.21	0.26
	(0.37)	(0.38)	(0.37)		(0.19)	(0.27)	(0.21)	
Total revenue	38.8	36.56	36.23	-2.57	40.38	40.23	40.8	0.42
	(1.90)	(1.83)	(2.00)		(1.15)	(1.12)	(1.07)	
Income taxes	10.89	9.2	9.03	-1.86	11.02	11.21	11.26	0.24
	(1.10)	(0.98)	(1.08)		(0.74)	(0.71)	(0.67)	
Business taxes	4.25	3.37	2.6	-1.65	3.03	2.78	2.74	-0.29
	(0.83)	(0.63)	(0.33)		(0.25)	(0.20)	(0.22)	
Indirect taxes	13.33	12.57	12.6	-0.73	12.67	12.5	12.76	0.09
	(0.61)	(0.61)	(0.69)		(0.39)	(0.40)	(0.36)	
Social security contributions	8.7	8.93	9.35	0.65	11.08	11.17	11.36	0.28
	(0.94)	(0.82)	(0.89)		(0.69)	(0.68)	(0.70)	

Source: OECD. Variables are in share of GDP. Total deficit, Primary deficit, Primary expenditures, Transfers, Total revenues, and all revenue items are cyclically adjusted variables.

Standard deviations of the means in parenthesis. See the Data Appendix for the exact definition of the variables

Table 2: Fiscal stimuli and growth

	Expansionary				Contractionary			
	[T-2 - T-1]	T	[T+1 - T+2]	(c) - (a)	[T-2 - T-1]	T	[T+1 - T+2]	(c) - (a)
	(a)	(b)	(c)		(a)	(b)	(c)	
G7 GDP Growth	0.39	1.6	2.03	1.64	0.2	-0.7	-0.74	-0.94
	(0.66)	(0.53)	(0.32)		(0.23)	(0.23)	(0.19)	
GDP Growth	3.9	3.77	4.37	0.47	2.89	0.93	1.79	-1.1
	(0.65)	(0.35)	(0.32)		(0.22)	(0.26)	(0.27)	
Private Consumption Growth	3.49	3.47	3.72	0.23	3.08	1.54	1.86	-1.22
	(0.7)	(0.61)	(0.32)		(0.22)	(0.3)	(0.29)	
Total Investment Growth	3.44	2.58	6.55	3.11	2.9	-1.39	0.04	-2.86
	(1.81)	(1.63)	(1.00)		(0.59)	(0.82)	(0.64)	
Private Investment Growth	3.5	1.14	7.49	3.99	3.36	-1.9	0.07	-3.29
	(2.05)	(2.04)	(1.25)		(0.73)	(1.02)	(0.82)	
Business Investment Growth	5.51	2.5	7.64	2.13	6.73	-0.34	-0.78	-7.51
	(2.06)	(3.21)	(1.53)		(1.44)	(1.34)	(1.07)	
Trade Balance	0.53	0.61	-1.9	-2.43	0.19	-0.2	0.14	-0.05
	(2.07)	(2.2)	(2.11)		(0.7)	(0.65)	(0.69)	

Table 3: Expansionary and contractionary fiscal adjustments: size and composition

	Expansionary				Contractionary			
	[T-2 - T-1] (a)	T (b)	[T+1 - T+2] (c)	(c) - (a)	[T-2 - T-1] (a)	T (b)	[T+1 - T+2] (c)	(c) - (a)
Debt	59.86 (5.52)	57.53 (5.22)	54.1 (5.07)	-5.76	69.15 (4.04)	71.8 (4.23)	69.52 (4.25)	0.37
Change in debt	-1.46 (1.03)	-2.42 (1.14)	-2.3 (0.54)	-0.84	3.28 (0.62)	1.97 (0.54)	1.28 (0.52)	-2.00
Total deficit	3.61 (1.09)	1.33 (1.18)	0.56 (0.98)	-3.05	5.67 (0.63)	3.89 (0.70)	4.14 (0.72)	-1.53
Primary deficit	1.31 (0.77)	-0.84 (0.74)	-1.23 (0.60)	-2.54	2.7 (0.40)	0.74 (0.43)	0.85 (0.39)	-1.85
Primary expenditures	41.32 (2.04)	39.71 (1.80)	39.13 (1.59)	-2.19	43.22 (0.98)	42.47 (0.95)	42.58 (0.93)	-0.64
Transfers	18.1 (1.37)	17.66 (1.21)	17.52 (1.08)	-0.58	17.95 (0.54)	18.21 (0.54)	18.42 (0.54)	0.47
Government wage expenditures	11.65 (0.53)	11.41 (0.51)	11.25 (0.46)	-0.40	12.46 (0.40)	12.25 (0.38)	12.16 (0.36)	-0.30
Government non wage expenditures	7.03 (0.53)	6.91 (0.49)	6.9 (0.48)	-0.13	8.09 (0.27)	8.1 (0.28)	8.11 (0.28)	0.02
Subsidies	2.17 (0.33)	1.95 (0.30)	1.85 (0.28)	-0.32	2.07 (0.13)	1.98 (0.13)	1.98 (0.14)	-0.09
Government investment	2.38 (0.29)	1.77 (0.27)	1.61 (0.25)	-0.77	2.66 (0.18)	1.95 (0.17)	1.96 (0.14)	-0.70
Total revenue	40.02 (1.99)	40.56 (1.90)	40.36 (1.84)	0.34	40.52 (0.98)	41.73 (0.94)	41.73 (0.96)	1.21
Income taxes	10.62 (1.04)	10.59 (1.07)	10.35 (0.97)	-0.27	11.45 (0.63)	11.79 (0.63)	11.93 (0.63)	0.48
Business taxes	2.92 (0.41)	3.49 (0.51)	3.58 (0.50)	0.66	2.55 (0.17)	2.88 (0.22)	2.9 (0.25)	0.35
Indirect taxes	13.52 (0.46)	13.61 (0.40)	13.53 (0.40)	0.01	12.44 (0.31)	12.69 (0.30)	12.65 (0.30)	0.21
Social security contributions	9.63 (1.01)	9.52 (0.92)	9.56 (0.89)	-0.07	11.44 (0.61)	11.52 (0.62)	11.38 (0.66)	-0.06

Source: OECD. Variables are in share of GDP. Total deficit, Primary deficit, Primary expenditures, Transfers, Total revenues, and all revenue items are cyclically adjusted variables.

Standard deviations of the means in parenthesis. See the Data Appendix for the exact definition of the variables

Table 4: Expansionary and contractionary fiscal adjustments and growth

	Expansionary				Contractionary			
	[T-2 - T-1]	T	[T+1 - T+2]	(c) - (a)	[T-2 - T-1]	T	[T+1 - T+2]	(c) - (a)
	(a)	(b)	(c)		(a)	(b)	(c)	
G7 GDP Growth	0.57	1.49	1.98	1.41	-0.32	-0.42	-0.49	-0.17
	(0.55)	(0.37)	(0.24)		(0.2)	(0.2)	(0.17)	
GDP Growth	3.14	4.73	4.68	1.54	2.03	2.36	2.25	0.22
	(0.56)	(0.39)	(0.33)		(0.2)	(0.18)	(0.18)	
Private Consumption Growth	2.82	4.12	4.34	1.52	1.94	2.27	2.27	0.33
	(0.49)	(0.47)	(0.42)		(0.26)	(0.24)	(0.19)	
Total Investment Growth	1.44	7.72	7.91	6.47	1	1.91	2.5	1.5
	(1.68)	(0.98)	(1.12)		(0.61)	(0.54)	(0.72)	
Private Investment Growth	1.41	9.6	7.81	6.4	1.04	2.92	3.15	2.11
	(1.86)	(1.22)	(1.33)		(0.75)	(0.69)	(0.89)	
Business Investment Growth	2.23	10.88	4.98	2.75	2.97	3.23	5.17	2.2
	(1.9)	(1.76)	(2.62)		(1)	(1.18)	(1)	
Trade Balance	0.71	1.85	1.56	0.85	-0.54	0.15	0.95	1.49
	(1.58)	(1.61)	(1.81)		(0.58)	(0.64)	(0.65)	

	[T-2 - T-1]	T	[T+1 - T+2]	(c) - (a)	[T-2 - T-1]	T	[T+1 - T+2]	(c) - (a)
	(a)	(b)	(c)		(a)	(b)	(c)	

Table 5: Successful and unsuccessful fiscal adjustments: size and composition

	Successful				Unsuccessful			
	[T-2 - T-1] (a)	T (b)	[T+1 - T+2] (c)	(c) - (a)	[T-2 - T-1] (a)	T (b)	[T+1 - T+2] (c)	(c) - (a)
Debt	61.92	59.63	53.18	-8.74	68.29	71.4	72.06	3.77
	(4.32)	(4.50)	(4.16)		(4.32)	(4.53)	(4.48)	
Change in debt	-1.6	-1.97	-3.88	-2.28	3.68	2.29	2.14	-1.54
	(0.72)	(1.14)	(0.34)		(0.64)	(0.53)	(0.43)	
Total deficit	2.5	0.29	0.66	-1.84	5.6	3.77	3.69	-1.91
	(1.00)	(1.06)	(1.09)		(0.71)	(0.83)	(0.85)	
Primary deficit	0.8	-1.2	-0.64	-1.44	2.7	0.71	0.57	-2.13
	(0.68)	(0.64)	(0.69)		(0.45)	(0.51)	(0.46)	
Primary expenditures	45.78	43.67	43.83	-1.95	43.46	42.68	42.74	-0.72
	(1.76)	(1.60)	(1.46)		(1.10)	(1.10)	(1.03)	
Transfers	19.86	19.07	19.03	-0.83	18.38	18.59	18.81	0.43
	(1.11)	(0.94)	(0.89)		(0.63)	(0.64)	(0.61)	
Government wage expenditures	12.82	12.5	12.3	-0.52	12.51	12.3	12.19	-0.32
	(0.69)	(0.67)	(0.63)		(0.44)	(0.42)	(0.40)	
Government non wage expenditures	8.73	8.62	8.71	-0.02	7.96	8.01	8	0.04
	(0.49)	(0.47)	(0.45)		(0.30)	(0.31)	(0.30)	
Subsidies	2.29	2.14	2.05	-0.24	2.05	1.94	1.93	-0.12
	(0.36)	(0.35)	(0.34)		(0.14)	(0.14)	(0.15)	
Government investment	2.12	1.34	1.74	-0.38	2.57	1.85	1.81	-0.76
	(0.38)	(0.34)	(0.27)		(0.19)	(0.18)	(0.16)	
Total revenue	44.98	44.86	44.47	-0.51	40.76	41.97	42.17	1.41
	(1.61)	(1.57)	(1.67)		(1.04)	(1.04)	(1.03)	
Income taxes	13.69	13.43	13	-0.69	11.02	11.35	11.55	0.53
	(1.18)	(1.17)	(1.16)		(0.64)	(0.65)	(0.64)	
Business taxes	2.77	3.37	3.59	0.82	2.69	3.08	3.1	0.41
	(0.26)	(0.31)	(0.35)		(0.22)	(0.28)	(0.31)	
Indirect taxes	13.77	13.6	13.46	-0.31	12.32	12.51	12.63	0.31
	(0.68)	(0.61)	(0.62)		(0.33)	(0.32)	(0.33)	
Social security contributions	10.82	10.73	10.73	-0.09	12.04	12.25	12.15	0.11
	(1.26)	(1.15)	(1.20)		(0.62)	(0.62)	(0.64)	

Source: OECD. Variables are in share of GDP. Total deficit, Primary deficit, Primary expenditures, Transfers, Total revenues, and all revenue items are cyclically adjusted variables.

Standard deviations of the means in parenthesis. See the Data Appendix for the exact definition of the variables

Table 6: Successful and unsuccessful fiscal adjustments and growth

	Successful				Unsuccessful			
	[T-2 - T-1]	T	[T+1 - T+2]	(c) - (a)	[T-2 - T-1]	T	[T+1 - T+2]	(c) - (a)
	(a)	(b)	(c)		(a)	(b)	(c)	
G7 GDP Growth	0.4	0.8	0.85	0.45	-0.18	-0.22	-0.12	0.06
	(0.53)	(0.46)	(0.37)		(0.23)	(0.22)	(0.18)	
GDP Growth	2.99	3.61	3.45	0.46	2.07	2.56	2.52	0.45
	(0.58)	(0.5)	(0.28)		(0.25)	(0.2)	(0.21)	
Private Consumption Growth	2.75	3.74	3.02	0.27	2.01	2.28	2.42	0.41
	(0.6)	(0.67)	(0.3)		(0.26)	(0.23)	(0.2)	
Total Investment Growth	2.95	4.11	4.78	1.83	1.02	2.55	3.52	2.5
	(1.37)	(1.54)	(1.24)		(0.69)	(0.56)	(0.73)	
Private Investment Growth	3.45	5.6	5.07	1.62	1.18	3.43	4.23	3.05
	(1.46)	(1.85)	(1.43)		(0.81)	(0.73)	(0.9)	
Business Investment Growth	3.2	5.46	6.06	2.86	3.23	5.17	5.84	2.61
	(1.79)	(2.06)	(1.42)		(1.07)	(0.97)	(1.08)	
Trade Balance	2.72	3.99	4.31	1.59	-0.19	0.48	1.15	1.34
	(1.1)	(1.03)	(1.51)		(0.71)	(0.77)	(0.84)	

| | [T-2 - T-1] | T | [T+1 - T+2] | (c) - (a) | [T-2 - T-1] | T | [T+1 - T+2] | (c) - (a) |

Table 7: GDP growth during and in the aftermath of a fiscal stimulus

	(1) GDP growth	(2) GDP growth	(3) GDP growth	(4) GDP growth	(5) Avg. GDP gr.	(6) Avg. GDP gr.	(7) Avg. GDP gr.	(8) Avg. GDP gr.
GDP growth (-1)	0.467***	0.484***	0.51***7	0.48***	0.217*	0.236**	0.266**	0.237**
	(3.18)	(3.62)	(3.76)	(3.66)	(1.84)	(2.15)	(2.40)	(2.17)
GDP growth (-2)	-0.16	-0.08	-0.10	-0.08	-0.08	-0.02	-0.04	-0.028
	(-1.16)	(-0.60)	(-0.78)	(-0.68)	(-0.74)	(-0.19)	(-0.39)	(-0.27)
G7 GDP growth (-1)	0.36*	0.27	0.25	0.27	-0.164	-0.23	-0.244	-0.228
	(1.80)	(1.47)	(1.34)	(1.49)	(-1.03)	(-1.53)	(-1.61)	(-1.53)
Debt (-1)	-0.004	-0.007	-0.009	-0.0068	-0.003	-0.006	-0.0061	-0.005
	(-0.54)	(-0.90)	(-1.10)	(-0.93)	(-0.37)	(-0.78)	(-0.74)	(-0.77)
Δ Curr. G		-0.75***				-0.44**		
		(-2.87)				(-2.02)		
Δ Gov. Inv		-0.256				-0.076		
		(-1.38)				(-0.50)		
Δ Tax		-0.177				-0.199		
		(-0.62)				(-0.85)		
Δ Pr. Deficit	-0.283		-0.428**	-0.264	-0.102		-0.197	-0.089
	(-1.51)		(-2.29)	(-1.57)	(-0.68)		(-1.30)	(-0.64)
Δ Curr. G/Δ Pr. Deficit			-0.02***				-0.016***	
			(-3.43)				(-3.37)	
Δ Gov. Inv/Δ Pr. Deficit			-0.003				-0.005	
			(-0.39)				(-0.73)	
Δ Curr. G + Δ Tax				0.466***				0.323***
				(4.07)				(3.44)
Constant	0.008	0.012	0.026***	0.012	0.023***	0.026***	0.037***	0.026***
	(0.90)	(1.38)	(2.66)	(1.45)	(3.13)	(3.52)	(4.57)	(3.78)
Observations	72	72	72	72	69	69	69	69
R-squared	0.28	0.43	0.40	0.43	0.06	0.21	0.21	0.21

Notes: OLS regressions. Dependent variables: real GDP growth rate during the fiscal stimulus in columns 1-4; average real GDP growth rate during the fiscal stimulus and in the following two years in columns 5-8. T-statistics in parenthesis. See the Data Appendix for the exact definition of the variables.

Table 8: GDP growth and the composition of a fiscal stimulus

	(1) GDP growth	(2) GDP growth	(3) GDP growth	(4) Avg. GDP gr.	(5) Avg. GDP gr.	(6) Avg. GDP gr.
GDP growth (-1)	0.36**	0.53**	0.48***	0.26**	0.38***	0.25**
	(2.61)	(3.81)	(3.29)	(2.25)	(3.41)	(2.11)
GDP growth (-2)	0.05	-0.09	-0.23	0.046	-0.08	-0.11
	(0.42)	(-0.71)	(-1.64)	(0.41)	(-0.81)	(-0.94)
G7 GDP growth (-1)	0.14	0.08	0.26	-0.343**	-0.357**	-0.27
	(0.78)	(0.44)	(1.29)	(-2.28)	(-2.42)	(-1.64)
Debt (-1)	-0.0127*	-0.01	-0.0003	-0.008	-0.0004	-0.0017
	(-1.69)	(-1.41)	(-0.04)	(-1.08)	(-0.05)	(-0.22)
Δ Tran	-0.23			-0.345		
	(-0.50)			(-0.87)		
Δ Gov. non wage exp.	-3.10***			-3.01***		
	(-3.57)			(-4.06)		
Δ Gov. wage exp.	-1.32**			-0.034		
	(-2.43)			(-0.07)		
Δ Subsidies	-1.50			-0.623		
	(-1.49)			(-0.73)		
Δ Gov. Inv	-0.22			-0.059		
	(-1.35)			(-0.42)		
Δ Income taxes	0.12			-0.281		
	(0.30)			(-0.85)		
Δ Bus. taxes	-0.23			-0.121		
	(-0.73)			(-0.45)		
Δ Soc. security contr.	0.248			0.186		
	(0.56)			(0.50)		
Δ Indirect taxes	-0.181			-0.167		
	(-0.37)			(-0.40)		
Δ other taxes	-3.001***			-2.022**		
	(-2.80)			(-2.24)		
Δ Pr. Deficit		-0.493***	-0.32*		-0.276*	-0.077
		(-2.76)	(-1.80)		(-1.93)	(-0.53)
Δ Tran/Δ Pr. Deficit		0.002			-0.007	
		(0.26)			(-1.06)	
Δ Gov. non wage exp./Δ Pr. Deficit		-0.053***			-0.065***	
		(-3.05)			(-4.72)	
Δ Gov. wage exp/Δ Pr. Deficit		-0.032**			0.0019	
		(-2.07)			(0.16)	
Δ Subsidies/Δ Pr. Deficit		-0.062**			-0.04*	
		(-2.14)			(-1.75)	
Δ Gov. Inv/Δ Pr. Deficit		-0.0016			-0.007	
		(-0.20)			(-1.10)	
Δ Income taxes/Δ Pr. Deficit			0.016*			0.015**
			(1.93)			(2.29)
Δ Bus. taxes/Δ Pr. Deficit			0.029***			0.017*
			(2.83)			(1.88)
Δ Soc. security contr./Δ Pr. Deficit			0.01			0.008
			(0.99)			(1.00)
Δ Indirect taxes/Δ Pr. Deficit			0.030**			0.023**
			(2.50)			(2.42)
Δ other taxes/Δ Pr. Deficit			0.032**			0.014
			(2.48)			(1.34)
Constant	0.027***	0.035***	0.006	0.035***	0.041***	0.019***
	(3.12)	(3.65)	(0.70)	(4.72)	(5.28)	(2.73)
Observations	67	69	70	64	66	67
R-squared	0.63	0.51	0.43	0.47	0.39	0.21

Notes: OLS regressions. Dependent variables: real GDP growth rate during the fiscal stimulus in columns 1-3; average real GDP growth rate during the fiscal stimulus and in the following two years in columns 4-6. T-statistics in parenthesis.

See the Data Appendix for the exact definition of the variables.

Table 9: GDP growth during and in the aftermath of a fiscal adjustment

	(1) GDP growth	(2) GDP growth	(3) GDP growth	(4) GDP growth	(5) Avg. GDP gr.	(6) Avg. GDP gr.	(7) Avg. GDP gr.	(8) Avg. GDP gr.
GDP growth (-1)	0.296***	0.288***	0.269***	0.30***	0.198**	0.197**	0.182**	0.202***
	(2.99)	(3.12)	(3.04)	(3.29)	(2.41)	(2.56)	(2.48)	(2.66)
GDP growth (-2)	-0.0013	0.08	0.123	0.07	-0.059	0.01	0.045	0.007
	(-0.01)	(0.98)	(1.50)	(0.86)	(-0.80)	(0.14)	(0.66)	(0.10)
G7 GDP growth (-1)	0.116	0.038	0.018	0.025	0.005	-0.068	-0.08	-0.07
	(0.76)	(0.27)	(0.13)	(0.18)	(0.04)	(-0.58)	(-0.72)	(-0.63)
Debt (-1)	-0.011*	-0.006	-0.007	-0.009	-0.008	-0.006	-0.006	-0.006
	(-1.84)	(-1.11)	(-1.33)	(-1.54)	(-1.42)	(-1.05)	(-1.22)	(-1.20)
Δ Curr. G		-0.433**				-0.296**		
		(-2.55)				(-2.10)		
Δ Gov. Inv		0.082				0.046		
		(0.60)				(0.41)		
Δ Tax		-0.22				-0.26		
		(-1.09)				(-1.56)		
Δ Pr. Deficit	-0.044		-0.023	0.016	-0.027		0.006	0.024
	(-0.33)		(-0.19)	(0.13)	(-0.24)		(0.06)	(0.23)
Δ Curr. G/Δ Pr. Deficit			0.017***				0.015***	
			(4.70)				(4.81)	
Δ Gov. Inv/Δ Pr. Deficit			0.0013				0.004	
			(0.28)				(0.96)	
Δ Curr. G + Δ Tax				0.34***				0.284***
				(3.80)				(3.84)
Constant	0.027***	0.024***	0.019***	0.027***	0.029***	0.029***	0.024***	0.03***
	(3.85)	(3.44)	(2.97)	(4.23)	(4.90)	(4.87)	(4.28)	(5.41)
Observations	88	88	88	88	83	83	83	83
R-squared	0.22	0.35	0.40	0.34	0.12	0.27	0.34	0.27

Notes: OLS regressions. Dependent variables: real GDP growth rate during the fiscal adjustment in columns 1-4; average real GDP growth rate during the fiscal adjustment and in the following two years in columns 5-8. T-statistics in parenthesis. See the Data Appendix for the exact definition of the variables.

Table 10: GDP growth and the composition of a fiscal adjustment

	(1) GDP growth	(2) GDP growth	(3) GDP growth	(4) Avg. GDP gr.	(5) Avg. GDP gr.	(6) Avg. GDP gr.
GDP growth (-1)	0.208**	0.26***	0.276**	0.127	0.187**	0.155*
	(2.11)	(2.99)	(2.54)	(1.58)	(2.56)	(1.80)
GDP growth (-2)	0.112	0.13	0.072	0.079	0.06	0.036
	(1.26)	(1.59)	(0.74)	(1.09)	(0.88)	(0.47)
G7 GDP growth (-1)	0.068	-0.05	0.108	-0.048	-0.15	-0.04
	(0.44)	(-0.37)	(0.61)	(-0.39)	(-1.33)	(-0.30)
Debt (-1)	-0.013**	-0.010*	-0.013*	-0.014**	-0.008*	-0.012*
	(-2.08)	(-1.74)	(-1.95)	(-2.43)	(-1.69)	(-1.99)
Δ Tran	-0.057			-0.30		
	(-0.20)			(-1.27)		
Δ Gov. non wage exp.	-1.53**			-0.46		
	(-2.59)			(-0.94)		
Δ Gov. wage exp.	-1.18***			-1.05***		
	(-2.66)			(-2.85)		
Δ Subsidies	-1.98**			-1.84***		
	(-2.61)			(-2.93)		
Δ Gov. Inv	0.044			-0.002		
	(0.32)			(-0.02)		
Δ Income taxes	-0.016			0.04		
	(-0.06)			(0.18)		
Δ Bus. taxes	-0.57*			-0.79***		
	(-1.92)			(-3.19)		
Δ Soc. security contr.	-0.04			-0.24		
	(-0.10)			(-0.64)		
Δ Indirect taxes	-0.19			-0.37		
	(-0.43)			(-1.03)		
Δ other taxes	-0.27			0.106		
	(-0.50)			(0.24)		
Δ Pr. Deficit		-0.084	0.051		-0.022	0.077
		(-0.70)	(0.35)		(-0.22)	(0.67)
Δ Tran/Δ Pr. Deficit		0.006			0.009*	
		(1.01)			(1.93)	
Δ Gov. non wage exp./Δ Pr. Deficit		0.025**			0.005	
		(2.23)			(0.56)	
Δ Gov. wage exp/Δ Pr. Deficit		0.026***			0.022***	
		(3.16)			(3.04)	
Δ Subsidies/Δ Pr. Deficit		0.043***			0.036***	
		(2.69)			(2.66)	
Δ Gov. Inv/Δ Pr. Deficit		-0.0004			0.0026	
		(-0.08)			(0.66)	
Δ Income taxes/Δ Pr. Deficit			-0.009			-0.005
			(-1.42)			(-1.11)
Δ Bus. taxes/Δ Pr. Deficit			-0.011			-0.015*
			(-1.16)			(-1.84)
Δ Soc. security contr./Δ Pr. Deficit			-0.01			-0.015*
			(-1.04)			(-1.93)
Δ Indirect taxes/Δ Pr. Deficit			-0.015			-0.02***
			(-1.62)			(-2.68)
Δ other taxes/Δ Pr. Deficit			0.0012			0.0001
			(0.11)			(0.01)
Constant	0.024***	0.019***	0.033***	0.03***	0.025***	0.04***
	(3.29)	(3.11)	(3.99)	(4.92)	(4.56)	(5.78)
Observations	81	88	80	77	83	76
R-squared	0.47	0.46	0.28	0.41	0.38	0.26

Notes: OLS regressions. Dependent variables: real GDP growth rate during the fiscal adjustment in columns 1-3; average real GDP growth rate during the fiscal adjustment and in the following two years in columns 4-6. T-statistics in parenthesis.

See the Data Appendix for the exact definition of the variables.

Table 11: GDP growth and fiscal policy

	(1) GDP growth	(2) GDP growth	(3) GDP growth	(4) GDP growth	(5) GDP growth	(6) GDP growth	(7) GDP growth	(8) GDP growth	9 GDP growth
GDP growth (-1)	0.35***	0.37***	0.37***	0.34***	0.36***	0.37***	0.34***	0.35***	0.36***
	(8.37)	(9.24)	(9.45)	(8.14)	(8.98)	(9.21)	(7.99)	(8.77)	(8.93)
GDP growth (-2)	-0.038	0.016	0.014	-0.035	0.02	0.017	-0.03	0.026	0.025
	(-0.91)	(0.41)	(0.36)	(-0.84)	(0.51)	(0.43)	(-0.71)	(0.65)	(0.62)
Debt (-1)	-0.004	-0.005	-0.005	-0.004	-0.005	-0.005	-0.004	-0.005	-0.005
	(-1.09)	(-1.31)	(-1.34)	(-1.04)	(-1.22)	(-1.27)	(-1.10)	(-1.28)	(-1.39)
Δ Pr. Deficit	-0.154***		-0.145***	-0.131**		-0.136**	-0.11		-0.14
	(-3.98)		(-3.99)	(-1.99)		(-2.19)	(-1.08)		(-1.58)
Tight*Δ Pr. Deficit							0.12		0.16
							(0.74)		(1.05)
Loose*Δ Pr. Deficit							-0.213		-0.126
							(-1.27)		(-0.80)
Δ Curr. G		-0.51***			-0.51***			-0.51***	
		(-8.37)			(-6.20)			(-4.59)	
Tight*Δ Curr. G								0.29	
								(1.48)	
Loose*Δ Curr. G								-0.25	
								(-1.21)	
Δ Gov. Inv		-0.07			-0.067			0.006	
		(-1.16)			(-0.89)			(0.04)	
Tight*Δ Gov. Inv								0.036	
								(0.19)	
Loose*Δ Gov. Inv								-0.246	
								(-1.22)	
Δ Tax		-0.12**			-0.12			-0.134	
		(-1.97)			(-1.45)			(-1.29)	
Tight*Δ Tax								0.025	
								(0.11)	
Loose*Δ Tax								0.038	
								(0.17)	
Δ Curr. G + Δ Tax			0.314***			0.312***			0.315***
			(8.36)			(8.32)			(7.05)
Tight*Δ Curr. G + Δ Tax									-0.145
									(-1.52)
Loose*Δ Curr. G + Δ Tax									0.124
									(1.34)
Tight				-0.0016	-0.0024	-0.0020	0.0019	0.0006	0.0015
				(-0.69)	(-1.05)	(-0.87)	(0.52)	(0.16)	(0.44)
Loose				-0.0038	-0.0027	-0.003	0.0014	0.002	0.0017
				(-1.45)	(-1.11)	(-1.23)	(0.35)	(0.53)	(0.44)
Observations	569	569	569	569	569	569	569	569	569
R-squared	0.58	0.64	0.63	0.59	0.64	0.64	0.59	0.64	0.64

Notes: OLS regressions. Dep. var.: real GDP growth rate. Tight=1 in period of a fiscal adjustment, 0 otherwise. Loose = 1 in period of a fiscal stimulus, 0 otherwise. Country and year dummies included. T-stat in (). See Data Appendix.

Table A1: Episodes of fiscal stimuli and adjustments

Fiscal Stimuli

Australia	1990	1991							
Austria	1975	2004							
Belgium	1975	1981	2005						
Canada	1975	1982	1991	2001					
Denmark	1974	1975	1980	1981	1982				
Finland	1978	1982	1983	1987	1990	1991	1992	2001	2003
France	1975	1981	1992	1993	2002				
Germany	1995	2001							
Greece	1981	1985	1989	1995	2001				
Ireland	1974	1975	1978	2001	2007				
Italy	1972	1975	1981	2001					
Japan	1975	1993	1998	2005	2007				
Netherlands	1975	1980	1995	2001	2002				
New Zealand	1988								
Norway	1974	1976	1977	1986	1987	1991	1998	2002	2007
Portugal	1978	1985	1993	2005					
Spain	1981	1982	1993						
Sweden	1974	1977	1979	1980	1991	1992	2001	2002	
United Kingdom	1971	1972	1973	1990	1991	1992	2001	2002	2003
United States	2002								

Fiscal Adjustments

Australia	1987	1988							
Austria	1984	1996	1997	2005					
Belgium	1982	1984	1987	2006					
Canada	1981	1986	1987	1995	1996	1997			
Denmark	1983	1984	1985	1986	2005				
Finland	1973	1976	1981	1984	1988	1994	1996	1998	2000
France	1979	1996							
Germany	1996	2000							
Greece	1976	1986	1991	1994	1996	2005	2006		
Ireland	1976	1984	1987	1988	1989	2000			
Italy	1976	1980	1982	1990	1991	1992	1997	2007	
Japan	1984	1999	2001	2006					
Netherlands	1972	1973	1983	1988	1991	1993	1996		
New Zealand	1987	1989	1993	1994	2000				
Norway	1979	1980	1983	1989	1996	2000	2004	2005	
Portugal	1982	1983	1986	1988	1992	1995	2002	2006	
Spain	1986	1987	1994	1996					
Sweden	1981	1983	1984	1986	1987	1994	1996	1997	2004
United Kingdom	1977	1982	1988	1996	1997	1998	2000		

Table A2

Expansionary Fiscal Stimuli

Canada	2001				
Finland	1978	1987			
Greece	2001				
Ireland	1974	1975	1978	2001	2007
Italy	1972				
Japan	1975				
Netherlands	1995				
Norway	1974	1991	2007		
Portugal	1978	1985			
United Kingdom	2001	2002	2003		

Expansionary Fiscal Adjustments

Finland	1973	1996	1998	2000	
Greece	1976	2005	2006		
Ireland	1976	1987	1988	1989	2000
Netherlands	1996				
New Zealand	1993	1994	2000		
Norway	1979	1980	1983	1996	
Portugal	1986	1988	1995		
Spain	1986	1987			
Sweden	2004				

Successful Fiscal Adjustments

Austria	2005			
Denmark	2005			
Finland	1998			
Ireland	2000			
Italy	1982			
Netherlands	1972	1973	1993	1996
New Zealand	1993	1994		
Norway	1979	1980	1989	1996
Sweden	1986	1987	2004	
United Kingdom	1977	1988	2000	