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Destiné à Site web FEB  
Page(s).  
Date 21 novembre 2011  
**Sujet** Efficience des pouvoirs publics  
**Directives pour une politique d'assainissement performante**

## MEMO

**L'Université de Gand a analysé une quarantaine d'assainissements budgétaires réalisés par le passé dans 21 pays industrialisés**, afin de déterminer ceux qui permettent de réduire le taux d'endettement de manière durable. Un premier constat est que la croissance économique joue un rôle crucial. En effet, sans croissance, il est extrêmement difficile de réduire la dette, même avec une politique budgétaire restrictive. La situation que connaît actuellement la Grèce le montre à souhait. En vue de maintenir la croissance, il faut principalement économiser du côté des dépenses plutôt que d'augmenter encore les impôts. Il importe cependant de sauvegarder les investissements publics, car ils ont un impact positif considérable sur la croissance économique future. Selon les chercheurs, il faut surtout se concentrer sur l'énorme potentiel de gains d'efficacité au niveau des pouvoirs publics, des dépenses sociales et des subventions. De plus, il est préférable d'opter pour une solution drastique mais brève plutôt que d'étaler l'assainissement budgétaire sur une très longue période.

**Cette étude de l'Université de Gand confirme les conclusions d'études antérieures du FMI, de l'OCDE et de la Commission européenne. Si l'on ne se conforme pas à ces directives, la croissance économique et la création d'emplois en seront fortement affectées, avec de lourdes conséquences au niveau de notre prospérité, de la cohésion sociale et de l'assise de notre modèle social. Il est grand temps que les négociateurs pour la formation d'un gouvernement fédéral suivent ces conseils.**

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# Fiscal consolidation, institutions and institutional reform: a multivariate analysis of government debt dynamics

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9 November 2011

## Abstract

We study the evolution of the public debt to GDP ratio during 40 fiscal consolidation episodes in 21 OECD countries in 1980-2008. We test within a multivariate regression framework seven hypotheses put forward in the literature on the success or failure of consolidation programmes. These hypotheses concern (i) the composition of the consolidation programme, (ii) its size and persistence, (iii) the gravity of the debt situation, (iv) the influence of the international macroeconomic environment, (v) the role of labour and product market institutions and institutional reform, (vi) the ideological orientation of the government, and (vii) the contribution of budgetary institutions, in particular the role of strict fiscal rules. We add a new hypothesis to this literature, emphasizing the influence of public sector efficiency. We also improve on most existing literature methodologically by controlling for one-off budgetary measures when defining consolidation episodes. In an appendix we apply our main results to Belgium.

**Keywords:** government debt, fiscal consolidation, fiscal policy composition, budgetary institutions, labour and product market institutions, government efficiency

**JEL codes:** E62, H62, H63

*A shorter version of this paper is published as Working Paper, N° 11/74, Faculteit Economie en Bedrijfskunde, Universiteit Gent.*

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We are grateful to Gerdie Everaert, Stijn Goeminne and Ruben Schoonackers for their valuable suggestions and comments on an earlier draft of this paper. We also gratefully acknowledge support from the Flemish government (Steunpunt Fiscaliteit en Begroting - Vlaanderen). We have benefited from discussions within the 'Sporwerkgroep A3' of the Steunpunt. Any remaining errors are ours.

## Korte samenvatting

We bestuderen de evolutie van de overheidsschuld in percent van het BBP in 21 OESO landen in de periode 1980-2008. We focussen hierbij voornamelijk op periodes van budgettaire sanering. Deze bakenen we af als perioden van minstens 2 jaar waarin de overheid haar structureel begrotingsaldo jaar na jaar verbetert (haar structureel tekort afbouwt). Analyse van de data levert 40 saneringsperioden op, o.a. België 1982-87, 1993-94 en 1996-98. We stellen vast dat in een kleine meerderheid van deze saneringsperioden de overheidsschuld in percent van het BBP na de sanering niet lager is dan ervoor.

Verder onderzoek toont het grote belang aan van de economische groei tijdens de sanering. Bij zwakke economische groei slaagt bijna geen enkele sanering erin de schuldgraad af te bouwen. Bij sterke groei zijn de slaagkansen veel groter. De wetenschappelijke literatuur suggereert verschillende factoren die de groei tijdens een sanering, en dus de kansen op succes versus slagen, kunnen bepalen. Relevante factoren betreffen (i) de specifieke samenstelling van het saneringsprogramma (uitgavenvermindering of belastingverhoging), (ii) haar omvang en duur, (iii) de initiële hoogte van de schuld ('noodtoestand'), (iv) de invloed van de internationale macro-economische context, (v) de rol van arbeids- en productmarktinstuties en institutionele hervormingen, (vi) de ideologische oriëntatie van de overheid en (vii) de invloed van budgettaire instituties (o.a. fiscale regels). Een bijkomende, eigen, hypothese betreft de invloed van de efficiëntie van het overheidsapparaat.

Ons onderzoek wijst op een belangrijk onderscheid tussen de korte en lange termijn wat betreft de samenstelling van het saneringsprogramma. Terwijl belastingverhogingen op korte termijn iets effectiever kunnen zijn om de schuld te verlagen (omdat ze op korte termijn minder op de economische groei wegen), zijn uitgavengebaseerde programma's effectiever op langere termijn. Verlaging van subsidies en sociale uitgaven werkt, net als besparen op de publieke loonmassa. Dit laatste werkt echter enkel in landen waar de overheidsefficiëntie laag is. Verlaging van de publieke investeringen is daarentegen nefast. Ons onderzoek suggereert dat een verhoging van de overheidsinvesteringen een belangrijke rol moet innemen in elk saneringsprogramma. Deze vaststelling sluit vanzelfsprekend nauw aan bij de cruciale rol van economische groei voor het succes van een sanering. België valt in deze context op als een land met een (in internationaal perspectief) relatief hoog aandeel van subsidies in het BBP, een relatief hoog aandeel van overheidslonen, een eerder lage overheidsefficiëntie in de administratie, en een laag aandeel van overheidsinvesteringen.

Wat betreft de duur en omvang van saneringsoperaties betreft, verkiezen onze resultaten omvangrijke programma's van kortere duur boven langdurige programma's die beperkter zijn in (jaarlijkse) omvang.

Heel belangrijk is ook de internationale context waarbinnen een budgettaire sanering plaatsvindt. Een saneringsprogramma heeft meer kans op slagen als de internationale economische groei hoog is, en wanneer internationale interestvoeten laag zijn. Omgekeerd zal saneren dus heel moeilijk zijn wanneer alle landen dit simultaan doen. Simultane sanering weegt immers veel sterker op de groei. Vooral hoge schuldlanden zijn kwetsbaar voor een internationale groeivertraging. Zeker in die omstandigheden is internationale monetaire accommodatie - een lage interestvoet - dan van cruciaal belang.

De hypothese dat saneringsprogramma's effectiever zijn wanneer de initiële budgettaire situatie in noodtoestand is (bijv. een initiële schuldgraad boven 100%), wordt niet eenduidig beantwoord. Enerzijds

plukken landen met een hoge schuld vlugger de vruchten wanneer zij overtuigend hun bereidheid tonen om te saneren (vb. door lagere risicopremies). Anderzijds, blijkt saneren in deze omstandigheden veel zwaarder op de groei te wegen. Eén verklaring is dat bij uitzonderlijk hoge schuld het banksysteem verstoord is, met kredietbeperkingen tot gevolg. Wanneer de overheid saneert, is er dan minder kans dat private investeerders of consumenten 'de fakkel overnemen', en bijv. meer gaan investeren. Veel negatievere gevolgen voor de groei leiden dan tot het risico van een vicieuze cirkel.

De rol van instituties en institutionele hervorming voor het slagen van saneringsprogramma's is eveneens niet rechtlijnig. Enerzijds blijken arbeidsmarktinstuties (vakbondsmacht, flexibiliteit bij aanwerving en ontslag) weinig invloed te hebben op het succes van budgettaire sanering. Anderzijds is de kans op een succesvolle consolidatie groter wanneer deze samengaat met productmarktderegulering en de creatie van een meer competitieve omgeving. Verhoogde efficiëntie, innovatie en productiviteit kunnen een belangrijk element vormen van de noodzakelijke groeistrategie bij sanering. De invloed van budgettaire instituties is eveneens heel belangrijk. We vinden dat saneringsinitiatieven effectiever zijn wanneer ze ingebed zijn in een regime van strikte budgettaire regels en wanneer ze worden uitgevoerd door efficiënte overheden. Beide aspecten leiden mogelijk tot een hogere geloofwaardigheid van het begrotingsbeleid, en dus een grotere kans op slagen. Data van de OESO en het Planbureau leren dat België in deze context opvalt als een land met een minder flexibele productmarkt. Data van de Europese Commissie tonen dat de overheidsfinanciën in België minder zijn ingebed in een geheel van regels. Een laatste resultaat betreft de ideologische oriëntatie van de overheid. Volgens onze bevindingen t.a.v. de onderzochte 40 saneringsperioden, zijn linkse regeringen meer succesvol dan rechtse. Er zijn indicaties dat zij de overheidsinvesteringen beter bewaken tijdens een sanering. Mogelijk slagen linkse regeringen er ook beter in om de maatschappelijke consensus te bewaren (bijv. aanvaarding door vakbonden) die nodig is om grote saneringen succesvol door te voeren.

Onderzoek toont aan dat de evolutie van de economische groei tijdens en na een budgettaire saneringsperiode cruciaal is voor het succes ervan, d.w.z. voor de mate waarin de sanering tot schuldafbouw kan bijdragen. Bovenstaande resultaten tonen dat het beleid deze groei-evolutie vooral kan beïnvloeden door een goede samenstelling van het programma, het doorvoeren van complementaire institutionele hervormingen op de productmarkt, en het bevorderen van efficiëntie in de eigen administratie. Verder is vooral de internationale conjunctuur en monetaire omgeving van doorslaggevend belang.

# 1. Introduction

The sharp increase in public debt ratios and growing concern about the sustainability of public finances since the recession in 2008-09 have imposed the need for a significant fiscal adjustment and credible debt reduction strategies in most OECD countries.

Many countries have gained experience with fiscal consolidation programmes in the past two or three decades. Analysis of the determinants of the success or failure of fiscal consolidation has also been high on the agenda of many researchers since seminal work by Giavazzi and Pagano (1990) and Alesina and Perotti (1995). The range of existing studies is extremely wide. Whereas some studies focus on individual countries or fiscal episodes, most studies have a cross-country or panel setup. As dependent variable, many studies try to explain the probability of success in debt or deficit reduction. Others focus on the evolution of economic growth, private consumption, or private investment during and after consolidation periods. Still others directly study the evolution of fiscal deficits. Explanatory variables may relate narrowly to the characteristics of the consolidation programme, e.g. its composition or size, the economic context within which consolidation takes place, or the institutional environment within which it takes place. As to institutions, some studies focus on fiscal institutions, others on labour and product market institutions, still others on the ideology of ruling political parties. In our discussion of the literature in the next sections we provide further detail and references on most of these issues.

This paper studies the evolution of the ratio of public debt to GDP during and after fiscal consolidations in 21 OECD countries in 1980-2008. To the best of our knowledge, only one study has investigated the dynamics of the public debt ratio during consolidation periods before (see Heylen and Everaert, 2000). Given that ultimately it is the evolution of public debt that matters most in a consolidation context, this scarcity of available studies is surprising. We test seven hypotheses put forward in the literature on the success or failure of consolidation programmes. These hypotheses concern (i) the composition of the consolidation programme, (ii) its size and persistence, (iii) the gravity of the debt situation, (iv) the influence of the international macroeconomic environment, (v) the role of labour and product market institutions and institutional reform, (vi) the ideological orientation of the government, and (vii) the contribution of budgetary institutions, in particular the role of strict fiscal rules. We add a new hypothesis to this literature, emphasizing the influence of public sector efficiency. Next to studying all these hypotheses within one common framework, and with one dataset, we improve on existing work along other dimensions. First, when defining fiscal episodes we take the IMF (2010a) criticism seriously and focus on the evolution of *underlying* cyclically-adjusted primary budget balances. The influence of one-off measures is excluded when we select fiscal episodes and test composition effects. Moreover, our analysis allows to distinguish short-run effects of fiscal adjustment policies on the debt to GDP ratio, i.e. effects during the adjustment period, from more persistent longer run effects.

A key determinant of the success of fiscal adjustment programmes is the evolution of economic growth during (and after) consolidation episodes. Whereas in the short run tax increases may be more effective than expenditure cuts to bring down the debt ratio (because the short run negative growth effects of tax increases are smaller), things seem different for the longer run. In line with the composition hypothesis, expenditure driven consolidations may be more friendly to output and growth in the long run, and therefore more likely to succeed. Cuts in subsidies and social expenditures may work. Cutting the public wage bill may also contribute to debt rate reduction, but mainly so in countries where government efficiency is low. For countries where public administration is efficient, we reject the hypothesis that - to succeed - consolidation should rely on cutting the government wage bill. Finally, our results confirm the

important role that an increase of public investment should play in any intelligent consolidation programme. As to other aspects of policy design, our results favor sizeable adjustment programmes of shorter duration above moderate programmes of long duration.

Next to policy design, our results demonstrate the importance of the context within which consolidation takes place. First of all, we find that consolidation is significantly more likely to succeed when international economic growth is high, and interests are low. Consolidation may therefore be much harder when all countries undertake simultaneous consolidation efforts, at least if it can be taken that the latter has negative effects on world growth. Complementary (international) monetary accommodation, keeping interest rates low and supporting growth, is then of crucial importance. Second, we obtain mixed evidence on the hypothesis that consolidation programmes are more effective in bringing down the debt ratio when the initial fiscal situation is in a state of emergency. On the one hand, our results suggest that very high debt countries may reap much stronger and immediate benefits when they show willingness to consolidate, for example thanks to falling risk premia. On the other hand, however, our evidence is consistent with the hypothesis that consolidation programmes in these countries hit growth much harder. Fiscal multipliers may be stronger in very high debt countries, for example due to rigged financial markets and tighter credit conditions for private borrowers.

Our results on the role of institutions and institutional reform for the effects of consolidation, are more diverse. Labour market institutions, like employment protection legislation or union power, seem to have little overall influence. Consolidation policies may be significantly more successful, however, when they are complemented by product market deregulation. Our evidence suggests that product market deregulation may not only make given consolidation policies more effective (e.g. by simultaneously improving productivity and reinforcing growth promoting incentives). It may also imply better consolidation policies (e.g. by reducing the power of interest groups to block off necessary changes). Furthermore, we find that consolidation policies may be more effective when they are embedded in a regime of strict and wide fiscal rules, and when they are adopted by efficient public administrations. Increased credibility may be a possible explanation for these findings. A final result concerns the ideological orientation of the government. All other institutions equal, we find left-wing governments to be more successful in fiscal consolidation.

The structure of this paper is as follows. In Section 2 we define about 130 fiscal episodes in 21 OECD countries since 1980. Among these, 40 are classified as consolidation episodes, 29 as expansion episodes. The others are 'neutral' periods. In Section 3 we review existing hypotheses on the determinants of the success or failure of fiscal consolidation, and refer to the results of related empirical studies. In Section 4 we present the results of our own empirical work, explaining the evolution of the ratio of public debt to GDP during the above defined episodes. Section 5 concludes the paper.

## **2. Fiscal episodes in the OECD, 1980-2008**

The fiscal consolidation literature commonly determines consolidation and expansion periods using a criterion based on swings in the cyclically adjusted primary balance (further *CAPB*). In a recent study the IMF (2010a) has criticized this method. Although the *CAPB* corrects for interest expenditures and business cycles fluctuations, it may sometimes give wrong signals about actual policy changes. Periods in which no specific consolidation measures were taken, were sometimes classified by researchers as consolidations. Also, periods with a deteriorating *CAPB* despite severe consolidation measures were sometimes not

selected (IMF, 2010a). A key element is the influence of one-off budgetary measures. When one-off measures are taken, they may typically imply a temporary improvement of the reported *CAPB*, followed by a subsequent deterioration when their effect again disappears. From the reported *CAPB*, one might erroneously conclude that a fiscal consolidation year was followed by an expansion year, whereas in reality there was no deliberate policy at all.

Instead of the *CAPB* as a selection variable for consolidation and expansion periods, we use the underlying cyclically adjusted primary balance in percent of potential GDP (*CAPBu*). The latter corrects the *CAPB* for one-off budgetary measures. *CAPBu* data are published by the OECD, annual data are available since 1980. We distinguish three kinds of periods based on the evolution of the *CAPBu*. To define the different episodes we slightly adapt the definition of a consolidation period used in Heylen and Everaert (2000)<sup>1</sup>. A consolidation period is a period of at least two consecutive years when the *CAPBu* improves by at least 2 percentage points. Besides the requirement that the *CAPBu* improves in each single year of the consolidation period, there should be an improvement by at least 0.25 percentage points in the first year of the consolidation period and at least 0.10 percentage points in the final year. With the latter conditions, we hope to exclude years of mere stabilization. Similarly, we define an expansion period as a period of at least two consecutive years when the *CAPBu* in percent of potential GDP deteriorated by at least 2 percentage points. Periods that do not fit our definition of expansion, nor consolidation are labeled 'neutral'. We will refer to these three kinds of periods as 'fiscal impulse periods'.

According to the above criteria we distinguish 134 fiscal impulse periods in 21 different countries since 1980. Among them, 40 are classified as consolidations, 29 as expansions and 65 as neutral. Table 1 shows the different periods and their changes in the *CAPBu*. We also display the associated change in the gross government debt to GDP ratio (*GD*) up to two years after the end of the period ( $t_{f+2}$ ).

To check if the *CAPBu* is indeed a better selection criterion than the *CAPB*, we compare our selection of periods with the ones found by the IMF. The IMF (2010a) uses a narrative action-based approach to select fiscal adjustments. The authors emphasize five striking years which the commonly used *CAPB*-method incorrectly classifies as consolidations. Moreover, they point out five effective years of consolidation which are not classified as such. Nine of these ten years relate to 1980-2008. Appendix 1 displays these nine years, and reports the change in the *CAPBu*, the change in the *CAPB*, and corresponding values for the size of fiscal policy measures according to the narrative IMF approach. With the exception of only one case (Finland, 1992), the change in the *CAPBu* gives the same signal as the IMF narrative approach. The data that one obtains to evaluate policy using  $\Delta CAPBu$  are in general (much) closer to the action-based indicator from the IMF than the data obtained when considering  $\Delta CAPB$ .

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<sup>1</sup> The way to define fiscal episodes is not uniform in the literature. Some specify episodes as periods of a fixed number of one or two years during which the change of the *CAPB(u)* exceeds a chosen number (e.g. Alesina and Perotti, 1995; von Hagen *et al.*, 2001). Others specify episodes as periods of flexible duration in which the *CAPB(u)* consistently moves in the same direction (e.g. Heylen and Everaert, 2000; Guichard *et al.*, 2007). We follow the latter approach. It allows to study homogeneous episodes as well-defined cases. Each episode ends with a change in policy. Among the 40 consolidation episodes that we define in this paper, 37 are followed by 'neutral' policy. Clearly, this improves consistent estimation of policy effects. If one defines episodes as periods of one or two years, the next episode may be of a different kind, but it may also be of the same kind. It may then be more difficult to study longer run debt dynamics.

**Table 1.** Fiscal consolidation, expansion and neutral periods in the OECD: 1980-2008

Consolidation periods					Expansion periods				
Country	Code	Period (ts-tf)	$\Delta CAPBu$	$\Delta GD$	Country	Code	Period (ts-tf)	$\Delta CAPBu$	$\Delta GD$
Austria	at1	1984-1985	2.32	13.5	Austria	at1e	1993-1995	-2.40	9.2
	at2	1996-1997	3.88	1.4		at2e	1998-2000	-2.04	6.3
Belgium	be1	1982-1987	9.47	35.1	Belgium	be1e	2002-2005	-2.19	-24.0
	be2	1993-1994	2.77	-3.3	Canada	ca1e	1982-1985	-2.65	24.5
	be3	1996-1998	2.41	-21.7	ca2e	2001-2003	-3.55	-10.5	
Canada	ca1	1986-1988	3.71	8.3	Denmark	de1e	1989-1995	-3.94	7.5
	ca2	1993-1997	7.23	1.1	Finland	fi1e	1982-1983	-3.30	4.4
Denmark	de1	1983-1986	10.5	2.2	fi2e	1985-1987	-3.51	-0.8	
	de2	1996-1999	2.45	-23.4	fi3e	1990-1992	-6.41	44.3	
	de3	2003-2005	4.18	-24.1	fi4e	2001-2004	-4.29	-6.9	
Finland	fi1	1993-1996	4.40	16.6	Hungary	hu1e	1997-1998	-2.55	-16.5
	fi2	1998-2000	6.46	-15.2	hu2e	2001-2002	-5.04	4.2	
France	fr1	1994-1999	3.63	13.2	hu3e	2005-2006	-2.62	13.3	
Germany	ge1	2003-2007	2.96	14.4	Ireland	ir1e	2000-2002	-5.23	-18.9
Ireland	ir1	1982-1984	5.95	37.3	Italy	it1e	2000-2003	-4.37	-6.5
	ir2	1986-1989	6.25	-6.1	Japan	ja1e	1992-1996	-5.68	50.0
	ir3	1992-1994	2.59	-21.0	Netherlands	ne1e	1989-1990	-3.16	4.8
	ir4	2003-2004	2.05	-7.3	ne2e	2001-2002	-3.04	-0.5	
Italy	it1	1982-1983	4.37	-2.3	New Zealand	nz1e	1996-1999	-2.80	-18.3
	it2	1990-1993	6.18	27.0	Norway	no1e	1987-1992	-7.68	-3.5
	it3	1995-1997	3.19	5.5	no2e	2001-2003	-6.17	14.9	
	it4	2006-2007	2.27	7.8	Portugal	pr1e	1989-1991	-2.72	0.6
Japan	ja1	1981-1985	3.72	29.7	Spain	sp1e	1988-1991	-2.50	16.8
	ja2	2005-2008	3.01	32.9	Sweden	sw1e	1990-1993	-6.92	30.6
Netherlands	ne1	1981-1983	3.11	28.9	sw2e	2001-2003	-4.68	-4.4	
	ne2	2004-2005	2.59	-9.9	UK	uk1e	1990-1993	-5.42	15.6
New Zealand	nz1	1992-1994	3.86	-15.3	uk2e	2001-2004	-5.55	0.9	
Norway	no1	1994-1995	5.40	-8.7	USA	us1e	1982-1986	-2.69	20.2
	no2	2004-2007	6.39	-0.7	us2e	2001-2003	-5.95	6.9	
Portugal	pr1	1982-1984	7.37	19.5					
	pr2	2006-2007	2.73	14.4					
Spain	sp1	1992-1997	5.25	19.8					
Sweden	sw1	1981-1984	4.12	22.8					
	sw2	1986-1987	3.09	-20.0					
	sw3	1996-2000	8.20	-20.8					
	sw4	2004-2005	2.26	-23.7					
UK	uk1	1981-1982	2.72	8.0					
	uk2	1994-1999	6.97	-8.3					
USA	us1	1987-1989	2.00	9.0					
	us2	1993-1998	4.59	-15.8					

Note:  $\Delta CAPBu$ : change in the underlying cyclically-adjusted primary government balance in percent of potential GDP (change in percentage points between  $t_{s-1}$  and  $t_t$ );  $\Delta GD$ : change in the gross debt ratio in percent of GDP (change in percentage points between  $t_{s-1}$  and  $t_{f+2}$ ).

Data sources: OECD (2010a) and European Commission, AMECO. See Appendix 3 for details.

Neutral periods <sup>2</sup>					Neutral periods <sup>2</sup>				
Country	Code	Period (ts-tf)	$\Delta CAPBu$	$\Delta GD$	Country	Code	Period (ts-tf)	$\Delta CAPBu$	$\Delta GD$
<b>Austria</b>	at1n	1981-1983	0.26	13.0	<b>Italy</b>	it1n	1981	-2.80	-7.3
	at2n	1986-1992	-0.66	16.7		it2n	1984-1989	-0.78	20.9
	at3n	2001-2008	4.00	4.8		it3n	1994	-0.35	12.6
<b>Belgium</b>	be1n	1981	0.03	32.3		it4n	1998-1999	-0.61	-9.5
	be2n	1988-1992	-1.16	12.9		it5n	2004-2005	-0.43	-4.2
	be3n	1995	-0.05	-9.8	<b>Japan</b>	ja1n	1986-1991	0.89	4.5
	be4n	1999-2001	-0.95	-19.8		ja2n	1997-2004	-1.52	78.4
	be5n	2006	0.02	-2.5	<b>Netherlands</b>	ne1n	1984-1988	0.23	9.1
<b>Canada</b>	ca1n	1981	2.37	12.8		ne2n	1991-2000	0.00	-28.4
	ca2n	1989-1992	-0.56	25.6		ne3n	2003	0.02	0.7
	ca3n	1998-2000	-0.19	-15.8		ne4n	2006-2008	-1.16	13.5
	ca4n	2004-2005	0.78	-10.1	<b>New Zealand</b>	nz1n	1987-1991	-0.14	-6.9
<b>Czech Republic</b>	cz1n	2000-2007	2.49	18.9		nz2n	1995	0.05	-18.9
	<b>Denmark</b>	de1n	1981-1982	-1.17		33.4	nz3n	2000-2006	2.70
de2n		1987-1988	-1.05	-5.5	<b>Norway</b>	no1n	1981-1986	0.53	-6.8
de3n		2000-2002	-1.75	-13.0		no2n	1993	0.02	8.5
<b>Finland</b>	fi1n	1981	2.02	4.3		no3n	1996-2000	3.64	-0.2
	fi2n	1984	1.71	1.5	<b>Poland</b>	pl1n	1997-2007	-1.25	7.0
	fi3n	1988-1989	2.64	4.8		<b>Portugal</b>	pr1n	1985-1988	-1.14
	fi4n	1997	-0.12	-11.3	pr2n		1992-2005	-1.30	7.0
	fi5n	2005-2007	1.14	1.1	<b>Spain</b>	sp1n	1981-1987	1.73	18.6
<b>France</b>	fr1n	1981-1993	-2.36	32.9		sp2n	1998-2007	0.90	-12.6
	fr2n	2000-2006	-1.13	9.1	<b>Sweden</b>	sw1n	1985	-0.27	-9.0
<b>Germany</b>	ge1n	1993-2002	0.71	25.4		sw2n	1988-1989	0.11	-6.9
	ge2n	2008	-0.02	14.6		sw3n	1994-1995	-0.08	4.8
<b>Hungary</b>	hu1n	1999-2000	1.67	-4.3		sw4n	2006-2008	0.16	-8.7
	hu2n	2003-2004	0.48	10.1	<b>UK</b>	uk1n	1983-1989	-0.76	-18.0
<b>Ireland</b>	ir1n	1981	0.02	24.5		uk2n	2000	0.09	-6.6
	ir2n	1985	-0.59	15.2		uk3n	2005-2006	0.72	13.2
	ir3n	1990-1991	-1.51	-5.2	<b>USA</b>	us1n	1981	1.07	7.1
	ir4n	1995-1999	-0.84	-53.1		us2n	1990-1992	-1.10	9.5
	ir5n	2005-2006	0.65	14.7		us3n	1999-2000	0.15	-7.4
						us4n	2004-2006	1.70	10.9

Note:  $\Delta CAPBu$ : change in the underlying cyclically-adjusted primary government balance in percent of potential GDP (change in percentage points between  $t_{s-1}$  and  $t_f$ );  $\Delta GD$ : change in the gross debt ratio in percent of GDP (change in percentage points between  $t_{s-1}$  and  $t_{f+2}$ ).

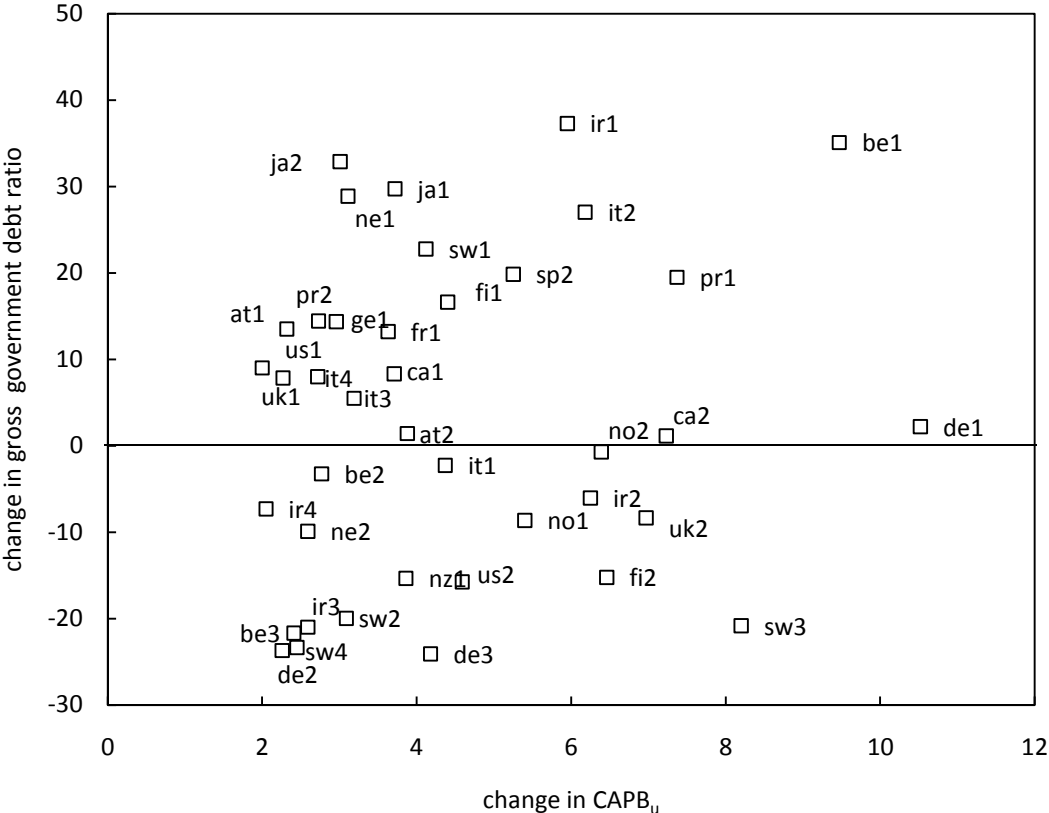
Data sources: OECD (2010a) and European Commission, AMECO. See Appendix 3 for details.

<sup>2</sup> Note that in a few cases  $\Delta CAPBu > 2$  in absolute value. Typically, these are longer periods when there is some trend in fiscal policy, but no consistent change of  $CAPBu$  in one direction. Years of increases are followed by years of decreases, or vice versa. Another possibility is that the 'period' lasts only one year.

Figures 1 to 2 relate the change in the gross government debt ratio to the change in the *CAPBu* during all consolidation and all expansion periods<sup>3</sup>. Figure 1 confirms the results in Heylen and Everaert (2000). Even if during consolidation severe fiscal measures are taken, this does not guarantee an improvement of the public debt ratio. No negative relationship shows up. In about half of the consolidation periods the debt ratio deteriorates. Among the worst periods we find Ireland, 1982-84, Belgium, 1982-87 and Japan, 1981-85 and 2005-08, with increases in the debt ratio by more than 25 percentage points. However, Figure 1 also reveals many successful consolidation episodes, with debt ratio reductions by more than 20 percentage points (e.g. Denmark, 1996-1999, 2003-2005, Ireland, 1986-1989, and Sweden, 1996-2000, 2004-05). Observations for expansion periods (Figure 2) are much more in line with ex-ante expectations. A clear relationship shows up here, with larger expansions being accompanied by a greater increase in the debt to GDP ratio.

Table 2 relates the average change in the *CAPBu* per fiscal episode to the average change in the gross debt ratio for each group of fiscal episodes. First, we note that the average size of consolidation and expansion periods is almost identical (slightly more than 4% of GDP). Second, we observe that none of the categories has, on average, a falling debt ratio. The average rise in the debt ratio is larger in neutral and expansion periods than in consolidation periods, but even in the latter periods, it is not negative.

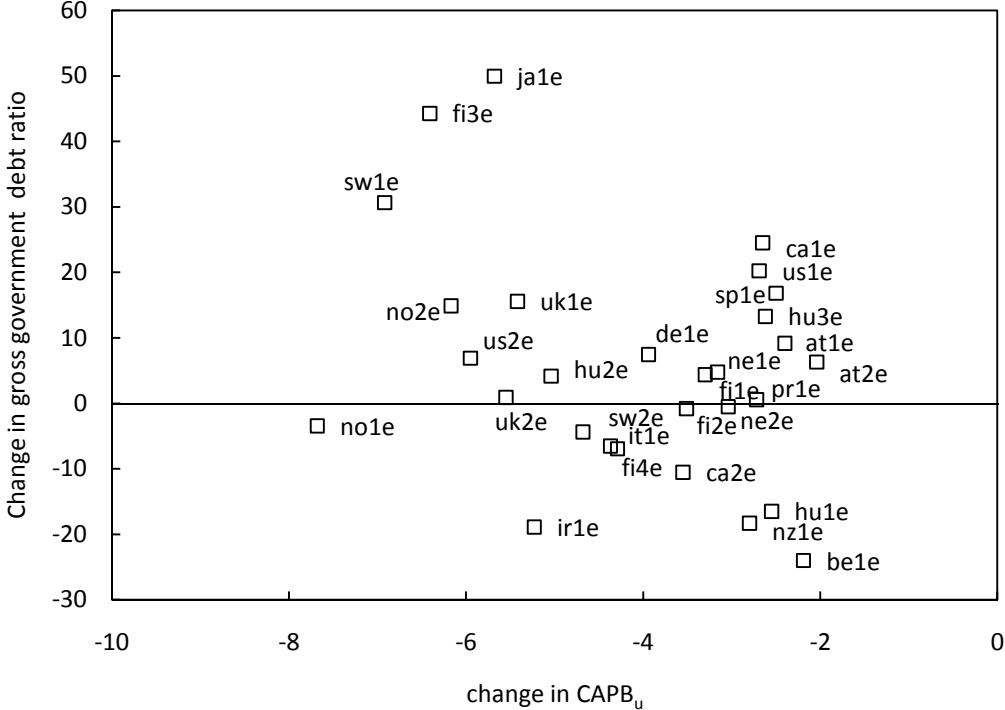
**Figure 1.** Fiscal consolidation and the evolution of gross government debt in percent of GDP



Data and data sources: see Table 1.

<sup>3</sup> The same figure for the neutral periods is available upon request.

**Figure 2.** Fiscal expansion and the evolution of gross government debt in percent of GDP



Data and data sources: see Table 1.

**Table 2.** Average change in *CAPBu* and *GD* per fiscal impulse period

	$\Delta CAPBu$	$\Delta GD$
Consolidation	4.42	3.02
Expansion	-4.11	5.65
Neutral	0.12	3.74

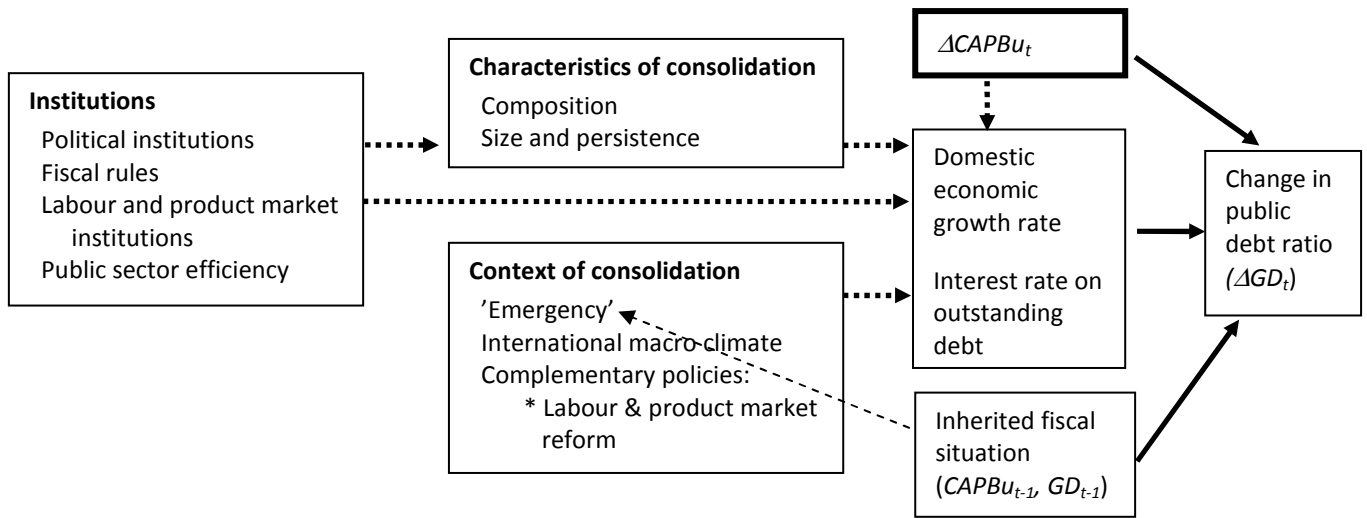
Note: The data underlying these averages are those reported in Table 1.

### 3. Output growth and the outcome of fiscal consolidation

Sections 3 and 4 of this paper investigate the reasons for success or failure of fiscal adjustment. In Section 3.1. we highlight the crucial role of output growth in the consolidation period. In Section 3.2. we review the theoretical effects of tight fiscal policy on real growth and discuss seven hypotheses that explain why growth is strong in some consolidation episodes and weak in others. Each of these hypotheses refers to the characteristics of the consolidation programme, or to the circumstances in which it takes place. We also pay attention to the institutional environment which may affect the characteristics of the consolidation programme, or its effects. We consider the role of labour and product market institutions, the political context, and the possible contribution of fiscal rules. We empirically test our hypotheses in Section 4.

Figure 3 represents the structure of our approach and the causal relationships we have in mind. We start the discussion in Section 3.1. at the right hand side of this figure (bold arrows). Section 3.2. focuses on the left hand side (dotted arrows).

**Figure 3.** Determinants of success or failure of fiscal consolidation



### 3.1 Dynamics of the government debt ratio and the role of output growth

High GDP growth is of crucial importance for the success of consolidation efforts. Equations (1) and (2) illustrate this. Equation (1) is the well-known equation for the dynamics of the government debt ratio. Equation (2) follows from (1) after some rearrangements.

$$\Delta GD_t = -PB_t + \frac{(r_{n,t} - g_{n,t})}{(1 + g_{n,t})} GD_{t-1} + SF_t \quad (1)$$

$$\Delta GD_t = -CAPBu_t - CCPB_t + \frac{(r_{n,t} - g_{n,t})}{(1 + g_{n,t})} GD_{t-1} - ONEOFF_t + SF_t \quad (2)$$

$$\text{with: } PB_t = CAPBu_t + CCPB_t + ONEOFF_t$$

In Equation (1),  $GD_t$  is the ratio of nominal gross government debt to nominal GDP at the end of year  $t$ ,  $PB_t$  is the nominal primary balance in percent of nominal GDP in  $t$ ,  $r_{n,t}$  the nominal interest rate on outstanding government debt,  $g_{n,t}$  the growth rate of nominal GDP, and  $SF_t$  the stock-flow adjustment in percent of GDP. The latter captures the effect on the public debt ratio from the accumulation of financial assets for example, and remaining statistical adjustments. In Equation (2) we split up the primary balance in year  $t$  in three components. We have already defined  $CAPBu_t$  as the underlying cyclically-adjusted component. Furthermore,  $CCPB_t$  is the cyclical component in percent of GDP, and  $ONEOFF_t$  captures the effect on the primary balance of one-off budgetary measures. It is defined as net revenue.

Equation (2) reveals two channels of influence of real output growth on the ratio of debt to GDP. First, for given inflation, higher real growth reduces the debt burden,  $\frac{(r_{n,t} - g_{n,t})}{(1 + g_{n,t})} GD_{t-1}$ . Faster GDP growth automatically reduces the weight of a given amount of debt and interest payments, relative to national income. Second, by raising tax receipts and reducing unemployment benefit expenditures, higher real output growth raises the cyclical component of the primary balance,  $CCPB$ . Both channels contribute to debt reduction ( $\Delta GD < 0$ ). The other main determinants of the rate of debt reduction are the underlying cyclically adjusted primary balance ( $CAPBu_t$ ) and the interest rate ( $r_{n,t}$ ). Fiscal policy makers have a direct influence on

the former. The latter will depend also on actions from monetary policy makers. Finally, Equation (2) highlights the influence of the historical fiscal situation as reflected by  $GD_{t-1}$ .

Figure 4 demonstrates the crucial role of real growth in actual consolidation episodes. It relates the change in the gross debt ratio between  $t_{s-1}$  and  $t_{f+2}$  to the change in the output gap between  $t_{s-1}$  and  $t_{f+1}$ .<sup>4</sup> This change in the output gap indicates the cumulated difference between actual real GDP growth and potential real growth in the years  $t_s$  to  $t_{f+1}$ . A clear negative relationship emerges. If we compare this result with the absence of a relationship between  $\Delta CAPBu$  and the change in the debt ratio in Figure 1, one may conclude that in Equation (2) output growth is a dominating factor. Strong growth really seems to be a necessary condition for consolidation policy to succeed. Only three episodes can be observed in Figure 4 where consolidation efforts have led to a fall of the government debt ratio in times of weak growth (Belgium, 1993-1994; Ireland, 1992-1994, and Italy, 1982-1983). On the other hand, Figure 4 also reveals that strong growth is not a sufficient condition. In about 40% of the episodes with a rising output gap, the debt to GDP ratio increases.

Looking at the expansion periods in Figure 5, we observe a similar negative relationship between changes in the output gap and the debt ratio, but here it is much weaker. Also for neutral periods a weak negative relationship exists (not shown).

Next to the influence of growth, Equations (1) and (2) also highlight the role of the initial underlying cyclically-adjusted primary balance, the interest rate, and lagged government debt ( $GD_{t-1}$ ). The former two are clearly more important. Inspection for the 40 consolidation periods in our sample reveals significant correlations between  $\Delta GD$  and the former two, but no correlation between  $\Delta GD$  and the latter.

### 3.2 Consolidation and growth: 7 hypotheses about success and failure

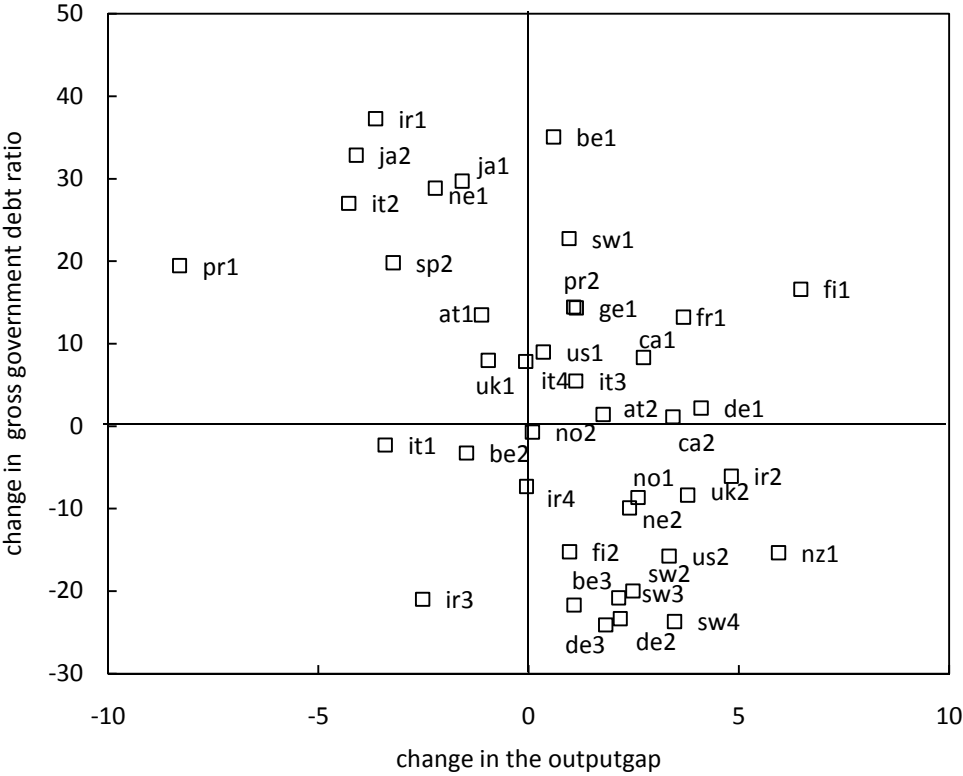
Given the dominant role of the evolution of economic growth, it is not surprising that several authors have concentrated on the determinants of growth during and after consolidation. Major contributions have been made by, among others, Giavazzi and Pagano (1990, 1996) and Alesina and Perotti (1995, 1996). Alesina and Perotti (1996) and Heylen and Everaert (2000) present early surveys of the literature. For recent discussions, we refer to European Commission (2007) and IMF (2010a).

Theoretically, the net effect of tight fiscal policy on growth is uncertain. For decades economists have paid attention mainly to its *negative Keynesian effects*. The Keynesian view predicts that fiscal consolidation undermines economic growth because it leads to a reduction of aggregate demand. The fall in demand occurs either directly when the government reduces its consumption or investment, or indirectly when households reduce their consumption because higher taxes or lower transfers affect their disposable income. The multiplier mechanism implies that consumption and investment cuts are more contractionary than tax rises or transfer reductions. Moreover, the fall in aggregate demand may be reinforced when private investment responds negatively to the (expected) fall in output caused by lower private consumption or government spending. This is the well-known accelerator mechanism discussed in many macroeconomics textbooks. As a result of these negative demand effects, consolidation efforts have only limited or no effect on the debt to GDP ratio. Debt may be reduced, but so may GDP. Many authors argue that in the short-run the impact of consolidation on growth is likely to be negative indeed (IMF, 2010a; OECD, 2010b).

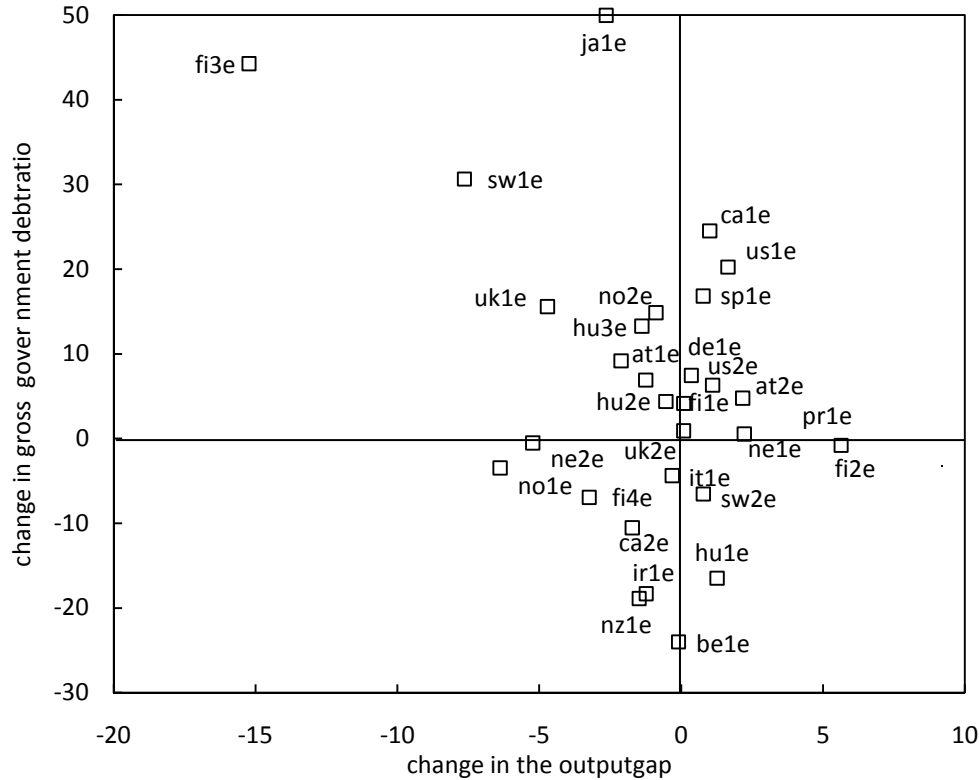
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<sup>4</sup> We indicate by  $t_s$  the first year of the consolidation period and by  $t_f$  the last year (see heading of Table 1).

**Figure 4.** Consolidation periods, output gap evolution and evolution of the gross debt



**Figure 5.** Expansion periods, output gap evolution and evolution of the gross debt ratio



Data sources: OECD (2010a) and European Commission, AMECO. See also Appendix 3.  
 Note: the change in the output gap and the change in the government debt ratio are in percentage points.

Since the 1990s, however, this view has also been criticized<sup>5</sup>. Several authors have emphasized that fiscal consolidation also induces positive demand effects. In addition to standard *crowding-in effects on private investment* and *wealth effects on consumption*, caused by *falling real interest rates* (and rising asset prices) that result from lower government deficits, attention has been paid to favourable expectation effects and credibility effects, among others. The idea behind *expectation effects* (also called Ricardian effects) is that fiscal consolidation - if it is believed to be long lasting - implies a permanent reduction in future taxes on households and firms. A reduction of government consumption today will then raise private spending because consumers and businesses will feel that their permanent income has increased. An increase in taxes or a reduction in transfers may then leave private spending unaffected, even if it reduces current disposable income. Furthermore, as argued by Blanchard (1990), fiscal consolidation - to the extent that it reduces uncertainty about future fiscal policy - may reduce precautionary savings which further supports current aggregate demand. Favourable *credibility effects* follow if fiscal consolidation increases the authorities' solvency and, as a consequence, reduces the risk premium (default risk, inflation risk) on government debt. This effect reinforces the fall in real interest rates and the crowding-in and wealth effects mentioned above. In addition to demand effects, it has been argued that consolidation also generates a number of *supply effects*, which might be positive as well. Intelligent consolidation programmes may induce lower union wage claims and rising competitiveness, as we illustrate below. Whether all these positive effects are strong enough to overrule the negative Keynesian effects is uncertain, however. In this respect the literature points at the crucial role of the characteristics of a consolidation programme and at the circumstances in which consolidation takes place. Several important hypotheses have been put forward. In the remaining part of this section we review these hypotheses as well as some of the related empirical evidence.

### 3.2.1 Composition

The importance of the composition of consolidation efforts has been emphasized in particular by Alesina and Perotti (1995, 1996). In their view, *consolidation programmes that rely mainly on government consumption cuts (especially cuts in the wage bill) and social transfer cuts have a high probability of success*, i.e. a high probability of generating strong economic growth and reducing the debt ratio. *Programmes that rely mainly on tax rises and government investment cuts, on the other hand, are expected to fail*.

Alesina and Perotti justify this hypothesis on several grounds. They argue that government wage bill and transfer cuts, in contrast to tax rises and investment cuts, induce favourable credibility and expectation effects on demand, as well as favourable supply effects. Positive credibility effects follow from the fact that governments that tackle the politically more delicate components of the budget (e.g. public employment, social security) signal that they are really serious about fiscal adjustment, and bringing down public debt. The risk premium will fall. As for *expectation effects*, cuts of public employment and transfers are more sustainable than investment cuts. Although their impact may be the same, one cannot postpone investment (e.g. the maintenance of public infrastructure) forever. Furthermore, given the experience of the past that tax increases tend to elicit higher spending, these provide the least convincing signal of a permanent change in fiscal policy. Therefore, the probability that the public considers fiscal consolidation to be long lasting (and revises its permanent income upwards) will be higher when it relies mainly on government wage bill and transfer cuts. The *supply effects* of government consumption and transfer cuts are also believed to be more favourable. If taxes are raised or public investments cut, supply effects will be negative. Higher taxes will – especially in the short run and

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<sup>5</sup> For earlier work, see e.g. Feldstein (1982) and Barro (1989).

in unionized economies – cause higher labour costs, either directly (due to a rise of employer contributions to social security) or indirectly (when workers ask higher gross wages to compensate for their decreased after tax income). A cut in government investment will, *ceteris paribus*, reduce the capital stock in the economy. Some authors (see e.g. Aschauer, 1989; Baxter and King, 1993) expect this to cause negative effects on private investment also, leading to a further reduction of the economy's supply potential. On the other hand, government wage bill cuts (especially public employment cuts) and transfer cuts may induce positive supply effects. These occur because spending cuts may pave the way for tax cuts and because lower public employment and transfers (e.g. unemployment benefits) may change the perspectives of unions and lead to wage moderation in the private sector (Ardagna, 2004). Note that in a second round these supply effects may also act upon the demand side of the economy. In general, beneficial supply developments will strengthen the favourable credibility and expectation effects of fiscal consolidation, whereas adverse supply developments will undermine them. Further, and more specifically, the evolution of wage costs will influence the international competitiveness and profitability of firms, and thus affect exports and investment (Lane and Perotti, 2003).

Empirically, the composition hypothesis has received the support of a lot of authors, e.g. McDermott and Westcott (1996), Perotti (1996), Alesina and Ardagna (1998), von Hagen *et al.* (2001, 2002), Kumar *et al.* (2007), and Schaltegger and Feld (2009). Heylen and Everaert (2000) confirm the favourable effects from transfer cuts, and from *not* cutting public investment, but they do not find favourable effects from public wage bill cuts. Tagkalakis (2009) confirms the contribution to successful consolidation of social spending cuts via a reduction of the generosity of the unemployment benefit system. Somewhat in line with Heylen and Everaert (2000), however, he also questions the potential of public wage freezes to contribute to successful consolidation.

Taking the ambiguity in the literature on the effects of wage bill cuts as a starting point, we advance in this paper a new hypothesis emphasizing the role of public sector efficiency. Angelopoulos *et al.* (2008) find that the relationship between the size of the public sector and economic growth depends critically on public sector efficiency. It will be our hypothesis that wage bill cuts may contribute to debt reduction if public sector efficiency is low, but that it will not contribute when public sector efficiency is high. In the latter case, downsizing the public sector may have negative effects on overall productivity and growth.

### **3.2.2 Size and persistence**

Our second hypothesis has been advanced by Drazen (1990), Giavazzi and Pagano (1995) and McDermott and Westcott (1996). It states *that large and persistent fiscal consolidations have a higher probability to be successful*. Large and persistent consolidations are far more likely expansionary thanks to favourable credibility and expectations effects. In contrast to small and temporary ones, drastic adjustments lasting for, say, more than two years prove that policy makers are serious about fighting debt and deficits. At least their persistence shows willingness to realize certain objectives that take time and to bear the political costs that may come with consolidation (Feldstein, 1982). Drastic adjustments also provide a stronger signal of a change in the policy regime and, thus, of future tax reductions. That is why they may be accompanied by a more vigorous private consumption and investment growth, and thus by stronger output growth. Blanchard (1990) adds that drastic and persistent adjustments provide clarity. They reduce uncertainty about future fiscal policy and may therefore also reduce precautionary savings, which further contributes to demand. Various more recent studies have found evidence in favour of this hypothesis. Among these are Giavazzi *et al.* (2000), Heylen en Everaert (2000), Ardagna (2004), Baldacci *et al.* (2006), and Kumar *et al.* (2007). Other studies challenge this hypothesis, e.g. Alesina and Perotti (1996).

### 3.2.3 Emergency effects

Our third hypothesis is that *fiscal consolidation has a higher probability of success when the economy is in a situation of emergency, i.e. when the debt ratio is very high or has risen strongly recently*. The reason is again related to favourable expectation effects on private consumption and investment. In economies with very high debt ratios and strong recent debt rises, consumers and investors will be aware that the day of reckoning comes closer and a fiscal crisis becomes likely. In these circumstances fiscal consolidation may raise private consumption and investment. Blanchard (1990) and Sutherland (1997) have proposed models generating this result for private consumption. Basically, the idea is the following. At low and sustainable debt levels, current consumers will face the burden of fiscal adjustment (e.g. tax increases) without clear perspectives of also reaping the benefits of this adjustment. The unfavourable Keynesian effects of tight fiscal policy may then dominate. If, on the other hand, the economy is close to the brink, current consumers will also benefit. They will understand that fiscal adjustment reduces the probability of a crisis and of disruptive tax increases in the near future. Fiscal adjustment will then strongly raise their permanent income and stimulate their consumption. At high debt levels, consumption behaviour will be much more Ricardian.

Empirical evidence is mixed. Several authors confirm the hypothesis (e.g. Nicoletti, 1989; Alesina and Ardagna, 1998; Perotti, 1999; Hogan, 2003; Ardagna, 2004), while others report evidence against it (Heylen and Everaert, 2000; Pozzi *et al.*, 2004). Pozzi *et al.* (2004) show that high government debt implies tighter credit conditions for consumers and an increasing sensitivity of private consumption to disposable income. At high debt, it will according to their evidence be harder for consumers to act in a Ricardian way.

### 3.2.4 International macroeconomic context

Our fourth hypothesis follows from observations by Alesina and Perotti (1995), McDermott and Wescott (1996) and Heylen and Everaert (2000) among others. It says that *fiscal consolidation has a much higher probability of success if the international macroeconomic situation is supportive, i.e. characterized by high real output growth and low interest rates*. To the extent that these conditions favourably influence national growth and interest rates, debt reduction becomes easier (see also Equation 2). By contrast, to reduce debt ratios in the midst of a global recession is much harder, especially if at the same time interest rates are rising.

### 3.2.5. Labor and product market institutions

The literature reveals various ways in which labor and product market institutions may matter for the effects of fiscal consolidation. Both the existing level of institutions and possible changes in the context of labour or product market reform, may be important, but the exact sign of all possible effects is theoretically often ambiguous. Tagkalakis (2009) discusses most of these effects. He also illuminates the possible trade-offs that policy makers may face between reforming labour and/or product markets and initiating fiscal consolidation.

One of the reasons for tax based consolidations to fail is that they induce higher wage claims and labour costs (see section 3.2.1). Theory suggests that this adverse effect will mainly occur in economies with powerful, but uncoordinated *unions* and uncoordinated wage setting. It will not occur in highly competitive labour markets, where unions may be too weak to claim higher wages, or in economies with strong but coordinated unions and coordinated wage bargaining (Calmfors and Driffill, 1988). In the case of coordination, unions internalize the negative aggregate effects from asking higher wages. They know that if they raise wage claims, wages will rise in large parts of the economy. This will create additional

unemployment and new fiscal problems, such that in the end union members pay anyway. It is therefore better to accept the loss of purchasing power from the beginning. Along the same line of arguments, encompassing unions may also better see the long-run advantages of fiscal consolidation, and convince workers to accept the efforts needed. Tagkalakis (2009), however, also points at counter arguments. Strong and coordinated unions may undermine the success of fiscal consolidation when they use their power to organize opposition, or to push the composition of consolidation into the wrong direction. They may for example block off transfer cuts or cuts in the public wage bill. They may even cause higher expenditures, for example to compensate any losers of consolidation policies. Tagkalakis' evidence tends to support these counter arguments. He finds that weaker unions/weaker degrees of coordination raise the likelihood of successful consolidation.

Similar ambiguity exists on the effects of (changes in) *employment protection legislation* and *product market regulation*. On the one hand, deregulated goods and labour markets may have higher employment, higher firm entry, and higher productivity and growth. In deregulated markets interest groups are typically also less powerful, implying less opposition to efficient fiscal consolidation. It would then follow that flexible markets and/or complementary deregulation and structural reform may significantly raise the chances for successful consolidation (European Commission, 2007). On the other hand, deregulation and reform may also imply short-run disruptions, more firings, more need to compensate losers, and a loss of political negotiation capital for the government (Deroose, 2005; Tagkalakis, 2009). Instead of contributing to the success of consolidation, deregulation and structural reform may then induce failure. Tagkalakis (2009) finds that product market deregulation and more flexible employment protection legislation do *not* contribute positively to fiscal consolidation.

As a final result, Tagkalakis (2009) observes that less generous unemployment benefit systems contribute to the success of fiscal consolidation. This result is clearly in line with the evidence in favour of social transfer cuts as a necessary part of fiscal consolidation programmes (see Section 3.2.1.).

### **3.2.6. Political institutions: ideology, fragmentation**

A large literature has studied the effects of political institutions. Some studies investigate effects on the likelihood that a fiscal adjustment programme is started, others concentrate on the chances that this programme is successful or fails (see e.g. Mierau *et al.*, 2007, for a survey). Our attention here goes out to two of the probably most investigated political institutions: the ideological orientation and the degree of fragmentation of the government. Moreover, we concentrate on their influence on the chances for success. As for decisions to start a fiscal adjustment, Mierau *et al.* (2007) find that these are primarily driven by economic factors and hardly affected by political variables.

Political parties from the left are traditionally associated with bigger government, higher (social) expenditures, and higher taxes (but not necessarily more unbalanced budgets). These preferences may explain why in periods of consolidation, governments from the left may find it more difficult to cut transfers and the public wage bill, and why they may prefer revenue based strategies and tax increases (Mulas-Granados, 2003; Tavares, 2004). Given the possible importance of the precise composition of fiscal consolidation, the hypothesis may follow that *left-wing policy makers have lower probabilities to bring down public debt rates if necessary*. Right-wing governments would prefer spending cuts to reduce debts and deficits, which would raise their chances for successful consolidation. It should be noted though that this hypothesis is not undisputed. Ardagna (2004) shows that left-wing governments are more likely to implement fiscal stabilizations associated with a persistent reduction of the debt to GDP ratio. One possible explanation is that left-wing governments face less resistance to reform than right-wing ones.

Unions for example may be more willing to offer their support to left-wing governments and allow them to cut government spending and/or increase tax rates.

As to the role of government coherence, a popular hypothesis is that *less fragmented governments have a higher possibility to be successful in fiscal consolidation*, independently of their political orientation. Single party governments have the necessary power to reduce transfer and social security programs, whereas coalition governments may fail to do the same, due to internal conflicts about the redistributive consequences of these policy measures. Moreover, more fragmented governments tend to prefer tax-based consolidation. They are not motivated to reduce expenditures. Given that each group in the government only has to finance one part of the expenditures, the gain from cutting them is limited (see e.g. Alesina and Perotti, 1995; Perotti, 1998; Alesina and Ardagna, 1998; Perotti and Kontopoulos, 2001; Volkerink and de Haan, 2001; Mulas-Granados, 2003; Tavares, 2004; Alesina *et al.* 2006).

### **3.2.7. Budgetary institutions: fiscal rules**

Various authors have studied the effects of the introduction of fiscal rules on budgetary performance and the likelihood of successful consolidation. Such rules may include balanced budget rules, expenditure rules, debt ceilings, etc. They may be imposed by national or supranational authorities. The evidence on whether these matter, is still somewhat ambiguous. Most studies tend to confirm the hypothesis that *rules shape policy makers' incentives and behavior in a way that implies better fiscal performance*. The likelihood that fiscal consolidation is successful, would also be higher when the consolidation programme is embedded in, or complemented by, stricter and wider rules. Rules would make the programme more credible and imply larger and more durable effort (see e.g. European Commission, 2007; Guichard *et al.*, 2007; IMF, 2009). Other studies also find positive correlation between rules and good fiscal performance, but they raise questions about causality (Debrun and Kumar, 2007; Lavigne, 2011). Causality may run from fiscal performance to rules, rather than the other way round. Debrun and Kumar (2007, p. 506) suggest that responsible governments may adopt strict rules to reveal the nature of their (unobservable) preferences. IMF (2009, p. 3) argues that rules contribute to prudent fiscal policies, but they are often introduced at the end, i.e. to lock-in earlier consolidation efforts, rather than at the beginning of fiscal adjustment.

In recent work, Abbas *et al.* (2011) have studied the degree to which governments in Europe implement announced budgetary consolidation plans. In line with the majority opinion, they find higher degrees of implementation in the presence of stronger national fiscal rules.

Along similar lines, other authors have studied the effects of fiscal institutions on fiscal performance. Institutions concern the mechanisms and procedures of the budget formation process. Although questions can again be raised about causality, the evidence tends to be that having good institutions matters (see Fabrizio and Mody, 2006, and their discussion of the literature).

## **4. Empirical test**

In this section we present the results of an empirical analysis of the evolution of the public debt to GDP ratio in 134 fiscal episodes in 21 OECD countries in 1980-2010. To be explained as our main dependent variable are the data for  $\Delta GD$  that we report in Table 1. In Section 4.1 we describe our methodology, and the explanatory variables that we use. We report our results in Section 4.2.

## 4.1 Methodology

We first derive and discuss the basic equations that we will estimate. Then, we motivate the empirical methodology (least squares methodology) that we will employ. We also give insight into the precise data that we shall use.

### 4.1.1 Basic equations and data

The starting point of our estimations is Equation (2), describing the change of the public debt to GDP ratio in year  $t$ . In our regressions, however, we will not include the cyclical component of the primary balance ( $CCPB$ ), nor the domestic interest and growth rates ( $g_n, r_n$ ). It will be clear from the many hypotheses that we have described in the previous sections that the evolution of these variables is highly endogenous. They will be affected by the precise characteristics of discretionary policy during the year (episode) and by the context within which policy is executed. By not controlling for  $CCPB, g_n$  and  $r_n$  in the regressions, we allow the exogenous fiscal policy variables and/or context variables to pick up the endogenous effects that they bring about. Policy variables that we include concern the level and change of  $CAPBu$  and  $ONEOFF$ . These policy variables are cyclically-adjusted and expressed in percent of potential GDP. They typically result from decisions taken before the year  $t$ . As to context variables, we first of all include international growth and interest rates ( $GROWTH, INTEREST$ ). Later we also introduce other variables, like institutions, to test other hypotheses that we formulated in Section 3.2. A final element in Equation (2) concerns the effects on the gross public debt ratio from stock-flow adjustments. It will be harder to account for these. Most of them are small and will show up in the error term. An important exception, however, concerns stock-flow adjustments due to deliberate government support to the banking sector (capital injections) during financial crises (see IMF, 2010b, p. 14). To capture these we may introduce  $CRISIS$  dummies, to be defined in greater detail below.

Taking these arguments into account generates the following empirical specification for the change in the government debt ratio in country  $i$  and year  $t$ :

$$\Delta GD_{i,t} = \alpha_i + \beta_1 CAPBu_{i,t-1} + \beta_2 \Delta CAPBu_{i,t} + \beta_3 BURDEN_{i,t} + \beta_4 ONEOFF_{i,t} + \beta_5 CRISIS_t + v_{i,t} \quad (3)$$
$$\text{with: } BURDEN_{i,t} = \frac{(INTEREST_t / 100 - GROWTH_t / 100)}{(1 + GROWTH_t / 100)} GD_{i,t-1}$$

and where it is our expectation that  $\beta_1 = -1$ ,  $\beta_2, \beta_4 < 0$  and  $\beta_3, \beta_5 > 0$ . In this equation  $\beta_1$  captures the effect on the debt ratio from the inherited (underlying cyclically-adjusted primary) surplus. The parameter  $\beta_2$  measures the partial effect of discretionary policy changes. The Keynesian view would be that due to negative (positive) effects from fiscal consolidation policies (expansion policies) on domestic growth,  $\beta_2$  would be smaller than 1 in absolute value. Non-keynesian effects however may raise  $\beta_2$ . Clearly, according to the hypotheses reported in the previous sections, the composition of underlying tax and/or expenditure changes, or the size or persistence of policy measures, may play a key role here. We emphasize the important distinction between the parameters  $\beta_1$  and  $\beta_2$ . Fiscal consolidation efforts bring about a *temporary*  $\Delta CAPBu > 0$  which may imply a *permanent* increase of the level of  $CAPBu$  and permanently better debt dynamics (more favourable  $\Delta GD$ ) in the subsequent period. The coefficient  $\beta_1$  measures this permanent (longer run) effect, whereas  $\beta_2$  captures the temporary effect during the consolidation period. Note, however, that even temporary effects on the change in the debt ratio ( $\Delta GD$ ) give rise to permanent effects on the level of  $GD$ .

$BURDEN_{i,t}$  is a new variable in Equation (3). It picks up the automatic ‘snowball’ component of debt dynamics, as well as the effect from (exogenous) international nominal growth and interest rates on their domestic counterparts. We indicate international variables as  $GROWTH_t$  and  $INTEREST_t$ . We define them in greater detail below (Table 3). Finally,  $\alpha_i$  is a country-specific fixed effect, and  $v_{i,t}$  is the country and year specific error term. The fixed effect may for example capture the influence of variables that explain structurally (higher or lower) potential growth or real interest rates in individual countries during the period under consideration<sup>6</sup>.

Our focus in this paper is not on annual debt dynamics, however, but on the evolution of the public debt ratio during well-defined multi-annual fiscal episodes. Equation (4) establishes the basis of our regressions. This equation follows from summing Equation (3) over all years that are part of the same episode. In Appendix 2 we illustrate the derivation of Equation (4) for the case where a fiscal episode includes two years, and the approximations that we made.

$$\begin{aligned} \Delta GD_{i,T} = & \alpha_i \cdot DURATION_{i,T} + \beta_1 AvgCAPBu_{i,T} \cdot DURATION_{i,T} + \beta_2 \Delta CAPBu_{i,T} \\ & + \beta_3 BURDEN_{i,T} \cdot DURATION_{i,T} + \beta_4 ONEOFF_{i,T} + \beta_5 CRISIS_T + v_{i,T} \end{aligned} \quad (4)$$

In this equation,  $\Delta GD_{i,T}$  is the change in the public debt to GDP ratio in country  $i$  during episode  $T$ ,  $AvgCAPBu_{i,T}$  is the average underlying cyclically-adjusted primary balance in % of potential GDP during this episode,  $DURATION_{i,T}$  indicates the length of the episode in years, and  $\Delta CAPBu_{i,T}$  is the change in  $CAPBu$  during the episode<sup>7</sup>. The analogy with Equation (3) is quite clear. Whereas  $\beta_1$  captures the permanent effects on debt dynamics from changing a country’s basic financial position (which can be good or bad, and which is reflected by  $AvgCAPBu_{i,T}$ ),  $\beta_2$  measures the more temporary effect from deliberate policy actions ( $\Delta CAPBu_{i,T}$ ). The data for  $\Delta GD_{i,T}$  and  $\Delta CAPBu_{i,T}$  are reported in Table 1. Remember that we calculate  $\Delta GD_{i,T}$  over a period including two years after the end of the fiscal episode. The reason to do this, follows from our discussion in Section 3. Given that many of the exogenous determinants of the evolution of the debt ratio operate via all kinds of effects on private agents’ behavior and growth (e.g. credibility effects, expectation effects), it may take some time for these effects to materialize.

The other variables in Equation (4) have been specified as follows.  $ONEOFF_{i,T}$  is the sum of all annual one-off measures over the fiscal episode.  $CRISIS$  is a dummy capturing stock-flow adjustments during banking crises. A first crisis dummy that we introduce ( $CRISIS08$ ) is 1 for all episodes which include 2008 in the computation of  $\Delta GD_{i,T}$ . A second dummy ( $CRISIS91sf$ ) is 1 in Sweden and Finland during their banking crisis in the early 1990s<sup>8</sup>. Finally,  $BURDEN_{i,T}$  has been computed from average international nominal interest and growth rates during the episode  $T$  and from the level of the government debt ratio in the year before the start of the episode  $T$ . The latter we indicate as  $GDINIT$ . Algebraically,

$$BURDEN_{i,T} = \left( Avg \left( \frac{INTEREST_T / 100 - GROWTH_T / 100}{1 + GROWTH_T / 100} \right) \right)_T \cdot GDINIT_{i,T}$$

<sup>6</sup> Note that we include no time dummies in Equation (3). The reason is that we have international growth and interest rates and the crisis dummies in the regression. These pick up the main time effects common to all countries

<sup>7</sup>  $\Delta GD_{i,T}$  is computed as the change in  $GD_i$  between  $t_{s-1}$  and  $t_{f+2}$ , where  $t_s$  is the first year of the episode and  $t_f$  the last one.  $\Delta CAPBu_{i,T}$  is the total change in  $CAPBu_i$  between  $t_{s-1}$  and  $t_f$ . Finally,  $AvgCAPBu_{i,T}$  is an average computed over all years from  $t_{s-1}$  to  $t_{f-1}$ .

<sup>8</sup> We tested for banking crisis effects in other countries (Norway early 1990s, Japan end of 1990s), but there we did not observe any significant effect on the public debt ratio.

In our empirical analysis we extend Equation (4) in various ways. The first one allows to test for composition effects. It has been shown in many studies that the way in which governments change their  $CAPBu$  may matter for the effects of fiscal policy (see Section 3.2.1). We introduce this idea in our Equation (4) by substituting one of the following two decompositions for  $\Delta CAPBu_{i,T}$ :

$$\Delta CAPBu_{i,T} = \Delta INCu_{i,T} - \Delta NIEXPu_{i,T} + \Delta OTHERu_{i,T} \quad (5)$$

$$\begin{aligned} \Delta CAPBu_{i,T} = & \Delta TAXB_{i,T} + \Delta TAXH_{i,T} + \Delta INTAX_{i,T} + \Delta SOC_{i,T} \\ & - \Delta WAGE_{i,T} - \Delta NONWAGE_{i,T} - \Delta SOCEXP_{i,T} \\ & - \Delta SUBS_{i,T} - \Delta INV_{i,T} + \Delta OTHERu2_{i,T} \end{aligned} \quad (6)$$

The same decompositions can be made for the level of  $AvgCAPBu_{i,T}$ . In (5) we make use of a rather general decomposition of the change in the underlying cyclically-adjusted primary balance. This decomposition distinguishes changes in underlying current government revenues ( $\Delta INCu$ ) and changes in underlying non-interest expenditures ( $\Delta NIEXPu$ ). A very small rest category of changes in underlying ‘other’ net revenue closes the equation. One can think of net capital transfers received by the government. The median over all countries and years in our dataset of the absolute value of  $\Delta OTHERu$  is less than 0.1% of GDP.

Equation (6) is a much more detailed decomposition of  $\Delta CAPBu$ . At the revenue side, we distinguish changes in cyclically-adjusted direct taxes on business ( $TAXB$ ), direct taxes on households ( $TAXH$ ), social security contributions paid by workers and firms ( $SOC$ ), and indirect taxes ( $INTAX$ ). At the expenditure side, we decompose changes in non-interest expenditures into changes in government wage consumption ( $WAGE$ ), government non-wage consumption ( $NONWAGE$ ), social security benefits paid ( $SOCEXP$ ), subsidies ( $SUBS$ ) and investment in physical capital ( $INV$ ). Again, a component  $\Delta OTHERu2$  closes the equation. This component is larger than  $\Delta OTHERu$ . It includes changes in net capital transfers, property income, and other current expenditures (e.g. transfers outside social security). In Table 3 below we report all variables that will occur in our regressions, with their definition. All fiscal policy data are provided by the OECD, or computed from OECD data. They are adjusted for the cycle and for one-offs, and always expressed in percent of potential GDP.

By introducing Equations (5) and (6) for  $\Delta CAPBu$  into Equation (4), and by consequently assigning separate coefficients  $\beta_{2j}$  to each component, we fully take into account the government budget identity in our estimations. Kneller *et al.* (1999) have demonstrated the importance of appropriately dealing with this identity in order to obtain unbiased estimates and a correct interpretation of the effects of changes in each revenue or expenditure component. Our approach implies that each of the estimated individual coefficients  $\beta_{2j}$  measures the effect of a change in the  $CAPBu$  on the government debt ratio if this change is brought about by one particular expenditure or revenue component, controlling for (keeping constant) all other components. The composition hypothesis claims that the coefficients  $\beta_{2j}$  may differ strongly. Even if each unit change in a revenue or expenditure variable brings about the same change in the  $CAPBu$ , its effect on the debt ratio may vary. Changes in different components of the government budget may affect the behavior of households, firms, investors, etc. differently. Effects on growth may be different, and so may be effects on the debt ratio.

A second extension of Equation (4) introduces different coefficients on the composition variables according to the fiscal episode to which they belong. This means that we allow for different coefficients on for example  $\Delta INCu$  or  $\Delta WAGE$  in years of neutral fiscal policy, years of consolidation, and years of expansion. Such a flexible specification may be particularly useful for example if we want to provide room

for the many nonlinearities in the effects of fiscal policy in non-Keynesian theories to show up. The same absolute change in an expenditure or revenue variable may bring about different effects on expectations of households or firms when this change belongs to an expansion period rather than a consolidation period. As a result, household or firm behaviour may be different, and so may the change in the ratio of debt to GDP. In our discussion below, we will mainly focus on effects during consolidation.

An important third series of extensions of Equation (4) concerns the introduction of additional explanatory variables. We introduce these additional variables to test the other hypotheses that we advanced in Section 3.2. More precisely, these variables relate to the size and persistence (or duration) of a particular fiscal episode, the possible situation of fiscal emergency that governments may have run into at the time they execute a consolidation programme, and institutions and institutional change (structural reform). Table 3 defines also these additional variables.

#### 4.1.2 Estimation method

In regression equations like Equation (3), which use annual data, the least squares estimation methodology would seem a most reasonable choice. If it can be assumed that fiscal policy makers do not react to shocks in the public debt ratio within the same year, all variables at the RHS of the equation would seem uncorrelated to the error term. A key element is that policy plans are usually determined before the start of a new year. Beetsma *et al.* (2008) test this assumption for public spending in the European Union, and find it to be justified. The use of the least squares estimator may be less obvious, however, in a multi-annual setting like the one in Equation (4). The probability of correlation between the error term and some of the explanatory variables, in particular  $\Delta CAPBu_{i,T}$  or  $ONEOFF_{i,T}$ , may indeed be higher in periods lasting several years, rather than only one. If, for example, consolidating governments are hit by an adverse shock to the debt ratio (e.g. caused by an unexpected domestic growth slowdown), they may respond by adjusting their policies in order to reach the goals for the debt ratio that they may have set earlier. Even if responding is not possible within the same year, it may be possible in periods lasting longer. The endogeneity that then occurs would impose the use of IV methods. Considering this possibility, it was important for us to test the endogeneity of  $\Delta CAPBu_{i,T}$ ,  $AvgCAPBu_{i,T}$  and  $ONEOFF_{i,T}$ . We used the Wu-Hausman test as described in Davidson and MacKinnon (1993, p. 237-242). As our main result, we could never reject the null that there is no correlation with the error term, i.e. that our regressors are exogenous and OLS estimates are consistent<sup>9</sup>.

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<sup>9</sup> Our procedure was as follows. (i) We defined five instruments:  $CAPB_u$  in the last year and in the one but last year *before* the start of the fiscal episode,  $ONEOFF$  in these two years, and the recent change in the debt ratio *before* the start of the episode. We specified the latter as  $\Delta GD$  between the third and the last year before the start of the episode. Standard Wald tests show high explanatory power in these instruments for  $\Delta CAPBu_{i,T}$  and  $AvgCAPBu_{i,T}$  (F values above 20), but much less so for  $ONEOFF_{i,T}$  (F value below 2.5). Given the highly ad hoc nature of one-off policy measures, the latter result should not be surprising. (ii) Augmenting our basic specification (Equation 4) with the residual series from the first stage regressions of  $\Delta CAPBu_{i,T}$ ,  $AvgCAPBu_{i,T}$  and  $ONEOFF_{i,T}$  on all exogenous variables and the instruments, and re-estimating with the least squares method, never resulted in significant coefficients for these residual series. All three individual  $p$ -values were above 0.25. A Wald test of their joint significance implied a  $p$ -value of more than 0.60. The null hypothesis that our regressors are exogenous can therefore not be rejected. (iii) We obtain the same conclusion in complementary tests for overidentifying restrictions. Estimating Equation (4) by the IV-method, while assuming one or two of  $\Delta CAPBu_{i,T}$ ,  $AvgCAPBu_{i,T}$  and  $ONEOFF_{i,T}$  to be exogenous, always yields  $p$ -values for the  $J$ -statistic above 0.20.

**Table 3.** Description of variables

<b>Fiscal policy</b>	
<i>GD</i>	Gross public debt in % of GDP.
<i>GDINIT</i>	Gross public debt in % of GDP in the year before the start of a fiscal episode.
<i>CAPBu</i>	Underlying cyclically-adjusted primary balance, in % of potential GDP.
<i>ONEOFF</i>	One-off budgetary measures (net revenue), in % of potential GDP.
<i>INCu</i>	Underlying current receipts, in % of potential GDP.
<i>NIEXPu</i>	Underlying non-interest expenditures, in % of potential GDP.
<i>INTAX</i>	Cyclically adjusted indirect taxes on production and imports, in % of potential GDP.
<i>TAXB</i>	Cyclically adjusted direct taxes on business, in % of potential GDP (corporate tax).
<i>TAXH</i>	Cyclically adjusted direct taxes on households, in % of potential GDP.
<i>SOC</i>	Cyclically adjusted social security contributions, in % of potential GDP.
<i>WAGE</i>	Government final wage consumption expenditures, in % of potential GDP.
<i>NONWAGE</i>	Government final non-wage consumption expenditures, in % of potential GDP.
<i>INV</i>	Government fixed capital formation, in % of potential GDP.
<i>SUBS</i>	Subsidies, in % of potential GDP.
<i>SOCEXP</i>	Social security benefits paid by general government, in % of potential GDP.
<i>OTHERu(u2)</i>	Underlying other net revenue, in % of potential GDP.
<i>DURATION</i>	Number of years of the fiscal episode.
<b>International macro-context</b>	
<i>INTEREST</i>	'International' nominal short term interest rate, in % <sup>(a)</sup>
<i>GROWTH</i>	'International' nominal GDP growth rate, in % <sup>(a)</sup>
<i>BURDEN</i>	See main text.
<i>CRISIS08</i>	Dummy variable taking the value 1 in all fiscal episodes including the years 2006, 2007 or 2008 ( $\Delta GD_{i,T}$ computed for these episodes includes 2008).
<i>CRISIS91sf</i>	Dummy variable taking the value 1 in fiscal episodes in Sweden and Finland covering 1991-92.
<b>Institutions</b>	
<i>EPL</i>	Overall strictness of employment protection. Scale from 0 (least) to 6 (most restrictive).
<i>BRR1</i>	Unemployment benefit (gross replacement rate during the first year of unemployment, %).
<i>BRR45</i>	Unemployment benefit (gross replacement rate during the fourth and fifth year of unemployment, %).
<i>UNION</i>	Trade union density, in %.
<i>COORD</i>	Index from 1 to 5 rising in the degree of wage bargaining coordination.
<i>PMR</i>	Index for product market regulation. Varies from 0 (least) to 6 (most regulated).
<i>FRI</i>	Fiscal Rule Index, covering all types of numerical fiscal rules (budget balance, debt, expenditure, and revenue rules) at all levels of government. Varies in the data from -1 (no rules) to about 2.2 (strictest regulation).
<i>LEFT</i>	Dummy variable taking the value 1 if the government is left-wing and 0 otherwise.
<i>RIGHT</i>	Dummy variable taking the value 1 if the government is right-wing and 0 otherwise.
<i>FRAG</i>	Index for the degree of political fragmentation in government (higher for coalition governments than for one-party governments).
<i>PSEAdm</i>	Index of government efficiency in administration. Varies in the data from about 0.5 (least efficient) to about 5 (most efficient).
<i>PSEAvg</i>	Index of overall government efficiency in administration, education, infrastructure and stabilization. Varies in the data from about 0.7 to about 4.
<b>Other variables</b>	
<i>LARGE/PERSIST</i>	Several indicators (see discussion in Section 4.2.1. - size and persistence).
<i>EMERGENCY</i>	Several indicators (see discussion in Section 4.2.1. - emergency).

Notes:

(a) For all European countries except the UK, INTEREST and GROWTH are the (weighted) average short term nominal interest rate and the average nominal GDP growth rate among 21 European OECD countries. For Canada we use interest and growth data from the US. For the US we use average data for Canada, Europe, and Japan. Finally, for Japan, New Zealand and the UK, we take the average of the data for Europe and the US.

## 4.2 Regression results

In this section we present our estimation results. Section 4.2.1. concentrates on the effects of fiscal policies as obtained from estimating Equation (4), or extended versions of Equation (4). Extensions allow us to test for composition effects, size and persistence effects, or emergency effects. The former are tested by introducing Equations (5) or (6). The other effects can be tested by entering a number of other fiscal policy variables, like the duration of a fiscal episode or the inherited level of public debt. In Section 4.2.2. we focus on the role of institutions and institutional change.

### 4.2.1. Basic results

Table 4, column (1), contains the results from estimating Equation (4). All variables have the expected sign. With the exception of *ONEOFF*, they are all highly significant. The size of the estimated coefficients is interesting. The coefficients on  $\Delta CAPBu$  and *BURDEN* are not significantly different from 1 in absolute value. For *BURDEN* this is in line with expectations that one would derive from Equation (2), even if now international growth and interest rates are involved. For  $\Delta CAPBu$  the outcome is as one would expect if over the fiscal episode the effect of discretionary policy on output and growth is about neutral<sup>10</sup>. The inherited fiscal balance as reflected by the level of  $AvgCAPBu$ , however, obtains a coefficient which is clearly larger than 1 in absolute value. Having a better fiscal position seems to matter for  $\Delta GD$  not only by the mere fact of having to borrow less, as in the first term of Equation (2). It may also bring about favourable endogenous domestic interest and/or growth rate effects, affecting the ‘snowball’ mechanism. Moreover, the fact that  $\Delta GD$  has been computed over a period up to two years after the fiscal episode may enlarge the induced cumulative effects on interest payments. The *CRISIS* dummies capture direct stock-flow effects of more than 10 percentage points on the debt to GDP ratio in all countries during the 2008 financial crisis, and even more than 20 percentage points in Sweden and Finland during their banking crisis in the early 1990s. Finally, for *ONEOFF* we find no significant effect. According to our results in Table 4, one-off policies do not seem to contribute to debt rate reduction durably. One can easily imagine that negative credibility or expectation effects on private sector behaviour and/or financial markets may explain (part of) this result.

In column (2) we allow the coefficient on  $\Delta CAPBu$  to differ during fiscal consolidation episodes, fiscal expansion episodes and neutral periods. Differences are remarkable. Effects of discretionary action on the debt ratio are much smaller during consolidation than in expansion. Our regression results do not provide a clear explanation for this finding. One hypothesis is that domestic output (and therefore the denominator in the debt ratio) responds much more to policy in consolidation than in expansion, for example due to asymmetry in private sector behavior. Households may cut consumption after tax increases, but not raise it after tax cuts. Also, they may not raise consumption after public expenditure cuts, but reduce it after public expenditure increases. One way to explain such a pattern may involve the combination of forward-looking consumers with borrowing constraints. Another hypothesis may relate to nonlinear domestic interest rate responses. It will be more likely to get the effects that we observe in Table 4 if the interest rate (risk premium) rises more in times of expansion and increasing debt, than it falls in times of consolidation. These results notwithstanding, it should be clear that permanent consolidation efforts imply a better future *CAPBu* level. The effect of consolidation efforts may be limited

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<sup>10</sup> In complementary work we have run the regression in column (1) using annual data as in Equation (3). We then obtain an estimated coefficient on  $\Delta CAPBu$  of about -0.7. This result is in line with findings by e.g. IMF (2010a) and OECD (2010b) that short run output effects from contractionary (expansionary) fiscal policies are negative (positive).

during the consolidation episode (as revealed by the coefficient on  $\Delta CAPBu$ ). By permanently improving (future)  $AvgCAPBu$ , however, they will permanently facilitate debt reduction. The other estimation results in column (2) are hardly affected by allowing for different coefficients on  $\Delta CAPBu$ .

**Table 4.** Estimation results – 1

Explanatory variables	$\Delta GD$			
	(1)	se	(2)	se
Constant	3.47*	2.05	2.81	2.07
$AvgCAPBu * DURATION$	-1.35***	0.14	-1.34***	0.14
$BURDEN * DURATION$	1.12***	0.30	1.16***	0.30
ONEOFF	-1.06	0.96	-1.17	0.95
CRISIS08	11.3***	2.97	12.0***	2.97
CRISIS91sf	27.3***	8.15	22.9***	8.32
$\Delta CAPBu$	-1.01***	0.30	-	-
<b>Consolidation</b>				
$\Delta CAPBu$			-0.49	0.45
<b>Expansion</b>				
$\Delta CAPBu$			-2.04***	0.58
<b>Neutral</b>				
$\Delta CAPBu$			0.23	1.13
R-squared	0.75		0.76	
Adjusted R-squared	0.68		0.69	
Controlling for country fixed effects (times duration)	yes		Yes	
Number of obs. (countries)	134(21)		134(21)	

Notes: 'se' indicates the estimated standard error;

\*\*\* (\*\*) (\*) (°) indicates statistical significance at the 1% (5%) (10%) (15%) level.

For a definition of all variables, see Table 3.  $AvgCAPBu$  indicates the average level of  $CAPBu$  during the fiscal episode (see our discussion of Equation 4, footnote 7).

### Composition

Tables 5 and 6 allow for different effects from the various (cyclically-adjusted) revenue and expenditure components behind the government balance. Column (3) in Table 5 introduces the basic decomposition of  $\Delta CAPBu$  that we put forward in Equation (5). Column (4) additionally decomposes  $AvgCAPBu * DURATION$ , and therefore allows for possibly different permanent effects of taxes and government expenditures on debt dynamics, i.e. effects on  $\Delta GD$  which persist even after the end of a consolidation or expansion episode. Column (5) also splits up  $BURDEN$ . We allow for different effects from international interest rate changes and growth rate changes. Moreover, these interest and growth rate effects are free to differ according to the fiscal policy regime.

Our main results for the consolidation episodes are the following. First, fiscal adjustment efforts have only limited effects on the government debt ratio during the episode itself, which confirms our findings in Table 4. All our (reported and other) regressions reveal a negative coefficient on  $\Delta INC_u$  during consolidation. The most likely effect from raising taxes on the public debt to GDP ratio during the consolidation period is therefore negative. However, in general this effect is small and not significantly different from zero. Things are even worse at the expenditure side. Estimated effects from  $\Delta NIEXP_u$  are very close to zero, and even obtain an unexpected negative sign. As a group, expenditure cuts seem ineffective in bringing down the debt ratio, at least during the consolidation period which lasts about 3.5 years on average. Stronger impact effects on output, as one typically finds in multiplier studies (e.g. Blanchard and Perotti, 2002), may explain the lower effectiveness at the expenditure side. Another

explanation may be that  $NIEXP_u$  pools various expenditure components, with possibly opposite effects on the debt ratio (e.g. public investment versus social transfers)<sup>11</sup>. Although these observations may raise doubt about the composition hypothesis, it would be too fast to draw this negative conclusion.

Maybe more important, and in line with the composition hypothesis, are our results in the upper part of columns (4) and (5). When we also decompose the level of  $AvgCAPB_u$ , we observe significant positive effects on  $AvgNIEXP_u$  and significant negative effects on  $AvgINC_u$  with the former being much larger in absolute value. Permanent improvements of the  $CAPB_u$  will have stronger favourable effects on future debt dynamics if these permanent improvements are realized by means of expenditure cuts rather than tax increases. Although, as such, this finding confirms the composition hypothesis that consolidation policies are more effective when they operate at the expenditure side, it can clearly not be concluded that tax policies are totally ineffective.

**Table 5.** Estimation results – 2 – composition I

Explanatory variables	$\Delta GD$					
	(3)	se	(4)	se	(5)	se
Constant	3.43*	2.06	3.85*	2.00	3.48*	2.05
$AvgCAPB_u * DURATION$	-1.32***	0.15	-	-	-	-
$AvgINC_u * DURATION$	-	-	-1.10***	0.17	-1.13***	0.18
$AvgNIEXP_u * DURATION$	-	-	1.42***	0.15	1.40***	0.15
$AvgOTHER_u * DURATION$	-	-	-0.34	0.56	-0.29	0.59
$BURDEN * DURATION$	1.16***	0.29	1.41***	0.32	-	-
ONEOFF	-1.64*	0.94	-2.36**	0.95	-2.43**	1.02
CRISIS	10.2***	2.93	9.64***	2.84	9.86***	2.99
CRISIS91sf	12.6	9.77	6.42	9.73	8.96	10.61
<b>Consolidation</b>						
$INTEREST * GDINIT * DURATION$	-	-	-	-	1.60***	0.45
$GROWTH * GDINIT * DURATION$	-	-	-	-	-1.34**	0.58
$\Delta INCU$	-1.07	0.77	-0.82	0.75	-0.75	1.13
$\Delta NIEXPU$	-0.49	0.62	-0.25	0.60	-0.33	0.91
$\Delta OTHERU$	-10.5***	3.24	-10.7***	3.17	-10.0***	3.31
<b>Expansion</b>						
$INTEREST * GDINIT * DURATION$	-	-	-	-	1.01	0.74
$GROWTH * GDINIT * DURATION$	-	-	-	-	-0.64	1.03
$\Delta INCU$	-2.58***	1.03	-2.28**	1.00	-2.46**	1.15
$\Delta NIEXPU$	2.09***	0.69	2.76***	0.72	2.99***	1.08
$\Delta OTHERU$	-12.9*	7.29	-13.9*	7.07	-13.2*	7.25
<b>Neutral</b>						
$INTEREST * GDINIT * DURATION$	-	-	-	-	1.00**	0.44
$GROWTH * GDINIT * DURATION$	-	-	-	-	-0.62	0.62
$\Delta INCU$	0.68	1.13	1.03	1.12	1.35	1.23
$\Delta NIEXPU$	0.24	1.20	0.41	1.17	0.39	1.21
$\Delta OTHERU$	-1.57	2.85	-1.27	2.93	-0.10	3.17
R-squared	0.79		0.81		0.81	
Adjusted R-squared	0.72		0.74		0.73	
Controlling for country fixed effects (times duration)	yes		yes		yes	
Number of obs. (countries)	134(21)		134(21)		134(21)	

Notes: see Table 4. For a definition of all variables, see Table 3.

<sup>11</sup> We do not discuss the effects from  $\Delta OTHER_u$ . As we have mentioned before, this variable is so small, that it is not really important economically.

In expansionary episodes, all policy effects have the expected sign, and are highly significant. Note also (and again) that these policy effects are larger than during consolidations. Again this may support the hypothesis that domestic output responds much less to policy in expansion than in consolidation.

As to the other variables in Table 5, we observe some changes of limited importance compared to our findings in Table 4. The main difference is that now *ONEOFF* becomes statistically significant, whereas the early 1990s crisis dummy in Sweden and Finland loses significance. Both crisis dummies become smaller.

Table 6 investigates the composition hypothesis in greater detail. It introduces for each policy regime the decomposition of  $\Delta CAPBu$  that we put forward in Equation (6). The level of *AvgCAPBu* at the top of the table is still decomposed in its two major categories (and *OTHERu*) as in Table 5. Wald tests cannot reject the null hypothesis that at this level all expenditure subcategories have the same coefficient. So have all income subcategories.

The upper part of Table 6 confirms that permanent improvements of the *CAPBu*, realized either by expenditure cuts or by tax increases, do have favourable effects on future debt dynamics. In line with the composition hypothesis, the effects from permanent expenditure cuts are again stronger. During the consolidation period, however, it is difficult to observe strong effects, at least at first inspection. At the revenue side in column (6), raising direct taxes on business ( $\Delta TAXB$ ) or households ( $\Delta TAXH$ ) seems to contribute immediately to a reduction of the debt ratio, but both effects are only marginally significant. For indirect taxes ( $\Delta INTAX$ ), we observe the opposite, but here the effect is even less significant. Moreover, these results are not very stable, and may even change in columns (7) and (7'). We conclude that permanent tax increases may help to reduce the debt ratio in the longer run, but not in the shorter run during the consolidation period itself. At the expenditure side, column (6) suggests that spending cuts may only contribute to a reduction of the debt ratio during the consolidation period when they affect social security benefits ( $\Delta SOCEXP$ ). For all other subcategories, we observe the opposite, although none of these effects is statistically significant. Our observations in column (6) are therefore in line with the composition hypothesis for social expenditures and public investment, but they disagree with this hypothesis on the effects of changes in government consumption, in particular the wage bill. The estimated negative effect on  $\Delta WAGE$  in column (6) suggests that cutting the wage bill during consolidation may rather push up the debt ratio, at least during the consolidation period.

Columns (7) and (7') investigate the effect of public wage and non-wage consumption changes ( $\Delta WAGE$ ,  $\Delta NONWAGE$ ) in greater detail. They bring a much more nuanced picture. In these columns we control for the level of public sector efficiency in administration (*PSEadm*)<sup>12</sup>. We come back to this result in Section 4.2.2., but our main finding is that cutting the public sector wage bill will contribute directly and strongly to debt reduction when public sector efficiency in administration is low. For consolidation episodes of median duration (3 years) and for the median value of *PSEadm* (=1.69), we observe in column (7') a clear positive coefficient on  $\Delta WAGE$ . The lower the level of *PSEadm*, the higher the positive coefficient on  $\Delta WAGE$ . When public sector efficiency is high, however, reducing the public sector may not be an effective way to bring down public debt, quite on the contrary. Extending the regression as in column (7') also yields (much) more significant estimates for most of the other expenditure categories. We now observe significant negative coefficients on changes in public investment ( $\Delta INV$ ) and changes in nonwage consumption ( $\Delta NONWAGE$ ). The latter effect holds at median (1.69) or lower than median levels

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<sup>12</sup> The difference between both columns is the included sample. Column (7') excludes observations where the size of the public sector wage bill is very low (below 9.2% of GDP, which is the 10<sup>th</sup> percentile). These are most likely the observations where  $\Delta WAGE < 0$  is not an option.

**Table 6.** Estimation results – 3 – composition II

Explanatory variables	ΔGD					
	(6)	se	(7)	se	(7')	se
CONSTANT	1.50	2.20	4.51*	2.48	4.81*	2.82
AvgINCu*DURATION	-0.92***	0.22	-0.91***	0.29	-0.88***	0.32
AvgNIEXPu*DURATION	1.13***	0.20	1.13***	0.24	1.10***	0.26
AvgOTHERu*DURATION	0.05	0.59	-0.08	0.80	-0.23	1.14
BURDEN*DURATION	1.27***	0.32	1.19***	0.42	1.11**	0.48
ONEOFF	-2.13**	1.02	-1.82*	1.10	-2.72*	1.37
CRISIS08	14.4***	3.08	18.1***	4.02	15.8***	4.79
CRISIS91sf	12.5	11.4	12.0	11.9	13.8	13.6
<b>Consolidation</b>						
ΔTAXB	-4.72 °	3.04	-4.28	3.35	-3.73	3.75
ΔTAXH	-4.20 °	2.58	0.25	2.93	2.61	3.33
ΔSOC	-0.02	2.35	1.30	2.85	3.42	3.35
ΔINTAX	3.15	2.66	3.03	2.91	2.07	3.54
ΔSOCEXP	3.94*	2.34	0.73	2.55	-1.01	3.06
ΔSUBS	-3.56	4.43	5.60	4.87	10.8 °	6.54
ΔINV	-3.24	3.04	-7.16**	3.57	-11.7**	4.55
ΔWAGE	-3.21	2.97	7.79	6.72	16.5 *	9.04
ΔNONWAGE	-3.77	3.57	-23.0**	9.52	-27.3 *	16.2
ΔOTHERu2	3.02	3.35	4.86	3.71	6.17 °	4.18
PSEadm*DURATION	-		-2.94**	1.34	-4.51***	1.66
PSEadm*DURATION*ΔWAGE	-		-2.21**	0.89	-2.88**	1.14
PSEadm*DURATION*ΔNONWAGE	-		3.81***	1.44	4.27*	2.56
<b>Expansion</b>						
ΔTAXB	-5.50*	3.30	-5.84°	3.64	-5.59	4.08
ΔTAXH	0.36	2.03	0.05	2.27	-1.64	3.06
ΔSOC	1.85	1.92	0.96	2.02	0.77	2.10
ΔINTAX	0.57	3.12	-1.21	3.92	-3.09	4.38
ΔSOCEXP	3.79*	2.02	3.05	2.50	1.76	2.69
ΔSUBS	13.7*	7.69	16.9**	8.18	17.6**	8.55
ΔINV	2.03	4.01	-2.26	5.83	-4.96	6.67
ΔWAGE	3.07	3.18	10.1*	5.64	7.48	6.31
ΔNONWAGE	4.06	3.51	-6.05	5.06	2.85	9.96
ΔOTHERu2	-4.04	4.38	-2.20	5.21	2.11	6.32
PSEadm*DURATION	-		-1.66	1.60	-2.61 °	1.74
PSEadm*DURATION*ΔWAGE	-		-1.01	1.09	-0.36	1.30
PSEadm*DURATION*ΔNONWAGE	-		1.62*	0.86	-0.75	2.34
<b>Neutral<sup>(a)</sup></b>						
...						
R-squared	0.87		0.92		0.91	
Adjusted R-squared	0.77		0.82		0.77	
Controlling for country fixed effects (times duration)	yes		yes		yes	
Number of obs. (countries)	134 (21)		118 (19)		107 (17) <sup>(b)</sup>	

Notes: \*\*\* (\*\*) (\*) (°) indicates statistical significance at the 1% (5%) (10%) (15%) level.

(a) The results for the neutral periods are available upon request. In column (6) none of the estimated coefficients are statistically significant at 10% or better.

(b) The sample here excludes all observations where WAGE<9.2% on average during the fiscal episode (9.2% is the 10<sup>th</sup> percentile value of WAGE over all observations).

of public sector efficiency and median duration (3 years) of the consolidation period. Finally, we observe a (marginally) significant positive coefficient on changes in subsidies ( $\Delta SUBS$ ). The coefficient on changes in social expenditures is now insignificant and negative.

We conclude that permanent expenditure cuts contribute significantly to debt reduction, with their effects being stronger than the effects of permanent tax increases. The precise composition of these expenditure cuts is very important, however. A different composition may strongly affect the outcome of fiscal adjustment during the consolidation period. Our results argue in favour of cuts in subsidies and (when government efficiency is low or median) the public sector wage bill. Social benefit cuts may not have much effect during the consolidation period, but only matter in the longer run (by decreasing  $AvgNEXP_u$ ). Reducing expenditures by means of public investment cuts, by contrast, is highly counterproductive when the aim is to bring down the public debt ratio.

#### *International macroeconomic context*

Our results in Tables 4-6 also shed light on the possible role of the international macroeconomic context during consolidation (see section 3.2.4.). All in all, our results confirm that low international interest rates and strong growth contribute to bring down the debt ratio during consolidation periods. We derive this conclusion first from the significant positive coefficient on *BURDEN* in all regressions. Moreover, when we decompose *BURDEN*, we also observe significant positive coefficients on *INTEREST*, and negative coefficients on *GROWTH*, at least during consolidation (see column 5 in Table 5). We then find for example for a consolidating country with an initial debt to GDP ratio of 75% that a one percentage point rise (fall) in the international growth rate would bring down (raise) the debt ratio by about 1 percentage point ( $1.34 \times 0.75$ ). Countries with higher initial debt ratios are more vulnerable to fluctuations in international growth rates. The effect of changes in the interest rate is somewhat stronger ( $1.60 \times 0.75$ ). All in all, our results confirm the hypothesis that consolidation may be much more difficult when all countries undertake simultaneous consolidation efforts, at least if it can be assumed that the latter has negative effects on growth in the world economy. Complementary (international) monetary accommodation, keeping interest rates low and supporting growth, may then be of crucial importance.

Another interesting observation in Table 5 is the lower impact of international growth and interest rates on countries' debt dynamics during expansion. The estimated interest rate and growth effects have the expected sign, but neither effect is statistically significant. Unlike what we observe during consolidation, where countries may suffer from each other's efforts, an international growth bonus during expansion is not significantly reflected in lower future debt to GDP.

#### *Size and persistence / emergency*

Our results in Table 7 test the size and persistence hypothesis and the emergency hypothesis (see Sections 3.2.2. and 3.2.3.). We extend the regressions reported in Table 4, column (2), by additional interaction terms  $SP \cdot \Delta CAPB_u$  or  $EM \cdot \Delta CAPB_u$ , where *SP* is a variable reflecting the size and/or persistence of the fiscal impulse and *EM* a variable reflecting the emergency of the fiscal situation. We again allow for different effects in consolidation, neutral and expansionary periods. As indicators for *SP* we have used  $\Delta CAPB_u$ , which is the most direct indicator for the size of a fiscal impulse, *DURATION* as an indicator for persistence, and a set of dummy variables being 1 when the size and/or duration of the impulse exceeds a given threshold (e.g. larger than 4 percent of potential GDP, longer than 4 years, etc.) As indicators for *EM* we have specified the level of the gross government debt ratio in the year before the start of a fiscal episode (*GDINIT*), the rise of the debt ratio in the period from three years to one year before the start

(*DGDREC*), and again a set of dummies being 1 when *GDINIT* exceeds a given threshold (e.g. 60%, 100%). The higher *GDINIT* and *DGDREC*, the more likely is the case of emergency. Since using *DGDREC* did not imply any significant results, we here focus on *GDINIT*.

We report our basic findings for the size and persistence hypothesis in Table 7, columns (8) to (10). In columns (11)-(12') we extend these regressions with emergency variables. Column (13) re-estimates (12') including only those fiscal episodes lasting more than one year. This more limited sample contains all consolidation and expansion episodes, but drops 16 very short neutral episodes. The main messages of our results are the following. First, as to the size hypothesis, column (8) suggests that larger fiscal consolidation programmes are more likely successful in the sense that they imply a stronger fall in the government debt ratio, but this effect may be vulnerable to decreasing returns. Algebraically, it can be derived from column (8) that  $\frac{\partial(\Delta GD)}{\partial(\Delta CAPBu)} = -2.56 + 0.28\Delta CAPBu$ . The effect is therefore negative (for reasonable values of  $\Delta CAPBu$ ), but it becomes weaker the higher  $\Delta CAPBu$ . From columns (10) and (11), however, we can derive that this decreasing returns result is not robust. The estimated coefficient on  $\Delta CAPBu * \Delta CAPBu$  is no longer statistically significant. Measuring size by dummies, which are 1 when  $\Delta CAPBu$  exceeds a certain threshold and 0 otherwise, implies the same conclusion (results not shown). A second message from our results goes against the hypothesis that persistence (longer duration) promotes the success of fiscal consolidation. The estimated coefficient on  $DURATION * \Delta CAPBu$  in our regressions is always positive, implying that  $\frac{\partial(\Delta GD)}{\partial(\Delta CAPBu)}$  becomes smaller (in absolute value) the higher *DURATION*. In column (13) this effect is statistically significant at the 10% level. In most other columns its *p*-value varies between 10 and 15%. If a given consolidation effort is spread over more years, it is therefore more likely that its effect on the debt ratio will be smaller, rather than larger. All in all, the tendency of our results is in favour of sizeable, short programmes.

Columns (11)-(13) in Table 7 test the emergency hypothesis. As emergency variables, these columns include the government debt ratio before the start of a fiscal episode (*GDINIT*) and two dummy variables. A first dummy (*DUM60*) is equal to 1 when *GDINIT*>60%, and 0 otherwise. A second dummy (*DUM130*) is equal to 1 when *GDINIT*>130%, and zero otherwise. Each of these columns confirm the emergency hypothesis in the sense that governments that undertake fiscal consolidation enjoy a bonus in reducing their debt ratio when the initial debt ratio is high. Our results show a statistically significant bonus of about 3 to 4% per year of consolidation for an initial debt ratio between 60% and 130%. This bonus is estimated to be about 5 to 7% for an initial debt ratio above 130%. We observe no significant bonus for initial debt ratios below 60% (result not shown). The literature provides various explanations for these results (see Section 3.2.3.). Interestingly, however, despite this bonus, our results in columns (12) and (13) also demonstrate that fiscal consolidation at high debt remains a battle that is very difficult to win. Given the positive coefficient on  $GDINIT * \Delta CAPBu$  (conditional on *DUM60*=1), one can easily derive that the debt reducing effect from consolidation policies, i.e.  $\frac{\partial(\Delta GD)}{\partial(\Delta CAPBu)}$ , during the consolidation period gets weaker as initial debt is higher. For example, in column (13)  $\frac{\partial(\Delta GD)}{\partial(\Delta CAPBu)}$  becomes positive as soon as *GDINIT* exceeds 86%. An obvious explanation is that consolidation policies have more negative Keynesian effects on growth when the debt ratio is high. Here our results tend to be in line with Pozzi *et al.* (2004) showing that high government debt implies tighter credit conditions for consumers, which raises their sensitivity to disposable income (see Section 3.2.4). As a result of stronger negative growth effects, consolidation policies may then end up in their own vicious circle. To close the discussion, it should of course not be forgotten that permanent improvements in *CAPBu* also affect future debt dynamics by permanently

reducing borrowing requirements. As we have mentioned before, this effect is captured by *AvgCAPBu* in the upper part of Table 7.

**Table 7.** Estimation results – 4 – size and persistence / emergency

Explanatory variables	$\Delta$ GD						
	(8)	(9)	(10)	(11)	(12)	(12')	(13)
CONSTANT	4.26*	3.43°	4.09*	2.84	2.87	4.38**	6.93**
AvgCAPBu*DURATION	-1.33***	-1.29***	-1.28***	-1.28***	-1.24***	-1.30***	-1.27***
BURDEN*DURATION	1.22***	1.21***	1.23***	1.13***	1.15***	1.13***	1.18***
ONEOFF	-1.32	-1.27	-1.40°	-1.28	-1.47°	-1.26	-1.18
CRISIS08	11.8***	12.4***	12.3***	12.9***	13.6***	12.9***	13.9***
CRISIS91sf	24.2***	23.5***	24.5**	24.8*	25.8**	24.3***	24.7***
<b>Consolidation</b>							
$\Delta$ CAPBu	-2.56**	-2.18*	-2.98**	-1.89	-2.14°	-2.38*	-3.11**
$\Delta$ CAPBu* $\Delta$ CAPBu	0.28*	-	0.20	0.18	-	-	-
DURATION* $\Delta$ CAPBu	-	0.44°	0.28	-	0.43°	0.45°	0.58*
(DUM60-DUM130)*DURATION	-	-	-	-2.81	-3.99**	-3.72**	-4.06**
DUM130*DURATION	-	-	-	-5.17°	-6.35**	-6.35**	-7.13***
DUM60*GDINIT* $\Delta$ CAPBu	-	-	-	0.02	0.034**	0.031*	0.036**
<b>Expansion</b>							
$\Delta$ CAPBu	-1.83	-2.18	-2.10	-0.57	-2.55°	-1.90***	-1.66***
$\Delta$ CAPBu* $\Delta$ CAPBu	0.04	-	-0.06	0.15	-	-	-
DURATION* $\Delta$ CAPBu	-	0.05	-0.00	-	0.23	-	-
(DUM60-DUM130)*DURATION	-	-	-	2.47	2.98	-	-
DUM130*DURATION	-	-	-	-(a)	-(a)	-	-
DUM60*GDINIT* $\Delta$ CAPBu	-	-	-	0.02	0.025	-	-
<b>Neutral</b> <sup>(b)</sup>							
...							
R-squared	0.77	0.77	0.78	0.79	0.80	0.78	0.81
Adjusted R-squared	0.70	0.70	0.70	0.70	0.70	0.70	0.74
Controlling for country fixed effects (times duration)	yes	Yes	yes	yes	yes	yes	yes
Number of obs. (countries)	134 (21)	134 (21)	134 (21)	134 (21)	134 (21)	134 (21)	116 (21)
Sample	complete	complete	complete	complete	complete	complete	DURATION>1

Notes: \*\*\* (\*\*) (\*) (°) indicates statistical significance at the 1% (5%) (10%) (15%) level.

(a) there are no observations of fiscal expansion when the debt ratio exceeds 130%.

(b) results are available upon request. Included variables are always the same as for expansion periods.

#### 4.2.2. The role of institutions

We have studied the possible role of institutions for the success or failure of fiscal consolidation along three dimensions. First, we investigate whether given fiscal policies (in particular, consolidation policies) affect the debt ratio differently depending on *existing institutions*. As an example, one may want to know whether the same consolidation effort has stronger effects on the debt ratio when unions are strong rather than weak, or when labour markets are flexible rather than rigid. Also, one may want to know whether it makes a difference when given consolidation policies are embedded in an institutional context of strict and wide fiscal rules, rather than in a context of full discretion. Second, we investigate whether the effects of given consolidation policies are different when they are executed simultaneously with *institutional reform*. Given growing pressure on governments in many countries, mainly in Europe, to reform labour and product markets, one may want to know whether consolidation policies have more or

less effect when combined with simultaneous labour market reform, say a reduction of employment protection legislation, or product market liberalization. A third question is whether institutions or institutional change have an influence on the success or failure of fiscal consolidation by *affecting fiscal policies*, for example by pushing the composition of consolidation efforts in the right or wrong direction.

Empirically, we test the role of given institutions along the first dimension by adding  $INST * DURATION$  to the regression equation reported in Table 6, column (6), where  $INST$  is a single institutional variable in levels. For a definition of all included institutions, we refer to Table 3. We multiply by the length of the fiscal episode ( $DURATION$ ) since the total effect of an institution on the change of the debt ratio in a particular episode may obviously depend on the length of that episode. Each institutional variable is initially added separately. We again allow for different effects in consolidation periods, expansionary periods and neutral periods. The upper left corner of Table 8 shows the estimated coefficients on  $INST * DURATION$  for consolidation periods, as well as the expected effect on the debt ratio per year of consolidation when the level of the institution concerned is one standard deviation higher<sup>13</sup>. The bottom left corner of the Table shows the results of simultaneous institutional *change*, at least for those variables where policy makers can have an influence (second dimension)<sup>14</sup>. Here we extend the regression reported in Table 6, column (6), by adding  $\Delta INST * DURATION$  to the explanatory variables. Finally, the columns at the right hand side of Table 8 show the effects of institutions or institutional change when we do not control for the characteristics of fiscal policy, i.e. when we do not include revenue or expenditure variables ( $AvgNIEXPu$ ,  $AvgINCu$ ,  $ONEOFF$ ,  $\Delta TAXB$ ,  $\Delta INTAX$ , etc.) in the regression (third dimension). Next to the institutional variable, the regressions underlying these results include only the level of  $CAPBu$  in the year before the start of the fiscal episode (times duration),  $BURDEN$  (times duration), the crisis dummies, and country-specific fixed effects (times duration).

Our main findings are as follows. First, the institutional context is of only limited influence when it comes to the effects on the debt ratio of a *given* consolidation programme (first dimension, upper left corner of Table 8). Most variables, in particular those relating to labour market institutions ( $EPL$ ,  $BRR1$ ,  $UNION$ ,  $COORD$ ), product market institutions ( $PMR$ ) and political institutions ( $RIGHT$ ,  $FRAG$ ) show up highly insignificant. Only for  $LEFT$ ,  $FRI$  and the level of government efficiency ( $PSEAdm$ ,  $PSEAvg$ ) the evidence may be stronger. Given consolidation programmes may have higher chances to bring about a reduction of the debt to GDP ratio if they are adopted by left-wing governments, and embedded in a system of strict fiscal rules. Also efficiency in the execution of consolidation policies would seem to improve their overall effects.

Extending the estimated regression like we did in columns (7) and (7') of Table 6 reinforces the evidence in favour of the hypothesis that public sector efficiency affects the outcome of given consolidation policies. In column (7') we first observe a significant negative estimated coefficient on  $PSEAdm * DURATION$  (-4.51) which is stronger than the one reported in Table 8. Moreover, it can be derived from the estimation result in Table 6, column (7'), that  $\frac{\partial(\Delta GD)}{\partial(\Delta WAGE)} = 16.5 - 2.88 PSEAdm * DURATION$ . Assuming a duration of 3 years, for example, cutting the government wage bill will bring down the public debt ratio in those countries where  $PSEAdm$  is below 1.91<sup>15</sup>. When public administration is more efficient, cutting the wage bill may not be an effective way to reduce the public debt ratio. To the best of our

<sup>13</sup> We compute standard deviations over all countries and years. They are as follows:  $EPL$  1.03,  $BRR1$  19.8,  $BRR45$  13.7,  $UNION$  21.5,  $COORD$  1.45,  $FRI$  1.02,  $PMR$  1.45,  $FRAG$  0.26,  $LEFT$  0.44,  $RIGHT$  0.44,  $PSEAdm$  0.93,  $PSEAvg$  0.50.

<sup>14</sup> As a rule, changes are computed as the level of  $INST$  at the end of the fiscal episode minus the level in the last one or two years before the episode. Data limitations along the time dimension explain why we have not included  $\Delta PSE$  in the lower part of Table 8.

<sup>15</sup> Note that the median  $PSEAdm$  over all countries and periods in our dataset is 1.69.

knowledge, this is a new result, which may provide one explanation for the sometimes conflicting evidence on public wage bill cuts as a way to assure successful consolidation (see Section 3.2.1.)<sup>16</sup>.

**Table 8.** Effect of institutions / institutional change on the results of consolidation policy

	Estimated effect of institutions on $\Delta GD$ , per year of consolidation (a)		Estimated effect of institutions on $\Delta GD$ , after dropping all fiscal policy variables, except initial <i>CAPBu</i> (b)	
	estimated coefficient	effect from a one st. dev. change in the institution	estimated coefficient	effect from a one st. dev. change in the institution
EPL	1.41	1.45	1.20	1.24
BRR1 (c, d)	-0.04	-0.79	0.00	0.01
BRR45 (c, d)	-0.14*	-1.92*	-0.08	-1.10
UNION	-0.01	-0.06	0.02	0.43
COOR	-0.73	-1.06	-1.57**	-2.28**
PMR	0.66	0.96	0.53	0.77
FRI (e)	-2.80**	-2.80**	-3.18***	-3.18***
LEFT	-2.57**	-1.13**	-5.40***	-2.38***
RIGHT	1.17	0.51	-0.09	-0.04
FRAG	3.02	0.79	-1.87	-0.49
PSEAdm (f)	-2.07°	-1.86°	-3.60**	-3.24**
PSEAvg (f)	-5.63*	-2.82*	-13.2***	-6.58***
	Estimated effect of institutional <i>change</i> on $\Delta GD$ , per year of consolidation (a)		Estimated effect of institutional <i>change</i> after dropping all composition variables (a)	
	estimated coefficient	effect from a one st. dev. change in the institution	estimated coefficient	effect from a one st. dev. change in the institution
$\Delta EPL$	3.68**	3.81**	3.00°	3.10°
$\Delta BRR1$ (c, d)	0.09	1.78	0.19°	3.76°
$\Delta BRR45$ (c, d)	-0.02	-0.27	0.02	0.27
$\Delta PMR$ (d)	2.14*	3.10*	4.73***	6.86***
$\Delta COOR$	-1.82**	-2.64**	-1.77*	-2.57*
$\Delta FRI$ (e)	0.16	0.16	-1.60***	-1.60***

Notes: \*\*\* (\*\*) (\*) (°) indicates statistical significance at the 1% (5%) (10%) (15%) level.

(a) Each institutional variable (multiplied by *DURATION*) is added separately to the regression result reported in column (6), Table 6. We allow for different effects during consolidation, expansion and neutral periods. In the table here we only report results for consolidation periods. Other results are available upon request.

(b) Each institutional variable (multiplied by *DURATION*) is added separately to a regression explaining  $\Delta GD$  by means of only initial *CAPBu* (times *DURATION*), *BURDEN* (times *DURATION*), the crisis dummies and country-specific fixed effects (times *DURATION*).

(c) *BRR1* and *BRR45* (both multiplied by *DURATION*) are added together.

(d), (e), (f) based on regressions with only 133 / only 100 / only 118 observations.

For a definition of all institutional variables, see Table 3.

<sup>16</sup> For a proper interpretation of this result, and its policy implications, it may be interesting to mention that there is no clear relationship between *PSEAdm* and the size of the government wage bill in percent of GDP (*WAGE*). The Nordic countries for example combine the highest *WAGE* with above average efficiency.

Along the second dimension (bottom left corner of Table 8), we find that consolidation programmes may be more successful when they are combined with labour market deregulation (i.e.  $\Delta EPL < 0$ ), product market deregulation (i.e.  $\Delta PMR < 0$ ), or with an increase of wage bargaining coordination (i.e.  $\Delta COORD > 0$ ). Changes in the unemployment benefit system (i.e.  $\Delta BRR$ ) or a simultaneous strengthening of fiscal rules ( $\Delta FRI > 0$ ) does not make given consolidation programmes more effective.

Last but not least, we observe the strongest effects from institutions and institutional reform along the third dimension, i.e. when we do not keep fiscal policy variables during the consolidation period constant in the regression. If institutions matter, it is not only by determining the outcome of given policies, but also (and sometimes even more) by affecting policy itself, in good or bad directions. The results at the right hand side of Table 8 confirm the favourable effect of strict and wide fiscal rules, and of overall public sector efficiency, during consolidation episodes. They also confirm the contribution of complementary product market reform. A favourable one standard deviation improvement of these variables may imply a direct and significant reduction of the debt ratio by about 3 ( $FRI$ ), 6.5 ( $PSE_{avg}$ ) or almost 7 ( $\Delta PMR$ ) percentage points per year of consolidation. Labour market institutions or reform matter much less. We find no significant role for the level or change of employment protection legislation and unemployment benefit generosity, nor for the level of union density. We do obtain some evidence, however, that a higher initial level as well as an increase of wage bargaining coordination may help to bring down the debt ratio during consolidation. As to political institutions, we observe that in consolidation periods left-wing governments may be more successful in bringing down debt.

Summarizing, our results confirm most of the literature on the positive effects of fiscal rules (Section 3.2.8). They also shed new light on the conflicting hypotheses regarding the effects of product market deregulation (Section 3.2.6). Our evidence is strongly in favour of the hypothesis that complementary product market reform is important for the success of fiscal consolidation. Product market deregulation seems both to strengthen the positive effects of given consolidation policies (e.g. by simultaneously enhancing competition, overall productivity and growth, as in Wölfl *et al.* (2010)), and to imply better consolidation policies (e.g. by reducing the power of interest groups to block off necessary changes). In contrast to product market characteristics, labour market institutions do not seem to affect the outcome of consolidation initiatives in any clear way. It seems that conflicting forces, as one can observe in the literature, counteract each other. The only conclusion that one might draw is that consolidation has a higher probability of success when wage bargaining is highly coordinated. The increased possibility to internalize the long-run advantages of fiscal consolidation may explain this result.

Our evidence on the contribution of public sector efficiency to debt reduction is new. Higher efficiency also seems to operate along both the channel of better consolidation policies, and the channel of better outcomes of given policies. As we have mentioned above, the latter may for example be due to higher credibility and resulting positive effects on private sector behaviour. A very interesting result was to see that public sector efficiency also determines the possible contribution to debt reduction of public sector wage bill cuts. These may only 'work' in countries where public efficiency is low. Finally, our result on government ideology and the outcome of consolidation may be somewhat surprising considering most of the literature (see Section 3.2.6.). We find a better evolution of the government debt ratio during consolidation when government is dominated by left-wing parties. Here, our results match with those of Ardagna (2004) suggesting that left-wing parties may better be able to convince key players (like unions) to accept the efforts and costs imposed by consolidation policies in return for improved long-run perspectives. Consolidation is more likely successful when it can take place in a context of consensus. An alternative explanation for the success of left-wing governments during consolidation may be that they

pay more attention to safeguard government investment. Regressing  $\Delta INV_{i,T}$  on *LEFT* and *RIGHT* (and country and crisis dummies) and allowing different effects in consolidation, expansion and neutral periods, yields a positive effect on *LEFT* during consolidation which is significant at the 10% level.

Table 9 reports the results of a series of additional regressions testing the effect of institutions or institutional reform. We build on the regressions reported at the right hand side of Table 8, but rather than introducing all *INST\*DURATION*-variables separately, we now include some of the more important ones together. Basically, these additional results confirm the above mentioned effects for  $\Delta PMR$ , *LEFT*, *FRI* and *PSE*. Only in column (5) statistical significance is weaker, but this seems mainly due to the serious drop in the number of countries and observations (and therefore in the cross-country variation in institutions). The labour market variables by contrast lose statistical significance in column (1) already, with  $\Delta EPL$  even experiencing a change of sign. Also  $\Delta FRI$  becomes insignificant. Having tight fiscal rules (*FRI*) may contribute to successful consolidation. A further tightening of the rules during the consolidation process, however, may be less effective. In some final regressions, we further extended the set of institutions by re-introducing other labour market variables (*EPL*, *UNION*, *BRR*,  $\Delta BRR$ ). Again, these were never significant.

**Table 9.** Effect of institutions when introduced simultaneously

	Estimated effect of institutional variables on $\Delta GD$ , per year of consolidation, when included together and after dropping all fiscal policy variables except initial <i>CAPBu</i> (b)					
	estimated coefficients (1)	estimated coefficients (2)	estimated coefficients (3)	estimated coefficients (4)	estimated coefficients (5)	estimated coefficients (6)
$\Delta PMR$	3.76***	3.96***	2.50**	2.11*	2.54*	2.28
<i>LEFT</i>	-3.63***	-2.49**	-1.50	-2.26°	-3.23**	-1.71
$\Delta COOR$	-1.07	-	-	-	-	-
$\Delta EPL$	-1.83	-	-	-	-	-1.41
<i>PSEAdm</i>	-	-3.11**	-	-	-	-3.88*
<i>PSEAvg</i>	-	-	-10.0***	-	-	-
<i>FRI</i>	-	-	-	-1.77**	-	-1.43°
$\Delta FRI$	-	-	-	-	-0.37	-
Numb. of Obs. (countries)	133 (21)	117 (19)	117 (19)	100 (16)	100 (16)	85 (14)

Notes: \*\*\* (\*\*) (\*) (°) indicates statistical significance at the 1% (5%) (10%) (15%) level.

(b) see Table 8.

## 5. Conclusions

The sharp increase in public debt ratios since 2008 and growing concern about the sustainability of public finances, impose the need for a significant fiscal adjustment, and credible debt reduction strategies in almost all OECD countries. In this paper we test a wide range of hypotheses on the determinants of the success or failure of consolidation programmes. We have summarized our contribution and main findings in the introduction to this paper. Here we focus on the policy implications of our results. In Appendix 4 we go into more detail for Belgium.

The more effective way for governments to bring down the ratio of public debt to GDP in the short run, may be to raise taxes. The main reason seems to be that tax increases have smaller negative growth effects in the short-run than expenditure cuts. In the longer run, however, it is permanent expenditure cuts that imply the more favourable debt dynamics. Next to (changes in) the overall level of taxes and expenditures, our results confirm the important role of their composition, especially at the expenditure side.

All in all, we learn from our results that consolidation policies are most effective when they take part in an overall programme targeted at promoting economic activity and growth. The composition of expenditure based consolidation is therefore of crucial importance. Expenditure cuts are most likely to imply lower debt ratios when they focus on subsidies and (conditionally) the government wage bill. Cutting public employment and the public sector wage bill may contribute strongly to debt ratio reduction, but only when public sector efficiency in administration is low. According to our results, downsizing an efficient public sector will not 'work'. One explanation may be that this policy also undermines private sector productivity. Expenditure cuts should not include public investment, quite on the contrary. A key component of a programme to promote aggregate activity and growth, should be to raise public investment.

As to the size of consolidation policies, our results in general prefer sizeable adjustment programmes of shorter duration above moderate programmes of long duration. An exception here may be countries with very high public debt ratios. Drastic programmes may not work in these countries because they are much more likely to stifle economic activity. Tight credit conditions for the private sector may be part of the explanation here.

The success of consolidation policies depends not only on intelligent domestic policy design. The international macroeconomic climate is equally important, most so for high debt countries. Our results suggest that strong international growth and low interest rates (monetary accommodation) contribute strongly to successful consolidation and debt ratio reduction in individual countries. The importance of international growth is also a warning on the risks of simultaneous fiscal tightening in many countries. Those countries that can borrow at the lowest interest rates internationally, should therefore consider to at least temporarily slowdown their tightening efforts. Even more, the results in this paper offer support to arguments raised recently by e.g. Stiglitz (2011) that countries that can borrow at low interest rates, should exploit these to finance high return investment programmes.

Other policy implications from our results relate to the role of institutions. We find that consolidation policies are significantly more successful when they are complemented by product market deregulation. One explanation is that deregulation and competition contribute to overall productivity and growth, as recently shown for example in Wölfl *et al.* (2010). By contrast, we find little evidence for favourable effects from flexible labour markets, or complementary labour market reform. Clearly, this does not imply that the labour market situation itself is unimportant. Following Ohanian *et al.* (2008) and Berger and Heylen (2010), progress in the area of employment may however depend more on the level and structure of taxes and government expenditures than on labour market institutions. Finally, we find that consolidation policies may be more effective when they are embedded in a regime of existing strict and wide fiscal rules, and when they are adopted by efficient public administrations. Increased credibility may be a possible explanation for these findings.

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### Appendix 1:

**Classification of fiscal policy in specific countries and years (1980-2008) according to the traditional approach using the  $\Delta CAPB$ , the IMF action-based narrative approach, and the  $\Delta CAPB_u$  approach that we use in this paper**

**Tabel A1.** Size of fiscal consolidation policy according to alternative measurement

Country/year	$\Delta CAPB$	narrative approach IMF (2010a)	$\Delta CAPB_u$	Would we change our conclusion on the stance of policy (consolidation/ neutral/ expansion) if we used the IMF data instead of our $\Delta CAPB_u$ for the particular country and year ?
Belgium 1984	+4.13	+0.88	+2.15	No
Germany 1996	+6.63	+0.20	+0.13	No
Japan 1999	+4.20	+0.00	-1.30	No
Finland 2000	+4.35	+0.90	+4.00	No
Japan 2006	+4.52	+0.67	+1.35	No
Ireland 1982	+0.98	+3.80	+1.03	No
Finland 1992	-1.96	+1.80	-2.15	Yes
Finland 1993	-0.41	+3.80	+0.61	No
Italy 1993	+1.84	+4.30	+3.20	No

In eight out of these nine cases, the data that one obtains to evaluate policy using  $\Delta CAPB_u$  are much closer to the action-based indicator from the IMF than the data obtained from considering  $\Delta CAPB$ . The only exception is Finland 1992. In this case the difference between  $\Delta CAPB_u$  and  $\Delta CAPB$  is very small, however.

In eight out of these nine cases, we would not change our conclusion on the stance of fiscal policy in a particular year if we used IMF data. For example, we concluded that fiscal policy in Belgium in 1984 was contractionary, and part of a consolidation programme (see Table 1). If we used IMF data for 1984, we would draw the same conclusion. Using IMF data would make us change our conclusion only for Finland in 1992 (change from expansion to consolidation).

## Appendix 2: Derivation of Equation (4)

We assume a fiscal episode which lasts for two years,  $t$  and  $t+1$ . Derivation for longer periods is totally analogous. Dropping the *CRISIS* dummy, Equation (3) for these two years is:

$$GD_{i,t+1} - GD_{i,t} = \alpha_i + \beta_1 CAPBu_{i,t} + \beta_2 (CAPBu_{i,t+1} - CAPBu_{i,t}) + \beta_3 BURDEN_{i,t+1} + \beta_5 ONEOFF_{i,t+1} + v_{i,t+1}$$

$$GD_{i,t} - GD_{i,t-1} = \alpha_i + \beta_1 CAPBu_{i,t-1} + \beta_2 (CAPBu_{i,t} - CAPBu_{i,t-1}) + \beta_3 BURDEN_{i,t} + \beta_5 ONEOFF_{i,t} + v_{i,t}$$

To simplify further notation, we will specify  $BURDEN_{i,t}$  as :

$$BURDEN_{i,t} = X_t \cdot GD_{i,t-1}, \quad \text{with: } X_t = \frac{(INTEREST_t / 100 - GROWTH_t / 100)}{(1 + GROWTH_t / 100)}$$

Summing both equations then implies:

$$\begin{aligned} GD_{i,t+1} - GD_{i,t-1} &= 2\alpha_i + \beta_1 (CAPBu_{i,t} + CAPBu_{i,t-1}) + \beta_2 (CAPBu_{i,t+1} - CAPBu_{i,t-1}) \\ &\quad + \beta_3 (X_{t+1} GD_{i,t} + X_t GD_{i,t-1}) + \beta_5 (ONEOFF_{i,t+1} + ONEOFF_{i,t}) + v_{i,t+1} + v_{i,t} \end{aligned}$$

Using  $GD_{i,t-1}$  as a proxy for  $GD_{i,t}$  at the RHS of this equation, we can rewrite this result as the two period specification for Equation (4):

$$\begin{aligned} \Delta GD_{i,T} &= 2\alpha_i + 2\beta_1 (Avg CAPBu_{i,T}) + \beta_2 \Delta CAPBu_{i,T} + 2\beta_3 Avg X_T \cdot GD_{i,t-1} \\ &\quad + \beta_5 ONEOFF_{i,T} + v_{i,T} \end{aligned}$$

$$\Delta GD_{i,T} = GD_{i,t+1} - GD_{i,t-1}$$

$$2(Avg CAPBu_{i,T}) = CAPBu_{i,t-1} + CAPBu_{i,t}$$

$$\Delta CAPBu_{i,T} = CAPBu_{i,t+1} - CAPBu_{i,t-1}$$

With:  $2Avg X_T = X_t + X_{t+1}$

$$ONEOFF_{i,T} = ONEOFF_{i,t} + ONEOFF_{i,t+1}$$

$$v_{i,T} = v_{i,t} + v_{i,t+1}$$

We approximate  $GD_{i,t}$  at the RHS by  $GD_{i,t-1}$  for econometric reasons, which is to avoid the correlation that one has between  $(X_{t+1} GD_{i,t} + X_t GD_{i,t-1})$  and the error term  $v_{i,t}$ . Basically, this approximation comes down to instrumenting  $GD_{i,t}$  by  $GD_{i,t-1}$ .

A more general specification for longer fiscal episodes will have *DURATION* instead of 2 in the equation. We use the same proxy  $GD_{i,t-1}$  for each  $GD_{i,t+z}$  at the RHS where  $z \geq 0$ .

The equation that we finally estimate will also include *CRISIS* dummies. Moreover, as we mention in the main text, to allow for possible lags in behavioural responses, we have extended in our regressions the period over which we compute the dependent variable  $\Delta GD_{i,T}$  by two years.

### Appendix 3: Data and data sources

Almost all data that we use in this paper are publicly available from OECD sources and from the Database Political institutions (DPI). We downloaded OECD data in January 2011. For the political variables we use the DPI version of December 2010. The fiscal rule index has been taken from the European Commission. Details are described below.

#### Fiscal Policy

##### **Gross government debt in percent of GDP (GD):**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series GGFLQ and GDP). Data for the Czech Republic, Hungary, Ireland and Portugal have been taken from AMECO. Data for the first two countries are available since 1995 only.

##### **Cyclically adjusted underlying government primary balance in percent of potential GDP (CAPBu)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series NLGXQU). Data for the Czech Republic are available since 1999 only, for Hungary and Poland since 1996, for Germany since 1992 and for Portugal since 1981.

##### **Cyclically adjusted government primary balance in percent of potential GDP (CAPB)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series NLGXQA). Data for the Czech Republic are available since 1999 only, for Hungary and Poland since 1996, for Germany since 1992 and for Portugal since 1981.

##### **One-off measures in percent potential GDP (ONEOFF)**

*Calculation:* CAPB-CAPBu

##### **Cyclically adjusted underlying government revenues in percent of potential GDP (INCu)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series YRGTXQU). Data for the Czech Republic are available since 1999 only, for Hungary and Poland since 1996, for Germany since 1992 and for Portugal since 1981.

##### **Cyclically adjusted underlying government non-interest expenditures in percent of potential GDP (NIEXPu).**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series YPGTXQ). Data for the Czech Republic are available since 1999 only, for Hungary and Poland since 1995 and for Germany since 1991.

##### **Cyclically adjusted indirect taxes in percent of potential GDP (INTAX)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series TINDA and GDPTR). Data for the Czech Republic are available since 1999 only and for Hungary and Poland since 1995.

##### **Cyclically adjusted taxes on business in percent of potential GDP (TAXB)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series TYBA and GDPTR ). Data for the Czech Republic are available since 1999 only, for Hungary and Poland since 1996, for New-Zealand since 1986 and for Portugal since 1981.

##### **Cyclically adjusted direct taxes on households in percent of potential GDP (TAXH)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series TYHA and GDPTR). Data for the Czech Republic are available since 1999 only, for Hungary and Poland since 1996, for New-Zealand since 1986 and for Portugal since 1981.

##### **Cyclically adjusted social security contribution received by general government in percent of potential GDP (SOC)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series SSRG and GDPTR). Data for the Czech Republic are available since 1999 only since 1995, for New-Zealand since 1986 and for Poland since 1996.

##### **Public sector wage consumption in percent potential GDP (WAGE)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series CGW and GDPTR). Data for the Czech Republic, Hungary and Poland are available since 1995 only, for New-Zealand since 1986.

##### **Government non-wage consumption in percent potential GDP (NONWAGE)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series CGNW and GDPTR). Data for the Czech Republic, Hungary and Poland are available since 1995 only, for New-Zealand since 1986

### **Government fixed capital formation in percent of potential GDP (INV)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series IGAA and GDPTR). Data for the Czech Republic, Hungary and Poland are only available since 1995.

### **Subsidies in percent potential GDP (SUBS)**

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series TSUB and GDPTR).

Data for the Czech Republic, Hungary and Poland are only available since 1995.

### **Cyclically adjusted social expenditures in percent of potential GDP (SOCEXP)**

OECD provides no direct series for this variable. Following Heylen and Everaert (2000), we computed it as  $SOCEXP = NIEXP - WAGE - NONWAGE - SUBS - other\ current\ transfers - property\ income\ paid\ (except\ interest\ payments)$ , where NIEXP is cyclically-adjusted current primary disbursements. Underlying this approach is a double assumption. First, we assume that one-off current disbursements are negligible. Second, we assume that the variables at the right hand side of this equation are not affected by the cycle.

## **International macroeconomic context**

### **International nominal short term interest rate in percent (INTEREST)**

*Definition:* see our note to Table 3.

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series IRS)

### **International nominal GDP growth rate in percent (GROWTH)**

*Definition:* see our note to Table 3.

*Source:* OECD, Statistical Compendium, Economic Outlook, N° 88 (series GDP)

## **Institutions**

### **Employment protection legislation (EPL)**

*Definition:* OECD summary indicator of the stringency of Employment Protection Legislation. We use the overall EPL strictness indicator (time series, version 1).

*Source:* OECD, Employment Outlook 2004; see also Online OECD Employment Database.

Data shortages and adjustments: see Berger and Heylen (2011) who also use and extended this dataset.

### **Gross benefit replacement rate (BRR1, BRR45)**

*Definition:* gross unemployment benefit replacement rate across two income situations (100% and 67% of APW earnings) and three family situations (single, with dependent spouse, with spouse in work). BRR1 is the replacement rate during the first year of unemployment, BRR45 the replacement rate during the fourth and fifth years of unemployment.

*Source:* OECD, Benefits and Wages Database.

### **Trade union density rate (UNION)**

*Definition:* the share of workers affiliated to a trade union, in %.

*Source:* OECD, Employment Outlook 2004; see also Online OECD Employment Database. Data for the Czech Republic and Hungary are only available since 1996, for Germany since 1992, for Poland since 1990, for New-Zealand since 1986 and for Portugal since 1981.

### **Coordination of Wage Bargaining (COORD)**

*Definition:* Index from 1 to 5 for the degree of intentional harmonization in the wage setting process, for the degree to which "minor players" deliberately follow along with what the "major players" decide. The coding for the index is based on structural characteristics of the wage bargaining process.

*Source:* Kenworthy (2001).

Data shortages and adjustments: see Berger and Heylen (2011) who also use (and extended) this dataset.

**Product market regulation (PMR)**

*Definition:* OECD summary indicator of regulatory impediments to product market competition in seven non-manufacturing industries (telecoms, electricity, gas, post, rail, air passenger transport, and road freight).

*Source:* Conway, P., D. De Rosa, G. Nicoletti, and F. Steiner (2006); see also OECD.Stat, Public Sector, Taxation and Market Regulation (REGREF dataset).

The data from Conway et al. are available only until 2003. We extrapolated them relying on more recent product market regulation data from OECD.stat for 2003 and 2008. Data for the Czech Republic and Hungary is only available since 1998.

**Fiscal rule index (FRI)**

*Source:* The construction of the fiscal rule index is explained in European Commission (2006). The dataset is available at: [http://ec.europa.eu/economy\\_finance/db\\_indicators/fiscal\\_governance/fiscal\\_rules/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm)

Data for Canada, Japan New-Zealand, Norway and the United States are not available.

**Party orientation with respect to economic Policy (LEFT/ RIGHT)**

*Definition:* Right: for parties that are defined as conservative, Christian democratic, or right-wing. Left: for parties that are defined as communist, socialist, social democratic, or left-wing.

*Source:* Database political institutions, 2010 (series EXECRLC)

**Government fragmentation (FRAG)**

*Definition:* Probability that two randomly selected government members belong to different parties.

*Source:* Database political institutions, 2010 (series GOVFRAC)

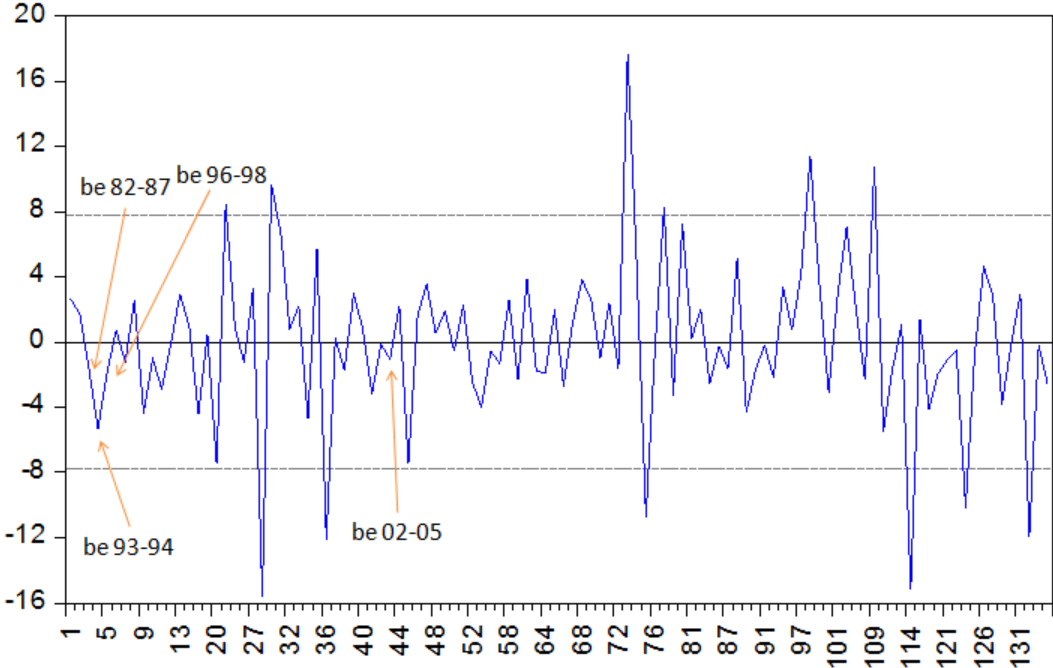
**Public sector efficiency (PSEAdm, PSEAvg)**

*Source:* Angelopoulos *et al.* (2008). The authors provide period averages for *PSEAdm* and *PSEAvg* (among other variables) for 1980-85, 1985-90, 1990-95 and 1995-2000. For most countries observations are available for three or four of these periods. For a few countries (Czech Republic, Italy, Poland, Spain) data availability is more limited. When a fiscal episode falls nicely within one of these periods (e.g. a consolidation episode in 1982-84), we take the *PSE* values relating to that period (1980-85). When a fiscal episode overlaps two periods, but the overlap in the second period is less than three years (e.g. 1983-87) we take the *PSE* values relating to first of these periods (1980-85). When the overlap is at least three years (e.g. 1983-88) we take the average of the *PSE* data for both periods. In case *PSE* data for the period concerned are missing, we take the available data for the adjacent period as a proxy. We never take *PSE* data where the gap with the fiscal episode is more than five years.

**Appendix 4: What about Belgium?**

Figure A4 shows the residuals from the regression represented in column (7'), Table 6. It shows that for most of the fiscal impulse periods in our dataset, *deviations* between actual and predicted changes in the government gross debt ratio are less than 8 percentage points. Focusing on the three Belgian consolidation periods, deviations are respectively -1.56%-points (period 1982-1987), -5.30%-points (1993-1994) and -1.85%-points (1996-1998). For the Belgian expansion period 2002-05 the deviation between the actual change in the debt ratio and our model's prediction is -1.05%-points. We conclude that our estimated model in Table 6 explains the evolution of the debt ratio in Belgium quite well.

**Figure A4:** Actual minus predicted change in gross government debt ratio for all fiscal impulse periods included in regression (7'), Table 6.



Our empirical analysis in this paper reveals various strategies that may (or may not) work to bring down the government debt ratio. These strategies may concern changes to the level or structure of government expenditures and/or taxes, and adequate changes to certain institutions. Table A4 below compares key Belgian data on fiscal policy and institutional variables with Germany, the Nordic3 (Denmark, Sweden and Finland) and a EU13 average.

The differences that one can observe and our empirical results mentioned in this paper may be inspiring when it comes to the near-future consolidation in Belgium. In an exercise like this it should of course be kept in mind that our results have been derived from a cross-country study. This has clear advantages. For example, it allows to exploit rich variation in experiences and institutions. But it also implies limitations. Available data on subcategories of taxes and government expenditures for example may not be fine enough to offer guidance to policy makers in individual countries. Think of subcategories of social expenditures, income taxes on households, property taxes, etc. on which we have insufficient data. Yet, some considerations:

**Table A4:** Fiscal policy and institutions in Belgium in international perspective.

Variable	Belgium	Germany	Nordic3	EU13
<i>Fiscal</i> <sup>(a,b)</sup>				
TAXB	3.52	1.09	3.41	3.12
TAXH	13.09	10.11	18.77	11.82
SOC	16.12	16.50	7.67	12.23
INTAX	12.55	12.53	15.98	13.57
SOCEXP	15.99	17.28	15.35	15.10
SUBS	2.08	1.13	1.64	1.39
INV	1.69	1.49	2.53	2.65
WAGE	11.91	6.93	15.09	11.62
NONWAGE	10.98	11.33	10.00	10.23
INCu	49.0	43.9	54.0	46.2
NIEXPu	46.3	41.4	49.5	45.2
<i>Institutional</i> <sup>(b)</sup>				
EPL <sup>(c)</sup>	2.18	2.12	1.92	2.09
PMR	1.43	1.33	1.18	1.21
FRI	0.20	0.92	1.12	0.71
PSEAdm <sup>(d)</sup>	1.24	1.23	1.95	1.50
PSEAvg <sup>(d)</sup>	0.96	1.33	1.34	1.15
BRR1 <sup>(c)</sup>	44.0	39.0	61.5	52.6
BRR45 <sup>(c)</sup>	38.0	14.0	17.1	16.3

Notes: (a) data in % of potential GDP. (b) Data for 2008. (c) Data for 2007. (d) Source: Angelopoulos *et al.* (2008), most recent period. EU13 is EU15 minus Luxembourg and Greece.

- The tax burden in Belgium is high in international perspective (INCu). Only the Nordic countries 'outperform' our country. A further tax increase to consolidate the budget is therefore no longer an obvious strategy, even if our empirical analysis reveals that it may help to do the budgetary job. If there is some room, it is clearly in the area of indirect taxes (e.g, environmental taxes) and property taxes. These are also the least harmful to growth (Kneller *et al.*, 1999; Arnold *et al.*, 2011). Moreover, they can generate resources for public investment (INV).
- Reduction of expenditures is the more effective way to consolidate the budget and bring down the debt to GDP ratio in the longer run. The precise composition of expenditure cuts is of crucial importance, as is also very clear from empirical employment and growth studies (Berger and Heylen, 2011; Kneller *et al.*, 1999). Government investment (INV) in Belgium is to date far below the average in the EU13 and the Nordic3. As we have argued in this paper, higher investment should be part of any intelligent consolidation programme. This argument holds even more when investment has been low for many years, which would suggest a high marginal productivity of public capital. Cuts should be made in the other expenditure subcategories.
- The level of overall social expenditures (SOCEXP) in Belgium is very close to the international benchmarks in our Table. Subsidies (SUBS) are relatively high.
- The public wage bill in percent of GDP (WAGE) in Belgium is similar in magnitude to the EU13 average. Public sector efficiency in Belgium is low, however, which would seem to make public sector wage bill cuts an effective instrument for consolidation. If we also compare with Germany and the Nordic countries, the Belgian situation is somewhat unique in combining a relatively large public

sector with relatively low efficiency in administration (*PSEAdm*). Germany scores low on both variables, the Nordic countries score high on both variables.

Our data for *PSEAdm* have been taken from Angelopoulos *et al.* (2008). A similar study by Afonso *et al.* (2005) confirms that public sector efficiency in administration is relatively low in Belgium. Eugène (2008) reveals low efficiency in public order and safety. For the sake of completeness, all studies reveal high efficiency in education. No clear message emerges for efficiency in health care.

- Compared to the international benchmarks, Belgium seems to have quite some room for institutional reform enhancing successful fiscal consolidation. This holds in particular for product market deregulation. Both the PMR data that we have used in this paper and Federaal Planbureau (2011) reveal that product market regulation is high in Belgium. In line with the above, it also holds for raising overall government efficiency (PSE is low in Belgium).
- The EU fiscal rules index (FRI) is also relatively low in Belgium, but here it should be emphasized that our evidence does not suggest that a tightening of rules during consolidation promotes success. We only find that having tight rules at the moment of consolidation will improve its outcome. Finally, from our evidence we cannot conclude that relaxing hiring and firing procedures (reducing EPL) will contribute to a successful reduction of the debt ratio. Moreover, EPL in Belgium hardly deviates from values observed in the reported benchmarks.

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