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# Demystifying the paths towards debt sustainability

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# Debt Sustainability

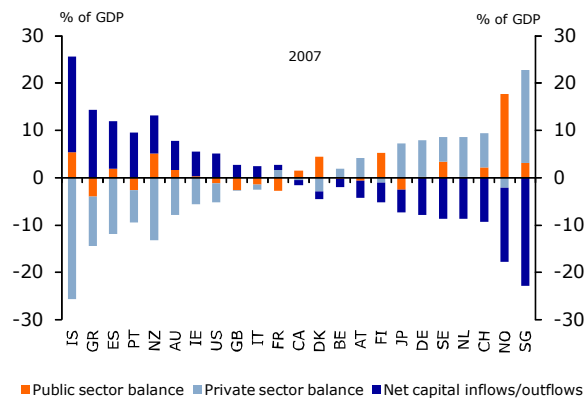
## What is the least costly exit strategy?

Governments in the industrialised countries embarked on the largest Keynesian experiment to date in order to avoid the Great Depression 2.0. Now that they have succeeded, they are struggling to find a way out of this fiscal mess without choking the fragile economic recovery. In our view, the most sensible way forward is to lower debt ratios by reining in public deficits and carrying out reforms that boost GDP over the medium term. To ease the pain of fiscal adjustment, governments can credibly commit to a medium term budgetary consolidation plan without needing to step on the brakes while the private sector is repairing its balance sheet. This gives them the option to restore order to their public finances when recovery takes foot. The withdrawal of support measures for the banking sector will help as well, but must only be carried out when the banking sector can stand on its own feet. The outright default option must always be on the table as a last resort but an implicit default through higher inflation should never be considered an option. In this report, we take a look at the five policy options – defaulting on debt obligations, withdrawing support measure for the banking sector, increasing inflation, boosting GDP growth and introducing austerity measures – that governments have at their disposal.

### Governments avoided the repeat of the Great Depression 2.0...

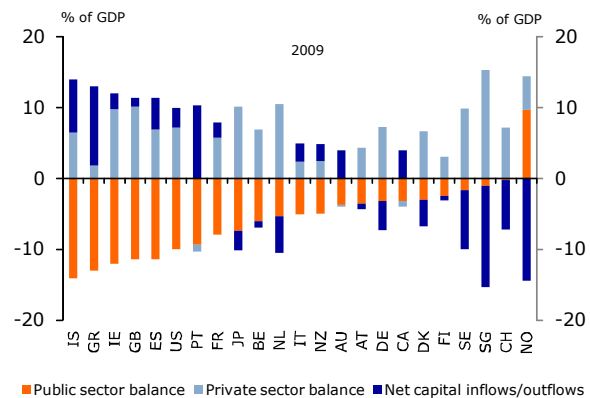
The governments of the advanced economies successfully staved-off a depression-like scenario by socialising part of the private sector's losses, stimulating the economy and allowing the automatic stabilizers to operate in full. This unprecedented re-leveraging of the public sector is best depicted by the financial balances of the OECD countries in 2007, before the crisis, and 2009, at its height (see figures 1 and 2). Note that the balance between income and expenditure in the private, public and foreign sectors must sum to zero. In figure 1, we can see that the private and public sectors of Greece, Portugal, Italy, the US, and the UK were living beyond their means in 2007 (i.e. this could only be

Figure 1: Those who lived beyond their means...



Source: Rabobank, EIU

Figure 2: ...are in greatest need of rescue



Source: Rabobank, EIU

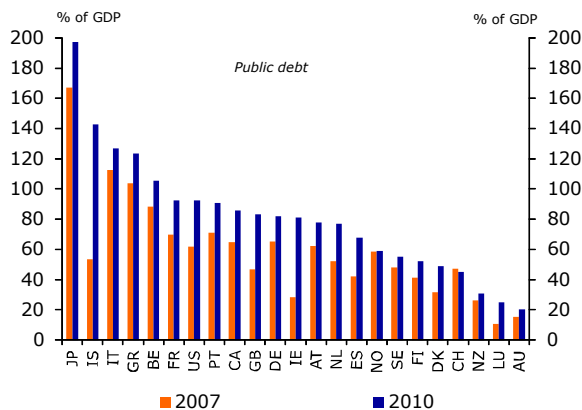
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made possible by substantial capital inflows). Once the overextended private sectors retrenched (all countries in our sample, with the exception of Canada, Portugal and Australia, started running private surpluses in 2009), governments needed to fill in the spending gap by running sizeable deficits. The result was simple: an economic catastrophe due to a collapse of aggregate demand was successfully averted at the expense of severely deteriorated public finances.

## ...but now debt ratios are expanding at an astronomical rate

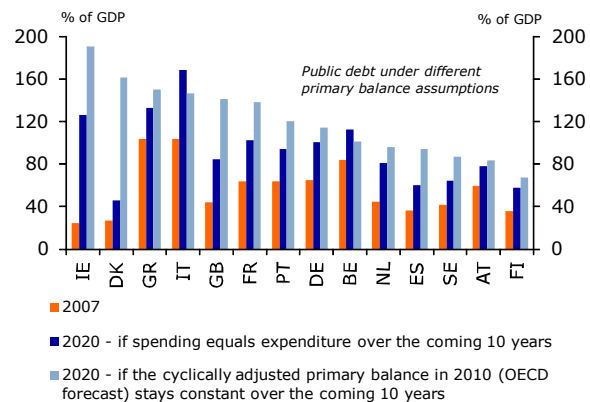
Since fiscal deficits cannot be sustained indefinitely against the backdrop of ballooning debt-to-GDP ratios (hereafter debt ratios), governments need to figure out *how* they must achieve long run debt sustainability without choking the fragile recovery. (According to the IMF, debt ratio of advanced economies will rise from 73% at end-2007 to 109% at end-2014). So not only do governments need to get the timing of the exit right, but also the path they choose in reducing their debt ratios. We will not be studying the timing of exit in this paper because it is extremely difficult to forecast it with any degree of accuracy. The one thing we can be sure of is that the currently loose fiscal policy stance in most of the advanced economies cannot be sustained for much longer no matter how resilient private sectors are. It is only a matter of time before authorities are forced by the financial markets, the rating agencies, or their constituents to start reining in their runaway deficits. Regarding the former, past research has shown that when investors ask for higher interest rates to be willing to hold on to a sovereign's debt, public finances worsen substantially. The IMF (2010) reckons that a 1%-point increase in the fiscal deficit raises long-term government interest rates by 10-60bps. The analysis also finds that long-term rates rise by 5bps for each one percent of GDP increase in the government debt stock. This implies that the 40%-point increase in government debt ratios projected for industrialized countries during 2008-14 by the IMF could raise

Figure 3: Debt ratios have increased sharply...



Source: OECD

Figure 4: ...and will rise even more in the future



Source: Rabobank, OECD

# Debt Sustainability

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interest rates by almost 2%-points. The effects are even larger for countries that start from high debt ratios or deficit levels, or that confront faster ageing population. Moreover, the results of the IMF suggest that the impact of debt and deficits on interest rates is greater during periods when the global supply of sovereign bonds is high. In their research on borrowing costs for advanced economies, Reinhart and Sack (2000) find that the impact of a deterioration in the fiscal balance by one percent of GDP in the current and the following year raises government bond yields by 9bps in a sample of OECD countries and by 12bps in the sample of G7 countries.

Therefore, it is not a question of *if*, but *when* will governments start implementing their exit strategies (i.e. lowering their debt ratios to more 'prudent' levels)? And, more importantly, *how* exactly do they intend to achieve that without damaging the economy?

To be able to answer the latter, which is the main subject of this paper, we need to first understand the exact determinants of the debt ratio and how they interact with one another. The change in debt ratio ( $\Delta d$ ) is dependent on the government's primary deficit,  $pd$  (i.e. budget deficit excluding interest rates), the difference between the long-term interest rate,  $r$ , and nominal GDP growth rate,  $g$ ,<sup>1</sup> multiplied by the debt ratio (this is known as debt dynamics or the snowball effect), and the stock-flow adjustment ( $SF$ ). The latter is the discrepancy between the change in government debt and the budget balance, which, in turn, reflects the accumulation of financial liabilities due to the banking sector support, differences between cash and accrual accounting, changes in the value of debt denominated in foreign currency (i.e.  $SF$  increases when the currency depreciates) and remaining statistical adjustments. More formally, debt accumulation in a country in the next period ( $t+1$ ) is given by

$$\Delta d = pd_{t+1} + \delta_{t+1}d_t + SF_{t+1} \quad (1)$$

where  $\delta \approx r - g$

All variables except  $r$  and  $g$  are defined as percentage of GDP (for the derivation of equation 1 go to appendix 1). So a government can lower its debt ratio in five different ways:

- **Defaulting on its debt obligations ( $d \downarrow$ )**
- **Increasing inflation ( $g \uparrow$ )**
- **Withdrawing its support measures for the banking sector ( $SF \downarrow$ ).**
- **Introducing real GDP growth boosting measures ( $g \uparrow$ )**
- **Generating a surplus on the primary budget balance ( $pd \uparrow$ ).**

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<sup>1</sup> Nominal GDP = Real GDP x Inflation

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To see how these variables interact, we can take the example of economic growth, which we will have to return to later in the article. The four channels that lower economic growth affects the debt ratio are:

1. **The debt dynamics channel:** Lower growth translates into less favourable debt dynamics for a fixed interest rate. It might also lead to higher interest rates as investors become concerned about the country's fiscal position ( $\delta \times d \uparrow$  in both cases).
2. **The automatic stabilisers channel:** Lower growth will push the primary deficit higher since it leads to an automatic drop in tax revenues and an increase in social security payments ( $pd \uparrow$ ).
3. **The discretionary expenditure channel:** Lower growth will perhaps force governments to inject more fiscal stimulus into the economy ( $pd \uparrow$ ).
4. **The stock-flow channel:** Lower growth may result in a deterioration of asset quality in the banks' balance sheets. Once capital ratios fall too much, authorities might need to either nationalise them or inject capital into them. Additionally, lower growth will usually commensurate with a depreciation of the exchange rate, which will push up the value of foreign denominated debt ( $SF \uparrow$  in both cases).

So to come to better grips with how countries can lower their debt ratios, it is useful to look at each criteria in turn.

## Strategy 1: Default and your problems will go away...

Defaulting is certainly the least costly way, at least in the short run, for any sovereign entity to reduce its debt. In principle, it can be done by delaying repayment or restructuring the debt with better terms (mostly lower interest rates). When a part of the debt is held by foreigners, as is the case for most OECD countries (see figure 5), the authorities might be choose to not completely repay the principal value. This is possible, because debt contracts are not enforced by the threat of liquidation, as is the case in the corporate world. Put differently, there is no legal mechanism for transferring a country's assets to the creditors in the event of default. The absence of gunboat diplomacy and presence of 'sovereign immunity' – a legal doctrine that limits the extent to which sovereign assets located in foreign jurisdictions can be attached by creditors – make countries even more willing to opt for this option.

### ...but only for a short while

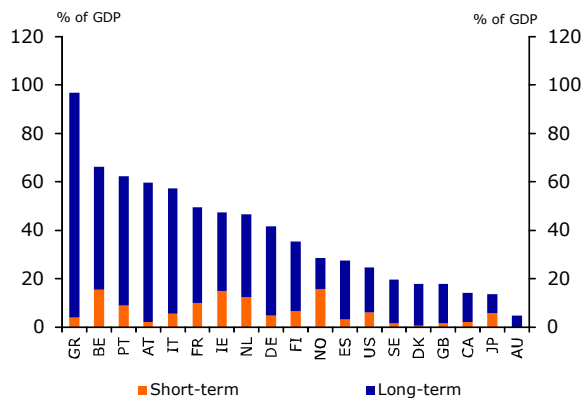
The long-term costs of default are, however, so large that they deter governments to adopt this short-term 'solution'. Let's look at some of the costs that have been identified in the academic literature based on historical experience of countries that decided to default. Rose (2002) finds that defaults

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can strongly hurt exporters and importers because bilateral trade between the debtor and its creditor countries drops by approximately 8% and persists for around fifteen years. This seems to be driven by a reduction in trade credit, and thus constitutes evidence for credit market sanctions of a particular kind, although legal sanctions could also play a role. Another reason why defaulting does not seem to be a sensible policy option is because it triggers a loss in market access by sovereigns. Admittedly though, this has become less of a problem in the more recent past. For example, several of the countries that defaulted in the late 1990s, including Russia, Ukraine and Pakistan, re-accessed markets within a short period. Gelos et al. (2004) find that it only took past defaulters 3½ months, on average, to regain market access after defaulting during the 1990s compared with more than 4½ years during the 1980s.

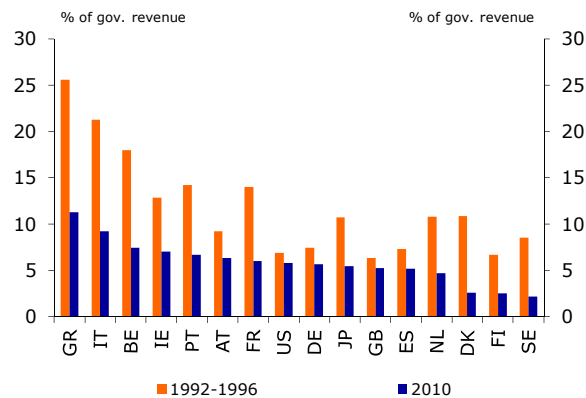
Borrowing costs also rise (i.e.  $r\uparrow$ ) in the aftermath of a default. Ozler (1993) finds that, during the tranquil period of the 1970s, lenders charged up to 50bps more for loans to previous (post-1930) defaulters. An increase in interest rates can be particularly painful for those countries that are already paying a massive bill on their debt. For example, around 10% of the Greek and Italian government's budget revenue is used for servicing the public debt (see figure 6). It should be stressed that the impact of the increasing sovereign risk premium is not likely to remain limited to the cost of public debt, but it will also affect the cost of capital for the private sector. For the international financial markets the rating (and thus risk premium) of the sovereign is usually the benchmark applied to private-sector entities of that country – the so-called sovereign ceiling. This implies that banks or large companies are likely to have to pay an even higher risk premium. Hence, the increase in borrowing costs for the government is likely to be transmitted to the entire economy with a further negative impact on the growth of productive capacity and consumption demand (i.e.  $g\downarrow$ ).

Figure 5: Investors should know better



Source: OECD, IMF, WorldBank, EIU, Rabobank

Figure 6: Who's gonna afford all that debt?



Source: Rabobank, OECD

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Bulow and Rogoff (1989) argue that a default could have much broader adverse effects on a lender's reputation than just on his standing in credit markets. Historical evidence has shown that governments are usually ousted from the office after defaulting on their debt. Additionally, the OECD governments have much more to lose in the international arena given their status as advanced economies. No government would like to participate in a G20 gathering as the only 'irresponsible partner'. The political cost is particularly significant in the case of the eurozone (EZ) members given their stronger ties at the regional level. At best, a defaulting country in the EZ might not be invited to high level meetings and, in the worst case scenario, it might be even forced out of the Union. Although such costs cannot be measured numerically, they are considered to be extremely high from a politician's point of view.

Finally, several of the recent defaults have led to the collapse or severe impairment of the domestic financial system, with severe contractionary effects on credit, financial intermediation, and ultimately output. For example, Russian banks stopped playing their intermediary role of providing liquidity and credit to the economy during the crisis in 1998.

On balance, De Paoli et al. (2009) estimate that median output can drop anywhere between 5-10% after a sovereign debt crisis. This means weaker economic activity can increase the debt ratio through all the four channels (debt dynamics, discretionary expenditure, automatic stabilisers and stock-flow) discussed above. Even worse, they find that sovereign debt crises do not occur in isolation. In three quarters of their sample sovereign debt crises overlap with currency crises and in two thirds of the sample, they overlap with banking crises. In fact, in almost half the sample sovereign crises overlap with both currency and banking crises ('triple' crises) and they usually precede or start in the same year as the banking and currency crises. This is perhaps one of the most important reasons why the Greek authorities are fighting tooth and nail to avoid defaulting on their debt. The country's banking sector holds around EUR 38.5bn worth of the government's bonds, which amounts to almost 8% of their total assets. A big write-down in the value of those bonds would leave the banks crippled. As a consequence, the government might even be forced to rescue the banking sector once again after defaulting (i.e. *SF*↑).

To sum up, defaulting on debt bears major economic and political costs that cannot be ignored. We believe the default option should always remain on the table as a last resort, but only to be utilised when all else fails. Resorting to this decision without trying the other options will certainly backfire.



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## Strategy 2: Inflating away your debt helps a bit...

The costs of outright default have made some politicians default in a stealthier/sneakier manner – through higher inflation, which will increase nominal GDP growth. Advanced economies can erode the real value of government debt through higher inflation because medium- and long-term, non-indexed, domestic currency debt accounts for three-quarters of the total in these countries. In a simple exercise, the IMF calculates the effect of inflation on debt ratios for a number of OECD countries (see table 1). The result of the calculation shows that if inflation over 2009-2014 turned out to be on average 6 percent as opposed to IMF's forecast (2%), then the debt ratio would average 86.4%, or 8%-points less than in the baseline (94.6%).

Table 1: Estimated impact of higher inflation on public debt

Country	Debt ratio 2009	Average inflation forecasted (2009-2014)	Debt ratio		Drop in debt ratio when inflation is 6%
			Forecast (2009-2014)	with av. Inflation equal to 6%	
Australia	16.4	1.9	26.1	23.8	-2.3
Canada	83.6	1.3	74.1	69.4	-4.7
France	78	1.3	96.6	86.7	-9.9
Germany	74.3	1.1	88.6	81.3	-7.3
Italy	115.1	1.5	127.2	115.3	-11.9
Japan	218.7	-0.6	247.6	225	-22.6
Mexico	44.9	4.4	42.5	38.8	-3.7
Turkey	46.8	4.8	46.6	43.4	-3.2
UK	68.8	2.3	93.8	86.2	-7.6
USA	83.8	1.6	103.1	94.6	-8.5
Average	83.1	2	94.6	86.4	-8.2

Source: IMF

Against this backdrop, we should ask ourselves whether such tiny drop in debt ratios is worth pushing inflation higher? A number of famous economists think so. Ken Rogoff of the Harvard university went so far as to mention in an interview<sup>2</sup> that "6% inflation for at least a couple of years" would "ameliorate the debt bomb" in the US and help the private sector "work through the deleveraging process"<sup>3</sup>. Even the chief economist of the IMF, Olivier Blanchard, has jumped on the bandwagon and argued in a recent paper that countries can opt for a 4% inflation target<sup>4</sup> (see Blanchard, Dell'Ariccia and Mauro, 2010).

This is a truly remarkable U-turn from the past recommendations of the highly esteemed economists. If *anyone* would have come up with such a suggestion only a couple of years ago, his sanity would be questioned by almost all market

<sup>2</sup> <http://www.bloomberg.com/apps/news?pid=20601109&sid=auyuQIA1IRV8>

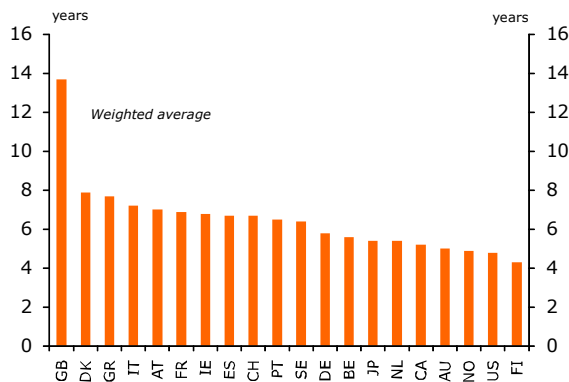
<sup>3</sup> Higher inflation will also lead to the erosion of the real value of mortgages and credit card debts.

<sup>4</sup> Of course, Mr. Blanchard's main argument for higher inflation was because it allows monetary policymakers to overcome the zero bound on nominal interest rates.

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participants. As a matter of fact, most central bankers are still strongly against this proposal. In a Q&A session in the ECB on March 4<sup>5</sup>, a journalist asked Mr. Trichet what his thoughts were on a 4% inflation target, as advocated by the

**Figure 7: Years to maturity of sovereign debt**



Source: The Economist

IMF chief economist. His response was: "I would say that it is plain wrong. That is my opinion and I believe it is the opinion of all central banks I know". But should we simply brush it under the carpet because fighting inflation is in the DNA of central bankers? Or must we also give it some thought given that such "economic heavyweights" as Ken Rogoff, Gregory Mankiw (Harvard university) and Olivier Blanchard are backing this idea? After all, some politicians, and possibly central bankers, might consider it an option behind the screens if they do not find a less painful way to get out this fiscal mess. Admittedly, nothing is written on stone!

## ...but then disaster strikes

But there are good reasons to argue against increasing inflation even if we disregard its social costs such as the arbitrary redistribution of wealth between creditors and debtors that it creates or distortions in resource allocation. First and foremost, investors understand that higher inflation is an implicit default since it is nothing more than a capital levy on holders of public debt – it reduces the real value of nominal liabilities at fixed interest rates. Phrased differently, all costs of default such as loss of market access, higher long-term interest rate, etc. that lead to higher debt ratios are applicable when inflation rises. With regards to the cost of borrowing, bond vigilantes will, without doubt, demand an interest-rate premium for bearing the risks of a future increase in the inflation target (i.e.  $\delta \times d \uparrow$ ). Basically, investors would say to the politicians 'fool me once, shame on you; fool me twice, shame on me'. It should be noted, however, that the effective nominal interest rate on the debt is slow to respond to an increase in market yields because the entire debt stock does not roll over every period (see figure 7). But in due time all the debt stock will have to be serviced at higher interest rates, so governments have an incentive to push inflation even higher. As you can imagine, this policy does not lead to debt sustainability.

Second, higher inflation will push the deficit higher in many countries that have indexed their social-security and health-care entitlements to inflation (i.e.  $pd \uparrow$ ). Third, given that the currency usually depreciates in line with inflation, the debt denominated in foreign currency will increase in value (i.e.  $SF \uparrow$ )<sup>6</sup>. Fourth,

<sup>5</sup> <http://www.ecb.de/press/pressconf/2010/html/is100304.en.html>

<sup>6</sup> Of course, the effective nominal interest rate on the debt is slow to respond to an increase in market yields because the entire debt stock does not roll over every period.

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lowering inflation at a future date is very costly when the inflation-fighting credibility of central banks is dented. Remember, Paul Volcker, the former chairman of the Fed, had to raise the interest rate to a peak of 20% in June 1981 to prove his credibility as an inflation fighter. His victory in the game-of-chicken with the financial markets came at the expense of a marked slowdown in economic activity (i.e.  $g \downarrow$ ). Fifth, the private sector will also be affected given that investors would also demand a higher nominal interest rate for holding corporate bonds. This is not only due to the rise of the benchmark yield, but also due to the volatility of returns (the rate and volatility of inflation are highly correlated<sup>7</sup>). Thus, it seems that Mr. Trichet had a point when he argued that Mr. Blanchard's idea paid "very little attention to the conclusions of academic research concerning the fact that at around 2%...the counterproductive effects of inflation [are minimised]". But we have to admit that the matter is not as black and white as Mr. Trichet would want us to believe. This is because the very academic research that the ECB president is referring to has found very different thresholds whereby inflation starts to negatively affect growth (see table 2).

**Table 2: Estimated impact of higher inflation on GDP growth**

Study	4%-points rise in inflation reduces GDP growth by	Study	GDP will only contract if inflation rises above
Barro (1995)	0.1%-points	Khan and Senhadji (2001)	1-3%
Fischer (1993)	0.15%-points	Ghosh and Phillips (1998)	2-3%
Gylfason and Herbertsson (1996)	0.18%-points	Burdekin et al. (2004)	3%
Rousseau and Wachtel (2002)	0.01%-points	Chistoffersen and Doyle (1998)	13%
Caporin and Di Maria (2002)	0.0025%-points	Barro (1995)	15%
Motley (1994)	0.1%-points	Pollin and Zhu (2006)	15-18%
Andres and Hernando (1997)	0.004%-points	Drukker et al. (2005)	19%
Kamalodin (2007)	0.01%-points	Bruno and Easterly (1996)	40%
Overall range	0.0024% - 0.18%	Overall range	1% - 40%

Source: Rabobank

Even if we disregard the thresholds, we could ask ourselves how much will growth fall when inflation rises by 4%-points. Again the negative impacts calculated vary per study, but all scholars agree that growth falls less rapidly than feared by most market participants (at least that is the result derived after looking at a large number of (emerging) countries during the past decades). Of course, these measurements done in a linear manner might understate the 'true' effect of increasing inflation on growth given that the inflation-growth relationship is non-linear (Sarel, 1996). One can imagine that an increase of inflation from 2 to 6% will have a stronger impact on growth than a rise of inflation from 100 to 106%. Another important factor that is missing in these studies is higher inflation volatility. As mentioned above, inflation volatility hinders economic growth much more than high, yet stable inflation.

<sup>7</sup> Judson and Orphanides (1996) show that in their data the correlation between the level and volatility of inflation exceeds 0.9.

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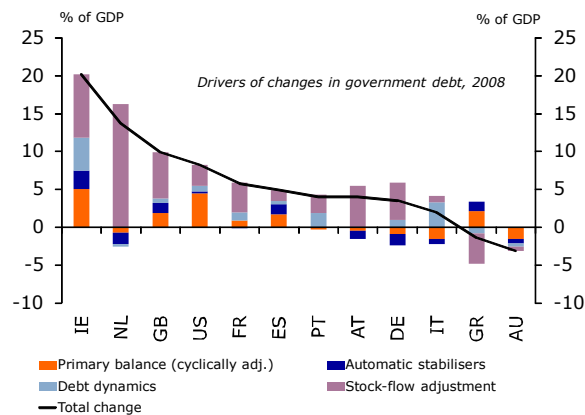
What can we conclude then from all of this? Increasing inflation will reduce the debt ratio by a tiny amount in the short-run but will eventually push it upwards in the long run. So even increasing inflation higher and higher won't help. All governments will achieve by adding this option into the policy mix is lower growth and higher unemployment. Inflation, anyone?

## Strategy 3: Withdrawing financial sector support...

Since default, be it outright or implicit, is not the correct path to debt sustainability, governments must seek other options that can reduce debt ratios in the long run. One way of doing this is by withdrawing the support measures from the financial sector. At the pinnacle of the financial crisis governments needed to ring-fence toxic assets and recapitalise the banking sector in order to avoid a total collapse of the financial system. To that, we have to say: job well done! Governments prevented the total meltdown of the financial system by socialising the banking sector's losses. But this came at a high cost. Looking at the decomposition of debt accumulation in a number of OECD countries (see figure 8), it becomes clear that the stock-flow adjustment component, which partly accounts for the financial sector support, made the biggest contribution, on average, to the increase in debt figures in 2008 (for a more complete picture see appendix 2). It should be noted that only capital injections and impairment of toxic assets show up in gross debt figures as they require upfront financing (see table 3). Adding the contingent liabilities in the form of debt and deposit guarantees would make the fiscal stance look even more worrying.

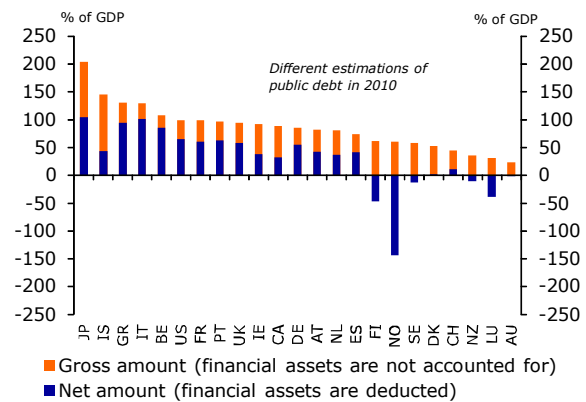
Although we have to mention that public sector's net debt, which is a better measure of government indebtedness, has not risen by as much because the financial assets that the government has taken over during the credit crisis has already been accounted for (see figure 9). Capital injections also do not add to

Figure 8: Bank support increases debt in 2008



Source: OECD

Figure 9: Make your pick: Gross or net?



Source: OECD

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net debt because it accounts for government's claims on the banking sector's assets. So removing financial sector support will not be as beneficial as most think.

**Table 3: Public interventions in the banking sector (as % of GDP)**

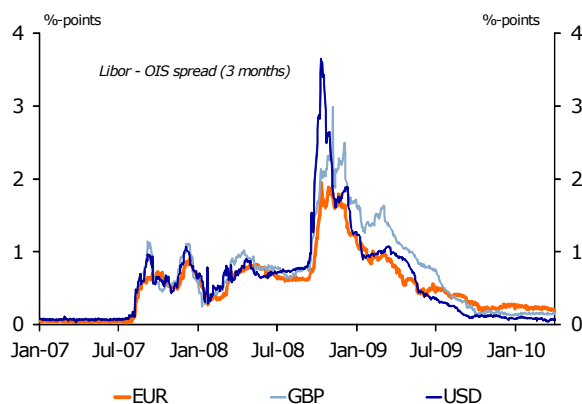
Countries	Relief of impaired asset and bank support		Capital injections		Guarantees on bank liabilities		Guarantees on deposits
	Total approved measures	Effective interventions	Total approved measures	Effective capital injections	Total approved measures	Guarantees granted	in dollars or %
BE	8,1	8,1	5,3	6,1	70,8	16,3	100000
DK	0,3	0,3	6,1	2,4	253	2,5	100%
DE	1,4	1,4	4,4	2	18,6	7,2	100%
IE	0	0	6,6	6,5	164,7	164,7	100000
GR	3,3	1,8	2	1,5	6,1	1,2	100000
ES	2,8	1,8	0	0	18,6	2,1	100000
FR	0,2	0,2	1,2	1,2	16,6	5,5	70000
IT	0	0	1,3	0,1	NA	0	103000
LU	0,9	0,9	6,9	7,9	12,4	NR	10000
NL	11,4	5,5	6,4	6,8	34,3	7,7	100000
AT	7,1	2	5,5	1,7	25,7	6,8	100%
PT	0	0	2,4	0	10	3,3	100000
FI	0	0	0	0	27,7	0	50000
SE	12,6	0	1,6	0,2	48,5	11	50000
GB	16,4	14,7	3,5	2,6	21,7	11,3	50000

Source: European Commission

**...is a good policy choice but should not be carried out straight away**

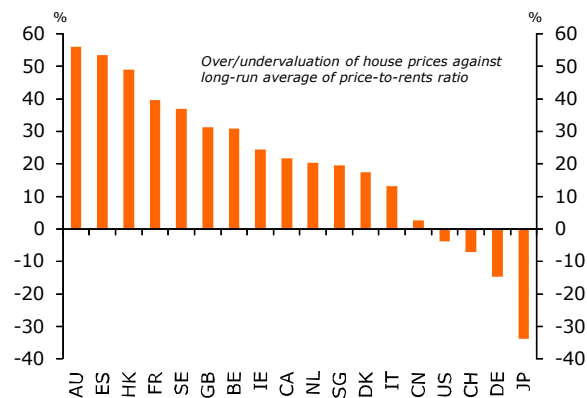
In any case, when the wounded financial sector can stand on its own feet, governments should start withdrawing their support. The problem is that this cannot happen in the short-term. First, much of the profit made by the industry is thanks to the strongly upward sloping yield curve. This party will be over sooner or later. Most central banks are expected to exit ultra accommodative monetary stances by end-2011 at the very latest unless the global economy is hit by another shock. Barring any unforeseen circumstances, therefore yield

**Figure 10: Have banks started to trust each other?**



Source: ECB, Federal Reserve, Bank of England

**Figure 11: Not all bubbles have popped?**



Source: The Economist

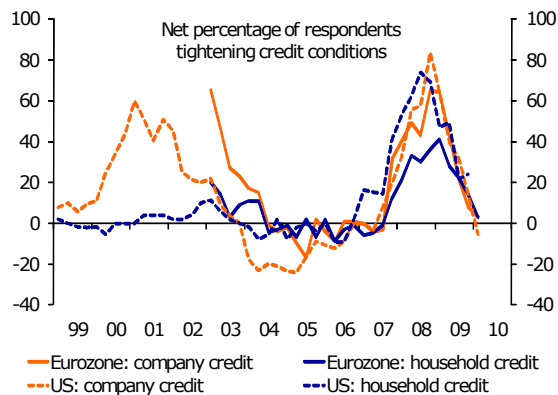
# Debt Sustainability

curves will become flatter in time and profits will drop in tandem. Second, the significant drop in the LIBOR-OIS spread in the past year might suggest that trust has returned in the financial markets (see figure 10). But this overlooks the fact that the banking system in many countries is still heavily reliant on central bank funding (i.e. transaction volumes in the interbank market are still relatively low by historical standards). For example, Ireland and Greece's banking sectors' total borrowing from the ECB amounts to roughly 7% and 10% of their total assets, respectively.

Even more worrying is that governments might be called up on again to support the system even though the chances of this happening is low. The IMF estimates that financial sector support could account for 3%-points of the 36%-points projected increase in average debt ratios by 2014. But the risks, in our view, still lie to the upside. For one, the banking sector's weak balance sheets can be severely hit if asset prices drop further in the medium term. For that matter, house prices in some OECD countries still look bubbly based on some measures (see figure 11). Additionally, the uncertain regulatory environment (such as higher capital requirements, introductions of bank levies, etc.) means financial institutions will have to recapitalise themselves even more in the future in order to maintain the trust of the markets. Another downside risk stems from a drop in global demand in the coming quarters, which will push non-performing loans on banks' balance sheets even higher. The global recovery can lose momentum for a number of reasons such as higher commodity prices, which will force central banks to exit sooner than currently anticipated, and the synchronised (and possibly premature) exit of governments from loose fiscal policies from 2011 onwards.

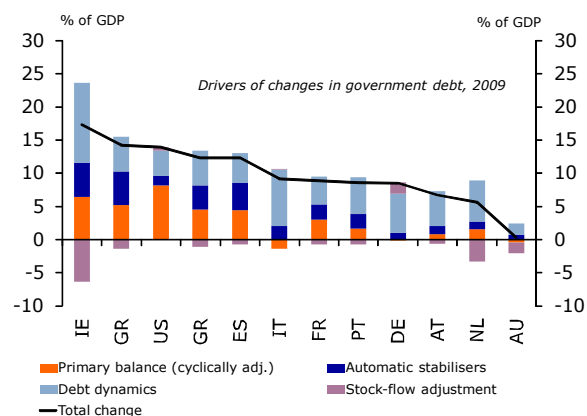
All these arguments warrant caution in withdrawing supports too soon. Support must only be removed when banks are sufficiently recapitalised to withstand future shocks or further slowdown in economic activity. Otherwise, credit

Figure 12: Credit conditions are still not loose



Source: ECB, Federal Reserve

Figure 13: Debt rising due to snowballing effects



Source: Rabobank, OECD

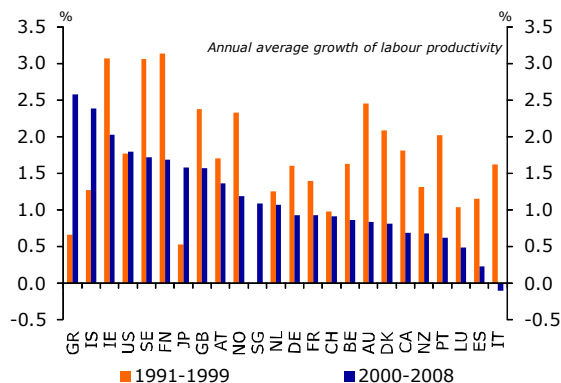
# Debt Sustainability

conditions can tighten once again (see figure 12) and push the economies back into recession. More importantly, if growth remains anaemic, interest rates stay high and/or governments do nothing to address their deteriorating public finances, gross debt ratios will keep on rising regardless. As a matter of fact, the experience of all the OECD countries in our sample, with the exception of Germany (see figure 13), clearly illustrates that debt ratios were on the rise in 2009 even though the stock-flow adjustment component was negatively contributing to the increase in debt ratios.

## Strategy 4: Growing your way out of debt is certainly good...

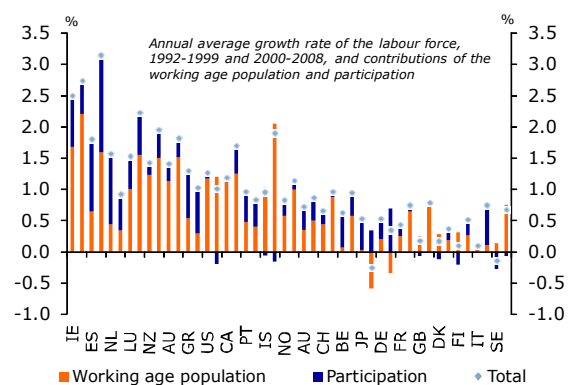
Since inflation is not the right way to increase nominal GDP, governments must attempt to boost real GDP instead. The IMF (2010) calculation shows that a 1%-point increase in growth for 10 years (holding spending constant and assuming a 40% tax rate) lowers government debt by a whopping 29%-points of GDP. Governments in the OECD can boost their real GDP by introducing a host of structural reforms. An important avenue to consider is increasing the growth of labour productivity, which has fallen in most industrialised countries in the 2000s compared to the second half of the 1990s (figure 14). Moreover, governments can increase GDP by increasing the size of the labour force through increased immigration and stimulating labour participations rates (see figure 15). The latter can be done, for example, by increasing child daycare facilities in order to allow women to participate more in the labour market. Other avenues that governments must consider is speeding up the privatisation process and reducing excessive regulation in some industries, which can promote competition.

Figure 14: Productivity growth is disappointing



Source: OECD

Figure 15: Growth of labour force



Source: NIESR

# Debt Sustainability

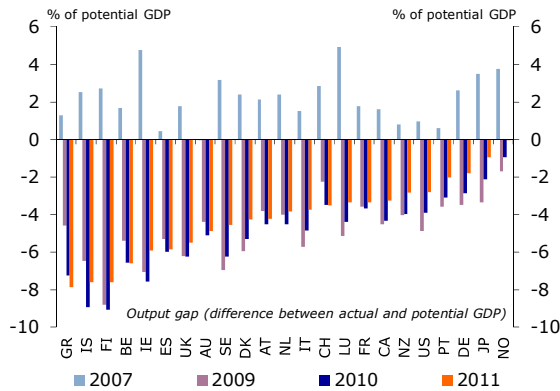
## ...but how to achieve it is *the* question

Although politicians must push through the much-needed reforms, they are not likely to benefit immediately from them since the impact of such reforms on the

broader economy are subject to lags and uncertainties. Moreover, the slow recovery of the global economy, as suggested by the sizeable OECD output gaps going forward (see figure 16), cautions against building a credible fiscal adjustment strategy primarily around an optimistic growth path. Mind you that a favorable external economic environment is extremely important for successful fiscal consolidation (McDermott and Wescott, 1996; Tsibouris et al., 2006; von Hagen, 2001). In addition, governments should be aware that they cannot grow out of their debt while they are spending more than they earn on a structural as well as on a cyclical basis (see figure 17). Note that even the removal of

discretionary fiscal stimulus in the OECD countries won't do the trick since it accounts for a small share of deficits (see figure 18).

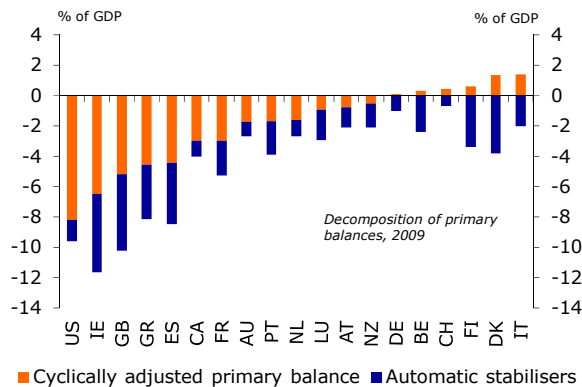
Figure 16: Don't bet too much on growth



Source: OECD

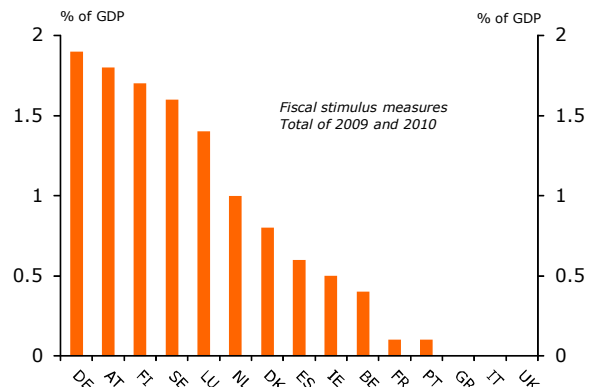
This means that active tightening of fiscal policy through expenditure cuts and tax hikes is indispensable, which is very much in accordance with the historical evidence. According to Giannitsarou and Scott (2007), this was the very route taken by the G7 countries over the period 1965 to 2008. The authors find that fiscal imbalances were mainly removed through adjustments in the primary balance (80-100%), with less substantial roles being played by inflation (0-10%) and GDP growth (0-20%). Hall and Sargent (2010) also reckon that *less than a quarter* of the reduction in America's debt-to-GDP ratio between 1945 and 1974

Figure 17: Auto. stabilisers won't do the trick...



Source: OECD

Figure 18: ...nor will the removal of fiscal stimulus



Source: IMF



# Debt Sustainability

came from negative real rates of return on government bonds (i.e. through higher inflation). The IMF's (2010) calculation also suggests that the top ten largest reductions in debt ratios in advanced economies over the last three decades occurred largely by running primary surpluses, not through higher growth (see table 4).

**Table 4: Decomposition of large reductions in debt ratios**

Country	Episode	Starting debt ratio	Ending debt ratio	Total debt reduction	Adjustment due to		
					Primary balance	Debt dynamics	Residual
Ireland	(1987-2002)	109.2	32.2	77.1	53.3	31.1	-7.4
Denmark	(1993-2008)	80.1	22	58.1	51.3	-26.7	33.4
Belgium	(1993-2007)	136.9	84	53	70.2	-25.2	8
New Zealand	(1986-2001)	71.6	29.8	41.8	52.1	-8.9	-1.4
Canada	(1996-2008)	101.7	62.7	39	39.3	-19.2	18.9
Sweden	(1996-2008)	73.2	38	35.2	21	-4.6	18.7
Iceland	(1995-2005)	58.9	25.4	33.6	17.4	4.7	11.4
Netherlands	(1993-2007)	78.5	45.6	32.9	27.5	-8.3	13.7
Spain	(1996-2007)	67.4	36.1	31.4	21.6	11.5	-1.7
Norway	(1979-1984)	56.5	35.1	21.4	24.2	11.7	-14.5
Average		83.4	41.1	42.3	37.8	-3.4	7.9

Source: IMF

## Strategy 5: The good ol' fashioned austerity plans...

It has by now become clear, hopefully, that governments need to roll up their sleeves and get their hands dirty if they are serious about achieving debt sustainability over the long-term. But the question is how much should governments tighten fiscal policy in order to bring down debt levels? To get a rough estimate of the required fiscal adjustment, we first need to make an assumption about the growth and interest rate outlook of a country over a given horizon<sup>8</sup>. What we also need to do is specify a target debt ratio, that is deemed 'sustainable', that the government must strive to achieve. After making these assumptions, we can calculate the required primary balance (RPB) that a country has to have in order to bring down its debt ratio towards a specified target within a given period through the following formula:

$$RPB = \frac{(1 + \delta_t)^j d_t - d_j^*}{\sum_{j=0}^{T-1} (1 + \delta_t)^j} \quad (2)$$

where  $T$  is the number of years that the government has to lower the debt ratio to the desired target level ( $d^*$ ). Note that we have not accounted for the

<sup>8</sup> For simplicity, we assume that the OECD's long-term interest rate and nominal GDP growth forecast on average over the period 2010-11 will hold for the entire forecast period.

# Debt Sustainability

withdrawal of financial sector support in the formula to keep the exercise as simple as possible.

In the first exercise, we assume that the government wishes to only stabilise the debt ratio at its current level (i.e.  $d^*=d_t$  and  $j=1$ ). This will simplify equation (2) exchange

$$\text{rate to } RPB = \frac{\delta_t d_t}{1 + \delta_t} \approx \delta_t d_t.$$

For example, to only stabilise its debt ratio, Greece would need to post a surplus on its primary balance amounting to 4.4% of GDP in 2010 (instead of a projected *deficit* of 5.1% of GDP according to the OECD). But would such a goal be sufficient? We do not think so for three important reasons.

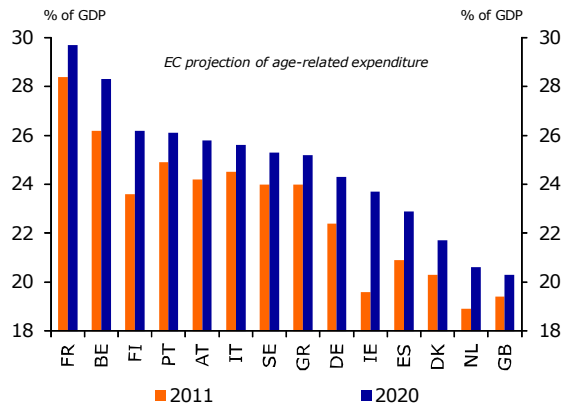
Firstly, the effects on real interest rates and global economic performance of having many advanced economies running large debt ratios – exceeding for example the arbitrary 100%-GDP mark – are unknown. Whereas in 2007

only three advanced economies had debt ratios near or above 100%, by 2014 this number would expand to eight according to the IMF. So the relatively benign experience of having only a small number of highly indebted countries (Greece, Italy and Japan) cannot be extrapolated to the situation of having the majority of industrialised countries highly indebted.

Second, economic growth may be hurt by high debt ratios (most likely as a result of concomitantly high real interest rates). The IMF (2010) estimates that maintaining public debt at its post-crisis levels could reduce potential growth in advanced economies by as much as ½%-point annually compared with pre-crisis growth performance. Reinhart and Rogoff (2010) find that historically median growth rates fall by 1% when the debt ratio rises above 90% of GDP. Third, debt ratios have to be lowered to provide more fiscal room when the ageing-related expenditures start rising in the coming years (see figure 19). Fourth, stabilising debt at high levels would reduce the flexibility of fiscal policy to respond to future economic shocks. Blanchard (1985) even argues that, while fiscal policy has strongly Keynesian effects at low levels of debt, the fiscal multiplier declines and can turn negative at high debt ratios. He argues that this is because, at low debt levels, the ‘payback’ for the private sector (in terms of lower expenditure/higher taxes) can be put off to the distant future. However, at higher levels of debt, the private sector realises that the situation is unsustainable and that a near-term correction is inevitable.

To this end, we carry out a second exercise, we assume that all governments need to reduce their debt ratios to their pre-crisis level (i.e. 2007), except for the EZ members that need to only meet the 60% debt ratio in line with the

**Figure 19: Rising ageing-related expenses**

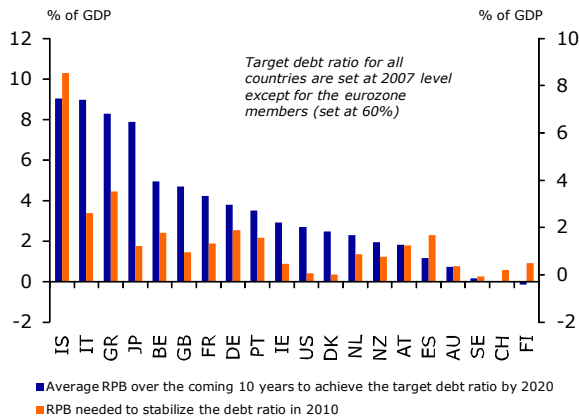


Source: European Commission

# Debt Sustainability

Maastricht Criteria. What's more, all countries need to achieve their goal by 2020 (i.e  $T=10$ ). It is clear from figure 20 that most countries cannot come up with such sizeable tax increases and expenditure cuts in the coming 10 years because it will send their economies into a tailspin.

**Figure 20: Required fiscal adjustment, ouch!**



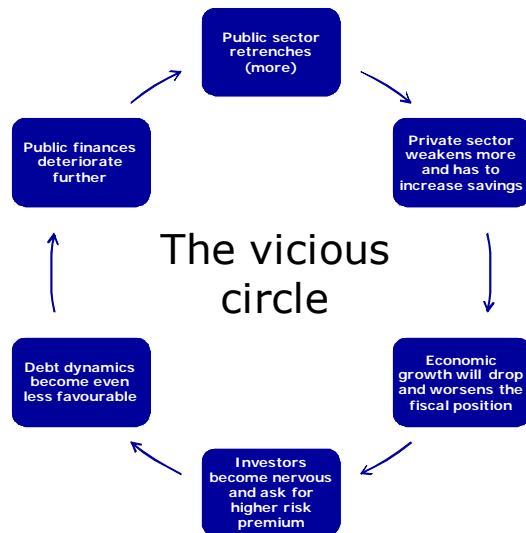
Source: Rabobank, OECD

Up until now we have assumed that growth and interest rates stay constant no matter how large the RPB is. This is certainly a ridiculous assumption. A correction of such magnitude for Greece, for example, is bound to push nominal GDP downwards. Deficit reduction will leave the households and enterprises without the much-needed support. They must, therefore, cut back either consumption and investment amid tight credit conditions. Those countries with low domestic saving that were relying on capital inflows to finance their expenditure in the past, as we saw in figure 1, will be particularly affected as foreign capital

inflows fall or are made available against higher interest rates. Germany, which happens to be the biggest net creditor in the eurozone, increased its total portfolio investment in Greece, Portugal and Spain – the largest net debtors (as a share of GDP) in the eurozone – by USD 64bn to USD 290bn during 2001-2008. The countries together accounted for 13.5% of Germany's total portfolio investment abroad in 2008, up from 8.2% in 2001. In our view, the weaknesses in these countries will make the Germans less willing than before to send money to these countries.

Not only will the fall in output push the automatic stabilisers in the wrong direction, the resulting deterioration in asset quality in the banking sector might even force governments to inject yet more capital in order to ensure that the sector as a whole is sufficiently capitalised (i.e.  $SF$  will also move in the wrong direction). We should be reminded that the Southern European banks, for example, are not only suffering from lower foreign funding, but their capital base is weakening substantially thanks to large mark-to-market losses on their holdings of government debt. Ongoing weakness in the economy may even result in a prolonged period of deflation ( $g$  will fall more). The nervousness of financial markets in the country's fiscal position in the aftermath of the output collapse may possibly lead to higher interest rates, thereby worsening snowballing effects. The figure below nicely depicts this vicious circle.

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It is clear from this analysis that the level of economic activity will, by and large, determine whether this vicious circle will form. But calculating that beforehand with a model is extremely tricky as it is subject to many assumptions. Gros (2010) proposes to use the standard Keynesian fiscal multiplier (KFM) model to get a rough estimate of the economic pain, which is given by:

$$KFM = \frac{1}{(1 - c) + m} \quad (3)$$

where  $c$  and  $m$  are the marginal propensity to consume and import, respectively. By this token, the larger the multiplier, the greater the economic contraction when the public sector tightens its belt. To keep things simple, we will only calculate the impact of fiscal contraction on the outputs of the European periphery using Gros's KFM calculations. The results are shown in table 5. According to this formula, the Greek economy will enter a period of economic depression next year if the authorities would want to lower their debt ratio to 60% by 2020.

**Table 5: Estimated impact of fiscal adjustment on GDP**

Country	Estimated Keynesian fiscal multiplier	RPB to lower debt ratios to 60% by 2020	Estimated drop in GDP following fiscal adjustment
Greece	2.5	8.3%	20.7%
Ireland	1.3	2.9%	3.8%
Portugal	1.7	3.5%	5.9%
Spain	2	1.2%	2.3%
Italy	1.5	9.0%	13.4%

Source: Gros (2010), Rabobank, OECD

# Debt Sustainability

... don't have to if consumers and investors play ball...

However, we should stress that not too much weight should be given to this somber outcome given the model's crude assumptions. In our view, the scenario depicted here is far too doom and gloom. For one, governments can provide their plans on how they will achieve debt sustainability in the medium term, without carrying them out until the private sector can carry its own weight. Second, authorities can take a longer time horizon – than the 10 years assumed in this exercise – for lowering debt ratios. Third, the target debt ratios might be uncomfortably low. Countries have managed to comfortably service their debt at higher debt ratios than, say, 60% assumed in this exercise for EZ countries.

**Table 6: The relationship between growth and austerity measures**

Country	Episode	Change in structural budget balance (as % of GDP)	GDP growth during austerity period	Trend GDP growth 1 year before austerity period	GDP growth (5 years prior to austerity period)	GDP growth (5 years after the austerity period)
Sweden	1994 - 1998	9.9	3.1	1.6	-0.1	2.9
Italy	1992 - 1997	8.4	1.3	2.0	2.9	1.8
Belgium	1993 - 1998	8.2	2.0	2.2	2.9	2.0
Ireland	1986 - 1989	8.0	3.9	3.1	2.6	4.3
Luxembourg	1992 - 1997	8.0	3.1	5.6	7.2	6.0
United Kingdom	1994 - 1999	7.6	3.4	2.5	0.8	2.8
Denmark	1983 - 1986	7.4	3.9	2.2	1.7	0.7
Belgium	1984 - 1987	6.5	2.1	1.8	1.5	2.9
Greece	1996 - 1999	6.0	3.2	2.3	1.3	4.5
Ireland	1991 - 1994	5.2	3.4	4.7	4.6	9.7
United Kingdom	1979 - 1982	4.3	0.3	1.7	1.3	3.7
Germany	1982 - 1985	3.8	1.6	2.0	2.5	3.3
Denmark	1996 - 1999	3.5	2.7	2.4	2.4	1.5
Unweighted average	4.7 years	6.7	2.6	2.6	2.4	3.5

Source: Rabobank Financial markets Research

A more important objection to these simplistic multipliers is that strong fiscal consolidation could increase aggregate demand through non-keynesian effects. Governments' decisions to introduce serious austerity measures may result in favourable debt dynamics as financial markets start asking lower interest rates given their trust in the government's resolve in bringing order to their public finances. Economic growth may also pick up if consumers start spending more in the expectation of paying lower taxes in the future (this is known as the *Ricardian equivalence effect*). Both effects together will give the economy a much-needed shot in the arm. Looking at the historical evidence, it becomes evident that even fiscal belt-tightening measures do not necessarily lead to a contraction of economic activity (see our Special: "Austerity, how bad for growth?" – 26.Feb.2010). The experiences of Sweden, Denmark, Greece and Ireland in the 1980s as well as UK in the 1990s shows that GDP growth during fiscal contraction can even surpass the economy's trend growth rate (see table 6).

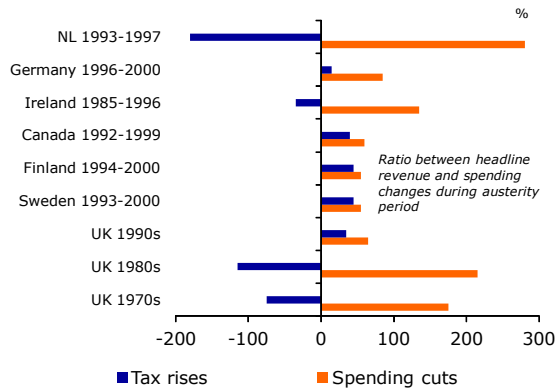
# Debt Sustainability

## ...and if governments place most of the burden on spending cuts

Admittedly, it is extremely difficult to assess the interplay between austerity measures and GDP given that confidence of consumers and financial markets, on

the one hand, and the strength of external demand plus the movement of the exchange rate, on the other, cannot be forecasted with any degree of accuracy. So what we should instead focus on is how governments can limit the fallout from the upcoming fiscal adjustment. Here we need to resort to academic studies again in order to see how governments can protect growth while correcting their fiscal imbalances. Based on three detailed case studies—Denmark (1983-86), Ireland (1987-89) and Italy (1989-92) — Alesina and Perotti (1995) conclude that fiscal adjustments that rely primarily on cuts to current spending have a better chance of being successful and are expansionary. A

**Figure 21: To spend or to cut, that's the question?**



Source: Policy Exchange

study by the UK Treasury (2009) concluded that “*there is broad agreement in the literature that spending restraint is more likely to generate lasting fiscal consolidation and better economic performance than tax increases*”. More recently, Goldman Sachs (2010) also finds that budgetary adjustments that have focused on reducing government expenditure have typically *boosted* growth and resulted in significant bond and equity market outperformance in their sample of 24 OECD economies in the period 1975-2009. By contrast, they find that tax-driven fiscal adjustments typically fail to correct fiscal imbalances and are damaging for growth.

Perhaps this is the reason why, historically, governments have typically placed around 80% of the burden on spending cuts during budgetary consolidation, according to the Policy Exchange (see figure 21). IMF (2010) estimates, however, are less conclusive (see appendix 3). Most countries have indeed placed most of their effort on spending cuts, but tax rises also seem to have played a strong role in most fiscal consolidation strategies. In OECD countries, business tax increases that were offset by cuts in other direct taxes improved the success of the adjustment effort (Alesina and Ardagna, 2009). The broadening of the tax base by fighting tax evasion and reduction of exemptions played an important role as well.

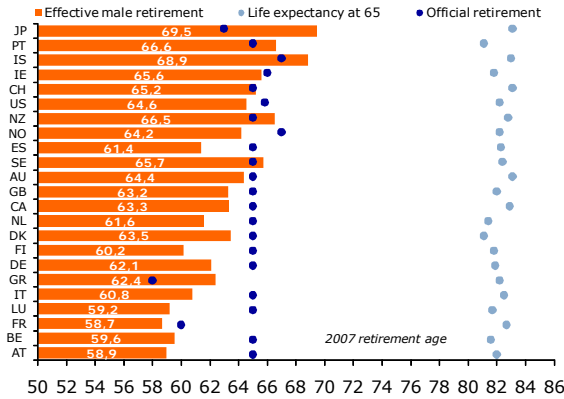
On the whole, however, spending cuts must take the leading role. The greater success of expenditure-driven vs. tax-driven adjustments is attributed to the following three factors. First, tax-driven adjustments to budgetary policy have the effect of crowding out investment (Baxter and King (1993)). Second, it is

# Debt Sustainability

easier for the private sector to fill the gap left by the budgetary adjustment if it does not face the additional burden of increased taxation during the adjustment process. Third, unit labour costs (ULCs) are usually lower in expenditure-driven

adjustments. Lane and Perotti (2003) find that a reduction in public wages have the effect of 'crowding in' an expansion of output, employment and profitability in the trade sector. This is because the public sector wage drop often leads to a concomitant drop in private sector wages.

Figure 22: Ample life to work longer

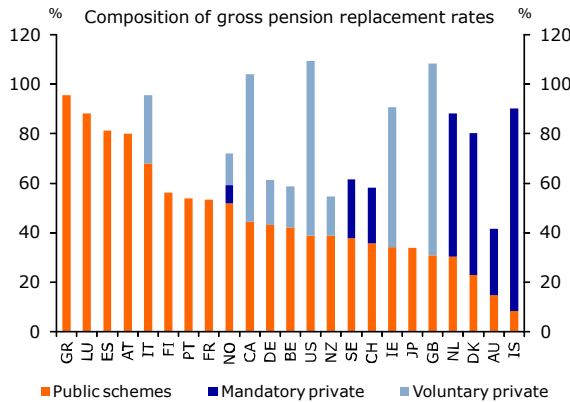


Source: OECD

So if governments must put most on the effort on cutting, which areas of expenditure cuts – defence, civil service employment, benefits, etc. – should they focus on? As mentioned above, cutting public sector wages is mostly helpful for countries that are suffering from high ULCs such as the Southern European countries. But, most importantly, all OECD

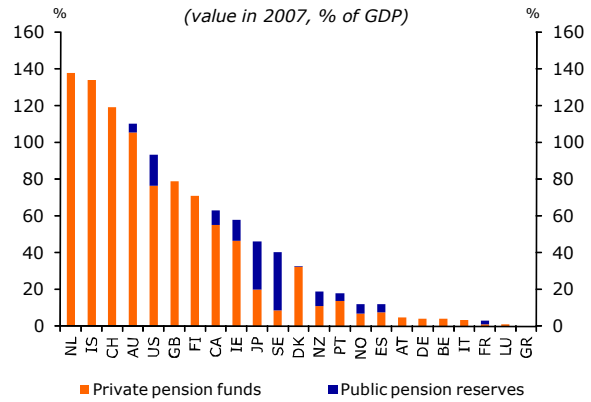
governments have to reform their pension and health entitlements as they will represent a sizeable share of total spending in the future (see figure 19). One of the most important measures is raising the retirement age since citizens of the OECD economies are currently living around 20 years after their retirement (see figure 22). Another policy reform is increasing the burden sharing of pensions with the private sector. It is quite unfavourable when the burden of ageing falls squarely on governments' shoulders (see figure 23). Worse still, sometimes governments have made promises that are pushing them towards insolvency. Greece's *uber* generous pension system is an excellent example in this respect.

Figure 23: Some governments are too generous...



Source: OECD

Figure 24: ...while having no money to back it up



Source: OECD

# Debt Sustainability

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The government has pledged to pay almost 100% of the retirees salaries without having any reserves to back it up (see figure 24).

Having said that, we must immediately stress that taking action to arrest such trend of rising ageing-related expenditures is politically difficult and can send panicky consumers into an ultra saving mode (i.e.  $g \downarrow$ ). Therefore, the effects of the needed measures should be phased in over time. Governments should also be aware that the strength of demographic factors are so high that the entitlement reforms would, at best, prevent ageing pressures from adding to the fiscal adjustment needed. In other words, these reforms do not reduce the daunting challenges ahead, they merely prevent them from becoming even bigger.

## Conclusion

It is clear that governments cannot pursue the ongoing expansionary fiscal policies forever. Therefore, the question to be asked is which exit strategy poses the least damage to the economies of the industrialised countries. At first glance, defaulting on debt seems to be the least painful way to reduce debt ratios as it is easily engineered. However, the long-run economic and political costs makes it extremely unattractive. Hence, the default option should only be exercised if all else fails (i.e. when liquidity dries up completely or interest rates rise to such levels that makes debt servicing unaffordable).

Defaulting in an implicit manner – through higher inflation – is even more damaging even though it is extremely tempting given the anaemic growth outlook and the magnitude of the required fiscal adjustment. In the long-run, governments would not only pay higher interest rates on their debt but they will hurt growth. As such, the adverse debt dynamics will push debt ratios even higher in the long-term.

The removal of support measures for the banking sector is a more sensible option but cannot be carried out immediately. Banks are still licking their wounds and are, therefore, in no position to stand on their own feet. Additionally, the banking sector might even need more assistance going forward if the global economic recovery loses momentum, asset prices fall further or long-term interest rates increase further amid fears of sovereign debt crises. Besides, this policy option is merely a 'one-off' and will certainly not lead to long-run debt sustainability if no fiscal adjustment takes place, long-term interest rates rise, and/or economic growth falters.

GDP growth boosting measures should certainly be frontloaded through a number of structural reforms. But given that the impact of reforms on the broader economy are subject to lags and uncertainties, governments in the OECD cannot hope that they can growth their way out of debt while external demand remains weak.



# Debt Sustainability

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So this leaves us with the least bad option, which is reducing spending and increasing taxes, with more weight being given to the former. But the synchronised nature of this crisis means that the required fiscal adjustment is more painful than in the previous recessions. The risk is that the private sector may not be able to pick up the slack when the government heads for the exit. So the whole plan may backfire! For that matter, a premature exit might push the economies back into recession, if not worse. Against this backdrop, we would recommend that governments announce credible, concrete and clear plans on how they would restore order to their public finances in the future without implementing immediately – at least as long as the private sector is in need of a life support and markets do not react adversely to the government's plans.

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# Appendix 1

## Derivation of debt accumulation formula

When analysing public debt sustainability, it is useful to recall the basic concept of public debt arithmetics. We start with the basic accounting relationship between debt and the annual budget balance:

$$D_{t+1} = D_t - B_{t+1} + SF_{t+1} \quad (1)$$

where  $D_{t+1}$  is the level of government debt at the end of next year (t+1),  $B_{t+1}$  is the budget balance next year ( $B_{t+1} < 0$  means the budget is in deficit) and  $SF_{t+1}$  is the stock-flow adjustment (e.g.  $SF_{t+1} > 0$  if government has increased its financial liabilities and/or foreign debt has increased in value thanks to a depreciation of the currency).

Next we split the budget balance into (net) interest payments,  $I_{t+1}$ , and everything else (i.e. the primary balance,  $PB_{t+1}$ ).

$$B_{t+1} = PB_{t+1} - I_{t+1} \quad (2)$$

The interest payments next years depend on the size of (this year's) debt and the rate paid on that debt:

$$I_{t+1} = r_{t+1}D_t \quad (3)$$

Where  $r_{t+1}$  is the interest rate (technically the country's average cost of borrowing) during year t+1. Then substituting equation 2 into 1 and substituting 3 into the result, we get:

$$D_{t+1} = D_t - (PB_{t+1} - I_{t+1}) = D_t - PB_{t+1} + r_{t+1}D_t + SF_{t+1} \quad (4)$$

Scaling everything to GDP ( $Y$ ),

$$\frac{D_{t+1}}{Y_{t+1}} = \frac{D_t}{Y_{t+1}} + r_{t+1} \frac{D_t}{Y_{t+1}} - \frac{PB_{t+1}}{Y_{t+1}} + \frac{SF_{t+1}}{Y_{t+1}} \quad (5)$$

Simplifying (5) gives us:

$$\frac{D_{t+1}}{Y_{t+1}} = (1 + r_{t+1}) \frac{D_t}{Y_{t+1}} - \frac{PB_{t+1}}{Y_{t+1}} + \frac{SF_{t+1}}{Y_{t+1}} \quad (6)$$

# Appendix 1

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This can also written as:

$$\frac{D_{t+1}}{Y_{t+1}} = (1 + r_{t+1}) \frac{D_t}{Y_t} \frac{Y_t}{Y_{t+1}} - \frac{PB_{t+1}}{Y_{t+1}} + \frac{SF_{t+1}}{Y_{t+1}} \quad (7)$$

If all lower case letters except r denote ratios to GDP, then equation (7) becomes:

$$d_{t+1} = (1 + r_{t+1}) d_t \times \frac{Y_t}{Y_{t+1}} - pb_{t+1} + sf_{t+1} \quad (8)$$

If  $g_{t+1}$  is growth in GDP in year t+1, then:

$$Y_{t+1} = Y_t(1 + g_{t+1}), \text{ or } \frac{Y_t}{Y_{t+1}} = \frac{1}{1 + g_{t+1}} \quad (9)$$

Substitution equation (9) into (10) gives:

$$d_{t+1} = \left( \frac{1 + r_{t+1}}{1 + g_{t+1}} \right) d_t - pb_{t+1} + sf_{t+1} \quad (10)$$

If we expect the following approximation to hold:

$$\frac{1 + r_{t+1}}{1 + g_{t+1}} = 1 + (r_{t+1} - g_{t+1}) \quad (11)$$

and defining  $\delta_{t+1} = r_{t+1} - g_{t+1}$ , we can redefine equation (10) as:

$$d_{t+1} = (1 + \delta_{t+1}) d_t - pb_{t+1} + sf_{t+1} \quad (12)$$

Further simplifying equation (12) gives:

$$d_{t+1} = d_t + \delta_{t+1} d_t - pb_{t+1} + sf_{t+1} \quad (13)$$

This gives us the debt accumulation equation:

$$d_{t+1} - d_t = \delta_{t+1} d_t - pb_{t+1} + sf_{t+1} \quad (14)$$

# Appendix 1

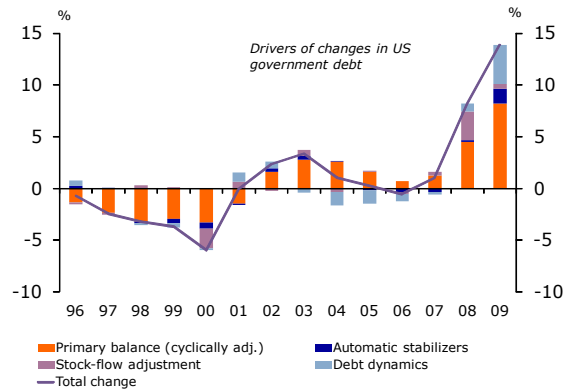
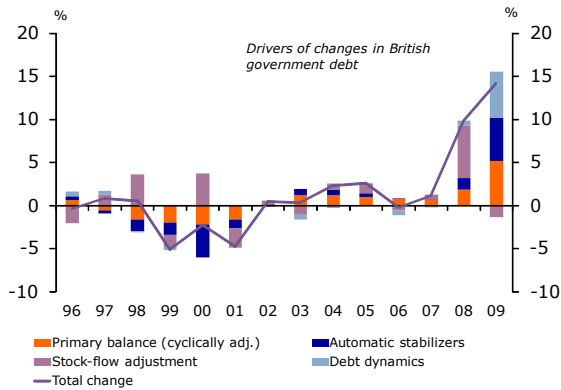
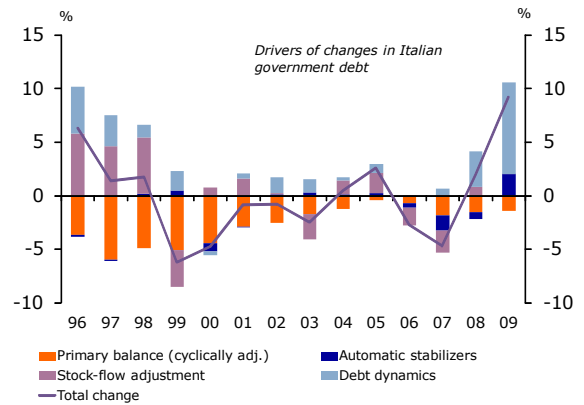
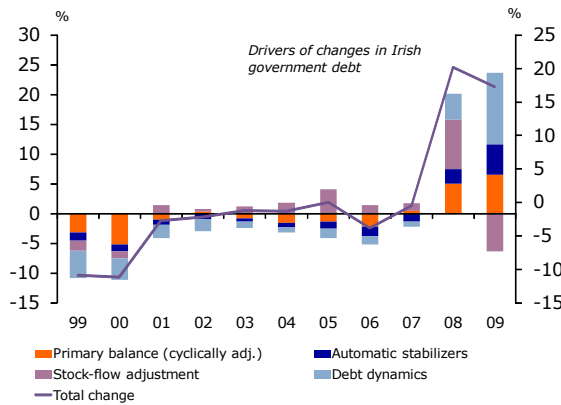
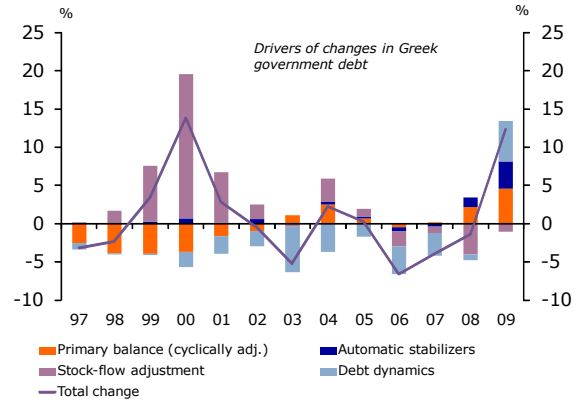
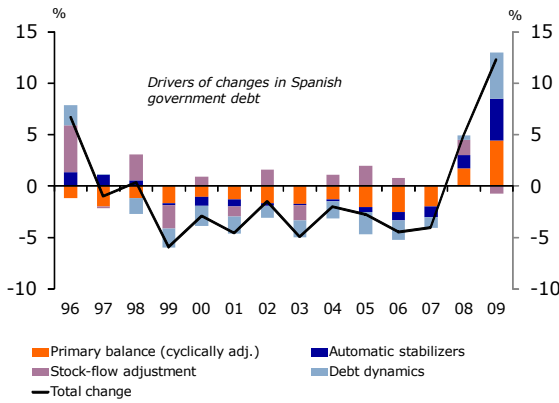
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If we define  $\Delta d = d_{t+1} - d_t$  and replace primary balance,  $pb_{t+1}$ , by primary deficit,  $pd_{t+1}$ , and slightly rearrange we get:

$$\Delta d = pd_{t+1} + \delta_{t+1}d_t + sf_{t+1} \quad (15)$$

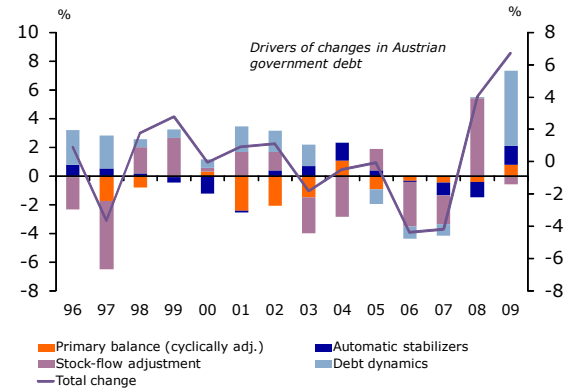
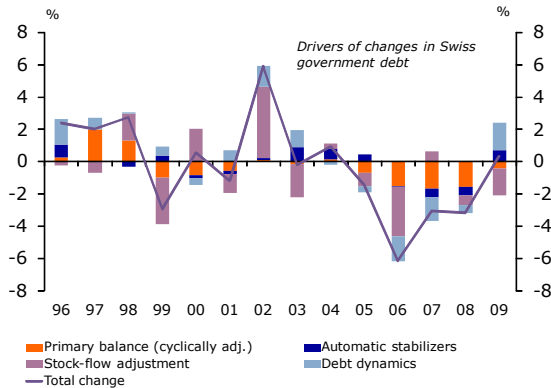
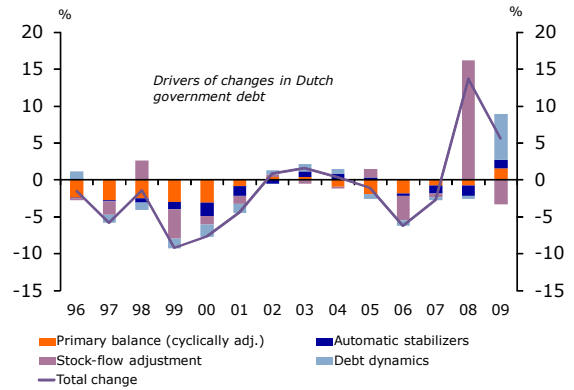
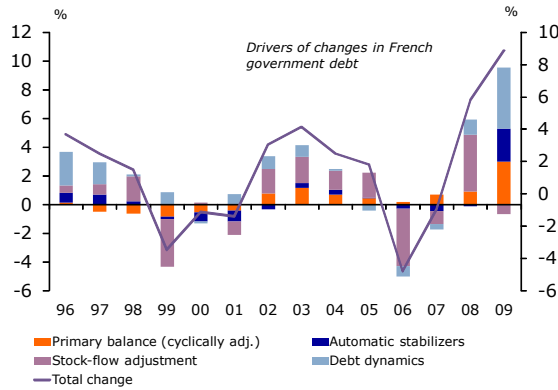
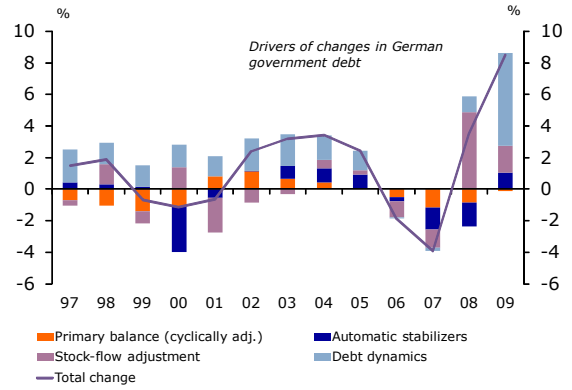
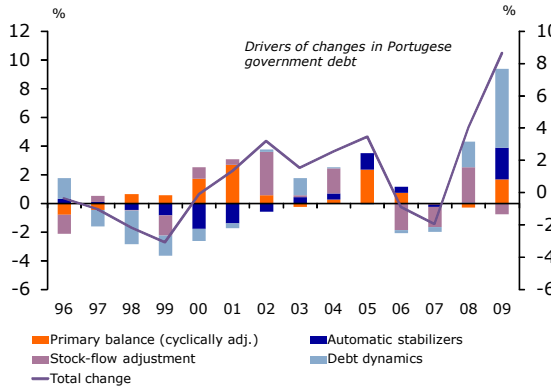
# Appendix 2

## Decomposition of debt accumulation



# Appendix 2

## Debt decomposition





# Appendix 3

## Ratio between spending & revenue changes

Table A1: Experiences of advanced countries with large fiscal adjustments

Country	Year end	Cumulative change in capb	Of which:		Ratio between spending and revenue changes
			Revenue increase	Expenditure reduction	
Belgium	1998	11.1	0.4	10.7	2675.0
Australia	1988	5.8	0.7	5.1	728.6
Austria	2001	5.8	1.1	4.6	418.2
Finland	2000	13.3	2.6	10.7	411.5
Sweden	2000	13.3	3	10.4	346.7
Denmark	2005	5.9	2.1	3.8	181.0
Canada	1999	10.4	4	6.4	160.0
United Kingdom	2000	8.3	3.2	5.1	159.4
Ireland	1989	20	8.1	11.8	145.7
Spain	2006	5.2	2.5	2.7	108.0
Denmark	1986	12.3	6.3	6	95.2
United States	2000	5.7	3	2.6	86.7
Sweden	1987	12.5	7.2	5.3	73.6
Germany	2000	5.3	3.4	1.9	55.9
Iceland	2006	6.3	4.6	1.6	34.8
Luxembourg	2001	6.7	5.2	1.6	30.8
Greece	1995	12.1	9.9	2.3	23.2
Japan	1990	8.1	7	1.1	15.7
Iceland	2000	5.7	4.9	0.7	14.3
Switzerland	2000	5.2	4.6	0.6	13.0
Portugal	1985	7.5	8.3	-0.8	-9.6
Italy	1993	7.9	8.9	-1	-11.2
Netherlands	2000	6.3	-2.8	9	-321.4
New Zealand	1995	5.8	-1.3	7.1	-546.2

Source: IMF

# Colofon

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