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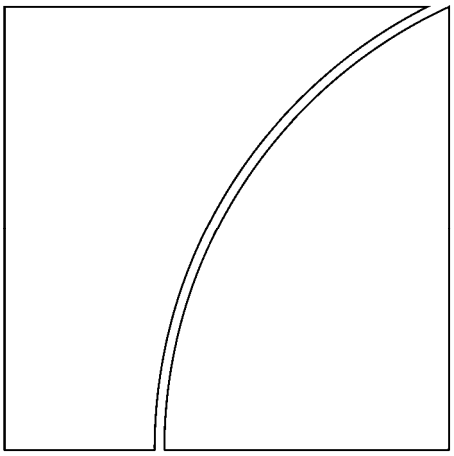

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by Stephen G Cecchetti, M S Mohanty and Fabrizio Zampolli

Monetary and Economic Department

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The future of public debt: prospects and implications

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Abstract

Since the start of the financial crisis, industrial country public debt levels have increased dramatically. And they are set to continue rising for the foreseeable future. A number of countries face the prospect of large and rising future costs related to the ageing of their populations. In this paper, we examine what current fiscal policy and expected future age-related spending imply for the path of debt/GDP ratios over the next several decades. Our projections of public debt ratios lead us to conclude that the path pursued by fiscal authorities in a number of industrial countries is unsustainable. Drastic measures are necessary to check the rapid growth of current and future liabilities of governments and reduce their adverse consequences for long-term growth and monetary stability.

JEL classification: H5; H6; E6

Keywords: public debt; fiscal deficit; age-related spending; inflation; interest rates; default risk

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1. Introduction

The financial crisis that erupted in mid-2008 led to an explosion of public debt in many advanced economies. Governments were forced to recapitalise banks, take over a large part of the debts of failing financial institutions, and introduce large stimulus programmes to revive demand. According to the OECD, total industrialised country public sector debt is now expected to exceed 100% of GDP in 2011 – something that has never happened before in peacetime.[2] As bad as these fiscal problems may appear, relying solely on these official figures is almost certainly very misleading. Rapidly ageing populations present a number of countries with the prospect of enormous future costs that are not wholly recognised in current budget projections. The size of these future obligations is anybody's guess. As far as we know, there is no definite and comprehensive account of the unfunded, contingent liabilities that governments currently have accumulated.

Should we be concerned about high and sharply rising public debts? Several advanced economies have experienced higher levels of public debt than we see today. In the aftermath of World War II, for example, government debts in excess of 100% of GDP were common.[3] And none of these led to default.[4] In more recent times, Japan has been living with a public debt ratio of over 150% without any adverse effect on its cost. So it is possible that investors will continue to put strong faith in industrial countries' ability to repay, and that worries about excessive public debts are exaggerated.[5] Indeed, with only a few exceptions, during the crisis, nominal government bond yields have fallen and remained low. So far, at least, investors have continued to view government bonds as relatively safe.

But bond traders are notoriously short-sighted, assuming they can get out before the storm hits: their time horizons are days or weeks, not years or decades. We take a longer and less benign view of current developments, arguing that the aftermath of the financial crisis is poised to bring a simmering fiscal problem in industrial economies to boiling point. In the face of rapidly ageing populations, for many countries the path of pre-crisis future revenues was insufficient to finance promised expenditure.

The politics of public debt vary by country. In some, seared by unpleasant experience, there is a culture of frugality. In others, however, profligate official spending is commonplace. In recent years, consolidation has been successful on a number of occasions. But fiscal restraint tends to deliver stable debt; rarely does it produce substantial reductions. And, most critically, swings from deficits to surpluses have tended to come along with either falling nominal interest rates, rising real growth, or both. Today, interest rates are exceptionally low and the growth outlook for advanced economies is modest at best. This leads us to conclude that the question is when markets will start putting pressure on governments, not if. When, in the absence of fiscal actions, will investors start demanding a much higher compensation for the risk of holding the increasingly large amounts of public debt that authorities are going to issue to finance their extravagant ways? In some countries, unstable debt dynamics, in which

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[2] Public finances in emerging market economies are generally in a much better shape. With their financial systems and economies remaining relatively immune to the crisis, public debt levels have grown much less rapidly, and are on average around 40% of GDP. One notable exception is India – a country with a history of fiscal problems – where public debt remains high by today's emerging market standards.

[3] In the United States debt/GDP peaked at close to 121%, while in the United Kingdom it rose to about 300%.

[4] According to Reinhart and Rogoff (2008, Appendix Table 3), the last default in the industrial world was Japan and Germany in the immediate aftermath of World War II. There have been no advanced country defaults for more than half a century.

[5] As a matter of macroeconomic theory, so long as the debt/income ratio is constant, an economy could live with any level of debt.

higher debt levels lead to higher interest rates, which then lead to even higher debt levels, are already clearly on the horizon.

It follows that the fiscal problems currently faced by industrial countries need to be tackled relatively soon and resolutely. Failure to do so will raise the chance of an unexpected and abrupt rise in government bond yields at medium and long maturities, which would put the nascent economic recovery at risk. It will also complicate the task of central banks in controlling inflation in the immediate future and might ultimately threaten the credibility of present monetary policy arrangements.

While fiscal problems need to be tackled soon, how to do that without seriously jeopardising the incipient economic recovery is the current key challenge for fiscal authorities. In this paper, we do not address this issue, but we note that, in our view, an important part of any fiscal consolidation programme is measures to reduce future liabilities such as an increase in the retirement age.[6] Announcements of changes in future programmes would allow authorities to wait until the recovery from the crisis is assured before reducing discretionary spending and improving the short-term fiscal position.

The remainder of this paper is organised in four sections. In Section 2, we present an examination of the recent build-up of public debt. Following the facts, we turn, in Section 3, to a forward-looking examination of the public debt trajectories in industrial countries. In Section 4, we discuss the challenges these possible future debt levels pose to both fiscal and monetary authorities. The last section concludes.

2. The facts

After a large increase during the recent financial crisis and recession, public debt ratios are set to continue to rise over the next few years. How far depends on several factors: the ultimate costs of the financial crisis, the rate of real growth and the level of interest rates, as well as political decisions about spending and taxes. The fact that structural deficits have a tendency to linger in industrial countries, together with large long-term age-related liabilities, makes the current policy in a number of countries unsustainable going forward. In this section, we summarise the factors influencing long-term fiscal imbalances and then go on to present projections of the path of debt/GDP ratios in large industrial countries.

Current and projected fiscal deficits

We start with Table 1. A key fact emerging from the table is that over the past three years public debt has grown rapidly in countries where it had remained relatively low before the crisis. This group of countries includes not only the United States and the United Kingdom but also Spain and Ireland. Although the rise in debt levels is comparatively small in countries with a history of debt problems (such as Italy and Greece), the crisis has, nevertheless, added fuel to their problems.

It is important to realise that, while the direct costs of financial crisis on governments may appear large, they are in fact relatively small compared to indirect costs arising from losses of tax revenues and increased expenditure to provide demand stimulus. Financial rescue programmes, including capital injection, treasury purchase of assets and lending as well as upfront government financing (but not debt guarantees), amount to 13.2% of GDP in

[6] See Giavazzi (2009) for a discussion. Measures to tackle long-term liabilities should be such to minimise their impact on current saving behaviour.

Table 1

Fiscal situation and prospects[1]

	Fiscal balance			Structural balance[2]			General government debt[3]		
	As a percentage of GDP								
	2007	2010	2011	2007	2010	2011	2007	2010	2011
Austria	–0.7	–5.5	–5.8	–1.4	–3.3	–3.6	62	78	82
France	–2.7	–8.6	–8.0	–3.5	–6.8	–6.3	70	92	99
Germany	0.2	–5.3	–4.6	–0.8	–4.0	–3.7	65	82	85
Greece	–4.0	–9.8	–10.0	–4.5	–6.9	–6.8	104	123	130
Ireland	0.2	–12.2	–11.6	–1.3	–9.0	–9.0	28	81	93
Italy	–1.5	–5.4	–5.1	–2.2	–2.6	–2.8	112	127	130
Japan	–2.5	–8.2	–9.4	–3.4	–7.4	–9.0	167	197	204
Netherlands	0.2	–5.9	–5.3	–0.6	–3.6	–3.1	52	77	82
Portugal	–2.7	–7.6	–7.8	–2.8	–6.1	–6.8	71	91	97
Spain	1.9	–8.5	–7.7	1.6	–5.2	–4.5	42	68	74
United Kingdom	–2.7	–13.3	–12.5	–3.4	–10.5	–9.9	47	83	94
United States	–2.8	–10.7	–9.4	–3.1	–9.2	–8.2	62	92	100
Asia[4]	0.1	–3.5	–3.6	…	…	…	37	40	41
Central Europe[5]	3.7	–4.4	–3.9	…	…	…	23	28	29
Latin America[6]	–1.5	–2.4	–2.0	…	…	…	41	37	35

[1] Regional averages calculated as weighted averages based on 2005 GDP and PPP exchange rates. [2] Cyclically adjusted balance. [3] For Argentina, the Philippines and Thailand, central government debt. [4] China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. [5] The Czech Republic, Hungary and Poland. [6] Argentina, Brazil, Chile and Mexico.

Sources: IMF, *World Economic Outlook* (emerging market economies)*;* OECD, *Economic Outlook* (advanced economies).

advanced economies so far (see IMF (2009))[7] – and a significant part of this is likely to be recovered.

By contrast, overall fiscal balances have been deteriorating sharply – by 20–30 percentage points of GDP in just three years. And, unless action is taken almost immediately, there is little hope that these deficits will decline significantly in 2011. Even more worrying is the fact that most of the projected deficits are structural rather than cyclical in nature. So, in the absence of immediate corrective action, we can expect these deficits to persist even during the cyclical recovery.

[7] This number is comparable with past crises. According to Laeven and Valencia (2008), in the previous 49 crises the average net direct resolution cost borne by the government has been 13% of GDP.

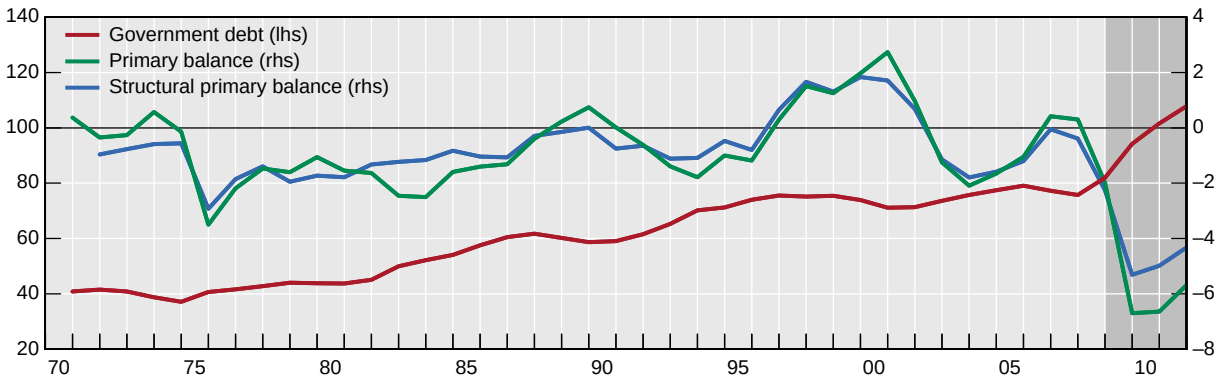
Based on a very comprehensive data set, Reinhart and Rogoff (2009a) report that three years after a typical banking crisis the absolute level of public debt is on average about 86% higher than prior to the crisis. In those countries where the crisis was most severe, debt almost trebled. This time around, several countries are beyond this historical average: Ireland with increases in public debt of 98% between 2007 and 2009; and the United Kingdom with projected rises of 111% by 2011. Meanwhile, the United States and Spain – with projected increases of 75% and 78%, respectively, by 2011 – are not far behind.

We doubt that the current crisis will be typical in its impact on deficits and debt. The reason is that, in many countries, employment and growth are unlikely to return to their pre-crisis levels in the foreseeable future.[8] As a result, unemployment and other benefits will need to be paid for several years, and high levels of public investment might also have to be maintained.

Graph 1

Government gross debt and primary fiscal balance in industrial economies[1]

As a percentage of GDP



Shaded areas represent forecast.

[1] Weighted average based on 2005 GDP and PPP exchange rates of economies cited and data availability; Australia, Austria, Belgium, Canada, Denmark, France, Finland, Germany, Greece, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States.

Sources: OECD; authors' calculations.

The permanent loss of potential output caused by the crisis also means that government revenues may have to be permanently lower in many countries. Between 2007 and 2009, the ratio of government revenue to GDP fell by 2–4 percentage points in Ireland, Spain, the United States and the United Kingdom. It is difficult to know how much of this will be reversed as the recovery progresses. Experience tells us that the longer households and firms are unemployed and underemployed, as well as the longer they are cut off from credit markets, the bigger the shadow economy becomes.[9]

[8] For instance, based on the experience of the past banking crisis, Knotek and Terry (2009) predict that the US unemployment rate may stay above 10% up to 2011, drifting down only gradually to 8% by 2014 and about 6% in 2018. OECD (2009a) projects a similar path for the euro area unemployment rate, with a return to below 9% level only in 2017.

[9] There is some evidence to suggest that VAT non-compliance among firms tends to worsen during an economic downturn; see Brondolo (2009). Schneider (2009), for instance, predicted that the share of the

These concerns also need to be put into historical context. Many countries have a clear deficit bias. To see this, note in Graph 1 the relationship between public debt and two major indicators of the budgetary stance in advanced economies: the primary balance (the deficit excluding interest payments on the outstanding debt) and the structural primary balance (the primary balance adjusted for cyclical increases in expenditure and cyclical decreases in revenue). The graph shows that primary deficits in industrial countries have a life of their own, staying high or low for a number of years running. Such persistence is clearly evident in the 1970s and 1980s and again, to a lesser extent, in the early 2000s. To investigate this tendency, we perform a panel regression of the structural primary balance on its own lag, the lagged value of the debt/GDP ratio and the contemporaneous value of the output gap, using the past 30 years as a sample period. The estimates in Table 2 confirm that, on average, the structural primary balance is highly persistent and, furthermore, allow us to conclude that it responds positively to the lagged debt/GDP ratio. In particular, the short-term response of the structural primary balance to a 1 percentage point increase in the debt/GDP ratio is between 1 and 2 basis points. Taken at face value, these results imply a long-term response of approximately 6–9 basis points.[10] Furthermore, we find no evidence that fiscal authorities behave opportunistically, taking advantage of improvements in the output gap to tighten the stance of fiscal policy. Taken together, all this suggests to us that fiscal policy is likely to remain highly expansionary in the near term. In addition, if past behaviour is any guide to the future, fiscal authorities might find it difficult to adjust quickly – unless, that is, they are left with no choice.

Table 2

Structural primary balance regressed on a constant, lagged debt/GDP ratio, lagged structural primary balance and contemporaneous output gap[1]

	R^2	Constant	Debt/GDP ratio (–1)	Structural primary balance (–1)	Output gap
Panel estimation 1[2]	0.76	–1.20***	0.02***	0.77***	0.05
Panel estimation 2[3]	0.76	–1.24***	0.02***	0.76***	0.06
Panel estimation 3[4]	0.74	–0.59***	0.01***	0.84***	0.02

*, ** and *** denote coefficients significantly different from zero at the 10%, 5% and 1% level, respectively.

[1] Sample period is 1970–2008. Countries in the sample: Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, Norway, New Zealand, Portugal, Spain, Switzerland, Sweden, United Kingdom and the United States. [2] The panel regression has been estimated by OLS with White cross-section standard errors and fixed effects. [3] The panel regression has been estimated by GMM with White cross-section standard errors and fixed effects (using as the instruments regressors and lags of dependent variable (from –1 to –3). [4] The panel regression has been estimated by GMM with White cross-section standard errors (using as the instruments regressors and lags of dependent variable (from –1 to –3).

Sources: OECD; authors' calculations.

shadow economy in OECD countries could rise, on average, by 0.5 percentage points of GDP in 2009 over the previous year, reversing a declining trend since the early 2000s.

[10] A short-term response of 1–2 basis points is sufficient to offset the immediate rise in interest payments that the extra debt would generate if the difference between the interest rate paid on debt and GDP growth is smaller. Yet, because of the sluggish response, any large negative values of the structural primary balance (as brought about, for example, by a recession) would narrow only slowly over time.

Long-term fiscal imbalances

More worryingly, the current expansionary fiscal policy has coincided with rising, and largely unfunded, age-related spending (pension and health care costs). Driven by the countries' demographic profiles, the ratio of old-age population to working-age population is projected to rise sharply. Interestingly, this rise is concentrated in countries such as Japan, Spain, Italy and Greece, which are already laden with relatively high debts (Graph 2, left-hand panel). Added to the effects of population ageing is the problem posed by rising per capita health care costs.

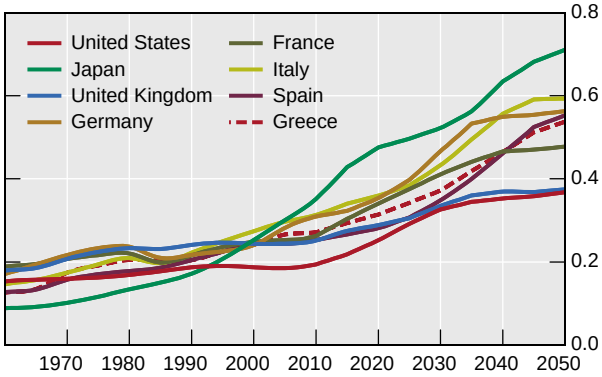
This leads us to the obvious conclusion that any assessment of the government fiscal situation based on a short-term perspective is incomplete and at best misleading. A key question is to what extent such accrued liabilities should be reflected in debt estimates. Concerns about both fiscal sustainability and intergenerational equity demand that the accumulated net discounted value of all future revenues and expenditure commitments scheduled in current laws be added to the current debt stock. Currently, however, there is no unique source providing such estimates. And uncertainty about future policy, demography and productivity growth raises issues about how this information should be presented and used (see eg Auerbach (2008) for a discussion).

That said, existing studies report that the magnitude of the long-term fiscal imbalance – the present value of unfunded liabilities arising from ageing – is very large. Hauner et al (2007) estimate the change in the primary balance required to equate the net present discounted value of all future revenues and non-interest expenditures to the debt levels prevailing at the end of 2005 for seven major industrial countries (Canada, France, Germany, Italy, Japan, the United Kingdom and the United States). The authors report that in order for these countries to pay off all their financial liabilities, they would require an average improvement in their budget balance excluding interest payments of 4.5% of GDP. For the United States and Japan, the estimate is 6.9% and 6.2%, respectively.

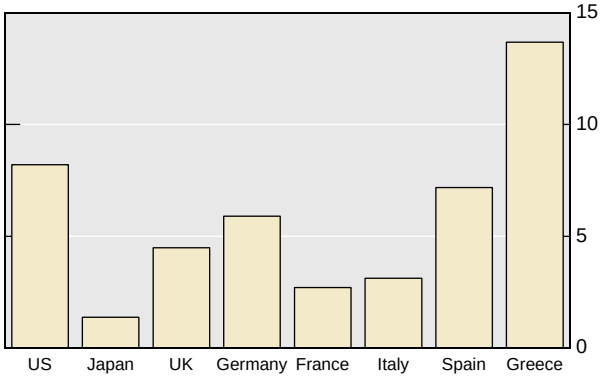
Graph 2

Projected population structure and age-related spending

Old-age population (ratio to working-age population)[1]



Estimated increase in age-related government expenditure from 2011 to 2050[2]



[1] Working-age population is between 15 and 64 years of age. [2] In percentage points of GDP.

Sources: IMF, World Economic Outlook, April 2007; UN Secretariat; European Commission; Congressional Budget Office; authors' calculations.

Other estimates are similar in magnitude. For example, Gokhale (2009) presents a measure of the long-term fiscal imbalance faced by 23 industrial countries. His estimates suggest that, for financing future benefits without future tax increases, the United States and major

European countries would be required to generate an annual present value surplus of the order of 8–10% of 2005 GDP over the period to 2050. The US Congressional Budget Office (CBO (2009)) provides official projections of long-term fiscal gaps associated with age-related spending. These suggest that the United States would need a permanent improvement in its budget balances of the order of 2.6% of 2009 GDP in the next 50 years and 3.2% in 75 years to stabilise the federal debt/GDP ratio at its 2009 level.

Because of the large uncertainties involved, we do not attempt to make our own projections of age-related liabilities, but instead rely on recent projections of age-related expenditure by the European Commission, the CBO and the IMF (Japan). The right-hand panel of Graph 2 reports the estimated incremental age-related outlays between 2011 and 2050. We note that these numbers suggest that the distribution of age-related spending is uneven across countries, with the burden considerably higher in Germany, Greece, Spain, the United Kingdom and the United States than in other countries. At the level projected, US health care expenditures as a percentage of GDP would double from about 5% today to 10% by 2035 and more than treble to 17% by 2080.

Interest rate and growth rate

The differential between the real interest rate and real output growth is a critical input parameter in determining the future evolution of public debt.[11] When this differential is positive, so that the interest rate is greater than the growth rate, the debt ratio will explode in the absence of a sufficiently large primary surplus.

So far, the build-up of public debt in industrial countries has taken place against the backdrop of an exceedingly low interest rate environment. Despite low inflation, the real interest rate (in effective terms) at which governments are able to finance their deficits and roll over outstanding debt obligations has been falling since the late 1990s, reaching almost zero in some countries in the wake of the monetary policy response to the financial crisis (Graph 3, left-hand panel). However, as the graph reveals, the situation is changing quickly even without a change in monetary policy-controlled interest rates. Real borrowing rates rose through 2009, and are poised to continue increasing with the reversal of the current zero interest rate policy. Added to this is the fact that the crisis is likely to reduce the potential output growth rate for some time to come (Cecchetti and Zhu (2009)).

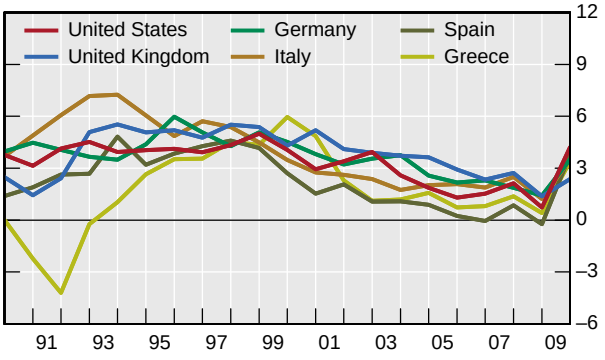
The right-hand panel of Graph 3 is indicative of the severity of the problems that governments face. It plots a measure of the difference between the real interest rate and real growth on the horizontal axis and the ratio of the primary surplus to total debt on the vertical axis. The higher the differential between the real interest rate and potential output growth, the larger the required structural primary surplus as a proportion of the previous-period debt level needed to maintain a stable debt/GDP ratio. Turning to the graph, for debt/GDP to remain stable, a country must be above the 45-degree line on the graph (which appears relatively flat due to the differences in the horizontal and vertical scale). The data show that the current fiscal policy is unsustainable in every country in the graph. Drastic improvements in the structural primary balance will be necessary to prevent debt ratios from exploding in future.

[11] The appendix contains a brief primer on the arithmetic of debt dynamics and the rationale behind our projections.

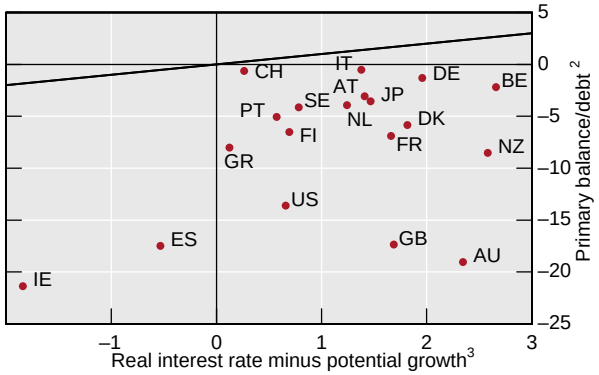
Graph 3

Government borrowing and interest rate growth differentials

Real government borrowing rates[1]



Interest rate growth differential and primary balance



AU = Australia; AT = Austria; BE = Belgium; CH = Switzerland; DE = Germany; DK = Denmark, ES = Spain; FI = Finland; FR = France; GB = United Kingdom; GR = Greece; IE = Ireland; IT = Italy; JP = Japan; NL = Netherlands; NZ = New Zealand; PT = Portugal; SE = Sweden; US = United States.

[1] Effective real interest rate on public debt computed from government gross interest payments at period (t) divided by government gross financial liabilities at period (t–1) minus inflation rate; in per cent. [2] Government primary balance at period (t) divided by government gross financial liabilities at period (t–1) in 2009; in per cent. [3] Effective real interest rate on public debt (average 1998–2007) minus OECD-estimated real potential GDP growth for 2012–17; in percentage points.

Sources: OECD; authors' calculations.

3. The future public debt trajectory

We now turn to a set of 30-year projections for the path of the debt/GDP ratio in a dozen major industrial economies (Austria, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, the United Kingdom and the United States). We choose a 30-year horizon with a view to capturing the large unfunded liabilities stemming from future age-related expenditure without making overly strong assumptions about the future path of fiscal policy (which is unlikely to be constant). In our baseline case, we assume that government total revenue and non-age-related primary spending remain a constant percentage of GDP at the 2011 level as projected by the OECD. Using the CBO and European Commission projections for age-related spending, we then proceed to generate a path for total primary government spending and the primary balance over the next 30 years.[12] Throughout the projection period, the real interest rate that determines the cost of funding is assumed to remain constant at its 1998–2007 average, and potential real GDP growth is set to the OECD-estimated post-crisis rate.[13]

[12] Note that the European Commission provides projections for age-related expenditure between 2008 and 2060. Using these projections, we interpolated an annual series for age-related expenditure for the next 30 years.

[13] The real interest rate is computed as the effective nominal interest rate on public debt minus CPI inflation (see definition in Graph 3). Potential real GDP growth is taken from OECD (2009a).

Debt projections

From this exercise, we are able to come to a number of conclusions. First, in our baseline scenario, conventionally computed deficits will rise precipitously. Unless the stance of fiscal policy changes, or age-related spending is cut, by 2020 the primary deficit/GDP ratio will rise to 13% in Ireland; 8–10% in Japan, Spain, the United Kingdom and the United States; and 3–7% in Austria, Germany, Greece, the Netherlands and Portugal. Only in Italy do these policy settings keep the primary deficits relatively well contained – a consequence of the fact that the country entered the crisis with a nearly balanced budget and did not implement any real stimulus over the past several years.

But the main point of this exercise is the impact that this will have on debt.[14] The results plotted as the red line in Graph 4 show that, in the baseline scenario, debt/GDP ratios rise rapidly in the next decade, exceeding 300% of GDP in Japan; 200% in the United Kingdom; and 150% in Belgium, France, Ireland, Greece, Italy and the United States. And, as is clear from the slope of the line, without a change in policy, the path is unstable. This is confirmed by the projected interest rate paths, again in our baseline scenario. Graph 5 shows the fraction absorbed by interest payments in each of these countries. From around 5% today, these numbers rise to over 10% in all cases, and as high as 27% in the United Kingdom.

Seeing that the status quo is untenable, countries are embarking on fiscal consolidation plans. In the United States, the aim is to bring the total federal budget deficit down from 11% to 4% of GDP by 2015. In the United Kingdom, the consolidation plan envisages reducing budget deficits by 1.3 percentage points of GDP each year from 2010 to 2013 (see eg OECD (2009a)).

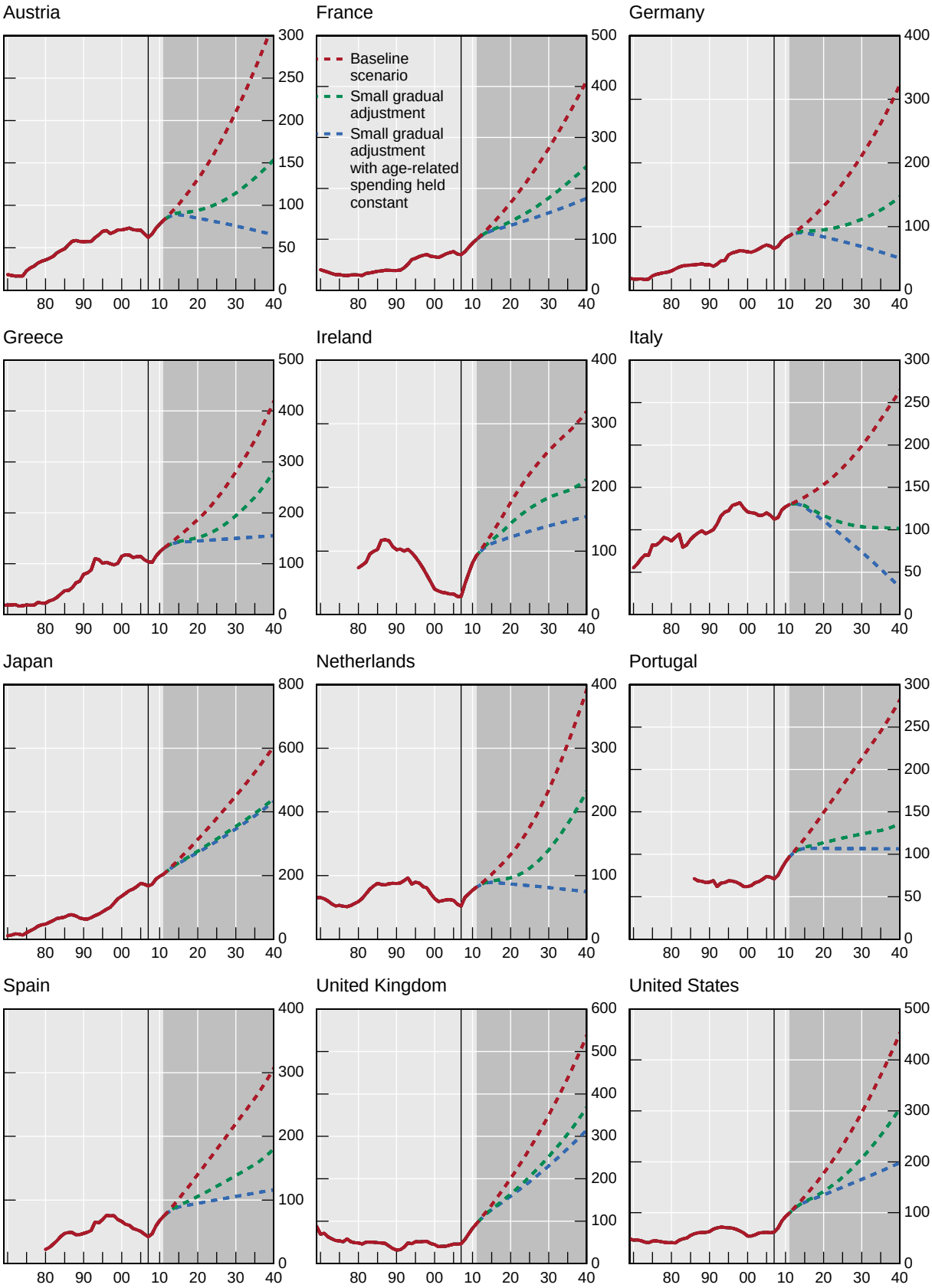
To examine the long-run implications of a gradual fiscal adjustment similar to the ones being proposed, we project the debt ratio assuming that the primary balance improves by 1 percentage point of GDP in each year for five years starting in 2012. The results are presented as the green line in Graph 4. Although such an adjustment path would slow the rate of debt accumulation compared with our baseline scenario, it would leave several major industrial economies with substantial debt ratios in the next decade. This suggests that consolidations along the lines currently being discussed will not be sufficient to ensure that debt levels remain within reasonable bounds over the next several decades.

An alternative to traditional spending cuts and revenue increases is to change the promises that are as yet unmet. Here, that means embarking on the politically treacherous task of cutting future age-related liabilities. With this possibility in mind, we construct a third scenario that combines gradual fiscal improvement with a freezing of age-related spending-to-GDP at the projected level for 2011. The blue line in Graph 4 shows the consequences of this draconian policy. Given its severity, the result is no surprise: what was a rising debt/GDP ratio reverses course and starts heading down in Austria, Germany and the Netherlands. In several others, the policy yields a significant slowdown in debt accumulation. Interestingly, in

[14] In our projections, we consider gross rather than net public debt, the latter being gross debt minus financial assets. Our preference for focusing on gross debt hinges on a number of considerations. First, government financial assets are more difficult to identify and accurately value than government liabilities. Second, the definition and range of assets included in net debt vary across countries, making comparisons more difficult. Third, from the point of view of a creditor, it is reasonable to assume that some or all of the fiscal authorities' financial assets, such as "soft loans" granted to firms with a high probability of default, may not be available to repay debt when needed. Fourth, including financial assets in our analysis would require accounting not only for interest payments on gross debt but also for revenue accruing to those assets. While use of net debt numbers would have made the absolute levels of the debt/GDP ratios somewhat lower, it would have complicated the analysis significantly without changing the profile of the projections.

Graph 4

Public debt/GDP projections

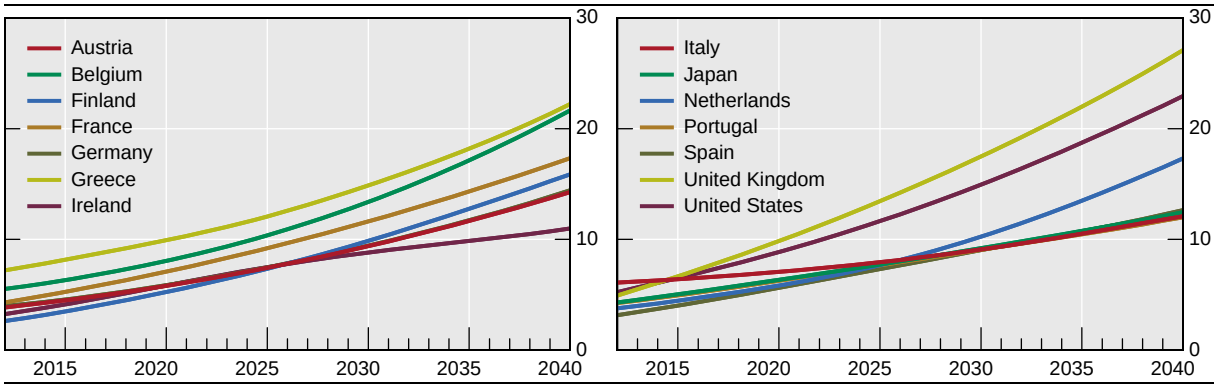


Sources: OECD; authors' projections.

Graph 5

Projected interest payments as a fraction of GDP

In per cent



Sources: OECD; authors' projections.

France, Ireland, the United Kingdom and the United States, even this policy is not sufficient to bring rising debt under control.[15]

All of this leads us to ask: what level of primary balance would be required to bring the debt/GDP ratio in each country back to its pre-crisis, 2007 level? Granted that countries which started with low levels of debt may never need to come back to this point, the question is an interesting one nevertheless. Table 3 presents the average primary surplus target

Table 3

Average primary balance required to stabilise the public debt/GDP ratio at the 2007 level[1]

	Over 5 years	Over 10 years	Over 20 years	*Memo: Primary balance in 2011 (forecast)*
Austria	5.1	3.0	2.0	*–2.9*
France	7.3	4.3	2.8	*–5.1*
Germany	5.5	3.5	2.4	*–2.0*
Greece	5.4	2.8	1.5	*–5.3*
Ireland	11.8	5.4	2.2	*–9.2*
Italy	5.1	3.4	2.5	*0.0*
Japan	10.1	6.4	4.5	*–8.0*
Netherlands	6.7	3.7	2.3	*–3.4*
Portugal	5.7	3.1	1.8	*–4.4*
Spain	6.1	2.9	1.3	*–6.6*
United Kingdom	10.6	5.8	3.5	*–9.0*
United States	8.1	4.3	2.4	*–7.1*

[1] As a percentage of GDP.

Sources: OECD; authors' calculations.

[15] Such a policy path is unlikely to reduce Japan's debt ratio substantially because of only a small increase in projected age-related spending in future. This is largely a consequence of the fact that Japan's old age population is projected to decline in absolute terms during much of the next 30 years, although it is expected to continue to rise as a percentage of the working population.

required to bring debt ratios down to their 2007 levels over horizons of 5, 10 and 20 years. An aggressive adjustment path to achieve this objective within five years would mean generating an average annual primary surplus of 8–12% of GDP in the United States, Japan, the United Kingdom and Ireland, and 5–7% in a number of other countries. A preference for smoothing the adjustment over a longer horizon (say, 20 years) reduces the annual surplus target at the cost of leaving governments exposed to high debt ratios in the short to medium term.

Risks from fiscal imbalances

The future profile of public debt presents major risks and challenges for both fiscal and monetary policy. Here we focus on the real implications of living with a higher level of debt, and turn to challenges facing monetary authorities in the next section.

When a country starts from an already high level of public debt, the probability that a given shock will trigger unstable debt dynamics is higher. This risk is increased when public debt is already on a steep upward trajectory, as it is now in several countries. Knowing this, we would expect investors to demand a higher risk premium for holding the bonds issued by a highly indebted country. Studies of the impact of debt on risk premia are rather limited for advanced economies. What evidence there is suggests that the impact is relatively small. For each percentage point of additional public debt, researchers estimate a risk premium increase of between 1.2 and 1.6 basis points.[16]

With the advent of the market for credit default swaps (CDS),[17] we now have an additional source of information about investor attitudes towards highly indebted advanced economies. Data plotted in the top left-hand panel of Graph 6 allow the unsurprising conclusion that CDS spreads, and hence credit risk premia, are positively correlated with debt/GDP ratios. But we note that there is substantial heterogeneity, suggesting that other factors are important as well. For example, the higher the fraction of debt that is short-term, the lower the risk premium (Graph 6, lower left-hand panel). A higher ratio of incremental debt to private saving (lower right-hand panel) is associated with a higher risk premium. And risk premia are generally lower for countries with a high average revenue share in GDP (top right-hand panel).[18]

In addition to higher risk premia and increased cost, a second risk associated with high levels of public debt comes from potentially lower long-term growth. A higher level of public debt implies that a larger share of society's resources is permanently being spent servicing the debt. This means that a government intent on maintaining a given level of public services

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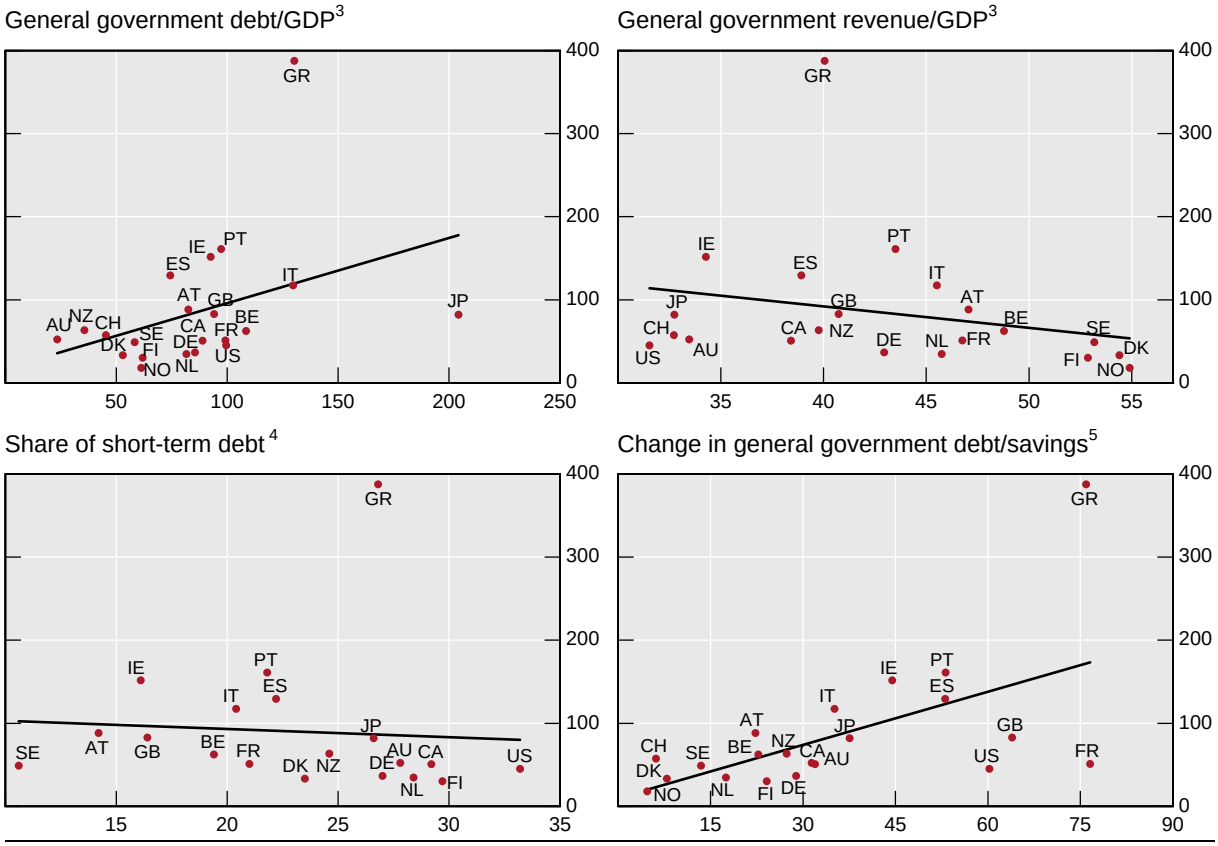
[16] Using the difference between government bond yields and yields on corporate bonds denominated in the same currency as a proxy for credit risk premia, Alesina et al (1992) find an impact of 1.6 basis points for each extra percentage point of public debt. Since these measures can be affected by changes in private sector credit risk, using the spread between the government bond yield and the return on interest rate swaps of corresponding maturity and currency, Goodhart and Lemmen (1999) find a slightly smaller effect (1.5 bp). However, these spreads are also affected by liquidity premia besides credit risk premia. In a study that attempts to disentangle the two effects, Codogno et al (2003) find that debt levels can explain yield differentials vis-à-vis Germany only in Italy and Spain.

[17] A CDS contract is a credit derivative that, for a specified bond issuer, protects the buyer against a default or debt restructuring.

[18] It is not clear exactly how this should be interpreted. On the one hand, an already high level of average taxation may indicate that a country is close to its fiscal limit – that is, it has less room for increasing taxes further. So, other things equal, one could expect risk premia to be lower for those countries with lower average tax rates. On the other hand, countries with high taxation might also be countries with a low level of debt or with strong social and political cohesion, which should reduce risk, all else equal. Further econometric analysis would be required to uncover partial correlations.

Graph 6

Sovereign CDS spreads[1] and fiscal indicators[2]



AU = Australia; AT = Austria; BE = Belgium; CA = Canada; CH = Switzerland; DE = Germany; DK = Denmark, ES = Spain; FI = Finland; FR = France; GB = United Kingdom; GR = Greece; IE = Ireland; IT = Italy; JP = Japan; NL = Netherlands; NO = Norway; NZ = New Zealand; PT = Portugal; SE = Sweden; US = United States.

[1] Vertical axis: spread as of end of January 2010; in basis points. [2] Horizontal axis. [3] Forecast for 2011. [4] Domestic government debt with a remaining maturity of one to three years as a percentage of total domestic government debt. [5] Average change in general government debt as a percentage of average private savings; forecast average for the period 2009–11.

Sources: IMF, World Economic Outlook; OECD; JPMorgan Chase; Markit.

and transfers must raise taxes as debt increases. Taxes distort resource allocation, and can lead to lower levels of growth. Given the level of taxes in some countries, one has to wonder if further increases will actually raise revenue.[19]

The distortionary impact of taxes is normally further compounded by the crowding-out of productive private capital. In a closed economy, a higher level of public debt will eventually absorb a larger share of national wealth, pushing up real interest rates and causing an

[19] Recent estimates by Trabandt and Uhlig (2009) show that the EU 14 can increase tax revenue 8% by raising labour taxes and 1% by raising capital income taxes. By contrast, these figures stand at 30% and 6%, respectively, for the United States, indicating a greater fiscal capacity to tolerate higher public debt levels.

offsetting fall in the stock of private capital.[20] This not only lowers the level of output but, since new capital is invariably more productive than old capital, a reduced rate of capital accumulation can also lead to a persistent slowdown in the rate of economic growth. In an open economy, international financial markets can moderate these effects so long as investors remain confident in a country's ability to repay. But, even when private capital is not crowded out, larger borrowing from abroad means that domestic income is reduced by interest paid to foreigners, increasing the gap between GDP and GNP.

Last but not least, the existence of a higher level of public debt is likely to reduce both the size and the effectiveness of any future fiscal response to an adverse shock. Since policy cannot play its stabilising role, a more indebted economy will be more volatile. This was evident during the latest crisis. Countries saddled with very high levels of public debt did not expand fiscal policy as much as other countries. And, although these countries benefited somewhat from the effects of foreign fiscal expansion, a larger domestic fiscal stimulus could have helped to reduce the severity of the recession actually experienced.

4. The challenge for central banks

Steeply rising public debt levels and the uncertainty associated with future fiscal consolidation plans pose at least two important challenges for monetary policymakers. First, deteriorating public finances can trigger a sudden increase in long-term inflation expectations. Second, uncertainty about the timing and extent of fiscal consolidation plans complicates the forecasting needed to set policy interest rates at their appropriate level. In the following, we focus on the inflation risks.

Is there currently a risk that inflation expectations may rise? And what can monetary policymakers do to reduce this risk? To answer these questions, it is helpful to review the mechanisms by which persistently high fiscal deficits could lead to inflation.[21]

A first mechanism stresses the ultimate impossibility of continuing to roll over ever increasing levels of public debt when monetary and fiscal authorities are pursuing inconsistent objectives. When the public reaches its limit and is no longer willing to hold public debt, the government would have to resort to monetisation. The result, consistent with the quantity theory of money, is inflation. And anticipation that this will happen may also lead to an increase in inflation today as investors reassess the risk from holding money and government bonds. In such an environment, fighting rising inflation by tightening monetary policy would not work, as an increase in interest rates would lead to higher interest payments on public debt, leading to higher debt, bringing the likely time of monetisation even closer.[22]

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[20] Estimates of the impact of public debt levels on real interest rates vary substantially. For the United States, Chinn and Frankel (2005) find an impact as low as 2 basis points per percentage point of the debt/GDP ratio. For Europe, EC (2004) provides a range estimate rising to 16 basis points.

[21] A main distinction in the literature is whether the quantitative theory of money holds (in which case inflation is always and everywhere a monetary phenomenon) or whether fiscal variables have a direct influence on the price level in addition to money (fiscal theory of the price level).

[22] This "paradox of tight money" is the striking finding of Sargent and Wallace's analysis (1981). Note that in their example debt is perfectly indexed in real terms. This rules out the case that inflation arises from the monetary authorities' attempt to reduce its real value. Inflation, instead, arises because at a certain point bond investors refuse to hold debt and the government is therefore forced to issue money, short of an outright default.

Thus, in the absence of fiscal tightening, monetary policy may ultimately become impotent to control inflation, regardless of the fighting credentials of the central bank.[23]

Conflicts between the goals of fiscal and monetary authorities can explain a number of inflationary outbursts in emerging market economies. Notable examples of this are: the Brazilian inflationary boom in the early 1980s when monetary policy, in the face of persistent fiscal deficits, started to act more aggressively against inflation (Loyo (1999)); the large jump in Israeli inflation in October 1983 (Sargent and Zeira (2008)); and the Indian inflation of the 1970s and 1980s in which fiscal deficits were monetised (Rangarajan and Mohanty (1997)).

A second mechanism by which public debt can lead to inflation focuses on the political and economic pressures that a monetary policymaker may face to inflate away the real value of debt. The payoff to doing this rises the bigger the debt, the longer its average maturity, the larger the fraction denominated in domestic currency, and the bigger the fraction held by foreigners. Moreover, the incentives to tolerate temporarily high inflation rise if the tax and transfer system is mainly based on nominal cash flows and if policymakers see a social benefit to helping households and firms to reduce their leverage in real terms. It is, however, worth emphasising that the costs of creating an unexpected inflation would almost surely be very high in the form of permanently high future real interest rates (and any other distortions caused by persistently higher inflation).[24]

While discussions of inflation risks in the financial press abound, there is little evidence that fiscal prospects are materially affecting inflation expectations. While US and euro area market-based inflation expectations became volatile immediately before and after the recent financial crisis, Graph 7 shows that they have reverted to the average levels of the past five years or so. Meanwhile, survey-based measures of inflation expectations in both areas have been more stable than market-based ones.

Although the chance of a government being forced or tempted to tolerate higher inflation is rather remote in the short run, the chance that it could do so in the future is not insignificant.[25] Therefore, the risk that long-term inflation expectations could suddenly become unanchored today is a possibility that should not be discounted. The most likely manifestation of this risk is an unexpected and abrupt rise in government bond yields at medium and long maturities as negative news about the state of the economy and public finances leads investors to reassess the risks of fiscal unsustainability and future inflation.

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[23] The mechanism emphasised here requires that, when the fiscal authority does not restore fiscal sustainability through changes in its fiscal instruments, the intertemporal budget constraint of the government will eventually be met through the issuance of money. By contrast, the fiscal theory of the price level stresses that the intertemporal budget constraint may also be met by a change in the market value of debt. In its more stylised form, the theory predicts that the general price level will adjust to bring about the required reduction in the value of bonds (eg Sims (1994), Woodford (1995) and Cochrane (1998)). In reality, how this change in the price level should occur in the presence of a wide array of assets, nominal rigidities and rational expectations is unclear. The theory is still untested and controversial (for a criticism, see eg Buiter (2002)).

[24] Persson et al (1996) estimate that, given the state of public finances and the economy in Sweden in the early 1990s, the benefit of an increase of 10 percentage points in the inflation rate could have been substantial (an annual real flow of 3–4% of GDP). Most of this benefit would have arisen not from seigniorage or the devaluation of outstanding debt but from the nominal character of the tax and transfer system in Sweden. Most importantly, the authors also found that the costs of the increase in inflation, including those arising from permanent real interest rates, would have been even higher.

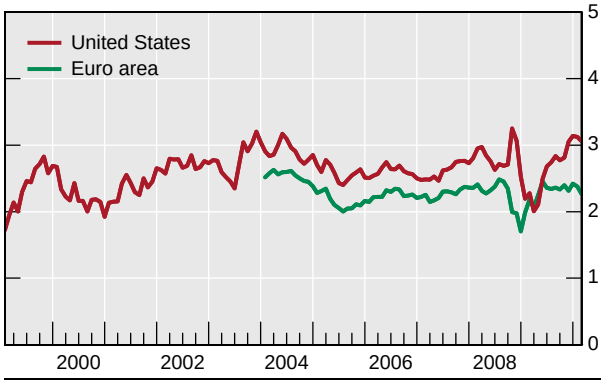
[25] History shows that countries that ran high public debts eventually ended up with high inflation because governments were unwilling to pay high interest rates. Makinen and Woodward (1990) provide an account of the experience of the European countries during the interwar period. Following funding crises, governments in many countries (Belgium, Spain and Italy) pegged interest rates and resorted to debt monetisation. Germany's hyperinflation is also an important reminder of this risk.

Graph 7

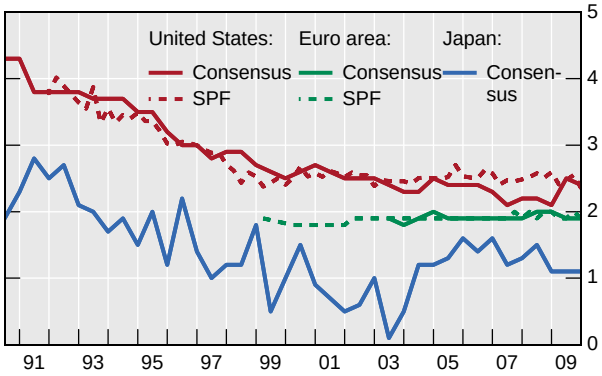
Inflation expectations

In per cent

Break-even inflation rates (five-year-ahead five-year)



Mid-term inflation expectations (10-year-ahead)[1]



[1] For Survey of Professional Forecasters (SPF); euro area, five-year-ahead.

Sources: ECB, Survey of Professional Forecasters; Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters; © Consensus Economics; national data; authors' calculations.

5. Conclusion

Our examination of the future of public debt leads us to several important conclusions. First, fiscal problems confronting industrial economies are bigger than suggested by official debt figures that show the implications of the financial crisis and recession for fiscal balances. As frightening as it is to consider public debt increasing to more than 100% of GDP, an even greater danger arises from a rapidly ageing population. The related unfunded liabilities are large and growing, and should be a central part of today's long-term fiscal planning.

It is essential that governments not be lulled into complacency by the ease with which they have financed their deficits thus far. In the aftermath of the financial crisis, the path of future output is likely to be permanently below where we thought it would be just several years ago. As a result, government revenues will be lower and expenditures higher, making consolidation even more difficult. But, unless action is taken to place fiscal policy on a sustainable footing, these costs could easily rise sharply and suddenly.

Second, large public debts have significant financial and real consequences. The recent sharp rise in risk premia on long-term bonds issued by several industrial countries suggests that markets no longer consider sovereign debt low-risk. The limited evidence we have suggests default risk premia move up with debt levels and down with the revenue share of GDP as well as the availability of private saving. Countries with a relatively weak fiscal system and a high degree of dependence on foreign investors to finance their deficits generally face larger spreads on their debts. This market differentiation is a positive feature of the financial system, but it could force governments with weak fiscal systems to return to fiscal rectitude sooner than they might like or hope.

Third, we note the risk that persistently high levels of public debt will drive down capital accumulation, productivity growth and long-term potential growth. Although we do not provide direct evidence of this, a recent study suggests that there may be non-linear effects of public debt on growth, with adverse output effects tending to rise as the debt/GDP ratio approaches the 100% limit (Reinhart and Rogoff (2009b)).

Finally, looming long-term fiscal imbalances pose significant risk to the prospects for future monetary stability. We describe two channels through which unstable debt dynamics could lead to higher inflation: direct debt monetisation, and the temptation to reduce the real value of government debt through higher inflation. Given the current institutional setting of monetary policy, both risks are clearly limited, at least for now.

How to tackle these fiscal dangers without seriously jeopardising the incipient recovery is the key challenge facing policymakers today. Although we do not offer advice on how to go about this, we believe that any fiscal consolidation plan should include credible measures to reduce future unfunded liabilities. Announcements of changes in these programmes would allow authorities to wait until the recovery from the crisis is assured before reducing discretionary spending and improving the short-term fiscal position. An important aspect of measures to tackle future liabilities is that any potential adverse impact on today's saving behaviour be minimised. From this point of view, a decision to raise the retirement age appears a better measure than a future cut in benefits or an increase in taxes. Indeed, it may even lead to an increase in consumption (see eg Barrell et al (2009) for an analysis applied to the United Kingdom).

Appendix: Budget accounting and debt dynamics

This appendix provides a summary of the main budget accounting identities that lie behind our discussion in the main text and that have been used to generate projections of future public debt/GDP ratios in different scenarios.

Our starting point is the *consolidated government sector budget identity*:

$$G_t + i_t D_{t-1} = T_t + \left(D_t - D_{t-1}\right) + \left(H_t - H_{t-1}\right) \quad (1)$$

where *G* is the nominal level of primary government expenditure and *i* is the nominal interest rate paid on nominal public debt *D*. The right-hand side indicates that total nominal expenditure (the left-hand side) can be funded through taxes *T*, new debt issuance (the second term on the right-hand side) and the change in the stock of central bank liabilities or monetary base (the third term on the right-hand side). The last term is also called seigniorage. In economies in which long-term inflation is low and stable – as it has been in major advanced economies since at least the mid-1980s – this source of public finance has been relatively small.

Dividing through by nominal GDP and rearranging terms, (1) can be rewritten as:

$$d_t - d_{t-1} = \hat{r}_t d_{t-1} + \omega_t + s_t$$

$$\hat{r}_t \equiv \frac{1+i_t}{\left(1+\pi_t\right)\left(1+\eta_t\right)} - 1 \cong i_t - \pi_t - \eta_t \quad (2)$$

$$\omega_t \equiv g_t - t_t$$

where now the small letters represent ratios of the original variables to GDP. According to (2), the change in the public debt/GDP ratio depends on real interest payments (adjusted for real output growth η), the primary deficit ω and seigniorage *s* (all expressed as a share of GDP). If the real interest rate on debt is higher than real output growth, then the debt/GDP ratio increases, even if a government manages to match its primary expenditure with revenue. In this case, new debt needs to be issued simply to cover the interest payments on the outstanding stock of debt.[26] As new debt is added, interest payments will increase even further, thus leading to the issuance of ever greater amounts of debt. Roughly speaking, when a government "indefinitely" issues new debt to pay interest on the stock of debt (and any additional non-funded expenditure), it is said to be running a Ponzi scheme, and its debt is set to grow without limit. (Below, this statement will be made more precise.)

However, a country does not have an unlimited capacity to borrow. The best way to see this is to solve (2) forward and rewrite it as an intertemporal budget constraint. For simplicity, we assume that both the nominal interest rate and nominal income growth are constant over time (so that we can drop the time subscript from them). We obtain:

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[26] Ignoring seigniorage, it follows from (2) that the condition for the debt/GDP ratio to remain constant over time is that:

(*) $-\omega_t / d_{t-1} = \hat{r}_t$; or (after simple manipulation): $-\Omega_t / D_{t-1} = \hat{r}_t$

that is, the primary surplus scaled by debt needs to be identical to the difference between the real return on public debt and real output growth. Relation (*) is plotted as a 45-degree line in the right-hand panel of Graph 3. If a country's primary surplus lies below such a line, then it will experience an increase in its debt/GDP ratio, and vice versa. How far a country is from the line provides a visual representation of how fast its debt/GDP ratio will increase at a given point in time.

$$d_{t-1} = \sum_{j=0}^{\infty} \frac{-\omega_{t+j} + s_{t+j}}{(1+\hat{r})^{j+1}} + \lim_{j\to\infty} \frac{d_{t+j}}{(1+\hat{r})^{j+1}} \quad (3)$$

A government is said to satisfy the intertemporal budget constraint when the last term on the right-hand side is equal to zero (no Ponzi condition):

$$d_{t-1} = \sum_{j=0}^{\infty} \frac{-\omega_{t+j} + s_{t+j}}{(1+\hat{r})^{j+1}} \quad (4)$$

If so, a government's debt must equal the present discounted value of all future primary surpluses and any future seigniorage revenue.

The seminal analysis of Sargent and Wallace (1981) has shown how fiscal and monetary policies are inextricably linked through the government's intertemporal budget constraint (4). If the fiscal authority does not adjust the primary surplus, then the monetary authority will have to issue more money to satisfy (4). If money financing implies that agents are flooded with money that they do not desire to hold, they may adjust their behaviour by spending it on goods, thus pushing up the price level. Hence, a fiscal imbalance has the potential to cause inflation when the fiscal authority fails to behave in accordance with the goal of price stability. The "unpleasant monetarist arithmetic" of Sargent and Wallace (1981) derives from the fact that a tightening of monetary policy will, through higher interest payments, cause a larger increase in public debt. Greater debt, in turn, brings forward the time at which money financing will be the only means left to finance the debt as the public refuses to hold further debt. In other words, an inflation-fighting central bank may paradoxically succeed in reducing inflation today but cause higher inflation tomorrow if the fiscal authority persists in its fiscal profligacy.[27]

Any gap between the left- and right-hand-side variables indicates that the current debt level is not on a sustainable path and that an adjustment in the primary surplus is therefore required. Failure by the fiscal authority to adjust would inevitably lead, short of outright default, to higher inflation. To the extent that agents anticipate that an adjustment will ultimately take place, the fiscal imbalance should have no consequence for inflation.[28]

The interpretation of (4) as an intertemporal budget constraint, which must hold at any time for all values of the price level, is not the only one. The other interpretation is that (4) is an equilibrium condition that determines the price level. Depending on the interpretation given, the literature has proposed two distinct types of theory for explaining how a fiscal imbalance could lead to a higher price level. One is that the quantity theory of money holds, so that the only way fiscal variables can affect the price level is by affecting the supply of money (as discussed above) and the real demand for money (via changes in the ratio of public debt held by the private sector). The other type of theory, instead, allows for the possibility that there could be more than one price level consistent with a given nominal amount of money. In this case, fiscal variables will determine the price level for a given level of money supply.[29]

The problem with (4) as a condition to assess the sustainability of current public debt levels is that it does not say anything about the time at which the required fiscal adjustment will or ought to take place. In principle, an adjustment could take place in the distant future. For

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[27] Sargent and Wallace (1981) also provide an example in which inflation may rise immediately as a result of a monetary tightening if money demand depends on expected future inflation.

[28] Things are more complicated when agents discount the possibility of failure to adjust. In this case, the possibility of unstable dynamics or multiple equilibrium price levels opens up. Inflation expectations might no longer be pinned down; see Leeper (2009).

[29] See Leeper (1991), Sims (1994), Woodford (1995) and Cochrane (1998).

example, it could take place so far in the future that it might not sound credible to bond investors. So, alternative benchmarks or criteria to judge fiscal sustainability are also used. One is to estimate the amount of debt that a country could sustain over a long period of time without facing too high a risk of default. Such an estimate of the sustainable debt level will take into account, among other factors, the fiscal capacity of a country (eg how far the government can raise tax revenues without causing the tax base to shrink, or how far it can cut public expenses without causing major social and political disruptions) and the response of financial markets to the state of the economy and the state of public finances.

Other approaches look at the magnitude of primary surpluses that a government needs to produce over time for its debt ratio to be stabilised at current levels or at some (lower or higher) level at some point in the future. An advantage of this approach is that it is to some degree less arbitrary than other approaches mentioned above, as the amount of assumptions and information required as an input is kept to a minimum. In this paper, we adopt this simpler approach. Specifically, we use (2) to project debt/GDP ratios into the future in different scenarios concerning the profile of primary surpluses. To keep things simple, we also assume that in (2) the real interest rate and real output growth are time-invariant. And we also assume that seigniorage remains zero throughout – an assumption justified by the fact that, in advanced economies with low inflation, seigniorage has been rather small.

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