

ARTICLES

ANALYSING GOVERNMENT DEBT SUSTAINABILITY IN THE EURO AREA



The rapid build-up of government debt in an environment of financial instability and low growth has increased the need for an assessment of government debt sustainability. Despite frontloaded and comprehensive fiscal consolidation in euro area countries, risks to debt sustainability need to be closely monitored. To assess the size of these risks, conventional debt sustainability analysis has become a core element of enhanced country surveillance. Such an analysis is, however, subject to several limitations. It depends crucially on the choice of underlying assumptions and analytical tool and its findings are subject to considerable uncertainty. What is required, therefore, is a more comprehensive approach to debt sustainability assessments, comprising a more systematic in-depth assessment of country-specific risks. This would need to include a systematic monitoring of a broad set of fiscal liabilities and private sector imbalances, replacing the current ad hoc approach to accounting for such risks. Moreover, more emphasis should be placed on accounting for fiscal and economic behaviour in response to shocks. In addition, the crisis has shown that apart from addressing medium-term risks to debt sustainability, there is also a need to account for short-term refinancing risks, which tends to further strengthen the case for safety margins in public finances in normal times. To limit risks to debt sustainability in the euro area, government debt-to-GDP ratios should be brought to levels safely below 60%. In this respect, the commitment to establish within the new Treaty on Stability, Coordination and Governance in the Economic and Monetary Union a new fiscal compact comprising a “debt brake” is a welcome step towards achieving more rigorous budgetary discipline in the euro area.

I INTRODUCTION

The global financial crisis has led to a rapid accumulation of government debt in most countries of the euro area and in the euro area as a whole. This reflects, among other things, the strong deterioration in economic growth and the working of automatic stabilisers, as well as, in several euro area countries, partly sizeable fiscal stimuli and government support to the banking sector.¹ The rapid build-up of government debt in an environment of financial instability and low growth has increased the need for an assessment of debt sustainability, i.e. a country's ability to service all accumulated government debt at any point in time. Despite frontloaded and comprehensive fiscal consolidation in euro area countries, risks to debt sustainability need to be closely monitored. To gauge the size of these risks, conventional debt sustainability analysis – an accounting-based approach which has long been widely applied to the monitoring of debt – has become a core element of enhanced country surveillance. As such, it is part of EU/IMF reports assessing the compliance of Member States that have a financial assistance

programme with their associated policy commitments.

However, conventional debt sustainability analysis is subject to several limitations, which means that the results need to be interpreted carefully. In fact, the outcome of debt sustainability analyses depends crucially on the choice of underlying assumptions and analytical tool and is subject to considerable uncertainty. Furthermore, particular care is needed, as debt sustainability assessments can also have a direct impact on sustainability itself: increases in government bond yields that are based on unfavourable sustainability assessments by financial markets could create a vicious circle of increasing government debt refinancing costs and furthering debt sustainability risks. As recent developments in the euro area have shown, this negative spiral accelerates further if unfavourable debt sustainability assessments, for example by credit rating agencies, have a negative impact on banks' balance sheets

¹ See Van Riet, A. (ed.), “Euro area fiscal policies and the crisis”, *Occasional Paper Series*, No 109, ECB, Frankfurt am Main, April 2010.

and result in higher deleveraging needs to meet core capital requirements. And this is compounded by higher sovereign bond yields feeding through to banks' funding conditions and private sector borrowing costs, which in turn weigh on private investment and economic growth.

Against this background, this article addresses the following three questions:²

- What can conventional debt sustainability analysis deliver?
- How can the tools to assess debt sustainability analysis be improved?
- Given the tools currently available to conduct debt sustainability analysis, what policy conclusions can be drawn for fiscal policies in the euro area?

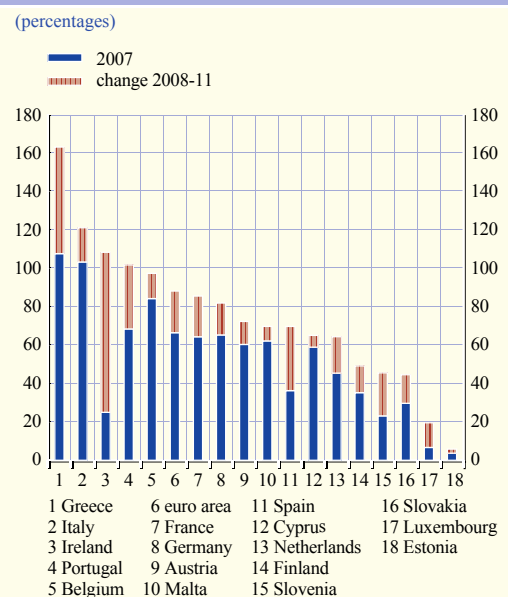
The article is structured as follows: section 2 briefly reviews the build-up of government debt across the euro area countries since the onset of the crisis and the associated increases in government bond yield spreads. Section 3 sets out the concept of debt sustainability, explaining the main features of conventional debt sustainability analysis, based on illustrative results for the euro area aggregate, and identifying the tool's main advantages and shortcomings. Section 4 puts forward some possible extensions to the conventional debt sustainability analysis, which would take account of risks associated with contingent, implicit and other off-budget liabilities. Section 5 examines alternative, more model-based, analyses of debt sustainability. Section 6 looks at early warning mechanisms of fiscal stress, focusing especially on short-term fiscal risks. Section 7 concludes, drawing particular attention to the high degree of uncertainty surrounding medium-term debt sustainability assessments and the resulting need for a stronger focus on short-term public finance developments and fiscal prudence in the euro area.

2 GOVERNMENT INDEBTEDNESS IN THE EURO AREA

The euro area government gross debt-to-GDP ratio is estimated to have risen by 22 percentage points from its pre-crisis level in 2007 to stand at 88% in 2011 (see Chart 1). Among the individual euro area countries, Ireland, Greece, Portugal and Spain were the ones that experienced the strongest increases over the period 2008-11. For 2011, debt ratios in Greece, Italy, Ireland and Portugal are estimated to have reached very high levels, i.e. at around 100% of GDP or above.

² For an overview and applications of various approaches to debt sustainability analysis, see the chapter entitled "Debt sustainability in the EU" in "Public finances in EMU – 2011", *European Economy* 3, Brussels, September 2011. See also "Modernizing the Framework for Fiscal Policy and Public Debt Sustainability Analysis", IMF, August 2011. For an assessment of medium and long-term fiscal adjustment needs under various scenarios, see the April 2011 edition of the IMF's *Fiscal Monitor*. For another survey, see Schaechter, A. et al., "A Toolkit to Assessing Fiscal Vulnerabilities and Risks in Advanced Economies", *Working Paper Series*, No WP/12/11 IMF, Washington DC, January 2012.

Chart 1 General government debt-to-GDP ratios in the euro area countries, 2007-11

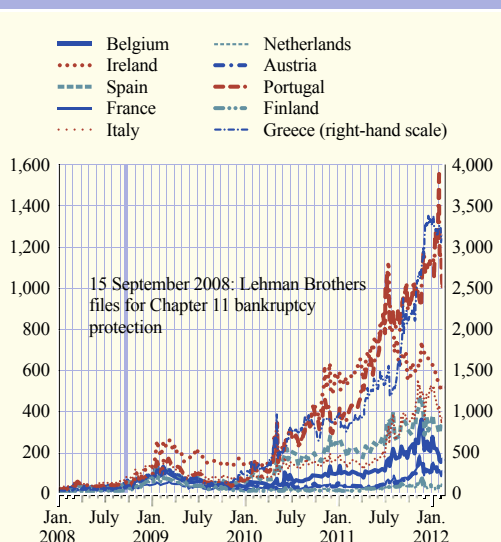


Sources: European Commission's autumn 2011 economic forecast and ECB calculations.

Indeed, debt ratios are estimated to have been below the 60% of GDP reference value in only five euro area countries. Further afield, in the United States and Japan, debt-to-GDP ratios have also increased to levels substantially above pre-crisis levels. However, when compared with the United States and Japan, budgetary imbalances have, on aggregate, been more limited in the euro area and fiscal consolidation has been more frontloaded and comprehensive. Thus, from its pre-crisis level in 2007, the euro area government debt-to-GDP ratio has increased less than in the United States and Japan. Over the medium term, debt-to-GDP ratios in the United States and Japan are expected to exceed the euro area aggregate (see the box entitled “Government debt developments in the United States and Japan”).

Given financial market concerns over the sustainability of government debt and unfavourable macroeconomic developments since the collapse of Lehman Brothers in September 2008, government bond yield spreads vis-à-vis Germany have risen in many euro area countries (see Chart 2).³ However, these increases have varied significantly across countries, in view of the different assessments of country-specific risks. More recently, there are indications that the progress made with fiscal consolidation in the euro area as a whole and in vulnerable countries in particular, as well as the efforts to strengthen the EU fiscal and economic framework, are recognised in financial markets.

Chart 2 Spreads over the German ten-year government bond yield, 2008-12



Sources: Bloomberg, Thomson Reuters Datastream and ECB calculations.

Notes: Data for Cyprus, Luxembourg, Malta, Slovenia and Slovakia are not comparable and are therefore not shown here.

In this vein, a certain stabilisation of sovereign debt markets can be observed in vulnerable euro area countries, associated with a reduction of their bond yield spreads vis-à-vis German sovereign yields.

3 Bond yield curves can be shown to depend on fiscal sustainability assessments and macroeconomic variables such as prospects for economic growth. See, for example, Borge, V., Laubach, T., Mésonnier, J.-S. and Renne, J.-P., “Fiscal Sustainability, Default Risk and Euro Area Sovereign Bond Spreads”, *Working Paper Series*, No 350, Banque de France, Paris, October 2011.

BOX

GOVERNMENT DEBT DEVELOPMENTS IN THE UNITED STATES AND JAPAN

Government debt sustainability concerns are rising among a number of advanced G20 countries. A substantial drop in revenues, compounded by a number of fiscal stimulus and financial sector support measures implemented during the recession have led to a surge in government debt levels across many advanced economies. In the United States, intense negotiations surrounding the recent increase in the debt ceiling have further concentrated investor focus on US public

Chart A General government gross debt and budget balances, United States

(as a percentage of GDP)



Sources: BEA, CBO and ECB calculations.
Note: Data for 2011-13 are forecasts.

Chart B General government gross debt and budget balances, Japan

(as a percentage of GDP)



Source: IMF.
Note: Data for 2011-13 are forecasts.

finances.¹ At the same time, Japan has had a long history of rising debt-to-GDP ratios such that its ratio is now almost twice that of the United States.² Against this background, this box presents recent deficit and debt developments and assesses debt sustainability prospects for the United States and Japan, highlighting differences in fiscal developments with the euro area.

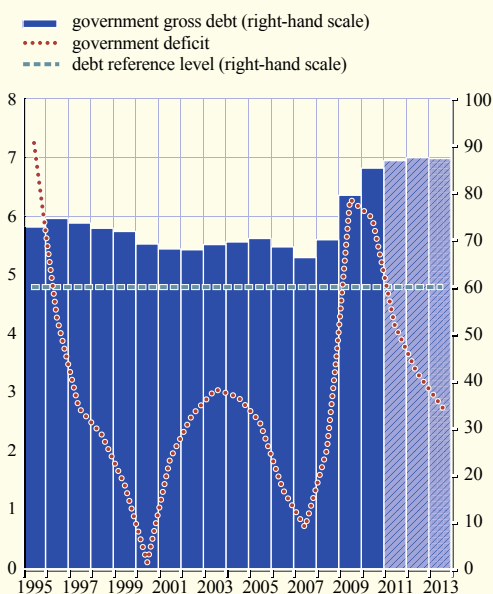
In 2007, prior to the recession, the general government gross debt-to-GDP ratio was around 65% in the United States, while Japan experienced a significantly higher level of indebtedness at close to 190% of GDP. From these pre-crisis levels, the cyclical downturn in federal receipts, coupled with the substantial fiscal stimulus implemented in response to the economic downturn, led to a rapid increase in the US budget deficit, which exceeded 10% of GDP in 2009 and 2010. In the case of Japan, budget deficits increased to above 9%, which also pointed to a rapid deterioration of public finances. As a result, the significant and sustained public deficits in both countries translated into a rapid rise in gross debt. In 2010 gross debt was around 95% of GDP in the United States and around 220% of GDP in Japan (see Charts A and B).³ The general government debt level in the euro area as a whole amounted to 85.6% of GDP in 2010 (see Chart C).

Although fiscal deficits are expected to decline in the United States over the next few years, debt ratios are expected to increase further in the short term – albeit less rapidly – before broadly stabilising in 2013. However, these developments are highly uncertain, as it will not become clear what the impact of the recent extension of tax cuts and benefits until the end of 2012 will be, nor is it clear whether the automatic tax cuts resulting from the failure of the “Super Committee” to reach an agreement will finally be implemented in full. These developments may

1 Citing political risks among other factors, Standard & Poor’s downgraded US long-term debt from AAA to AA+ on 5 August 2011 and cautioned that further downgrades may follow if the US government debt trajectory rises above the rating agency’s current baseline.
2 Moody’s downgraded Japanese debt in August 2011, following a previous downgrade by Standard and Poor’s at the start of 2011.
3 These government debt data for the United States and Japan are not fully comparable to the euro area data as they are not compiled according to the European accounting methodology (ESA 95).

Chart C General government gross debt and budget balances, euro area

(as a percentage of GDP)



Sources: European Commission, ECB calculations.
Note: Data for 2011-13 are forecasts.

imply an upward and downward risk to the deficit figures respectively. As regards Japan, the reduction in the deficit is expected to take place with some delay, partly on account of the special expenditures devoted to cope with the consequences of the Japanese earthquake in March 2011, meaning that debt ratios are expected to continue rising steadily up to 2013. These developments are again subject to a high level of uncertainty, given ongoing discussions in Japan regarding the budget for the 2012 fiscal year and the proposed tax and social security reform plan, which envisages a gradual increase in the consumption tax rate from the current 5% to 10% by the mid-2010s. By comparison, the euro area-wide general government deficit is projected to decline to lower levels, reaching 3% of GDP in 2013. As a consequence, the increase in the euro area debt-to-GDP ratio is projected to be more muted than in the United States and Japan, contributing to a lower debt-to-GDP ratio over the medium term.

The need for considerable fiscal consolidation in the United States and Japan also implies that there is very limited scope for fiscal policy to support growth in case of a weakening outlook. On the contrary, the risk of a deterioration in debt sustainability, related to adverse macroeconomic shocks which slow economic growth and increase long-term interest rates, is non-negligible.

3 CONVENTIONAL DEBT SUSTAINABILITY ANALYSIS

This section briefly sets out the concept of government debt sustainability, before discussing the theoretical underpinnings of conventional debt sustainability analysis. It provides illustrative projections for medium-term debt developments for the euro area aggregate, emphasising also the fact that conventional debt sustainability analysis is subject to a trade-off between simplicity and theoretical soundness.

THE CONCEPT OF GOVERNMENT DEBT SUSTAINABILITY

The sustainability of government debt means that the accumulated government debt has

to be serviced at any point in time. It requires governments to be both solvent and liquid.⁴

- “Solvency” is a medium to long-term concept and requires that the government’s net present value budget constraint is fulfilled, stipulating that the net present value of the government’s future primary balances must be at least as high as the net present value of outstanding government debt (“flow concept”).⁵

4 See also “Modernizing the Framework for Fiscal Policy and Public Debt Sustainability Analysis”, IMF, August 2011.

5 According to the “stock concept”, solvency requires that the net present value of all future outstanding liabilities shall not be higher than the outstanding amount of assets.

- “Liquidity” is a short-term concept and refers to a government’s ability to maintain access to financial markets, ensuring its ability to service all upcoming obligations in the short term.⁶

Thus, even though debt sustainability assessments take a medium to long-term perspective, they need to account for a country’s ability to maintain market access in the short term for the purposes of refinancing maturing debt. A country that faces increasing difficulties in accessing financial markets in the short term could face debt sustainability problems over the medium term, as higher bond yields will gradually increase the cost of servicing debt. Furthermore, government debt can only be considered sustainable if the fiscal policies required to ensure sustainable debt levels are feasible and realistic in both political and economic terms.

CONVENTIONAL DEBT SUSTAINABILITY ANALYSIS

Conventional debt sustainability analysis is a simple accounting exercise, based on the standard debt accumulation equation:⁷

$$\Delta b_t = \frac{i_t - g_t}{1 + g_t} b_{t-1} - pb_t + dda_t$$

According to this equation, the change in the debt-to-GDP ratio (Δb_t) is derived from the cumulated impact of three components:

- (1) the “interest-growth differential”, which captures the impact of the debt ratio-increasing (real) interest rate as well as the impact of the debt ratio-reducing (real) GDP growth rate;⁸
- (2) the primary balance (pb_t);
- (3) the deficit-debt adjustment (dda_t).

The deficit-debt adjustment relates to that part of the change in the debt-to-GDP ratio which is not reflected in the deficit. It is derived, for example, from: (i) a change in the size of foreign currency-denominated debt associated

with a change in the exchange rate; (ii) financial transactions in relation to government support to financial institutions; (iii) privatisation receipts; or (iv) the purchase of assets.

Generally, conventional debt sustainability analysis is based on a gross general government debt rather than on a net debt concept that nets out government financial assets. The reasons for this are twofold: first, the definition of financial (vis-à-vis non-financial) assets differs across countries, making comparability particularly challenging; second, financial assets are not always easy to liquidate. Nonetheless, financial assets – which for the euro area average represent about a third of the value of government liabilities – constitute an important buffer for governments to address concerns about debt sustainability. This also holds true for governments’ stakes in state-owned (or partly state-owned) companies: governments can always opt for reducing their ownership in them in order to use the privatisation receipts for reducing public debt. This notwithstanding, sales of such assets when a country already faces a liquidity shock may only generate limited revenue in a weak economic environment, or may not be possible at all. Thus, while non-financial assets in principle impact on the size of net debt and are therefore relevant for assessing long-term government debt sustainability, a prudent definition of net debt should include only financial assets which can be liquidated at short notice.

Assuming that dda_t is zero and that the interest-growth differential is positive and thus debt-increasing, two immediate conclusions can be drawn from the debt accumulation equation: first, sufficiently large primary surpluses are needed to stabilise the debt-to-GDP ratio, or reduce it; and second, high-debt countries need

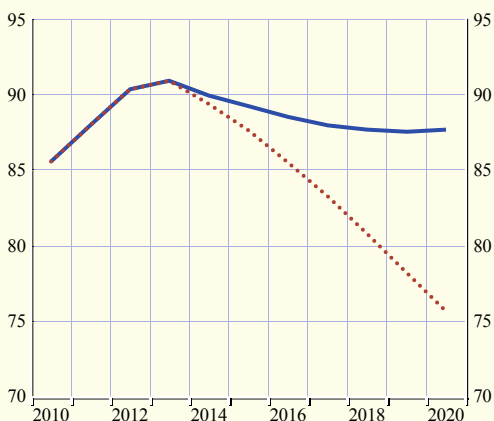
6 See Giammarioli, N., Nickel, C., Rother, P. and Vidal, J.-P., “Assessing fiscal soundness: theory and practice”, *Occasional Paper Series*, No 56, ECB, Frankfurt am Main, March 2007.

7 For more details, see the article entitled “Ensuring fiscal sustainability in the euro area”, *Monthly Bulletin*, ECB, Frankfurt am Main, April 2011.

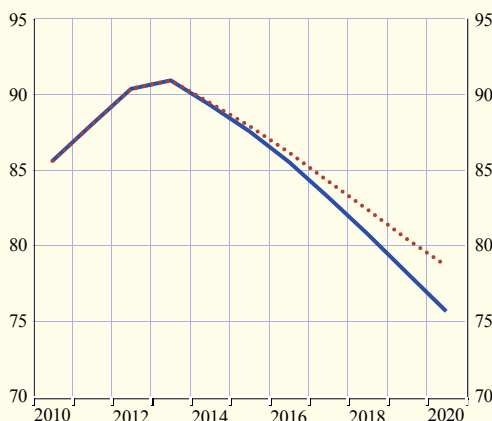
8 The interest-growth differential could also be denoted in nominal values if government debt is issued in nominal bonds.

Chart 3 Medium-term debt scenarios for the euro area for the period 2010-20

(a) (as a percentage of GDP)

— baseline scenario
..... consolidation scenario

(b) (as a percentage of GDP)

— consolidation scenario
..... consolidation + age-related spending

Sources: European Commission's autumn 2011 economic forecast until 2013 and ECB calculations.
Note: Technical assumptions underlying the different scenarios are outlined in the main text.

to run larger primary surpluses than low-debt countries in order to stabilise, or reduce, the debt ratio. Obviously, in the case of positive deficit-debt adjustments – as observed during the financial crisis through the support provided by governments to the banking sector – even larger primary balance adjustments would be required to stabilise and reduce debt-to-GDP ratios.

Chart 3a shows the results of conventional debt sustainability analysis for the euro area aggregate for the period 2010-20 under a baseline and a consolidation scenario. These scenarios are based on the European Commission's autumn 2011 economic forecast until 2013, aggregating the dynamics of all euro area countries.⁹ Thereafter, the assumptions on real interest rates and growth as well as primary balances that underlie the scenarios are the following:

- Real GDP growth g is based on potential growth after the end of the projection horizon in 2013, assuming a gradually closing output gap.¹⁰
- The average real effective interest rate is assumed to gradually converge to 3% for all countries.¹¹ The real interest rate is defined as

an average effective interest rate, reflecting a projection of interest rates at different maturities and the maturity structure of government debt.¹² Generally, the impact of market interest rates on the results of debt sustainability analysis depends on how quickly they feed through to refinancing needs (see Chart 5).

- The structural component of the primary balance pb_s is assumed to remain unchanged after 2013. Thus, from 2014 onwards, the headline primary balance improves with the lower cyclical deficit component, while the structural balance remains constant.

⁹ According to the European Commission's projections, the baseline includes only the measures that were legislated (or were very likely to be legislated) at the beginning of October 2011; as such, it does not reflect the most likely path for fiscal policy, but one based on current decisions.

¹⁰ Potential growth is projected to match the 2010-20 average presented in Table 3.3 of "The 2012 ageing report: underlying assumptions and projection methodologies", *European Economy 4*, Brussels, 2011.

¹¹ This implies a convergence of the average nominal effective interest rate to 5% for all countries, since it is assumed that inflation in each euro area country converges at around 2%.

¹² The standard approach uses the implicit interest rate on government debt (i.e. interest payments on the previous year's debt as a percentage of the current year's debt).

- The deficit-debt adjustment dda_t is assumed to be zero from 2014 onwards.

To assess the sensitivity of the results to shocks, a bound test is conducted: in the consolidation scenario, instead of keeping the structural primary balance constant after the end of the projection horizon as in the baseline scenario, a mechanical adjustment in the structural primary balance of 0.75 percentage point is assumed until a balanced budget, in structural terms, is achieved.

As Chart 3 shows, according to the baseline scenario, the debt-to-GDP ratio is set to level off in 2013, decline marginally thereafter before risking to rise again at the end of the projection horizon. By contrast, in the consolidation scenario, the debt-to-GDP ratio is set on a more strongly declining trajectory after 2013. Obviously, in a scenario with lower growth and/or higher interest rates than in the baseline (not presented here), the debt ratio would be on an unsustainable path.

It must be stressed, however, that these results for the euro area aggregate are only illustrative. They are based on ad hoc assumptions regarding the medium-term developments of interest-growth differentials and primary balances and merely reflect the aggregate sustainability risk for the 17 euro area member countries; in this sense, their meaningfulness for policy considerations is limited. In addition, sustainability at the euro area-wide level does not imply sustainability at the level of individual countries. This point is of particular importance, since unsustainable government debt in one country threatens to lead to widespread contagion, which in turn puts financial stability and fiscal sustainability in the euro area as a whole at risk. This is a reflection of the euro area's institutional framework, in which fiscal policies remain largely a national responsibility. Within this framework, it is the duty of each individual member country to pursue sound public finances, thereby contributing to the stability and smooth functioning of EMU.

ASSESSMENT OF CONVENTIONAL DEBT SUSTAINABILITY ANALYSIS

In light of the preceding review of the basic features of conventional debt sustainability analysis and its illustrative application, it is possible to draw some conclusions regarding the main advantages and shortcomings of such an analysis.

In terms of the advantages of conventional debt sustainability analysis, the main benefits are transparency and ease of application. Provided that the underlying assumptions are fully understood, the tool's results are easy to interpret and communicate. Assessing changes to single variables, as reflected in sensitivity/bound tests, is also straightforward. Moreover, the tool is usually readily applicable: once the general framework has been agreed, the tool is well-situated for operational work, which explains why it is widely used by both international institutions and financial market participants. A further benefit is that the deterministic baseline scenario can be adjusted for each variable of the debt accumulation equation to reflect country specificities and the judgements of individual experts.

Nonetheless, conventional debt sustainability analysis has several shortcomings. One drawback is that the deterministic baseline scenario only delivers valuable results if the medium-term trajectory of macroeconomic and budgetary variables is based on realistic assumptions. For example, a standardised cross-country approach, which assumes equal mechanical fiscal adjustment across countries, can potentially arrive at unrealistically large primary surplus assumptions when compared with country-specific historical evidence. This would ground the baseline on unsustainable fiscal policies.¹³ A key difficulty for debt sustainability analysis is thus the lack of knowledge on how quickly countries can

¹³ For an overview of selected episodes of large and sustained cyclically adjusted primary budget surpluses in EU countries, see the box entitled "Past experience of EU countries with sustaining large primary budget surpluses", *Monthly Bulletin*, ECB, Frankfurt am Main, June 2011.

improve primary balances and what levels of primary surpluses and tax levels they can sustain. As regards baseline scenarios derived from government plans, these are subject to obvious limitations: they tend to be based on overly optimistic macroeconomic projections and budgetary plans, which neglect the political cycle and the lower commitment to budget consolidation in the presence of upcoming elections. Therefore, any interpretation of sustainability exercises needs to account for restraints on the realism of the baseline projections, which need to be communicated as clearly and transparently as possible.

To sum up, there is obviously a clear trade-off between comfortable application and transparency on the one hand and theoretical soundness and robustness on the other. In this vein, there is scope for improving conventional debt sustainability analysis, namely by extending the scope of the analysis and by implementing alternative approaches that go beyond the standard debt accumulation equation. The next two sections address these possible extensions in more detail.

4 EXTENDING THE SCOPE OF CONVENTIONAL DEBT SUSTAINABILITY ANALYSIS

An obvious limitation of debt sustainability analysis is that it usually focuses only on explicit government liabilities, thereby ignoring the fact that the size of government debt can be affected both by contingent and implicit liabilities as well as by other off-budget obligations.¹⁴ This section therefore calls for a broadening of conventional debt sustainability analysis to include contingent, implicit and other off-budget liabilities.

Contingent liabilities refer to future government liabilities that arise only if a particular event materialises. In the euro area, government guarantees given to financial institutions feature prominently among these liabilities.¹⁵ As indicated in Table 1, the accumulated government contingent liabilities related to guarantees to the banking sector are sizeable in many euro area

countries and could rise further to reach, or even surpass, higher ceiling commitments. Other contingent liabilities incurred as part of the euro area sovereign debt crisis resolution mechanism relate to cross-border commitments. These include guarantees provided under the European Financial Stability Facility (EFSF) or, subsequently, the European Stability Mechanism (ESM).¹⁶ There has so far been no consistent debt sustainability analysis approach to systematically account for contingent liabilities. A recent exercise by the European Commission, for example, involved estimating bank default probabilities and including the estimated fiscal burden from defaults in the sustainability assessment.¹⁷ Another approach could be to explicitly amend the deficit-debt adjustment term by accounting for the results of the recapitalisation exercise carried out by the European Banking Authority.¹⁸

Implicit liabilities are mostly related to entitlements whose payments fall due in the future, such as pensions and other age-related public spending. However, the cost pressures related to these items could change sustainability

14 For a survey, see Hartwig Lojusch, D., Rodríguez Vives, M. and Slavík, M., “The size and composition of government debt in the euro area”, *Occasional Paper Series*, No 132, ECB, Frankfurt am Main, October 2011.

15 While government capital injections to banks are associated with an immediate increase in general government debt, government guarantees do so only once they are drawn. For a distinction, see Box 1 entitled “The statistical recording of public interventions to support the financial sector” (prepared by Catz, J. and Maurer, H.), in Van Riet, A. (ed.), “Euro area fiscal policies and the crisis”, *Occasional Paper Series*, No 109, ECB, Frankfurt am Main, April 2010.

16 The treatment of loans granted by the EFSF and the ESM differs. In cases where the EFSF is employed and provides loans, this has an impact on the balance sheet of countries providing guarantees proportional to their adjusted contribution key under the EFSF. As the EFSF borrows in the market on behalf of euro area governments to provide loans to euro area countries in severe distress, these lending operations are routed through the government accounts of the guarantor Member States. In the case of the ESM, loan provision will not affect the government debt level of these Member States. However, if guarantor Member States finance their share of paid-in ESM capital through borrowing, this will raise their government debt.

17 See the chapter entitled “Debt sustainability in the EU” in “Public finances in EMU – 2011”, *European Economy* 3, Brussels, September 2011.

18 See *Financial Stability Review*, ECB, Frankfurt am Main, December 2011.

Table I Measures impacting on government contingent liabilities, 2008-11

	EFSF amended guarantee commitments ¹⁾		EFSF amended contribution key ¹⁾ (shares in percentage)	Government guarantees to the banking sector (cumulative net impact on general government debt as a percentage of GDP)
	euro millions	as a percentage of 2011 GDP		
Belgium	27,032	7.30	3.72	12.7
Germany	211,046	8.22	29.07	3.0
Estonia	1,995	12.46	0.27	0.0
Ireland	-	-	0.00	42.8
Greece	-	-	0.00	25.8
Spain	92,544	8.61	12.75	6.2
France	158,488	7.97	21.83	3.1
Italy	139,268	8.78	19.18	2.7
Cyprus	1,526	8.51	0.21	15.7
Luxembourg	1,947	4.66	0.27	3.2
Malta	704	10.91	0.10	0.0
Netherlands	44,446	7.32	6.12	6.1
Austria	21,639	7.19	2.99	5.7
Portugal	-	-	0.00	9.0
Slovenia	3,664	10.23	0.51	4.4
Slovakia	7,728	11.05	1.06	0.0
Finland	13,974	7.34	1.92	0.0
Total	726,000	7.71	100.00	5.2

Source: ESCB and EFSF.

1) The amended contribution key accounts for the stepping out of Greece, Ireland and Portugal.

assessments over the medium term: even though the bulk of ageing cost increases will only materialise in many euro area countries after 2020, accounting for the more limited increases in the period up to then could render sustainable debt trajectories unsustainable. Systematically accounting for these costs in any medium-term debt sustainability analysis would thus offer a valuable broadening of the assessments.¹⁹ For the euro area, as indicated in Chart 3b, incorporating these liabilities into the consolidation scenario specified above (and assuming that no offsetting measures are adopted) would put government debt on a higher, though still declining, debt trajectory.

Other off-budget obligations refer to those government obligations that are not included in the statistical definition of general government, but that can become subject to government spending and relate, for example, to state-owned enterprises. The importance of these liabilities has come to the fore with recent fiscal developments, for example, in Portugal: over the period 2007-10, the debt-to-GDP ratio had to be revised upwards by almost 7 percentage

points of GDP due to the reclassification of three state-owned transportation enterprises from the broader concept of the “public sector” into the narrower concept of the “general government sector”.

Looking ahead, instead of only an ad hoc approach, a prudent assessment of the risks to debt sustainability needs to systematically account for contingent, implicit and other off-budget liabilities.

5 MODEL-BASED APPROACHES TO ASSESSING DEBT SUSTAINABILITY

Another drawback to conventional debt sustainability analysis is the fact that the standard debt accumulation equation does not capture interdependencies between the variables

¹⁹ For long-term projections of age-related spending for the period 2008-60, see “The 2009 ageing report – Economic and budgetary projections for the 27 EU Member States (2008-60)”, *European Economy* 2, Brussels, 2009. The data from this report have been incorporated into long-term sustainability projections provided in “Sustainability Report 2009”, *European Economy* 9, Brussels, 2009.

driving debt sustainability on account of it being just a simple accounting exercise. This section briefly surveys available approaches in the literature to account better for the interaction of key variables driving debt dynamics.

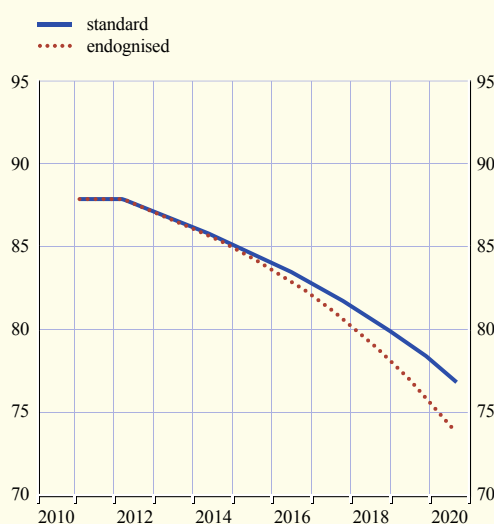
INTRODUCING INTERDEPENDENCIES IN CONVENTIONAL DEBT SUSTAINABILITY ANALYSIS

Whereas the standard debt accumulation equation abstracts from interdependencies between its key determinants – GDP growth, interest rates and primary balances – empirical evidence points to the existence of relationships between these variables. For example, some empirical evidence points to primary balances responding to changes in the debt-to-GDP ratio, at least beyond a certain debt threshold. This indicates that governments tend to respond to rising indebtedness by stepping up fiscal consolidation.²⁰ Other empirical evidence has found that growth is impeded at high levels of debt. This finding suggests that, if a debt ratio rises above a certain threshold (often estimated at around 90% of GDP), growth is negatively affected.²¹ The main channels through which government debt was found, in these studies, to have an influence on growth are private and public capital accumulation. Similarly, several empirical studies for the euro area have found that high government debt ratios may contribute to rising sovereign bond yield spreads and, ultimately, higher sovereign long-term interest rates.²²

Chart 4 shows some preliminary results accounting for such interdependencies in the euro area. They are derived from the estimated coefficients of interdependencies between GDP growth, interest rates and primary balances in a simultaneous equation panel approach, in which each variable driving debt accumulation is dependent on the remaining explanatory variables of the system. The resulting coefficients measuring the magnitude of interdependencies between the explanatory variables are then incorporated into the standard debt accumulation equation. For the euro area aggregate, the results show that, when accounting for such interdependencies (see the endogenised scenario

Chart 4 Sensitivity analysis with endogenous fiscal adjustment: euro area for the period 2010-20

(government debt-to-GDP ratio; in percentage)



Source: ECB calculations.

Note: For an explanation of the standardised and endogenised scenarios see the main text.

- 20 See, for example, Bohn, H., “The Behavior of U.S. Public Debt and Deficits”, *The Quarterly Journal of Economics*, No 113(3), August 1998, pp. 949- 963, and the box entitled “Government debt dynamics and primary budget balance developments in the EU Member States”, *Monthly Bulletin*, ECB, Frankfurt am Main, March 2011. Other available evidence indicates that governments tend to increase the level of labour taxation in response to rises in government debt and even more in response to rises in interest payments: for more details, see Holm-Hadulla, F., Leiner-Killingler, N. and Slavik, M., “The response of labour taxation to changes in government debt”, *Working Paper Series*, No 1307, ECB, Frankfurt am Main, March 2011.
- 21 For further details, see Reinhart, C. and Rogoff, K., “Growth in a Time of Debt”, *Working Paper Series*, No 15639, NBER, January 2010; Kumar, M. and Woo, J., “Public Debt and Growth”, *Working Paper Series*, No 10/174, IMF, Washington DC, July 2010; and Checherita-Westphal, C. and Rother, P., “The impact of high and growing government debt on economic growth: an empirical investigation for the euro area”, *Working Paper Series*, No 1237, ECB, Frankfurt am Main, August 2010.
- 22 See Codogno, L., Favero, C. and Missale, A., “Yield spreads on EMU government bonds”, *Economic Policy*, Vol. 18, No 37, October 2003; Ardagna, S., Caselli, F. and Lane T., “Fiscal Discipline and the Cost of Public Debt Service: Some Estimates for OECD Countries”, *Working Paper Series*, No 10788, NBER, September 2004; Attinasi, M.G., Checherita-Westphal, C. and Nickel, C., “What explains the surge in euro area sovereign spreads during the financial crisis of 2007-09?”, *Working Paper Series*, No 1131, ECB, Frankfurt am Main, December 2009; and Schuknecht, L., Von Hagen, J. and Wolswijk, G., “Government bond risk premiums in the EU revisited: the impact of the financial crisis”, *Working Paper Series*, No 1152, ECB, Frankfurt am Main, February 2010.

in Chart 4), fiscal consolidation at times of high debt would put the debt-to-GDP ratio on a steeper downward sloping path than in the baseline (standardised) scenario. This result reflects the fact that, at high debt ratios, fiscal consolidation that reduces the debt-to-GDP ratio tends to reduce long-term sovereign interest rates and support growth. This effect tends to abate at lower debt ratios, at which a more ambitious primary balance path is associated with lower nominal GDP growth rates.²³

The benefits of this approach relate to the fact that it can take into account interdependencies between factors driving debt dynamics within a deterministic baseline that can be adjusted as experts see fit. However, within a panel approach for a large set of countries the coefficients only reflect an average impact for the euro area aggregate; a valuable extension of this model would be to set up country-specific models, for example vector autoregressions.

Another work stream in relation to the expansion of debt sustainability analysis involves structural/DSGE (dynamic stochastic general equilibrium) models, in which the debt-to-GDP ratio can be forecast by taking account (at least to a certain degree) of the interdependency between the constitutive terms of the debt accumulation equation in a general equilibrium framework. Based on variants of the European Commission's QUEST model, such analysis has been used selectively in alternative debt simulations for EU countries with financial assistance programmes.²⁴

STOCHASTIC APPROACHES ACCOUNTING FOR UNCERTAINTY

As the above assessment of conventional debt sustainability analysis has shown, a much enhanced risk analysis is required that takes into account the high degree of uncertainty surrounding medium-term debt trajectories, which cannot be captured by simple bound tests as these are limited in number. In this vein, such an analysis would need to account for both a

correlation of shocks and fiscal responses to such shocks based on historical evidence of interdependencies between debt determinants. This would extend the spectrum of possible scenarios and thus strengthen the sensitivity analysis. One approach to address these concerns is the "fan-chart" approach.²⁵ This methodology seeks to enhance the understanding of the risks and their magnitude surrounding medium-term debt dynamics, thereby explicitly acknowledging the probabilistic nature of debt sustainability analysis exercises. Within this approach, the reference (baseline) scenario results as the median scenario. The magnitude of the risks associated with this scenario is illustrated in fan charts, which depict confidence bands for varying degrees of uncertainty around the median. The confidence band would be wider for countries for which uncertainty about medium-term debt developments is higher than for countries with more muted risk to debt sustainability. In the same vein, fan charts make it possible to quantify the probability that the debt ratio will turn out higher or lower than a certain value.

The main benefit of this approach is the fact that risks to government debt can be quantified and thus better assessed. In this regard, such a stress-testing approach would be highly valuable from a policy perspective. Yet, this has

23 It should be noted that this specification does not directly adhere to the common approach in the fiscal multiplier literature (which would, *inter alia*, require different measures for the fiscal shock than changes in the primary balance ratio). By contrast, the regression aims to capture key regularities between the variables in the debt accumulation equation, which on the fiscal side involves the primary balance ratio rather than the usual variables used to measure the fiscal impulse (such as the change in the structural balance). It is also worthwhile to point out that the estimates are based on a panel approach that ignores cross-country interdependencies between the relevant drivers of debt dynamics; an interesting extension to the analysis would be to empirically capture such interdependencies which may result, for example, from changes in the fiscal stance in one country influencing economic developments in other euro area countries.

24 An overview of the model-based approach is provided in the chapter entitled "Debt sustainability in the EU" in "Public finances in EMU – 2011", *European Economy* 3, Brussels, September 2011.

25 See Celasun, O., Debrun, X. and Ostry, J.D., "Primary Surplus Behavior and Risks to Fiscal Sustainability in Emerging Market Countries: A "Fan-Chart" Approach", *Working Paper Series*, No WP/06/67, IMF, Washington DC, March 2006.

to be weighed against the drawbacks common to all model-based approaches, namely that the results are not always easy to interpret and are dependent on historical relations.

LONG-TERM BUDGETARY OUTLOOKS BASED ON MICRO MODELS

Generally, for a more reliable analysis of debt sustainability a more in-depth assessment of country-specific risks would be desirable. One example of a comprehensive analysis is the long-term budgetary outlook prepared annually by the United States Congressional Budget Office.²⁶ This in-depth review provides projections for every government revenue and expenditure item, relying on a model-based analysis that accounts for past economic relationships. In particular, the budgetary impact of entitlement policies is projected by using a micro-founded model, which includes comprehensive long-term simulations for age-related spending. Another example of an in-depth long-term budgetary outlook is the Fiscal Sustainability Report published by the United Kingdom's Office for Budget Responsibility.²⁷

Overall, such analyses have clear benefits in terms of being detailed and country-specific. While such an in-depth approach would, in principle, be needed for a reliable assessment, its application to cross-country surveillance of sustainability risks is hardly feasible, given the high data intensity and large monitoring resources needed for this approach.

6 ENHANCING EARLY WARNING MECHANISMS FOR FISCAL STRESS

The above considerations on extending the scope of debt sustainability analysis show that there is, by necessity, a large amount of uncertainty prevailing over the medium term. In addition, even governments for whom the debt sustainability analysis indicates that long-term sustainability is ensured might face shorter-term difficulties in refinancing outstanding liabilities in adverse market circumstances.

Accompanying debt sustainability assessments by monitoring short-term fiscal risks and setting up early warning systems for fiscal stress would therefore appear to be of the utmost importance.

SHORT-TERM LIQUIDITY RISKS

An assessment of short-term liquidity risks, including short-term refinancing needs, accounts for the fact that the composition of government debt in terms of maturity, holdership and currency denomination can have a direct influence on the vulnerability of debt sustainability to negative sentiment and adverse spillovers.²⁸ Generally, countries with a large share of debt maturing in the short term are particularly vulnerable to abrupt changes in interest rates and market sentiment. Chart 5 depicts the estimated gross sovereign financing needs of euro area countries. It points at particularly large government refinancing needs at or above 20% of GDP in 2012 for Greece and Cyprus (which require only partial market funding) as well as for Belgium, Spain, France, Italy, the Netherlands and Portugal.

ESTIMATION OF DEBT LIMITS

As regards forward-looking assessments for identifying fiscal stress, another approach relates to estimating a critical debt limit based on countries' fiscal reaction to debt increases in the past. Based on this country-specific critical debt level, the remaining "fiscal space", namely the additional public debt increase before the critical level will be reached, can then be calculated given the current debt level. This method thus allows for an upfront identification of the size of safety margins and of the different degrees of vulnerability towards shocks affecting the government budget.²⁹

26 See *CBO's 2011 Long-Term Budget Outlook*, Congress of the United States Congressional Budget Office, United States, June 2011.

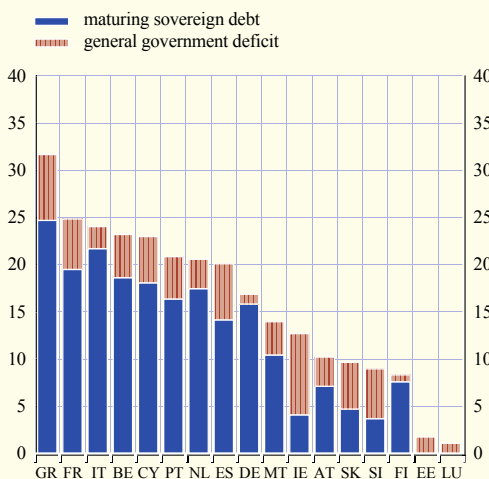
27 See *Fiscal sustainability report*, Office for Budget Responsibility, United Kingdom, July 2011.

28 See, for example, Hartwig Lojsch, D., Rodríguez Vives, M. and Slavík, M., "The size and composition of government debt in the euro area", *Occasional Paper Series*, No 132, ECB, Frankfurt am Main, October 2011.

29 See, for example, Ostry, J.D., Ghosh, A.R., Kim, J.I. and Qureshi, M.S., "Fiscal Space", *IMF Staff Position Note*, No SPN/10/11, IMF, Washington DC, September 2010.

Chart 5 Estimated gross sovereign financing needs in the euro area in 2012

(as a percentage of GDP; end-January 2012)



Sources: European Commission's autumn 2011 economic forecast, ECB and ECB calculations.

Notes: The gross financing needs for 2012 are broad estimates consisting of the redemption of maturing debt and the government deficit (assuming no additional financial operations "below the line"). The estimates are subject to the following caveats. First, they only take into account redemptions of securities, while maturing loans are not included on account of a lack of data (this may lead to underestimation). Second, some government securities do not fall into the ESA definition of general government debt (which might lead to overestimation). However, in order to provide more accurate estimates in the case of Cyprus the chart excludes the special purpose bond of €2.2 billion (12% of GDP) issued with the aim of improving the liquidity of the banking sector. This bond matures in November 2012 and it is expected to be paid back by banks and not to be rolled over by the government. Third, estimates do not account for the fact that some maturing government securities are held within the government sector. Finally, as some data are not yet available, refinancing needs corresponding to short-term debt issued after January 2012 are not reflected in the 2012 data.

EARLY WARNING MECHANISMS FOR FISCAL STRESS

Finally, early warning systems for fiscal stress, which draw on existing models for early warning systems for currency and banking crises,³⁰ employ historical data from crisis episodes to identify variables with leading properties in terms of flagging upcoming crises. The current financial crisis has shown that fiscal sustainability is challenged both by genuine fiscal imbalances and by private sector imbalances which – once they unfold – can have a large adverse impact on public sector balance sheets. The predominant methodological approach to assessing such risks is the "signalling approach". This approach tries to identify critical thresholds for different indicators by minimising wrong predictions of crisis and non-crisis events. An alternative

approach relates to multivariate logit/probit models, which have the advantage of capturing the interaction between different variables that predict crises.

Generally speaking, for a large number of advanced economies, the related studies indicate that financial indicators have larger predictive power for fiscal stress than fiscal variables.³¹ The decisive factor in all these approaches is the way in which fiscal crises and fiscal stress are defined.³² Recent analyses apply a definition, which covers only very severe fiscal stress (including events such as public debt default, large-scale IMF support programmes or yearly inflation rates above 35%). However, to arrive at meaningful results, several refinements to the current approaches seem necessary – including extending the definition of fiscal stress and improving the statistical methodology and the dataset applied.

7 CONCLUSION

The above analysis has shown that conventional debt sustainability analysis can serve as a useful reference point for assessing debt sustainability risks over the medium term. It is also a useful tool for gauging consolidation needs under certain (fixed) economic conditions and it provides a reference point for assessing whether fiscal policy commitments are compliant with debt sustainability. However, conventional debt sustainability analysis has several limitations,

30 See Alessi, L. and Detken, C., "'Real time' early warning indicators for costly asset price boom/bust cycles: a role for global liquidity", *Working Paper Series*, No 1039, ECB, Frankfurt am Main, March 2009.

31 See Baldacci, E., Petrova, I., Belhocine, N., Dobrescu, G. and Mazraani, S., "Assessing Fiscal Stress", *Working Paper Series*, No WP/11/100, IMF, Washington DC, May 2011, or see the chapter entitled "Debt sustainability in the EU" in "Public finances in EMU – 2011", *European Economy* 3, Brussels, September 2011.

32 Fiscal stress events "capture crisis episodes that encompass public debt default and near-debt default events, as well as severe deteriorations in the fiscal solvency risk outlook leading to fiscal sustainability risks" – quoted from Baldacci, E., Petrova, I., Belhocine, N., Dobrescu, G. and Mazraani, S., "Assessing Fiscal Stress", *Working Paper Series*, No WP/11/100, IMF, Washington DC, May 2011.

which must be reflected in a differentiated assessment and communication. Debt sustainability analysis is a simple accounting exercise that relies heavily on the individual judgement of risks, as reflected in the choice of the baseline and the sensitivity tests. Moreover, the definitions underlying debt sustainability (i.e. the stabilisation of government debt) are highly imperfect indicators for debt sustainability because they assume that the government will be able to refinance outstanding obligations in any market condition. The current financial crisis has, however, shown that liquidity risk is an important factor that should not be overlooked. Therefore, a careful and more prudent interpretation of debt sustainability analysis seems warranted.

In looking at how the tools to assess debt sustainability can be improved, the limitations of the debt sustainability analysis framework warrant an extension to the toolkit for sustainability analyses. A more comprehensive approach is needed, comprising a more systematic in-depth assessment of country-specific risks. This would need to include the systematic monitoring of a broad set of fiscal liabilities, replacing the current ad hoc approach to accounting for such risks. Looking ahead, fiscal risks arising from private-sector imbalances and from cross-country spillovers should also be carefully monitored. Moreover, more emphasis should be placed on accounting for fiscal and economic behaviour in response to shocks. However, it should be acknowledged and clearly communicated that any extension of conventional debt sustainability analysis gives rise to a trade-off between comprehensiveness on the one hand and transparency and simplicity on the other.

Finally, as regards the implications for fiscal policies in the euro area, even the most sophisticated debt sustainability analysis cannot overcome the widespread uncertainty surrounding medium to long-term projections. This requires enhancing early warning mechanisms for fiscal vulnerabilities with a view to detecting fiscal stress in a timely

manner. Nevertheless, by their very nature, such technical tools will still only be able to highlight specific aspects of impending risks to government finances. Policy-makers in the euro area therefore need to ensure that public finances carry sufficient safety margins at all times and urgently enable a revival of growth as a prerequisite for reducing sustainability risks. New shocks will differ from those observed in the past and may not give policy-makers the option of adjusting their policies in real time.

The fundamentally changed environment in global financial markets in general, and for sovereign debt financing in particular, calls for a new attitude towards fiscal prudence for the foreseeable future. Debt-to-GDP ratios should therefore be brought to levels safely below 60%. In many euro area countries, this will require significant further consolidation efforts over an extended period of time. While there are clearly very important differences across countries regarding their ability to achieve primary surpluses, many euro area countries under fiscal stress will need to run and maintain primary surpluses of 4% of GDP or above for a prolonged period of time. Looking ahead, the agreements following the European Council meetings of 8-9 December 2011 and 30 January 2012 – and signed on 2 March – including the commitment to establish within the new Treaty on Stability, Coordination and Governance in the Economic and Monetary Union a new fiscal compact comprising a “debt brake”, will need to be strictly adhered to.³³ If fully implemented, they will prove to be an important step towards strengthening fiscal discipline, giving rise to a virtuous circle of lower debt sustainability risks and increasing financial market confidence.

³³ The agreements of the European Council of 8-9 December 2011 and 30 January 2012 – and signed on 2 March – include the establishment of a fiscal compact, comprising a balanced budget rule formulated in structural terms in an intergovernmental treaty at the European level. This is supposed to be enshrined in national legislation and combined with an automatic correction mechanism in case of deviations (debt brake).