

## BOX 7

### PUBLIC DEBT SUSTAINABILITY: EXPANDING THE TOOLBOX<sup>1</sup>

Assessing sovereign debt sustainability has become a key issue for several advanced economies – both inside and outside the euro area – at this stage of the financial crisis. The methodologies used to make such assessments have tended to vary in their assumptions and rigour – perhaps not surprisingly given the difficulty of accurately modelling the complex interplay between fiscal fundamentals, macro-financial conditions and financial sector strength. A commonly used approach is based on a stock-flow identity for public debt accumulation, treating macro-financial conditions as exogenous.

This box seeks to expand the common approach to debt sustainability analysis for the euro area countries, by accounting for the interactions between the key drivers of government debt dynamics.<sup>2</sup> Practical applications of debt sustainability analysis usually consist of a baseline scenario for the development of the debt ratio that is of particular interest from the analyst's perspective and sensitivity tests to assess how the key conclusions are altered by changes in certain assumptions. These scenarios are based on a partial perspective, i.e. they are derived by separately changing one or more variables in the standard stock-flow debt dynamics equation<sup>3</sup> (primary balance-to-GDP ratio, interest rate or economic growth rate), while ignoring potential interdependencies between them. The benefit of this approach is that it allows a straightforward assessment of the “mechanical” implications of alternative assumptions on debt developments. At the same time, economic intuition and empirical evidence provide strong support that fiscal and macro-financial developments are interlinked.

One approach to capture these interdependencies empirically is to estimate a simultaneous equations model consisting of three equations, i.e. for interest rates, growth rates and primary balance ratios, in a panel of euro area countries over the period from 1970 to 2009. Each of these variables is treated as dependent on the others. In addition, further explanatory variables for each of the three equations are chosen in line with the related theoretical and/or empirical literature, including terms to capture potential non-linear responses. Interestingly, it is found that a lower primary deficit contributes to reducing long-term sovereign bond yields, but it does not show a robust impact on growth. Moreover, beyond a certain threshold, the higher the debt-to-GDP ratio, the lower the growth rate and the higher the sovereign yields, but also the stronger the consolidation efforts that countries tend to implement.

In a second step, the estimated relationships, based on the coefficients found to be statistically significant above, are incorporated into the debt sustainability framework to construct scenarios that

1 This box draws on C. Checherita-Westphal and F. Holm-Hadulla, “Public debt sustainability: expanding the toolbox”, proceedings of the ECB's Macro-prudential Research Network (MaRs), 2011.

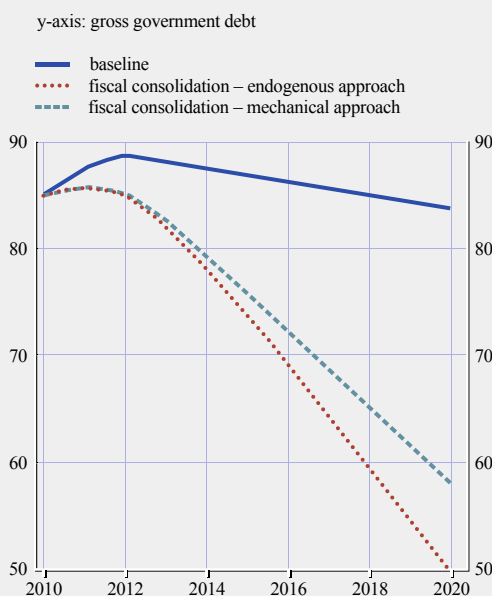
2 Other similar strands of research include: (i) the European Commission's expanded debt sustainability analysis that is based on a general equilibrium approach using the QUEST model (see European Commission, *Public finances in EMU – 2011*, September 2011) and (ii) the IMF's fan charts that are based on stochastic simulations. This second approach is intended to capture the uncertainty surrounding the baseline scenario by examining the impact of a series of shocks drawn from historical experience (see, for example, IMF, *Fiscal Monitor*, November 2010, and IMF, *Modernizing the Framework for Fiscal Policy and Public Debt Sustainability Analysis*, August 2011). The analysis in this box builds on an empirical model of the interdependencies between the variables relevant for debt sustainability analysis, as opposed to simulations or a pre-determined model-based approach. At the same time, this analysis is less prone to small sample bias as it exploits both the time and the cross-sectional dimension of the data. As such, it reflects an average euro area behaviour, for which the usual caveats apply in terms of extrapolating the panel findings to country-specific debt sustainability analyses.

3 For a detailed discussion of all constitutive terms of the debt accumulation equation and the related policy implications, see, for example, ECB, “Ensuring fiscal sustainability in the euro area”, *Monthly Bulletin*, April 2011.

are “internally consistent” (i.e. calibrated such that a deviation from the baseline assumptions with respect to one variable is accompanied by the estimated response in all other variables). For illustrative purposes, the chart presents a baseline debt path for the entire euro area where, for simplicity, primary balance ratios, as well as interest and growth rates, are set at their average values over the years 1999 to 2007, i.e. the period between the start of EMU and the beginning of the financial crisis. Moreover, the chart displays two alternative debt paths: (i) the standard “mechanical” approach derived by separately modifying the primary balance (assuming that governments immediately reduce their headline deficits to the threshold of 3% of GDP set in the Stability and Growth Pact and adopt further fiscal tightening of 1% of GDP per annum until they reach a balanced budget position) and (ii) the “endogenous” approach, which incorporates, in addition, the corresponding interest rate and growth rate effects.

#### Impact of fiscal consolidation under a “mechanical” and “endogenous” debt sustainability analysis

(2010 – 2020; percentages of GDP)



Sources: European Commission (AMECO database) and ECB calculations.

While the debt ratio would move along a slightly downward sloping path as from 2013 in the baseline scenario, debt dynamics are significantly more favourable in the scenarios assuming more ambitious fiscal adjustment. At the same time, the conclusions emerging from the two consolidation scenarios are subject to notable differences: based on the mechanical approach, the debt-to-GDP ratio is projected to fall somewhat below 60% of GDP in 2020, whereas the consolidation scenario, which takes interdependencies into account, would imply a debt ratio that is almost 10 percentage points lower. This reflects findings (derived from the aforementioned estimations) that in the case of high debt-to-GDP ratios, debt-reducing fiscal efforts go along with lower future yields and more favourable growth prospects, thereby reinforcing the direct effect of fiscal consolidation on sustainability.

Overall, the analysis summarised in this box illustrates the difficulties inherent in accurately gauging the interplay between fiscal and macro-financial conditions in coming to an overall determination of fiscal sustainability in any particular country. It underscores the importance of a joint approach, taking into account all relevant factors, in conducting effective debt sustainability analysis – with appropriate consideration of various scenarios to provide a robust signal. Taken alone, however, it is not sufficient to make an overall assessment, but rather provides a crucial ingredient in fiscal (and financial stability) analysis – which needs to be cross-checked with (often numerous) other relevant factors.