

Stochastic debt simulation using VAR models and a panel fiscal reaction function - results for a selected number of countries

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In most of EU Member States, one of the more enduring legacies of the severe economic recession of 2008-2009 is the significant rise in public debt ratios. Debt dynamics results basically from the interplay of (non-fiscal) macroeconomic variables with fiscal policy, including discretionary measures taken in response to economic developments. Economies are continuously subject to shocks. Although by definition shocks cannot be anticipated, under the assumption of the structural stability of macroeconomic relationships and policies, the statistical proprieties of historical data can be used to simulate the probabilistic distribution of future (public debt ratio) outcomes.

This paper emphasises the joint role played by the structure of macroeconomic disturbances facing the economy and those associated with fiscal policy in shaping the risk profile of the public debt ratio. It proposes a probabilistic/stochastic approach to debt dynamics, based on the statistical proprieties of (non-fiscal) macroeconomic variables and the response of fiscal policy to macroeconomic variables. In contrast with the standard type of debt analysis "anchored" on a central scenario, this methodology neither assumes unchanged macroeconomic variables nor fixed fiscal policy (at the last observed value). As regards the latter, availability constraints call for pooling fiscal data across EU Member States in order to assess the (statistical proprieties of the) historical response of fiscal policy to economic outcomes, while controlling for idiosyncratic country characteristics.

Stochastic debt simulations are calculated on two dimensions. The first dimension refers to the type of disturbances assumed for macroeconomic variables (normal errors versus bootstrapped residuals). The second dimension refers to the assumption on the (structural) primary balance (unchanged primary balance at the last observed value versus assuming mean reversion to historical values). Therefore, this methodology presents a four-way typology to assess debt dynamics.

For the period 2012-2016 and covering fifteen EU Member States, debt ratios are simulated 2000 times for each of the four typologies. Debt ratio distributions are then characterised using measures of localisation and distribution, such as deciles and boxplots. Results are not cast in stone but should rather be seen as a snapshot of applying this methodology to the available datasets at the cut-off date of April 2012. Given the reliance on econometric methods, outcomes based on this methodology may be subject to frequent and significant revisions. However, the four-way typology of stochastic debt ratios provides a useful framework to assess the impact of changes in major assumptions, namely comparing the effects of unchanged fiscal policy versus "mean reversion" to historical trends.

Summing up, the evidence strongly suggests that debt ratio paths are not normally distributed, having instead longer right tails (as the bulk of the values lies to the left of the mean); and that primary balances show "fiscal fatigue" and (partial) "mean reversion" to past trends, calling for running also debt sustainability scenarios based on an estimated reaction function of fiscal policy to economic outcomes.