Summary for non-specialists
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Stochastic public debt projections using the historical variance-covariance matrix approach for EU countries

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The methodology for stochastic debt projections based on the variance-covariance matrix of historical shocks is used in this paper (along the lines of di Giovanni and Gardner, 2008, and Beynet and Paviot, 2012) to run projections for 24 EU countries. The methodology is particularly suited to the purpose of featuring macroeconomic uncertainty into the analysis of debt dynamics. Shocks to growth, interest rates and the exchange rate have an impact on the evolution of the debt-to-GDP ratio. It is indeed crucial to take account of these shocks, beyond governments' control, when running debt projections and producing debt sustainability assessments.

More traditional deterministic debt projections (that produce single debt trajectories corresponding to precise sets of macroeconomic assumptions) respond with the so called "sensitivity analysis" to the need to account for the impact of possible macroeconomic shocks. While indeed providing some information on possible changes in debt evolution due to changes in underlying macroeconomic assumptions, sensitivity analysis does anyway only allow accounting for macroeconomic uncertainty in a very limited way, by considering alternative scenarios to the baseline, in which macroeconomic variables are shocked one at the time or ad-hoc combinations of shocks are assumed. The limitation of this kind of approach is twofold. First, only a limited number of alternative scenarios can be designed, while one could think of an infinite number of scenarios reflecting possible changes to growth, interest rates and the exchange rate. Second, the correlation of macroeconomic shocks is fully neglected. Both shortcomings are addressed in a stochastic debt projection framework, where a very large number of random shocks are simulated (2000 in this paper) and both the size of the shocks and their correlation (based on variables' historical behaviour) are taken into account.

A distinctive advantage of the methodology based on the historical variance-covariance matrix approach used in this paper, relative to the alternative methodology relying on VAR modelling, lies in the possibility to use model-independent forecasts to define a "central scenario", around which shocks are applied. To define our central scenario, we indeed used DG ECFIN's (Autumn 2012) forecasts, together with AWG agreed assumptions on the long-run convergence of the non-fiscal determinants of debt dynamics, consistently with the European Commission DG ECFIN's Debt Sustainability Monitor (DSM) model for deterministic debt projections. It is around this central scenario that we simulate shocks to growth, short-term and long-term interest rates, and the exchange rate for non-EA countries. In the model, the cyclical component of the government's balance adjusts to the shocks, while no (discretionary) fiscal policy response is assumed (in line with the no-policy change assumption made in deterministic projections).

The stochastic framework presented in this paper produces probabilistic outcomes, like the probability that the debt ratio for a certain country is higher than a certain value in a given projection year or the probability that the debt ratio stabilises or decreases over the projection horizon. This improves the transparency of simulation results relative to deterministic projections, which provide single debt trajectories, dependent on the specific macroeconomic assumptions made, with no corresponding probabilistic assessment. In the latter case, the reader can only judge about the relevance of the presented debt projection results based on his expectations about the plausibility of the underlying macro-assumptions, while stochastic projections make such a probabilistic assessment explicit.

Results are provided in the paper for all 24 EU countries for both scenarios with temporary and permanent macroeconomic shocks. Cross-country differences in the variance of the distribution of the debt ratio in 2017 (end of projection horizon), reflecting the country-specific volatility of macroeconomic conditions, are evident from the results. This shows the relevance of the applied methodology in providing a more comprehensive and country-tailored assessment of upward and downward risks to debt dynamics, based on which policy recommendations could be "modulated".

Three countries (IT, ES and HU) have been subject to closer scrutiny in the paper. For IT, our simulation results allow to conclude that the most likely outcome is a decreasing path for the debt ratio over the projection horizon (2013-17), despite possible adverse shocks to growth and interest rates. The debt ratio in 2017 is anyway projected to be still higher than 120% with a 30% probability, and higher than 116% with a 50% probability, when temporary shocks are accounted for. For ES, simulation results point to debt sustainability concerns due to the increasing debt path over the whole projection period, for all simulated shock combinations. Under the assumption of temporary macroeconomic shocks, the probability of a Spanish debt ratio greater than 100% is as high as 80% in 2017. Finally, for HU, there is a rather high probability (60%) that the debt ratio broadly stabilises (at around 76-77%) or reaches higher values from 2013 onwards. Under the assumption of temporary shocks, HU would have a 40% probability of a debt ratio higher than 80% in 2017.