

Box 5

The ECB's new euro area banking sector macro-micro model

The new macro-micro model was created for the purpose of macroprudential stress testing of the banking sector.³¹ It is a large-scale, multi-bank and multi-country, semi-structural model. The dynamics of each euro area economy are modelled separately, although they are interconnected via trade linkages.

The model focuses on the banking book of banks' balance sheets. Lending to the non-financial private sector is broken down by country and sector, i.e. non-financial corporations, residential mortgages and consumer lending. Banking book exposures to sovereigns and other financial institutions are also covered. The initial structure of banks' balance sheets is sourced from the stress-test templates of the 2018 EU-wide stress-test exercise. For each of these portfolios, the model estimates loan performance under different macroeconomic conditions, projecting the transition of loans across the three stages of impairment under IFRS 9, loss given default and loss rates. Risk weights are modelled at the same level of granularity. Banks adjust their loan volumes in response to loan demand conditions, while taking account of the loan maturity structure, their capital position, their profitability or the quality of their assets. The same set of factors matters also for the setting of banks' lending margins.

On the liabilities side, the model separates customer deposits and wholesale funding. The deposits are broken down into deposits of sovereigns, other financial institutions, non-financial corporations and households, and for the latter two also into term and sight deposits, each of those following their own supply function depending on economic conditions. Wholesale funding closes the remaining funding gap. The interest rates on deposits depend mostly on economic conditions and monetary policy rates, while wholesale funding costs respond to the perceived counterparty risk of the credit institution, which – in turn – is linked to its capitalisation and asset quality. Finally, banks also adjust the average debt maturity in response to changes in the yield curve.

Regarding profits and losses, the framework captures the dynamics of net interest income, loan loss provisioning and net fee and commission income. Other P&L components, such as dividend income, follow simple dynamic rules linking them, for instance, to the evolution of total assets of banks. Trading book assets, the market risk capital surcharge, banks' dividend holdings and the operational risk capital surcharge follow similar simplified dynamics. Furthermore, banks adjust their profit distribution policies to retain their management buffer over regulatory requirements.

Amplification effects from banks' adjustments to the real economy are captured in the model. In stressed conditions, banks' solvency ratios deteriorate and can fall below the regulatory capital ratios. This can occasionally trigger deleveraging and feed back to the real economy as a negative credit supply shock, amplifying the adversity of the initial macroeconomic scenario.

³¹ The model is applied to the ECB macroprudential stress test conducted since 2018. See Budnik, K., Balatti, M., Dimitrov, I., Groß, J., Hansen, I., di Iasio, G., Kleemann, M., Reichenbachas, T., Sanna, F., Sarychev, A., Siĭenko, N. and Volk, M., "Macroprudential stress test of the euro area banking system", Occasional Paper Series, No 226, ECB, July 2019.