Analysis

New stress-testing framework to assess the capital adequacy of Finnish banks

Financial stability | 04 May 2021 |

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Stress tests are important analytical tools that measure the resilience of banks to sudden, dramatic disruptions to the operational environment. The Bank of Finland and the Financial Supervisory Authority (FIN-FSA) have together developed a new stress testing framework as a more flexible means of testing the loss-absorbing capacity of banks when facing certain local systemic risks. The tool can also be used, for example, when setting macroprudential (capital) buffers.



Risk-taking is very much part of a bank's core business, and banks must have sufficient capital in the event of risks materialising. This could happen with one specific client or as a result of a sudden, significant deterioration in the business environment that is more widespread across different customer groups.

A stress test is an important analytical tool that measures the resilience of banks to various disruptions to the operational environment. Stress tests conducted by the supervisory authorities examine in particular the loss-absorbing capacity of individual banks (micro-stress tests), although they may at the same time help identify possible structural vulnerabilities in the banking system, such as the joint exposure of banks to certain risk types. Macroprudential stress tests have been developed to test the resilience of the entire financial system. These analyse the banking system overall and focus very much on the dynamic relationship between the economy and the banks as well as multiplier effects.

Stress tests can be carried out in two ways. Either the banks themselves use their own risk models to examine how a hypothetical scenario would affect their profit and loss account and balance sheet (bottom-up testing), or an authority uses its own model to work out the sort of credit loss a scenario would result in and how that would affect the typical risk parameters on the banks' balance sheets and, ultimately, their levels of capital (top-down testing).

The main business-related risk for banks is credit risk, which is directly linked to macroeconomic developments and the capital adequacy of the banks. Accordingly, stress tests have tended to focus on credit risk analysis. Another significant type of risk for the banks and subject of analysis in stress tests is market risk, which has an impact on their earnings and capital adequacy when the market value of securities or net interest income change. In recent years, stress testing methods

have improved enormously and, for example, special testing methods have been developed specifically for operational risks and for liquidity risks.

Since 2011, the European Banking Authority (EBA) has conducted Europe-wide stress tests every other year in cooperation with the other European banking authorities. The goal is to test all the main European banks using the same methodologies and criteria and to raise awareness of the resilience of the European banking sector. Banks' loss tolerance is tested based on a three-year-long adverse scenario as a bottom-up exercise. The loss tolerance of Finnish banks has in recent years mainly been tested at the same time.[1]

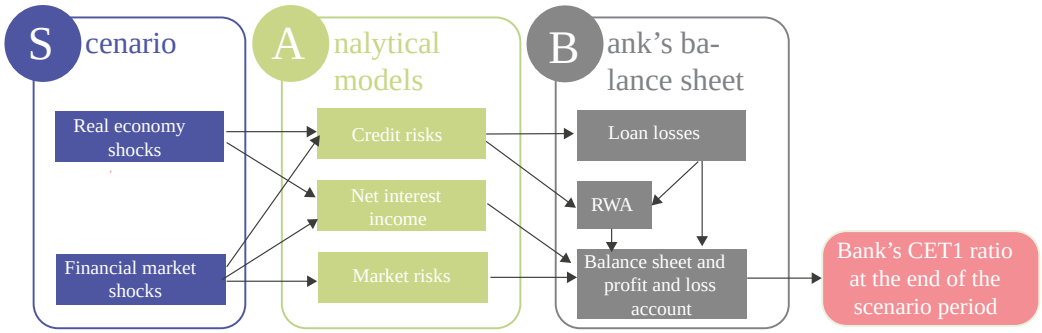
The EBA's stress tests are an important tool in assessing the adequacy of the various banks' capital buffers, although the tests are only carried out once every two years. Furthermore, the focus with them is economic trends and market disruption, which are among the main threats to financial stability in Europe as a whole. To supplement this toolkit, the Bank of Finland and the Finnish Financial Supervisory Authority have together developed a stress test as a more flexible means of testing more local systemic risks to the financial system in Finland and the Nordic countries. The stress tests can also be used to determine the size of different macroprudential (capital) buffers.

The Bank of Finland and FIN-FSA's stress testing framework tests banks' credit, interest rate and market risks

The methodology employed in the stress tests is typically multi-stage in nature and varies according to the type of test. Various econometric models may be used in different stages of the test to support the analysis. There are three stages in the stress testing framework employed by the Bank of Finland and the Finnish Financial Supervisory Authority (Chart 1). In the first, an adverse hypothetical scenario is created. In the second, an estimate is made of the scenario's impact on banks' risk parameters throughout the banking sector employing different econometric models. In the third stage, the effect of the risk parameters on the results and the balance sheet of individual banks is evaluated. This is how information is obtained regarding what each bank's capital adequacy ratio would be by the end of the scenario period.

Chart 1.

Bank of Finland and FIN-FSA's stress testing method has three stages



Sources: Bank of Finland and Financial Supervisory Authority.

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The test starts with the creation of a hypothetical scenario, where, for example, poor economic developments and serious disruptions to the financial markets are significantly undermining the banks' operational environment The scenario is not a forecast: it is intended as an unlikely though possible development in the business environment. The results of the stress test are always contingent on the scenario and only show the loss-absorbing capacity of banks within the context of a selected series of events. Because the banks face many types of risk and potential future sets of circumstances, the scenario has to be chosen with care and has to present the most relevant risks in the opinion of the experts.

In the second stage of the test, different models are used to evaluate the scenario's impact on banks' risks throughout the banking sector. The test uses two econometric models, the first of which is employed to assess the credit losses incurred by the banks as a result of the scenario. The second evaluates the scenario's effect on the banks' net interest income.

The credit risk model employs statistical methods for modelling the link between the general economic situation and the banks' loan losses. It helps to estimate how much loan losses the banks would incur in the context of the economic developments the scenario represents. History shows that rapid economic growth is associated with few indications of credit loss, while high interest rates push up the loan losses. A fast rise in outstanding debt in relation to GDP has been shown in the past to be associated with higher than average amounts of loan losses. Furthermore, house and share prices often help explain why the volume of credit losses is what it is, and the scenario needs to reckon with the direction in which these prices are moving.

The Finnish banks also incur credit losses on loans granted to foreign – mainly Nordic – entities, and so the scenario also needs to cover other countries besides Finland. The modelling exercise distinguishes between credit losses through household lending and those related to loans to business. Information is therefore needed on the loan losses resulting from different types of loan and how the amounts vary according to the economic situation. International data on historical loan losses from different sectors make an assessment of this sort possible.

Net interest income – the difference between interest earned and interest paid – is one of the main sources of income for the banks. It depends chiefly on the amount of bank loans and deposits on the balance sheets and the difference in interest on money borrowed and money lent. In the stress test calculations by the Bank of Finland and the FIN-FSA it is assumed that net interest income is linked to the business cycle and the interest rate. In practice, the variables used in the model are the three-month money market interest rate and nominal GDP. The effect these variables have on the combined net interest income for the banking sector was tested using quarterly data covering the time Finland has been in the euro area.[2] It is assumed that the statistical equivalence found would also apply to the stress testing scenarios.[3]

The final stage involves calculating the impact of the risk parameters on the banks' results and balance sheets. Firstly, the loan loss model is used to predict for various sectors and countries possible changes to the volume of non-performing loans of banks and the probability of default for different customer groups. These changes together with the risk weight formulae in prudential regulation serve to estimate banks' risk-weighted assets (RWA), which are used to determine their capital adequacy ratios.

Secondly, attention is given to the results of the net interest income model, which are directly reflected in the banks' profit and loss accounts. The BOF – FIN-FSA stress testing framework ignores any differences between banks, the assumption being that the net interest income for all credit institutions reflects the economic situation in the same way. Several bank groups have undergone major restructuring. Their market shares as regards the various customer groups have changed. The banking sector overall has altered much less than the individual groups, however, and the changes to market shares do not affect aggregate net interest income.

Thirdly, the effects of a market shock are assessed with reference to the changes in the market variables under the scenario and the risk sensitivities estimated by the big banks themselves.[4] Some of the effects are reflected on the banks' income statements and some are recorded directly as a change to equity, as there are differences in the accounting treatment for instruments measured at fair value. In the case of the smaller banks, the effects have been assessed based on the results of previous bottom-up stress tests and with reference to the market shock caused by

the COVID-19 pandemic in early 2020, since no regular estimates of risk sensitivities are available.

The final result of the test obtained is the solvency situation for each bank at the scenario end-point. The test furthermore produces other important information about the effect of different types of risk on individual banks.

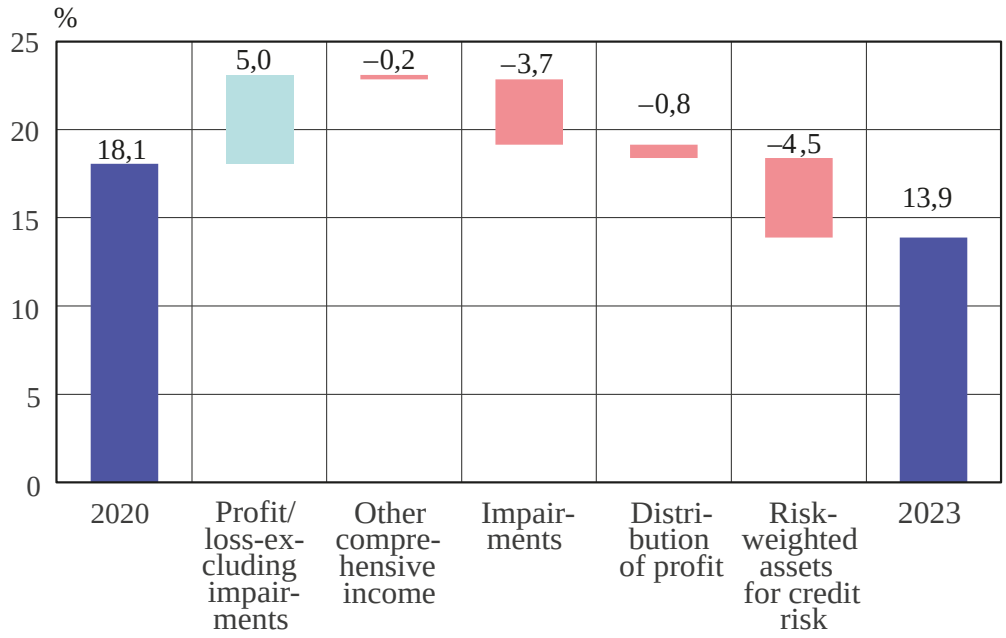
Stress testing framework put to the test

We conducted the Bank of Finland and FIN-FSA stress test[5] on Finnish banks using the scenario employed in the EBA stress tests in 2018 in order to throw light on how it functions. In the scenario the global economy is experiencing a severe recession and financial market disruption: the stock market, the bond market, the housing market – all are in turmoil. In the scenario, housing market shocks play a key role and house prices in Sweden, for example, are plummeting.

The result of the stress test shows that in the adverse scenario the banks' CET1 (capital ratio) falls to 13.9%, from a starting point of 18.1% (Chart 2).[6] The biggest impact on the banks' capital adequacy is, as expected, from the increase in credit risk. The fall in their CET1 (capital ratio) due to greater credit risk is by 8.2 percentage points.[7] Interest rate and market risks affect the capital adequacy of the banks either as a result of poor results or due to changes to equity. The impact both have is moderate compared with the decline in the capital adequacy ratio resulting from credit risk.

Chart 2.

The CET1 capital ratio in the Finnish banking sector falls in the stress test scenario particularly due to the increase in credit risk



Sources: Calculations by the Financial Supervisory Authority and the Bank of Finland.

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The test results show a similar pattern in terms of the relative effects of risks to the EBA test in 2018. However, the CET1 (Capital ratio) of the banks in this test falls more than in the EBA test. The results are not directly comparable, as the starting point for the banks in our calculation is different from what it was in the EBA test in 2018. Moreover, the groupings for the banks tested have changed. For example, Nordea was still being treated as a Swedish bank when it was tested in 2018.

The stress test developed by the Bank of Finland and the FIN-FSA is able to flexibly assess the resilience of banks to systemic risk, thus promoting the solvency of the entire banking sector. The information obtained from it can also be used when setting macroprudential (capital) buffers.

Notes

1. The big Finnish banks are involved in the joint test, in addition to which the FIN-FSA tests ↑

the smaller banks applying the same scenarios and methodology. The Finnish banks have come out well in the test – they would have had sufficient capital to cover the losses incurred in an adverse scenario.

2. There is a stable long-term relationship between sets of variables, discovered using a statistical method called a cointegration test. The relationship can be shown in simple terms, as follows. If GDP were to increase by, say, 1%, the banks' net interest income would increase by around 1.34%, depending on the business results. If the interest rate rose amid low interest rates by approximately one percentage point, the banks' net interest income would increase by around 14%. These 'elasticities' help calculate how net interest income would change in a hypothetical situation where GDP fell. ↑
3. In reality, the change could be stronger or weaker, but if net interest income depends on interest rates and economic cycles, as has generally been the case in the past with banks, the estimates are indicative. ↑
4. This concerns (first-order) sensitivity to a change in the market variables as evaluated by the banks. ↑
5. The stress test in 2018 was the most recent Europe-wide test, because the one conducted in 2020 was cancelled owing to the COVID-19 crisis. The EBA stress test for 2021 was begun in January and its results will be out by the end of July. The calculations and estimates given in this article are there merely to illustrate how the Bank of Finland – FIN-FSA stress testing framework functions. They will have no effect on the banks' monitoring process. ↑
6. The item 'Profit/loss excluding write-downs' is the difference between revenue and expenses in the banking sector before account is taken of write-downs. Consequently, it incorporates the estimated trend in net income interest in the stress scenario and the changes in value of instruments measured at fair value in the profit and loss account caused by a market shock. The item 'Other comprehensive income' includes changes to value caused by a market shock in instruments, changes in whose fair value is recorded directly as changes in equity. The item 'Write-downs' corresponds to the separate impact of estimated bad debts on the core capital ratio in the banking sector. The item 'Distribution of profits' includes any possible distribution of profits on the part of the banks during the stress period. The amount of profit distributed has been worked out in such a way that the banks distribute their profits in each year of the stress period in accordance with their own declared dividend policy or the distribution ratios from previous years, if a positive result for the year in question is recorded. The item 'Risk-weighted assets' shows the effect of the change in RWAs based on the estimated trend in bad debts. ↑
7. Impairments -3.7 percentage points, effect of credit risk on RWAs -4.5 percentage points. ↑

Keywords

banks, macroprudential stability, stress tests, systemic risks