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Further analysis of the stress tests in Financial Stability 2/2012

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Further analysis of the stress tests in *Financial Stability* 2/2012

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The results of macro stress tests of banks' solvency are published twice a year in Norges Bank's Financial Stability (FS) report. The purpose of the stress tests is to assess developments in credit and market risk under different macroeconomic assumptions and the consequences of these developments for the banking system as a whole. A baseline scenario and an adverse scenario reflecting key risk factors were presented in the November report (FS 2/12). This article describes how the adverse scenario in the report is constructed and the sensitivity of the results to changes in key assumptions.

Assumptions in the adverse scenario

The adverse scenario includes key risk factors affecting developments in the real economy that can have an impact on financial stability. One of the objectives of the stress tests has been to reflect the risk outlook described in the *Financial Stability* (FS) reports.[2] The adverse scenarios used in recent years have primarily been based on combinations of the following risk factors:

- A fall in GDP and economic activity for Norway's trading partners
- A fall in oil prices
- Rising turbulence in global money and bond markets[3], affecting banks' funding costs
- A fall in domestic house prices

The outcome of a stress test will depend on both the macroeconomic assumptions and the situation in banks. In order to assess developments in banks' vulnerability over time, however, it is important that the adverse scenario can be compared with adverse scenarios in previous stress tests. FS 2/12 included an adverse scenario which can be used with different years as starting-points. The scenario is based on the following principles and assumptions:

- Variables are increased or decreased to the same levels (for prices and indices) or growth rates (for GDP) each time the shock occurs (see Table 1).
- After the shock has occurred, conditions will gradually normalise. It is assumed that this will take place through an AR (1) process using historical data.
- The impact on interest rates, exchange rates and equity prices is the result of macro model calculations.[4] The key policy rate is changed in line with a Taylor rule for monetary policy, but is always above zero. The exchange rate is sensitive to a fall in oil prices. Equity prices fall markedly in the year the shock occurs.
- It is assumed that fiscal policy functions in line with normal countercyclical policy, and extraordinary fiscal policy measures are therefore not included.

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[1] Thanks to Ingvild Svendsen for useful comments.
[2] See Table 3.
[3] We measure turbulence in money and bond markets using the VIX. The VIX is a volatility index based on derivative contracts as a measure of expected volatility in the US financial market over the 30-day period ahead.
[4] For a description of the model, see Hammersland and Træe (2012).

Table 4 Stress test of banks'[1)] losses and profits. Financial Stability 2/2012

	Baseline scenario[2)]				Adverse scenario 2013			
Macro scenario. Percentage change on previous year, unless otherwise specified	2012	2013	2014	2015	2012	2013	2014	2015
Mainland GDP	3 3/4	3	2 3/4	2 3/4	3 3/4	-3/4	-1	1
CPI	3/4	2	2	2 1/4	3/4	1	1	1
Annual wage growth	4	4 1/4	4 1/2	4 1/2	4	4 1/4	3 1/4	1 1/2
Registered unemployment (percentage of labour force)	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3 1/2	4 1/2
Exchange rate (level. Import-weighted exchange rate index, 44 trading partners)	87	85 3/4	85 1/4	85 1/2	87 1/4	89 3/4	90 1/4	89 1/2
Oil price, USD per barrel (level)	112	105	99	96	112	47	50	52
Average bank lending rates (level)	4 3/4	4 3/4	5	5 1/2	4 3/4	4	3 1/2	2 3/4
House prices	7 3/4	7 3/4	6 1/4	4 1/4	7 3/4	-12 1/4	-7 1/2	-3 1/2
Credit to households[3)]	7 1/4	7 3/4	8 1/2	8 1/4	7 1/4	4 1/2	1 1/2	- 1/2
Credit to non-financial enterprises[3)]	3 1/4	7 3/4	7 1/2	6 3/4	3 1/4	-1 3/4	-8 1/2	-6
Banks' losses and profits								
Problem loans households[4)] (percentage of lending to sector)	1.8	1,7	1.7	1.6	1.8	2.2	2.9	3.5
Problem loans non-financial enterprises[4)] (percentage of lending to sector)	3.1	2,8	3.1	3.3	3.1	4.3	7.9	11
Problem loans total[4)] (percentage of total lending)	2.4	2,2	2.3	2.4	2.4	3.2	5.1	6.7
Loan losses (percentage of total lending)	0.2	0.2	0.3	0.3	0.2	2	3.2	4.2
Pre-tax profits (percentage of average total assets)	0.7	0.7	0.8	0.8	0.7	-0.3	-0.7	-1.3
Net interest income (percentage of average total assets)	1.2	1.4	1.5	1.6	1.2	1.3	1.2	1.1
Tier 1 capital ratios	11.6	11.7	12	12.4	11.6	10	8.9	6.8

[1)] The six largest Norwegian banks.

[2)] Baseline scenario for mainland GDP, CPI, annual wage growth, exchange rate and oil price from Monetary Policy Report 3/2012.

[3)] Change in stock of loans as measured at year-end. Owing to a change in the Norwegian standard for institutional sector classification as from 1 January 2012, credit growth statistics apply only to the period to end-February 2012.

[4)] Non-performing loans and other particularly doubtful loans. All banks in Norway excluding foreign branches.

Sources: Statistics Norway, Technical Reporting Committee on Income Settlements, Thomson Reuters, Association of Real Estate Agency Firms, ECON Pöyry, Finn.no, Association of Real Estate Agents, Finanstilsynet (Financial Supervisory Authority of Norway) and Norges Bank

Table 5 Stress test of banks'[1)] losses and profits. Financial Stability 1/2012

	Baseline scenario[2)]				Adverse scenario 1				Adverse scenario 2		
Macro scenario. Percentage change on previous year, unless otherwise specified	2012	2013	2014	2015	2012	2013	2014	2015	2012	2013	2014
Mainland GDP	3,25	3	3	3	3	-2	-1/4	2 1/4	2 1/2	1 1/4	1
CPI	1	1 3/4	2	2 1/4	1 1/4	1 1/4	3/4	1	1 1/4	1 1/2	1 1/2
Annual wage growth	3 3/4	4	4	4 1/4	4	3 1/2	1 1/2	0	4	3 1/2	2 3/4
Registered unemployment (percentage of labour force)	2 1/2	2 1/2	2 3/4	2 3/4	2 1/2	2 3/4	4 1/4	4 3/4	2 1/2	2 3/4	3
Exchange rate (level. Import-weighted exchange rate index, 44 trading partners)	87 1/4	87 1/4	87 1/4	87 1/2	87 1/4	87 1/4	87 1/4	87 1/2	88 3/4	90 1/4	91
Oil, USD per barrel (level)	121	115	103	103	117	65	65	65	102	87	78
Average bank lending rates (level)	4 3/4	4 1/2	4 3/4	5 1/2	5	5 1/4	3 1/2	2 1/2	5 1/4	5	4 3/4
House prices	8	7 1/4	4 3/4	3 3/4	6 1/2	-7 1/2	-11 3/4	-6	1	-2 3/4	-2 3/4
Credit to households[3)]	8	8 3/4	8 1/2	8	8	4 1/4	2	1/2	6 3/4	5 1/2	3 3/4
Credit to non-financial enterprises[3)]	7	8 1/4	7 3/4	7 1/2	6 1/4	-6 1/2	-11	-7 1/2	5 1/2	1 1/4	-2 1/4
Banks' losses and profits											
Problem loans households[4)] (percentage of lending to sector)	0.9	0.8	0.7	0.7	0.9	1.0	1.2	1.5	1.0	1.0	1.1
Problem loans non-financial enterprises[4)] (percentage of lending to sector)	2.5	2.7	3.0	3.1	2.5	4.3	8.6	10.0	2.7	3.6	5.0
Problem loans total[4)] (percentage of total lending)	1.4	1.3	1.4	1.5	1.4	2.0	3.2	3.6	1.5	1.8	2.3
Loan losses (percentage of total lending)	0.2	0.2	0.2	0.3	0.4	1.4	2.6	3.2	0.7	1.5	2.6
Pre-tax profits (percentage of average total assets)	0.7	0.8	0.8	0.8	0,.6	0.1	-0.3	-0.7	0.5	0.2	-0.2
Net interest income (percentage of average total assets)	1.4	1.4	1.5	1.6	1.4	1.6	1.5	1.2	1.5	1.6	1.5
Tier 1 capital ratio (percentage of risk-weighted assets)	11.4	11.4	11.5	11.7	10.7	10.4	10.0	9.1	10.6	10.1	9.3

[1)] The six largest Norwegian banks.

[2)] Baseline scenario for mainland GDP, CPI, annual wage growth, exchange rate, oil price and money market rate from Monetary Policy Report 1/2012.

[3)] Change in stock of loans as measured at year-end.

[4)] Non-performing loans and other particularly doubtful loans. All banks in Norway excluding foreign branches.

Sources: Statistics Norway, Technical Reporting Committee on Income Settlements, Thomson Reuters, Association of Real Estate Agency Firms, ECON Pöyry, Finn.no, Association of Real Estate Agents, Finanstilsynet (Financial Supervisory Authority of Norway) and Norges Bank

Table 6 Stress test of banks'[1)] losses and profits. Financial Stability 2/2011