Economic commentaries

Stress testing in Norges Bank before and after the crisis – an overview

by Gøril B. Havro, economist, Norges Bank Financial Stability

❀NB❀ NORGES BANK

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Stress testing is a central tool in assessing the outlook for and risks to financial stability, and a tool that has received increased attention in connection with the global financial crisis. Since 2004, Norges Bank has published stress tests in its biannual Financial Stability *reports. This commentary reviews the development of Norges Bank's stress tests from 2008 to spring 2010.*

Prior to the crisis, stress tests focused primarily on domestic shocks. Increased funding costs were viewed as a risk, but the main stress driver was the fragility of the Norwegian housing market. The scenarios were, however, and contrary to many stress tests carried out elsewhere, deeper than the real impact seen in 2008 and 2009. The stress test published in early 2009 was marked by the highly uncertain outlook for financial stability. It showed that banks might fail to meet capital adequacy requirements if the crisis were to escalate further. Norges Bank's stress scenarios were steeper than scenarios published by Sveriges Riksbank and Danmarks Nationalbank during the same period.

Stress testing in *Financial Stability*

Stress tests of Norwegian banks' losses and profits have been carried out in Norges Bank since 2004, and aggregated results have been published in biannual *Financial Stability* reports (*FS*). In the tests, we project the financial statements of Norway's six largest banks[1] 3-4-year ahead based on macroeconomic forecasts. These banks represent over 60 per cent of total banking assets in Norway. As such they serve as a good measure for developments in the Norwegian banking market as a whole. In the model[2], bank losses, interest rates and credit growth are important variables explaining bank profits. Profits and assets affect banks' Tier 1 capital ratios. In practice, the focus of attention is whether banks meet the minimum regulatory capital ratio of 4 per cent Tier 1 capital.

The stress tests aim to analyse the effects on the Norwegian economy and Norwegian banks should the risk factors identified and described in the *Financial Stability* reports materialise. A stress scenario illustrates an economic development with low, yet positive, probability. Three times over the last century has Norway been struck by systemic banking crisis. The economic development during these three periods is shown in Table 1. The probability of the stress scenarios presented in the *Financial Stability* reports is therefore low. That does not mean that they are implausible.

Serious financial stress events occur rarely, and when they do occur, the underlying fragilities and trigger events tend to be different from those seen "in the last crisis". Anticipating new risks that may materialise and evaluating their impact on the economy and on the financial system is crucial in monitoring financial stability. Stress testing is considered an important tool in providing forward-looking risk assessments and overcoming limitations of historical data (Basel Committee on Banking Supervision 2009). The purpose of a stress test is not merely that banks should be able to "pass" any macroeconomic scenario with their capital

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Thanks to Cathrine B. Træe for discussion and technical assistance.

[1] DnB NOR, Nordea Bank Norge, Sparebank 1 SR-Bank, Sparebanken Vest, Sparebank 1 SMN and Sparebank 1 Nord-Norge

[2] For further information, see Andersen, Berge, Bernhardsen, Lindquist and Vatne: "A suite-of-models approach to stress-testing financial stability", Staff Memo, 2/2008, Norges Bank
http://www.norges-bank.no/upload/68187/staff_memo_0208.pdf

requirement intact. They are also informative in spelling out which risks banks could be faced with, and their potential consequences. Also, they can be used to explain how different risk factors may interrelate and how vulnerable Norwegian banks are to the shocks examined. Thus, they can inform the decision-making process involved in weighing measures to increase bank solidity against overall economic costs. Norges Bank draws on the stress tests to give an indication of the financial system's vulnerabilities and makes use of the results both as a communication tool and to inform policy advice. For instance, stress tests informed Norges Bank's advice on the need for and size of the Norwegian State Finance Fund, established in 2009.

Table 1: GDP growth in past crises and Norges Bank's stress tests

	GDP[1] Stress FS 1/08	GDP[1] Stress FS 2/08	GDP[1] Stress FS 1/09	GDP[1] Stress FS 2/09	GDP[1] Stress FS 1/10	GDP[1] 1988-1993 Banking crisis	GDP 1921-1924 Banking crisis	GDP 1900-1904 Kristiania crash
Year 1	2,6	2,6	-1,9	-1,3	0,1	-1,1	-9,7	1,3
Year 2	-1,5	-1,6	-1,3	0,0	0,2	-1,5	10,7	2,5
Year 3	-0,2	-0,5	0,4	0,8	0,5	0,9	2,7	1,5
Year 4	3,6	0,4	1,5	1,5	1,7	1,5	0	-0,6
								0,2
Average	1,1	0,2	-0,3	0,3	0,6	-0,2	0,9	1

[1] Growth in GDP Mainland-Norway

Scenario development in *Financial Stability* 1/08 to 1/10

The stress scenarios selected attempt to evaluate the impact of some of the risks that we see on the horizon, risk factors that are listed in the *Financial Stability* reports. The scenarios have been based on the risks deemed to have the most severe impact on the financial sector, to avoid the caveat of ignoring harmful but plausible scenarios (Breuer et al. 2009).
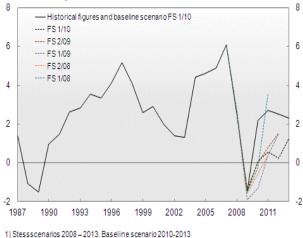
The scenarios considered have also varied, however, based on which risks have been considered as the most likely cause of a crisis. The reports published before the global financial crisis pointed to increased fragilities in the Norwegian economy. These fragilities stemmed from continued high credit growth and the need for a correction in property prices (see Table 2). In the scenarios published in 2008, *FS* 1/08 and 2/08, stress arose due to a fall in household expectations. At the same time, Norwegian banks tightened credit due to falling collateral values and simultaneous shocks to international financial markets. The latter affected banks' financing, increased premiums on market funding and led to higher overall interest rates. The economic downturn, high interest rates and rising unemployment led to a surge in banks' problem loans. Since bank losses lag economic downturns, these continued rising even after economic activity picked up (see Charts 1 and 2).

In *FS* 1/09 and 2/09, the global crisis was the driver for stress in the Norwegian economy, causing exports and oil prices to plummet. The downturn in these scenarios also affected residential and commercial property prices, pulling up bank losses in the commercial and residential property markets. Lending to international shipping and to the Baltic countries was subject to direct shocks in *FS* 2/09. Banks with substantial exposure to these segments were thus more vulnerable.

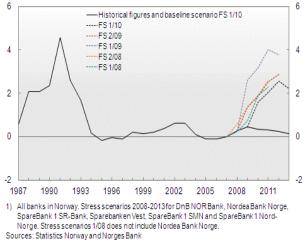In *FS* 1/10, the deep international downturn was still considered to be the most important

risk to financial stability. The stress test considered further negative developments to the international economy. Contrary to the 2009-scenarios, there was no NOK depreciation in this scenario, as Norway was seen as a "safe haven" in a European context. This would affect export sectors negatively. The shocks to specific sectors remained the same as in *FS* 2/09.

Chart 1 Annual volume growth, GDP Mainland-Norway. Stress scenarios in *Financial Stability* 1/08 – 1/10. Per cent. 1987 – 2013[1]

1) Stress scenarios 2008 – 2013. Baseline scenario 2010-2013
Sources: Statistics Norway and Norges Bank

Chart 2 Banks' loan losses. Stress scenarios in *Financial Stability* 1/08 – 1/10. Annual figures. Percentage of gross lending. 1987 - 2013[1]
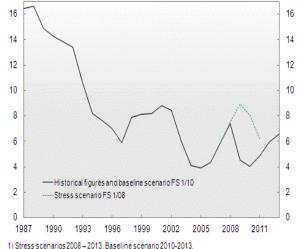
1) All banks in Norway. Stress scenarios 2008-2013 for DnB NOR Bank, Nordea Bank Norge, SpareBank 1 SR-Bank, Sparebanken Vest, SpareBank 1 SMN and SpareBank 1 Nord-Norge. Stress scenarios 1/08 does not include Nordea Bank Norge.
Sources: Statistics Norway and Norges Bank

Stress testing on the eve of the financial crisis – *FS* 1/08

Stress scenarios are not meant to be projections of "the next crisis". Even if they consider imminent risks, they are only meant to serve as a rough approximation for the likely impact on banks' balance sheets (Quagliariello 2009).

With hindsight, however, the scenario chosen in *FS* 1/08 deserves special attention, since it was published just as a major stress event was about to break out. The risk factors and the stress test in this report included continued unrest in money and credit markets, resulting in increased bank funding premiums. While focusing primarily on domestic issues, therefore, the stress test did take account of some of the risks that were later to materialise. Stress scenarios published prior to the crisis have been criticised for failing to select scenarios that were deep enough to anticipate the real events (Alfaro and Drehmann 2009). Core variables in the scenario published by Norges Bank in *FS* 1/08 were in line with actual developments for 2008. Furthermore, the stress outcome was in fact more severe than the crisis that followed, due to additional stress assumptions of inflationary pressures and policy responses.
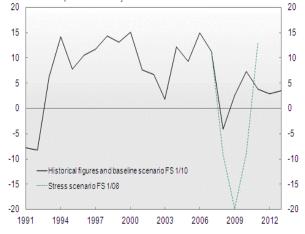
GDP developments in the *FS* 1/08 stress test were fairly accurate for 2008 and 2009 (see Chart 1). Unemployment, credit growth and problem loan developments were also close to the observed values for these variables. At the same time, the profits made by Norwegian firms and banks were in reality much higher than in the stress scenario. This is largely due to the monetary and fiscal policy responses seen during the financial crisis. In the *FS* 1/08 stress scenario, high imported inflation and domestic price pressures led to lending rates of almost 9 per cent in 2009, even though the economy was in a serious downturn (see Chart 3). As a result, property prices fell rapidly (see Chart 4). This scenario clearly diverges from the actual developments seen in 2008 and 2009. During this period, inflation was contained, interest rates have been historically low and property prices have picked up.

Chart 3 Bank lending rates. Annual figures. Per cent. 1987 – 2013[1]

1) Stress scenarios 2008 – 2013. Baseline scenario 2010-2013.
Sources: Statistics Norway and Norges Bank

Chart 4 House prices. Year-on-year rise. Per cent. 1991 – 2013[1]

1) Stress scenarios for 2008 – 2013. Baseline scenario 2010-2013
Sources: Association of Norwegian Real Estate Agents, ECON Pöyry, Finn.no, Association of Real Estate Agency Firms and Norges Bank
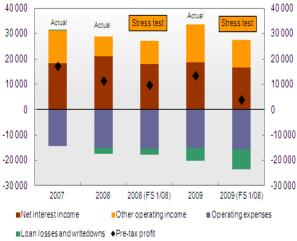
Chart 5 Banks'[1] pre-tax profits. Historical figures and stress scenario FS 1/08. Million NOK. Annual figures.

1) DnB NOR Bank, SpareBank 1 SR-Bank, Sparebanken Vest, SpareBank 1 SMN and SpareBank 1 Nord-Norge
2) Source: Norges Bank

With tumbling property prices, banks' collateral values will fall, and their loss given default rates will rise. Loss given default was assumed to be 25 per cent in 2008 and 50 per cent in 2009 according to the *FS* 1/08 stress scenario. Actual loss given default rates in these years were 21 and 20 per cent respectively. Losses were thus considerably lower in 2009 than assumed in the stress scenario (see Chart 5). At the same time, banks hiked their interest rate margins in 2008 and 2009, thus increasing their net interest income by an average of 15 per cent yearly relative to the stress scenario. Premiums on the stock of banks' market funding were in the stress scenario assumed to increase by 40 per cent through 2008 and 2009. Towards the end of 2009, however, the premiums had increased by 20 per cent. Furthermore, it was assumed that banks' market income would remain severely dented throughout the stress scenario. In reality, while other operating income was 13 per cent lower in 2008 than in the stress test projections, it was 37 per cent higher in 2009. It was particularly the positive developments in the share and bond markets that contributed to this effect. The Basel II transitional rules allowed banks using internal risk models, as were all our six banks, to decrease risk-weighted assets as a share of total assets. Hence the stress effects in the *FS* 1/08 tests were further cushioned, and Tier 1 ratios were held up in spite of severely deteriorating results.

In many ways, the *FS* 1/08 stress test anticipated the problems that a new crisis could bring. What it could not do was to consider the short-term liquidity stress that would arise. This is a risk which few have yet been able to capture in a longer horizon macro-based stress test focusing on bank solvency (Drehmann 2009). What the stress test also neglected was the policy response which helped mitigate losses. It is, however, important that banks do not take such responses for granted and fail to adapt to real risks.
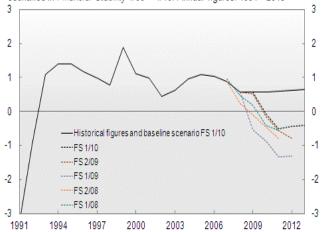
Stress testing in the midst of a crisis – FS 2/08 and 1/09

The scenario presented in autumn 2008 was far more negative than the one published in the previous report (see Table 1). The scenario chosen in *FS* 1/09 was even more severe, reflecting the considerable uncertainty surrounding the economic outlook. In spring 2009, the economic situation was shrouded in uncertainty. The baseline scenario saw bankruptcy rates continuing to rise and collateral values declining. The choice of scenario also reflected a consideration of what would happen if the crisis were to deepen further, potentially affecting the economy as sharply as the 1988-93 banking crisis. Given the outcome of the stress test, the report carried a clear message encouraging banks to increase their capital ratios.

In *FS* 2/08 and 1/09 we assumed that foreign market funding would vanish. This would lead to a 70 per cent increase on the cost of market funding, decreasing net interest income and causing profits to tumble (see Chart 6). Capital ratios in *FS* 1/09 reached levels far below the regulatory requirement of 4 per cent (see Chart 7). This was due to high losses and severely negative profits, but also to banks' low capital level at the outset of the test. In addition, dwindling profits were not accompanied by a credit squeeze, the way they had been in *FS* 1/08 and 2/08. Low, or negative, credit growth implies a dampening of bank lending, thus limiting the increase in risk weighted assets.
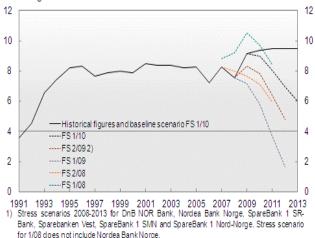
In these scenarios, as in the previous one, interest rate margins have remained constant. Sharp competition for deposits and an unwillingness to push strained borrowers "over the cliff" by increasing lending rates, has been assumed to make such changes difficult. In *FS* 1/09, a sensitivity analysis showed that banks would have had to increase their interest margins substantially not to break the 4 per cent rule on the capital ratio. However, such a move would likely have had a devastating effect on default rates.

Chart 6 Banks' post-tax profits as a percentage of average total assets. Stress scenarios in *Financial Stability* 1/08 – 1/10. Annual figures. 1991 - 2013[1]

1) Stress scenarios 2008-2013 for DnB NOR Bank, Nordea Bank Norge, SpareBank 1 SR-Bank, Sparebanken Vest, SpareBank 1 SMN and SpareBank 1 Nord-Norge. Stress scenario for 1/08 does not include Nordea Bank Norge.
Sources: Statistics Norway and Norges Bank

Chart 7 Banks' Tier 1 ratio. Stress scenarios in *Financial Stability* 1/08 – 1/10 Annual figures. Per cent. 1991 - 2013[1]

1) Stress scenarios 2008-2013 for DnB NOR Bank, Nordea Bank Norge, SpareBank 1 SR-Bank, Sparebanken Vest, SpareBank 1 SMN and SpareBank 1 Nord-Norge. Stress scenario for 1/08 does not include Nordea Bank Norge.
2) Includes increased losses to international shipping and the Baltic region. Does not include planned capital increases.
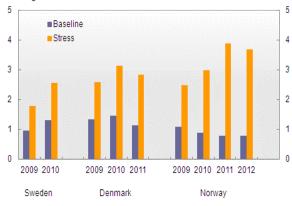Sources: Statistics Norway and Norges Bank

Norges Bank's stress tests in a Scandinavian context

The Nordic banking market is closely interwoven, and Nordic banks have been exposed to similar shocks, albeit of varying degrees of severity. On this basis, Chart 8 compares the stress scenario losses in *FS* 1/09 to the stress scenarios published by Sveriges Riksbank and Danmarks Nationalbank in the same period. Norges Bank's scenario was clearly the more severe.

Sveriges Riksbank focused its scenario on credit risk in the Baltic countries and in

exposed sectors such as construction, commercial property and international shipping. Following increased risk and the pro-cyclicality of Basel II regulations, risk-weighted assets increased by 5 per cent per year. Although Swedish banks' lending to the Baltic countries and other countries with high default rates was substantial, total losses in this scenario were far lower than in *FS* 1/09. Losses in the Swedish scenario were also likely to be lower due to the shorter stress test horizon. There were, however, differences between the banks. Some Swedish banks saw considerably higher losses and faced Tier 1 capital ratios approaching the 4 per cent regulatory requirement. In comparison, all Norwegian banks fell below the regulatory requirement in the stress test.

Chart 8 Banks' loan losses in baseline and stress scenarios published in the spring of 2009. Norway, Sweden and Denmark. Percentage of gross lending. Annual figures. 2009 - 2012[1]

1) Swedish banks' loan losses in the baseline scenario are calculated based on gross lending in the stress scenario.
Sources: Sveriges Riksbank, Nationalbanken, Statistics Norway and Norges Bank

Danmarks Nationalbank published two stress scenarios in spring 2009. The drivers in the first scenario were primarily shocks to the domestic economy, with an accompanying credit crunch and interest rate hike, given Denmark's monetary policy regime. The second scenario, which is presented in Chart 8, included both a domestic shock and a protracted downturn internationally. Unemployment in this scenario increased to 11.8 per cent, compared to 6.3 per cent in the baseline scenario. Even in the more dramatic scenario, the losses incurred by Danish banks are lower than in *FS* 1/09. Over 75 per cent of

the Danish banks see their capital fall below the regulatory requirement, however. The comparatively high losses in Norges Banks' scenario can partly be explained by the high loss given default rate. With 40 per cent loss given default, the rate used in our later stress tests, average yearly losses would have been lower than in the Danish stress test. Half of the banks would have passed the test under these conditions. In addition, the long horizon of the scenario, 4 years, generates considerably poorer results for the banks considered. While Norwegian banks' losses were higher in the stress test in spring 2009, one of Danmarks Nationalbank's scenarios in fall 2009 was clearly deeper than that of Norges Bank.

Emerging from the crisis? – *FS* 2/09 and 1/10

In fall 2009 economic uncertainty and volatility had come down somewhat. The turnaround in the Norwegian economy occurred in 2009 Q2, but this did not become clear until well into autumn. As a result, the stress scenarios in *FS* 2/09 and 1/10 were more moderate than the extreme stress scenario published in spring 2009. At the same time, increased attention was given to new risks for Norwegian banks, primarily in the Baltic countries and the shipping industry.

In the two latest reports, *FS* 2/09 and 1/10, loss given default rates have been assumed to be 40 per cent. This is close to the average of the three years with the highest losses during the Norwegian banking crisis (1990-92). It is lower than in the stress tests that were published in the midst of the crisis and lower than at the trough of the banking crisis. In 1991, losses were at an all time high and loss given default was 55 per cent. In spite of higher loan recovery rates, losses in the *FS* 2/09 and 1/10 stress tests have remained elevated (see Chart 2). These scenarios have hit particularly hard many of the sectors where the six banks have large exposures, including manufacturing, commercial property and international shipping. Also, many prime

residential and commercial property mortgages have been transferred to mortgage companies, allowing bank groups to participate in the government swap exchange arrangement. This has facilitated bank access to liquidity, but has led to increased risk for bank depositors and bond holders, as the loans remaining on the banks' books now have a higher probability of default.

In fall 2009 liquidity risk had diminished and bank funding costs had already risen sharply. Due to this, the stress scenarios in *FS* 2/09 and 1/10 saw lower increases in risk premiums than in the previous reports. In the *FS* 2/09 scenario, banks were also assumed to widen the gap between their lending and deposit rates. Banks reported that they were in the process of increasing their interest margins, so as to better reflect the riskiness of their loan portfolios. This improved profits both in the baseline and stress scenarios. It also pushed up banks' net interest income in the scenario.

While the stress scenarios in *FS* 2/09 and 1/10 were milder in some respects, they also reflected new risks, both to segments of the loan book and in terms of the Basel II regime's pro-cyclical effects. In *FS* 2/09 and 1/10 it was assumed that as borrowers' credit ratings fall and their probability of default rise, risk-weighted assets will rise by 5 per cent per year. Hence, banks' capital adequacy ratios would be significantly weaker. In future stress tests, it will be helpful to consider the effects of further regulatory developments. Also, it will be important to incorporate in more depth other significant risks to financial stability, such as liquidity and contagion risk.

Conclusion

An overview of the stress scenarios in the five latest *Financial Stability* reports shows that the scenarios have developed according to the economic outlook and the risks envisaged. The comparison between the *FS* 1/08 scenario and actual developments shows that GDP growth in itself is insufficient as a measure of severity. Even though GDP growth matched the stress

scenario, the interrelation with other factors played a more important role in determining bank losses. There are good reasons to believe that expansionary monetary and fiscal policy has helped improve debt servicing capacity. As such, it has likely had a dampening effect on bank losses for a given development in economic output. In hindsight, the scenario in *FS* 1/09 looks very dramatic, both in comparison with previous stress tests and the stress tests carried out by Norway's neighbouring economies. However, the scenario reflects the risks present at the time, given the highly uncertain economic outlook. Norwegian banks should be careful in adapting to expected government measures in times of crisis. It would be better if they allow for developments that are more negative than expected. The stress scenarios illustrate the risk of not adapting to these risks.

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Quagliariello, M. (2009): "Macroeconomic stress-testing: definitions and main components" in Quagliariello, M. *Stress-testing the Banking System – Methodologies and Applications.* Cambridge: Cambridge University Press

Table 2 Stress scenarios in Financial Stability 1/08-1/10

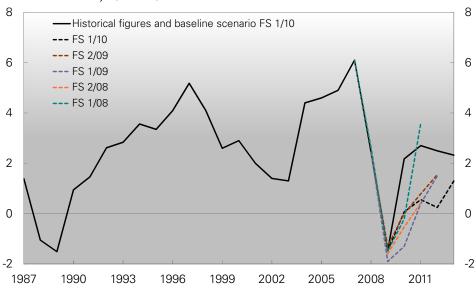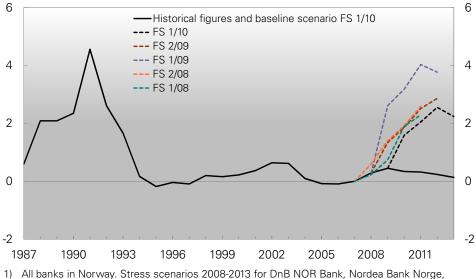|	FS 1/08	FS 2/08	FS 1/09	FS 2/09	FS 1/10
Risk factors	Continued unrest in money and credit markets International downturn Households' financial adjustment Commercial property	Continued unrest in money and credit markets International downturn Households' financial adjustment Commercial property	New collapses in financial institutions Continued international downturn Sudden increases in the saving rate Commercial property	Banks' short term market funding Still low activity internationally High household debt and excessive optimism in the housing market Losses to commercial property, shipping and the Baltic countries	Increasing funding costs Still slow growth internationally High household debt
Stress scenario	Household expectations weaken, causing housing prices to fall. Domestic and imported inflationary pressures. Increased credit and liquidity risk internationally leads to tighter credit.	Increased risk premiums in international money markets and increased risk pricing at banks lead to higher lending rates. Credit is tighter and household expectations weaken.	The oil price falls to USD 30 per barrel, Norwegian exports fall and household expectations weaken.	The oil price falls to USD 40 per barrel, manufacturing declines and household expectations weaken. NOK depreciates and inflation increases. Banks losses abroad increase and banks hike their lending margins.	Slow growth internationally gives low oil prices, around USD 40 per barrel. The real exchange rate is still close to the baseline scenario, as the NOK is considered a "safe haven". Exports fall and unemployment increases. Household expectations weaken.
Shocks	Housh. expectations Credit growth Wage and price rise Risk premiums	Housh. expectations Credit growth Risk premiums	Housh. expectations Oil price GDP (Fall in exports) Unemployment Risk premiums	Housh. expectations Oil price GDP (Fall in exports) Exchange rate (depreciation) Lending margins and risk premiums	Housh. expectations Oil price International GDP Real exchange rate (as in baseline scenario) Risk premiums

Chart 1 Annual volume growth, GDP Mainland-Norway. Stress scenarios in *Financial Stability* 1/08 – 1/10. Per cent. 1987 – 2013[1]

1) Stessscenarios 2008 – 2013. Baseline scenario 2010-2013
Sources: Statistics Norway and Norges Bank

Chart 2 Banks' loan losses. Stress scenarios in *Financial Stability* 1/08 – 1/10.
Annual figures. Percentage of gross lending. 1987 - 2013[1]

1) All banks in Norway. Stress scenarios 2008-2013 for DnB NOR Bank, Nordea Bank Norge, SpareBank 1 SR-Bank, Sparebanken Vest, SpareBank 1 SMN and SpareBank 1 Nord-Norge. Stress scenarios 1/08 does not include Nordea Bank Norge.
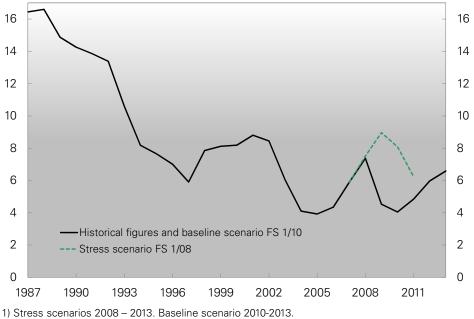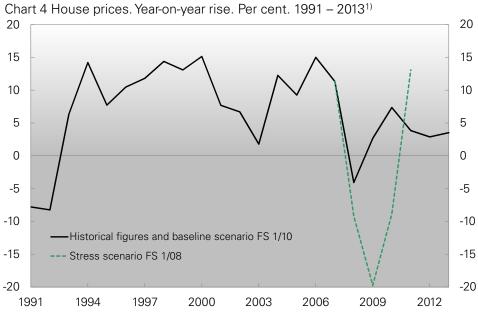Sources: Statistics Norway and Norges Bank

Chart 3 Bank lending rates. Annual figures. Per cent. 1987 – 2013[1]

- —— Historical figures and baseline scenario FS 1/10
- – – – Stress scenario FS 1/08

1) Stress scenarios 2008 – 2013. Baseline scenario 2010-2013.
Sources: Statistics Norway and Norges Bank

Chart 4 House prices. Year-on-year rise. Per cent. 1991 – 2013[1]

- —— Historical figures and baseline scenario FS 1/10
- – – – Stress scenario FS 1/08

1) Stress scenarios for 2008 – 2013. Baseline scenario 2010-2013
Sources: Association of Norwegian Real Estate Agents, ECON Pöyry, Finn.no, Association of Real Estate Agency Firms and Norges Bank
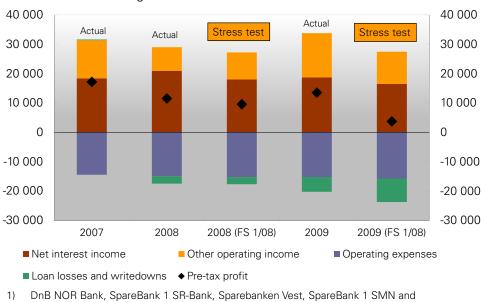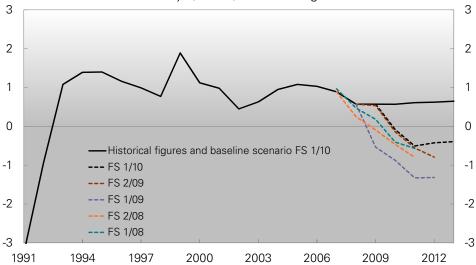
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Chart 5 Banks'[1] pre-tax profits. Historical figures and stress scenario FS 1/08. Million NOK. Annual figures.

1) DnB NOR Bank, SpareBank 1 SR-Bank, Sparebanken Vest, SpareBank 1 SMN and SpareBank 1 Nord-Norge
2) Source: Norges Bank

Chart 6 Banks' post-tax profits as a percentage of average total assets. Stress scenarios in *Financial Stability* 1/08 – 1/10. Annual figures. 1991 - 2013[1]

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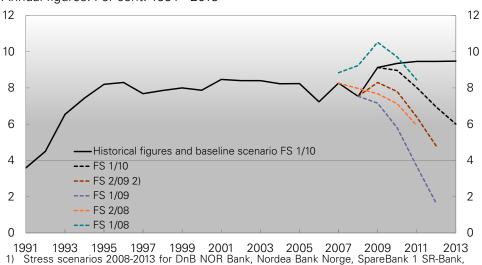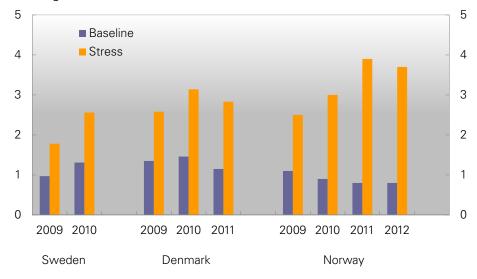Sources: Statistics Norway and Norges Bank

Chart 7 Banks' Tier 1 ratio. Stress scenarios in *Financial Stability* 1/08 – 1/10
Annual figures. Per cent. 1991 - 2013[1]

Historical figures and baseline scenario FS 1/10
FS 1/10
FS 2/09 2)
FS 1/09
FS 2/08
FS 1/08

1) Stress scenarios 2008-2013 for DnB NOR Bank, Nordea Bank Norge, SpareBank 1 SR-Bank, Sparebanken Vest, SpareBank 1 SMN and SpareBank 1 Nord-Norge. Stress scenario for 1/08 does not include Nordea Bank Norge.
2) Includes increased losses to international shipping and the Baltic region. Does not include planned capital increases.
Sources: Statistics Norway and Norges Bank

Chart 8 Banks' loan losses in baseline and stress scenarios published in the spring of 2009. Norway, Sweden and Denmark. Percentage of gross lending. Annual figures. 2009 - 2012[1]

Baseline
Stress

Sweden   Denmark   Norway

1) Swedish banks' loan losses in the baseline scenario are calculated based on gross lending in the stress scenario.
Sources: Sveriges Riksbank, Nationalbanken, Statistics Norway and Norges Bank

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