

MEMORANDUM



Date **13/12/2016**
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FI Ref. 16-18843

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Stress test to assess the capital planning buffer-specific calibration of risk factors and results from SREP 2016

Summary

Finansinspektionen's (FI's) stress test to determine the capital planning buffers for the largest banks, credit market companies and securities companies (hereafter the firms) is divided into a general overarching methodology and a specific calibration of risk parameters. The overarching methodology was published on 10 August 2016 in a decision memorandum¹. The specific calibration of risk parameters can be changed by FI on a year-by-year basis. FI has decided to publish every year post-ex the results of the specific calibration of risk factors. This memorandum describes the calibration that was used during the supervisory review and evaluation process (SREP) for 2016.

FI's overarching methodology states that the capital planning buffer must be of such a scope that it covers as a minimum the deterioration to the capital adequacy corresponding to the firm being exposed to a *severe but plausible financial stress*. For the specific calibration of operational risk parameters, FI makes the assessment that this corresponds to a scenario for risk parameters that probably will occur at least three times but no more than ten times every century.

The financial stress in the stress test has a direct effect on the firms' earnings capacity via net interest income, commission income and net financial income. Furthermore, the stress test introduces unexpected losses for the firms in the form of higher credit losses that are assumed to coincide with large, unexpected operational losses.

¹ See the memorandum, "Stress test methodology for determining the capital planning buffer" (FI Ref. 15-11526)

(http://www.fi.se/upload/90_English/20_Publications/20_Miscellaneous/2016/stresstestmetod-pm-160810eng.pdf)

The elevated risk level is also judged to raise the firm's risk weights, which could lead to higher capital requirements if this occurs in parallel with unfavourable developments in the foreign exchange markets.

It is FI's intention to publish the capital planning buffers for the largest firms, but additional work on the methodology is needed before these buffers can be published in full.

The calculated outcomes for the specific calibration in SREP 2016 showed that none of the ten largest firms were assigned a capital planning buffer in excess of 2.5 per cent of their risk-weighted assets. In other words, the firms' capital planning buffers are smaller than their capital conservation buffers. The outcome of the stress test thus does not affect the participating firms' capital requirements in SREP 2016, with the exception of some individual banks where the Basel I floor exceeds the total capital requirements under CRD4/CRR.

1. General methodology

The overarching methodology is described in a decision memorandum that was published on 10 August 2016 on FI's website. This document lays forth the framework for the stress test that will be used every year to determine the size of the capital planning buffer for the largest firms at a consolidated level. For 2016, this group consists of the ten largest firms.

The overarching methodology can be summarised as follows:

- The balance sheet and income statement from the firms' reported financial data serve as the starting point for the stress test. An assumption of a static balance sheet is applied.
- The stress test analyses a three-year period. The stress is introduced by changing the operational parameters without making any macroeconomic assumptions. The greatest stress is applied in Year 1.
- The overall calibration for the total effect of the changes to the risk parameters is judged to correspond to a negative financial outcome for the firms that occurs at least three times but no more than ten times a century.
- The outcomes of the stress test will be calculated using a top-down approach. This means that FI will calculate the outcome of the stress test using data collected from regular reporting occasions or additional requests for information.

For the 2016 stress test, FI used the firms' income statements and balance sheets from Q4 2015 that were submitted as part of their regular reported data. FI also requested additional information from the firms in question in order to assess the risks associated with interest rate exposures and (where relevant) currency exposures.

FI strives to do all of the calculations for the stress test itself. However, FI believes that it may be necessary in the future to sometimes apply a bottom-up approach for situations where there is no readily accessible data for a specific risk and it is considered particularly burdensome for firms to provide additional information. If such situations occur, FI will clearly specify the assumptions that apply to the firms' calculations in order to treat the firms as equally as possible.

2. Specific calibration of risk factors for 2016

2.1 Stressed income

The specific calibration of risk parameters for the stress test conducted as part of SREP 2016 stresses net interest income, net commission income and net financial income.

2.1.1 Stressed net interest income

FI's first step was to assume that the firms' net interest income for each of the three years of the stress test would be the same as in 2015. FI then used the data reported by the firms for periods of fixed interest and tied-up capital to calculate how changes to different types of interest rates would affect the firms' net interest income.

Three scenarios² were analysed:

- Changes to the risk-free market rate. The effects of two scenarios on the firms' net interest income were calculated: a parallel shift upward of 100 basis points and a parallel shift downward of 50 basis points. The scenarios are asymmetric given the fact that market rates are currently very low, and the interest rate is expected to change less in the scenario where the interest rate continues to fall. The scenario that generated the most negative effect for each firm was used.

²In this memorandum, the term *scenario* refers to an intended change to operational risk parameters that corresponds to a severe but plausible financial stress and does not rest on explicit underlying macroeconomic assumptions.

- A 50-basis point increase to the general credit spread. This scenario analyses the effect of an increase in the general price of credit risk, regardless of what is happening with the market rate. This affects the firms’ interest income and funding costs, both of which rise, but the calculation is done per the capital tie-up date and not the interest fixing date.
- A 50-basis point increase in the firms’ own funding cost for market funding. This stress has been assumed to be idiosyncratic and only affects individual firms. This means that it is not possible to pass the increased funding cost on to the firms’ end customers.

FI has access to data on how large volumes in the firms’ banking books that within a given time interval have been reset to the market rate, the general credit spread and how much of the firms’ market funding falls due during different time intervals. Given this information, FI is able to estimate the effect of the above scenarios on the firms’ net interest income.

2.1.2 Stressed net commission income

FI’s first step was to assume that firms’ net commission income for each of the three years of the stress test will be the same as in 2015. This income was then broken down into procyclical income, for example brokerage fees from equity trading, and other income, for example income from card services. Procyclical commission income fell 20 per cent, while other income fell 5 per cent. All commission expenses rose 5 per cent.

The stress has been calibrated to historical data (Figure 1). During the most recent financial crisis, net commission income fell 10-20 per cent for the four major banks, primarily because costs continued to rise as income contracted or stayed the same. The historical data also clearly indicates that the change to commission income varies depending on the procyclicality of the income source.

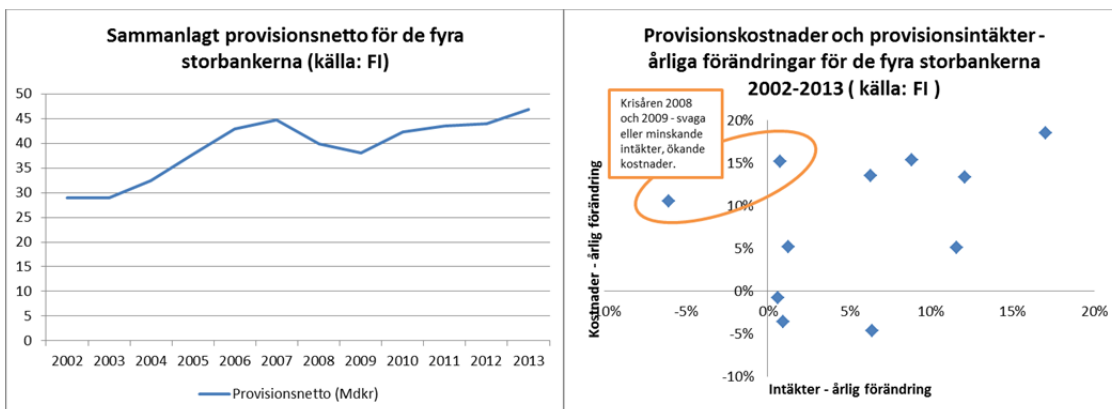


Figure 1. Commission costs and income for the four major banks 2002-2013.

2.1.3 Stressed net financial income

The assumption was made that the firms' net financial income, if positive, fell 20 per cent during the scenario compared to 2015.

2.2 Stressed own funds

The assumption is made here that the firms experience a number of unexpected losses which, in cases where earnings are not sufficiently strong, will have a negative impact on the firms' own funds.

2.2.1 Stressed credit losses

FI's methodology for estimating the credit losses is based on the detailed credit risk data reported by IRB firms. "IRB firms" refers here to the group of firms that are authorised to use an internal ratings-based approach to credit risk. Through this reporting, FI has access to detailed information regarding the firms' Probability of Default (PD) estimates and the expected Loss Given Default (LGD) for different exposures in the firms' portfolios.

By making assumptions about how credit losses will be distributed given these PD and LGD estimates, it is possible to use mathematical formulas to quantitatively describe how large the credit losses can be expected to be at different confidence levels. One such formula that is well-known is the IRB formula³, which is used to determine the capital requirement for credit risk for firms that use internal methods for this purpose.

In SREP 2016's specific calibration of risk factors in the stress test to determine the size of the capital planning buffer, FI used a modified version of the IRB formula to estimate the total credit losses in the scenario. The confidence level in this modified formula was lowered from 99.9 per cent to 98 per cent.

FI has stated in previously published memorandums its opinion that the IRB firms' are underestimating credit risk for mortgages and exposures to corporates.⁴ The credit losses estimated using the modified IRB formula are therefore adjusted so they scale up to a factor that corresponds to the ratio between the risk weights that the firms use for capital adequacy and the risk

³ For a more comprehensive description of the IRB formula, see the Basel Committee's memorandum, "An explanatory note on the Basel II IRB risk weight functions", <http://www.bis.org/bcbs/irbriskweight.pdf>.

⁴ See <http://www.fi.se/Tillsyn/Skrivelser/Listan/Riskviktsgolv-for-svenska-bolan/> and <http://www.fi.se/Tillsyn/Skrivelser/Listan/Nya-metoder-for-bankernas-riskvikter-och-kapitalkrav-beslutade/>

weights that FI considers to be more accurate (15 per cent for mortgages, 30 per cent for corporate lending). These adjusted credit losses for the largest firms' IRB portfolios are then aggregated using the following asset classes: credit institutions, corporates, mortgages and consumption loans.

By analysing the distribution of the firms' risk weights by country in these asset classes, the stressed credit losses are then calculated and expressed as a per cent of the size of the exposure, which is the same for all of the largest firms. In other words, for a certain asset class in a certain country, the largest firms have equally large credit losses in relation to their exposure. Table 1 below shows the credit loss assumptions that are used for the stress applied to Year 1 in SREP 2016's specific calibration of risk factors. For Year 2 and Year 3, the assumption is made that losses will correspond to 50 and 25 per cent, respectively, of Year 1 losses.

	Credit Institutions	Corporates	Mortgages	Consumption Loans
DENMARK	0.20%	1.38%	0.62%	1.92%
ESTONIA	0.53%	1.92%	0.63%	2.52%
FINLAND	0.22%	1.22%	0.62%	1.74%
LATVIA	0.91%	2.28%	1.28%	2.76%
LITHUANIA	0.53%	2.12%	0.92%	2.16%
NORWAY	0.19%	1.26%	0.62%	1.18%
UNITED KINGDOM	0.41%	0.98%	0.62%	1.60%
SWEDEN	0.20%	0.98%	0.62%	1.24%
GERMANY	0.43%	1.51%	0.62%	1.83%
OTHER	0.49%	1.38%	0.62%	1.27%

Table 1. Average modelled credit losses as a per cent of the size of the exposure for the largest firms' IRB portfolios for Year 1 under stress

2.2.2 Calibration of credit losses

According to the overarching methodology that FI has established, the stress within each of the risk parameters included in the stress test is calibrated to be plausible that the resulting stress will occur at least three times but no more than ten times a century. The chosen confidence level of 98 per cent (corresponding to twice a century) at first glance may seem to signal a level of stress that lies outside this interval. However, it is FI's view that the IRB formula includes aggressive assumptions on total diversification, which means that it is not possible to directly translate the chosen confidence level into a frequency. A study of the outcome and a comparison to the credit losses measured during the crisis in the 1990s and the most recent financial crisis show that the specific calibration falls somewhere in-between these two degrees of severity (Figure 2).

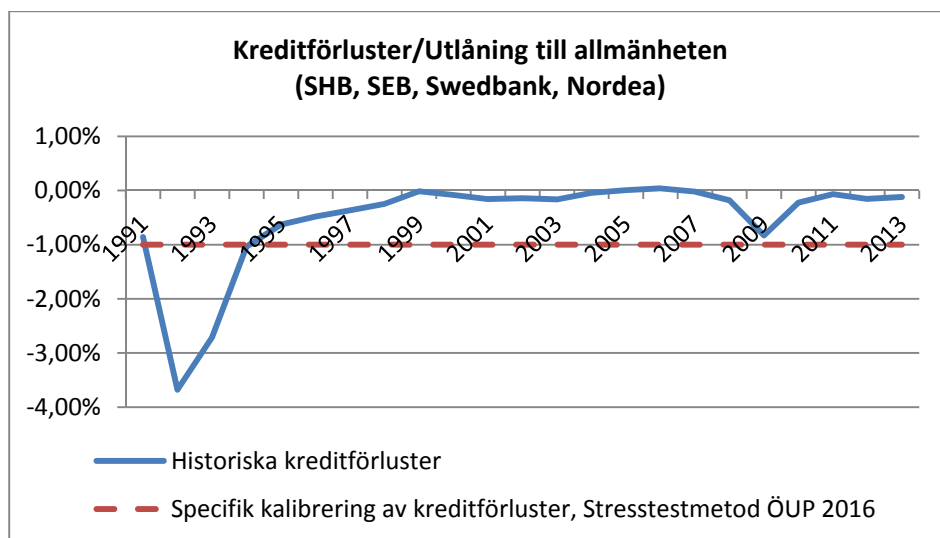


Figure 2. Historical credit losses for the four major banks 1991-2013.

2.2.3 Operational costs

The stress test also assumes that firms are exposed to some form of operational risk cost during Year 1 of the scenario, for example, fraud, unexpected IT costs or legal costs. The operational costs in the scenario are assumed to total 2.5 per cent of the firms' net sales.

2.3 Stressed capital requirements

The firms' capital requirements may be affected by a financial stress. In SREP 2016's specific calibration of risk factors, FI chose to stress the capital requirement for credit risk and analyse what effect a weaker reporting currency would have on the capital requirement.

2.3.1 Increased capital requirement for credit risk

In the presence of a financial stress, it is reasonable to assume that the credit quality of the firms' lending portfolios would deteriorate. For the part of these portfolios that are covered by capital using the internal models (the IRB formula), this deterioration manifests itself in higher PD estimates, which in turn results in a higher capital requirement for credit risk. A certain degree of counter-cyclicality is built into the firms' PD estimates.

However, FI makes the assessment that in a situation as severe as the one the stress test is supposed to reflect, the estimates will still deteriorate. It is very difficult to model how much the risk weights will increase. FI has made the simplified assumption in the specific calibration that the capital requirement for

credit risk increases by 15 per cent in Year 1 of the scenario and is then constant for portfolios where the credit risk is covered by internal models.

2.3.2 Sensitivity of the capital requirement to foreign exchange fluctuations

Some of the largest firms have significant operations in countries with a currency other than their reporting currency. This applies in particular to the four major banks. Through these operations, the firms are exposed to foreign exchange risk that manifests itself in that the value of the firms' assets changes when their reporting currency appreciates or depreciates against other currencies. The firms can manage this risk to their bottom lines by securing funding in currencies that match their assets or entering into currency derivatives. However, even if the firms fully hedge their currency risk in this way, there is still a risk that the risk-weighted amounts will be affected by currency fluctuations. This applies in the scenario where the reporting currency depreciates against other currencies, and also when the capital requirements for credit risk in exposures in other currencies increase when translated to the reporting currency.

In order to stress this effect, the largest firms were asked to submit additional information about the break-down of their risk-weighted amounts by currency. FI was then able to use this information to estimate the effect of the capital requirement given a 10-per cent depreciation in the reporting currency.

2.3.3 Effects of credit losses on the capital requirement

When credit losses arise in an IRB portfolio, they are considered to be exposures that give rise to these losses are considered to be in default. Such exposures do not require a capital requirement, which is why the large credit losses that FI assumes in the stress test also result in a reduction in the capital requirement for credit risk for IRB portfolios.

2.4 Calculating the stress test's outcome

In the specific calibration for SREP 2016, FI chose to calculate the outcome of the stress test as the sum of the loss in income (if applicable) and the increase in the capital requirement. This amount can be considered to constitute the amount of the capital planning buffer. By dividing this amount by the firm's total risk-weighted assets, a percentage is generated that must be compared to the capital conservation buffer of 2.5 per cent. The capital planning buffer will only affect the firms' capital requirements if it is larger than the capital conservation buffer.

With regard to the Basel 1 floor, FI has only considered any losses in income under the scenario and not the increase in the capital requirement.

3. Outcome of the 2016 stress test

The outcome of the 2016 stress test shows that the size of the capital planning buffer in all cases is assessed to be less than 2.5 per cent of the risk-weighted assets. In other words, the capital conservation buffers of all participating firms are sufficiently large to absorb any losses and higher capital requirements under stressed conditions during each of the scenario’s three years.

The capital planning buffer in relation to the Basel 1 floor is assessed without taking into consideration the stress’s impact on the risk-weighted assets and its size is thus the same as the worst result during the three years of the period. The worst negative outcome for all firms occurs in the first year.

For some firms, the Basel 1 floor exceeds the total capital requirement under CRD4/CRR and the results from the stress test will therefore have a direct effect on the capital requirement. Figure 3 shows the distribution of the outcome for Year 1 in the stress test for all banks in relation to the original risk-weighted assets and Figure 4 shows the averages broken down into the major banks and the other banks.

For Common Equity Tier 1 (CET) capital, the outcome of the calculations shows that the CET 1 capital ratios decrease during Year 1 of the stress test but that there is a recovery in Year 2 and Year 3 (see Figure 5).

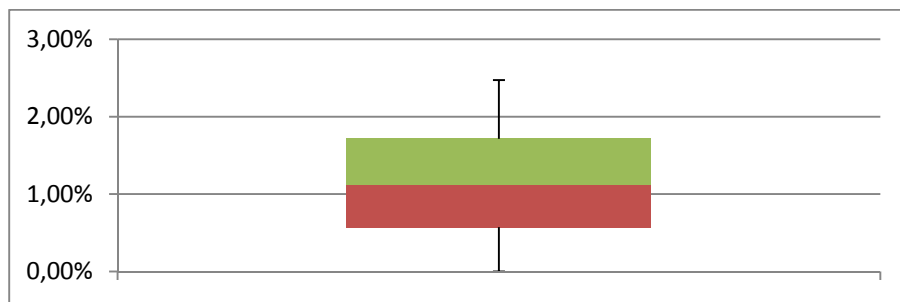


Figure 3. The distribution of the capital planning buffer in per cent of REA Year 1 for the 2016 stress test.

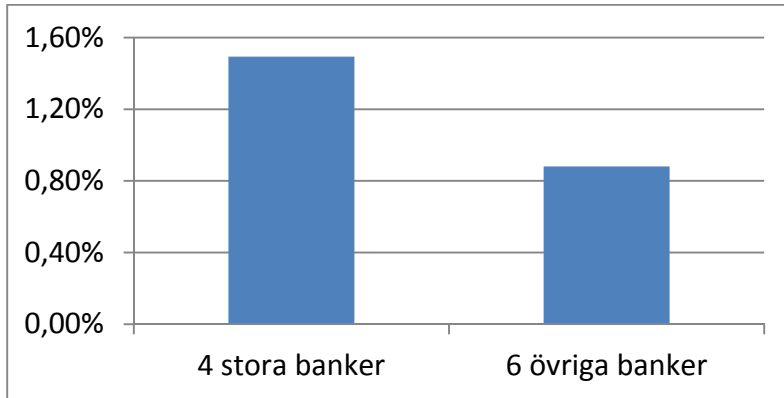


Figure 4. The average capital planning buffer in per cent of REA Year 1 for the 2016 stress test.

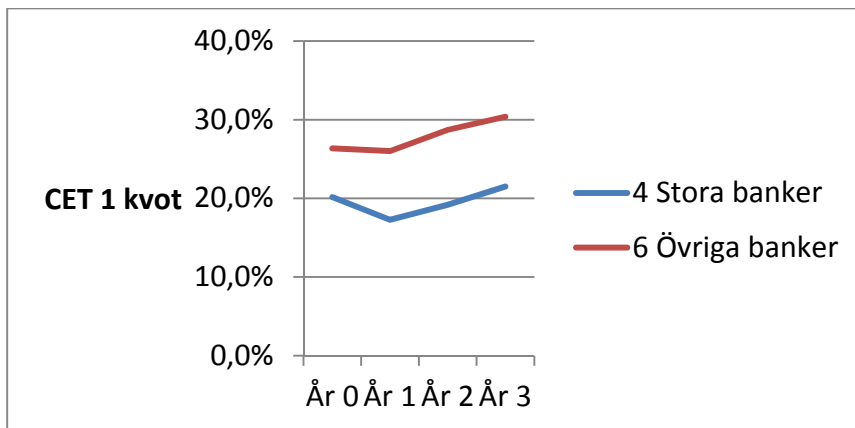


Figure 5. The average CET capital ratios during the 2016 stress test.

The negative outcome for Year 1 of the stress test is primarily caused by a fall in earnings due to large credit losses, but the major banks were also affected by lower income and higher capital requirements due to the increase in their risk-weighted assets.

FI sees a need to further develop the detailed stress test methodology for 2017. FI finds that the evaluation of the outcome of the stress test gives rise to questions that lead to a review of whether the risks the firms are exposed to are accurately represented and whether the calibration of the risk parameters is adequate.

FI intends to increase, if possible, the transparency of the methodology and in 2017 report outcomes for some banks in more detail. See Appendix 1 for a summary of the detailed methodology for 2016 and Appendix 2 for an account of the potential developments for 2017 and onward.

Appendix 1: Summary of risk factors that have been considered in SREP 2016's specific calibration of the stress test methodology

In SREP 2016's specific calibration of risk parameters for the stress test, the effects on the income statement have been taken into consideration by both analysing what happens to income in the stressed scenario and applying assumptions of unexpected losses that have a direct impact on own funds. The firms' risk-weighted assets are also analysed to assess how they may change in the presence of a financial stress. The risk factors that have been taken into consideration for the 2016 stress test are summarised below.

Net interest income

- Changes to the general market rate. The effects of two scenarios on the firms' net interest income were analysed: a parallel shift upward of 100 basis points and a parallel shift downward of 50 basis points. Of these two scenarios, the one that generated the most negative effect for each firm was used.
- A 50-basis point increase to the general credit spread.
- A 50-basis point increase in the firms' own funding cost for market funding.

Net commission income

Procyclical commission income fell 20 per cent compared to 2015, while other income fell 5 per cent. All commission expenses rose 5 per cent.

Net financial income

The assumption was made that the firms' net financial income, if positive, fell 20 per cent during the scenario compared to 2015.

Stressed credit losses

The credit losses in the scenario are calibrated to an average of the IRB firms' 98 per cent quantile for credit losses from the IRB formula.

The largest credit losses occur Year 1. For Year 2 and Year 3, it is assumed that losses will be 50 and 25 per cent, respectively, of Year 1 losses.

Stressed operational losses

The operational costs in the scenario are assumed to total 2.5 per cent of the firms' net sales during the first year of the scenario.

The risk-weighted exposure amount is assumed to be affected by:

- A deterioration in the credit quality of the firms' lending portfolios. The risk weights for IRB exposures are assumed to increase 15 per cent during Year 1 of the scenario and then stay the same.
- The risk weight for defaulted exposures being set to zero for an indefinite period of time. This decreases the risk-weighted exposure amount.
- Depreciation of the reporting currency, which increases the risk-weighted exposure amount.

Any increases in the risk-weighted exposure amount are transformed into increases in the capital requirement. The outcome of the stress test is calculated as the sum of the loss of income (if applicable) and the increase in the capital requirement.

Appendix 2: Additional risk factors that may be considered in the specific calibration for the stress test method for the capital planning buffer in 2017 and onward

FI intends to review the calibration of risk factors and further develop the detailed methodology for the stress test for future SREPs. FI also intends, as needed, to include additional risks that are judged to be significant for the firms in the future.

Below is an example of the risk factors that may be analysed within the framework of the stress test for the capital planning buffer.

- Changes to, for example, equity prices and commodity prices that affect the market value of firms' assets in the trading book.
- Pension risk, i.e. the risk of changes in valuations of contractual pension liabilities.
- Changes to personnel costs and other administrative costs.
- Counterparty risk, i.e. unexpected losses due to the default of counterparties.