

2016-05-24

M E M O R A N D U M

FI's supervision of banks' calculations of risk weights for exposures to corporates**Summary**

Finansinspektionen has decided to implement a new assessment method to evaluate the banks' calculations of risk weights both in general and for exposures to corporates. Banks that use the IRB approach will from this point onward calculate these risk weights under the assumption that at least every fifth year is a "bad year". This means the banks' risk weights will reflect actual risk to a greater extent. The risk weights for exposures to corporates will increase and are expected to be at least around 30 per cent for all banks when the assessment method has been fully implemented. The risk weights will also be less variable, both over time and between banks. By making risk weights more stable over time, the new assessment method will reduce the increase in banks' capital requirements which otherwise occurs in economic downturns.

The current capital adequacy regulations are largely risk-based. This means that the higher the risk of an asset, the more capital a bank must hold. Risk-based capital requirements are an important contributor to good risk management and therefore are beneficial for both financial stability and the manner in which the financial markets function. The major Swedish banks use the internal ratings-based approach (IRB approach), which means they calculate certain parameters themselves that serve as a basis on which their assets are assigned risk weights. One of the most significant of these parameters is the probability that a borrower will default, i.e. not fully discharge its commitments.

The probability of default (PD) is calculated in part on the banks' actual experiences of default. To avoid a situation where developments during good years have too much of an impact on PD, FI recommends that the basis for the PD estimates be divided into two categories – "normal years", with relatively low default frequencies, and "downturn years", with significantly higher default frequencies. PD is then calculated as a weighted average of the default frequencies in these two categories, where the proportion of downturn years is kept stable over time.

The banks' risk weights for exposures to corporates have decreased materially since the IRB approach was introduced in 2007. This is primarily because the

banks have received authorisation to use the IRB approach when calculating the risk weights for increasingly larger parts of their lending, as the regulations anticipate. Since the risks for Swedish banks are lower than the risks used for the calibration of earlier standardised methods, this naturally results in lower risk weights. During this period the banks also decreased the risk in their lending by prioritising lending to more creditworthy customers. They have also become better at taking in and registering collateral and guarantees for the loans granted.

The IRB approach itself also introduces some risks since it is based on assumptions that do not necessarily reflect actual risk. This can depend both on the fact that important economic conditions and dependencies change over time, but it can also be a consequence of the fact that banks have economic incentives to underestimate the actual risk. For example, it is assumed that historical default frequencies can be used to estimate expected future PD. However, if the historical period in question consists primarily of good years, and thus low default frequencies, this approach could underestimate future expected PD. This means that the risk weights are also too low.

Over the past 15 years, the payment capacity of Swedish companies in general has been good and stable. Partly as a consequence of this, banks have had low and stable default frequencies in their lending to Swedish companies. This is due to both structural factors, such as relatively low credit risk, and cyclical factors, such as the absence of any deep economic crises. FI, however, believes that the actual risk is not as low as the banks' experiences, or their assumptions in the IRB approach, would indicate. The fact that Sweden has experienced relatively low and stable default rates since the crisis of the 1990s can to a large extent, in FI's opinion, be due to temporarily beneficial factors. For example, the economy has been more stable in Sweden than in comparable countries and in particular recovered faster after the financial crisis. It is entirely possible that Swedish default frequencies will be less stable and predictable in the future, or that the average default frequencies will be higher than what has been the case historically. With a relatively limited actual experience of periods of economic downturns the rules require conservatism in estimates, which FI's assessment method provides for.

In general, the banks have already made assumptions about downturn periods in their calculations that to varying degrees take into account experiences from the crisis in Sweden in the 1990s. However, FI believes that the banks' assumptions about the downturn periods are not sufficiently prudent, particularly given the fluctuations in comparable countries. Consequently, banks therefore need to assume higher long-term default levels than they have done to-date.

An additional shortcoming in the IRB approach is that it, depending on choice of method, may result in increasing capital requirements in economic downturns, and vice versa. As a consequence, the IRB approach may inflate business cycles as regards, among other things, the ability of banks to provide customers with credit.

The new supervision methods and basis for assessment proposed here by FI entails the following:

- The calculations of PD should assume that at least every fifth year is a downturn year.
- The assumed default frequencies during a downturn year may need to be raised. FI will specifically assess in its supervision whether the banks' assumptions regarding default frequencies during downturn periods are sufficiently prudent.

FI's more prudent approach to how the IRB approach should be applied will also affect its assessment of the other parts of the IRB approach as well as all exposure classes.

FI expects the banks to change their calculations of credit risks and risk weights as soon as possible. It is difficult to determine exactly how great of an impact FI's new assessment basis and supervision methods will have before they are implemented in the IRB approach in a manner FI considers to be reasonable. However, FI has done some initial calculations and the following assessments:

- All banks that use the IRB approach are expected to report higher risk weights at least for corporate exposures, as a consequence of FI's new assessment methodology and supervision. The increase in risk weights is assumed to be at least a couple of percentage points.
- FI's analysis suggests that the differences in risk weights between the banks for comparable exposures, especially in Sweden, will decrease.
- The average risk weights for corporate exposures for all of the larger banks will be at least around 30 percent once the changes have been implemented. It should be noted that this analysis reflects both changes in PD estimation as well as the implications of other supervisory activities.
- Differences in underlying risk will continue to lead to changes in risk weights between different exposures and different banks. FI emphasises that the assessment method does not represent a floor on risk weights for corporate exposures. Future changes in risk profiles in corporate exposures may mean risk weights increase or decrease compared to the level FI's current impact assessment reflects.
- More conservative estimates of the probability of default will also result in the banks' risk weights becoming more stable over time. As a consequence, risk weights will be impacted to a lesser extent, or not at all, by economic downturns compared to what would be the case with the banks' current methodologies. In turn, this will lead to lower business cycle-related fluctuations in banks' capital ratios and consequently, at least to some extent, lower fluctuations in credit supply to the economy across business cycles.

- The changes are expected to increase the interest charged on corporate loans by at most 0.05 percentage points. The impact will be lower than this, or non-existent, during periods of economic downturn.

FI also notes that the capital requirement will increase more as a result of changed maturity assumptions described in the memorandum, *Pillar 2 capital requirements regarding maturity assumptions*.

Following the consultation period, FI has now formally adopted the assessment method described in this document. The implementation of the assessment methodology, and more broadly FI's supervision of the IRB approach, will impact the banks' reported risk weights primarily during 2016. To the extent the changes have not been fully implemented by the end of the third quarter 2016 FI may take into account the expected consequences in the form of additional capital requirements under pillar 2. FI decides on the banks' capital assessments at the latest on the 30 September 2016 for each of the four large banks. Any such additional capital requirements will be included in FI's quarterly publication of the banks' capital requirements.

Contents

- 1 Introduction6
 - 1.1 Background and purpose6
 - 1.2 Capital requirements and incentives7
 - 1.3 Capital requirements and confidence7
- 2 Capital requirements and the IRB approach8
 - 2.1 Introduction8
 - 2.2 The IRB approach and the risk-weight formula in brief8
 - 2.3 Banks' internal risk controls13
- 3 FI's assessment method for appropriate PD estimates13
 - 3.1 Introduction13
 - 3.2 Regulatory requirements on PD estimation: default assumptions and economic cycles14
 - 3.3 FI's position with regard to appropriate estimation methods for long-term PD14
- 4 Supervision of internal models25
 - 4.1 General legal framework for supervision25
 - 4.2 Requirements regarding estimation in the Capital Requirements Regulation, with a focus on PD27
- 5 Implementation28
 - 5.1 FI's expectations with regard to the banks' internal models and risk weights28
 - 5.2 FI's possibilities for intervention30
- 6 Other model aspects31
- 7 Probable consequences31
 - 7.1 Introduction31
 - 7.2 Consequences for society and the banks' customers32
 - 7.3 Consequences for the banks33
- 8 Final comments regarding internal models and risk weights34
 - 8.1 Introduction34
 - 8.2 Risk weights in relation to alternative risk measurements34
 - 8.3 International analysis of differences in reported risk weights37
 - 8.4 Future requirements on the internal models38

1 Introduction

1.1 Background and purpose

Since the implementation of the Basel 2 Agreement¹, credit market companies and securities companies that are subject to FI's supervision (hereafter in this memorandum, "banks") have had the possibility to calculate their risk-weighted exposure amounts themselves for credit risk using internal models². The internal models are used then instead of the standardised approach. Authorisation from FI is required in order to be allowed to use internal models for the calculation of capital requirements. The design of the internal models and the calculation of the estimates used in these models are regulated by the Capital Requirements Regulation³.

The Capital Requirements Regulation also regulates the validation methods and quality assurance processes the banks shall use and the requirements that the supervisory authorities shall consider during their supervision of the internal models⁴. At the same time, the regulatory framework allows the banks the flexibility to choose the methods for risk classification and estimates in the models themselves, provided that the requirements of the regulations are fulfilled.

The risk weights of Swedish banks have fallen since the internal models were introduced and approved. In FI's opinion, this reduction is greater than what can be explained by a decrease in the underlying risk and improved procedures for credit assessment and risk management. As described in more detail in section 4, this unjustified large decline in risk weights is largely due to a much too large effect from the low credit losses over the past 15 years. FI does not consider these credit losses to be representative of reasonable future outcomes.

In this memorandum, FI describes its position and amended assessment methods for its supervision of how the banks calculate one of the most significant assumptions on which the internal models and thus the risk-weighted exposure amounts are based, namely probability of default (PD). FI is also raising in this memorandum a discussion regarding the IRB approach and the conditions and

¹ The Basel II Agreement was implemented in the EU through two directives, in part Directive 2006/48/EC of the European Parliament and of the Council of 14 June 2006 relating to the taking up and pursuit of the business of credit institutions and in part Directive 2006/49/EC of the European Parliament and of the Council of 14 June 2006 on the capital adequacy of investment firms and credit institutions. The latter directive was implemented in Sweden largely through the Capital Adequacy and Large Exposures Act (2006:1371) and Finansinspektionen's regulations and general guidelines (FFFS 2007:1) regarding capital adequacy and large exposures.

² "Internal models" is a general term that refers to the models through which the banks implement parts of the IRB approach as regulated in the Capital Requirements Regulation.

³ Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012.

⁴ Additional regulation comes from delegated regulations and guidelines prepared by the European Banking Authority. Refer to section 4, Supervision of internal models, for a more detailed description.

fundamental assumptions on which it is built. Finally, the memorandum contains a brief general description of FI's supervision of the banks' implementation of the IRB approach in other respects than the PD estimate.

1.2 Capital requirements and incentives

Banks that are subject to FI's supervision shall fulfil a number of different types of capital requirements with differing degrees of risk sensitivity. FI considers there to be significant advantages to using risk-based capital requirements compared to non-risk-based requirements. Exposures with higher risk should result in higher capital requirements, and vice versa. If the capital requirements are not risk-based, banks may experience incentives to raise the risk level in their operations, which could result in a significantly riskier banking system than what would be the case with risk-based capital requirements. The incentives for improved risk awareness that result from the risk-based capital requirements in both regular business activities and the banks' more strategic decisions, according to FI, are significant for financial stability and for the manner in which the financial system functions.⁵

At the same time, the IRB approach allows for possibilities and incentives for the banks, to a certain extent and within the framework of the authorisation, to affect the outcome of their risk classification and estimates in a way that results in lower risk weights, and thus lower capital requirements, than what is justified by the risk level in the bank's operations. FI is of the opinion that the position statements presented in this memorandum will significantly restrict these possibilities.

1.3 Capital requirements and confidence

Confidence in the risk-weighted capital requirements and the banks' capital strength is important, not only for the banks themselves but also for the Swedish economy and Swedish financial stability. If the banks' risk weights are too low in relation to the underlying risks, the capital requirements could lose relevance and the banking system's resilience to disruptions become too low, which in turn could have a negative effect on confidence in the banking system. The complexity of the internal models and limitations in their transparency could also negatively impact confidence.

The Swedish banking system is more dependent on market funding than on average in Europe. Therefore, confidence in the banks' capital strength and their internal models could affect their access to, for example, market funding. New minimum requirements for bail-in-able debt⁶ can be expected to further increase the bank's market dependence.

⁵ For a more detailed description, refer to, for example, *Bruttosoliditetskrav för svenska banker* (FI Ref 14-16911) and *Den framtida utformningen av bankernas kapitalkrav* (FI Ref 15-9548).

⁶ Such requirements are implemented through the introduction of the minimum requirement on own funds and eligible liabilities (MREL) in 2016 and the total loss absorbing capacity (TLAC) at least for global systemically important banks as of 2019. MREL is a part of the Crisis Management Directive (Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014

The primary responsibility for establishing and maintaining the confidence of the market lies with the banks themselves. However, supervisory authorities play a major roll in particular by ensuring that the IRB approach is applied as intended and that the banks reported risk weights, and thus their capital positions, are fairly represented. FI further believes that the improved transparency of the capital requirements and FI's bases for its assessments could also contribute positively to maintaining the market's confidence.

2 Capital requirements and the IRB approach

2.1 Introduction

The risk-based capital requirements are calculated as a percentage of the banks' risk-weighted exposure amounts. For many of the banks that are subject to FI's supervision, credit risk represents the largest portion of the risk-weighted exposure amount. For the major banks credit risk represents 75–85 per cent. The risk-weighted exposure amount also includes market risk and operational risk, as well as other, generally smaller, types of risks. This memorandum discusses specifically the part of the risk-weighted exposure amount that refers to credit risk.

More finely calibrated risk-weighted exposure amounts are intended to provide a fairer and more reasonable presentation of underlying risk, but they also lead to greater complexity than what is the case with simpler and more standardised risk measurements. Risk-weighted exposure amounts that are based on the banks' the internal models also introduce a sensitivity in the risk-weighted exposure amounts to potential deficiencies in estimates, models and controls. This, in turn, leads to more extensive supervision initiatives from FI than if the standardised approach had been used.

2.2 The IRB approach and the risk-weight formula in brief

In conjunction with the implementation of the Basel 2 regulations in 2007, the IRB approach was also implemented for the banks that received authorisation from FI to use such an approach. By using the IRB approach, the banks calculate themselves the estimates for different risk parameters, such as probability of default (PD), loss given default (LGD), conversion factors and maturity.⁷ Based on a risk weight formula specified in the Capital Requirements Regulation and the banks' calculations of relevant parameter estimates, a risk weight is determined

establishing a framework for the recovery and resolution of credit institutions and investment firms and amending Council Directive 82/891/EEC, and Directives 2001/24/EC, 2002/47/EC, 2004/25/EC, 2005/56/EC, 2007/36/EC, 2011/35/EU, 2012/30/EU and 2013/36/EU, and Regulations (EU) No 1093/2010 and (EU) No 648/2012, of the European Parliament and of the Council). For a description of TLAC, visit <http://www.fsb.org/2015/11/total-loss-absorbing-capacity-tlac-principles-and-term-sheet/>.

⁷ As described in section 2.2.2., only banks with authorisation to use the advanced IRB approach calculate the actual LGD, conversion factors and maturity themselves.

for the exposures. This risk weight, when multiplied by the exposure amount, generates the risk-weighted exposure amount for credit risk.

2.2.1 *Expected and unexpected loss*

Expected and unexpected loss are two main terms used in the calculation of risk-weighted exposure amounts under the IRB approach. Expected loss is defined as the product of PD and LGD, which are estimated by the banks themselves. Expected loss can in many cases be calculated by taking into account, for example, historical experiences. Expected loss normally impacts the interest rates or other fees charged for a credit exposure. Expected loss, at least in part, shall also be taken into consideration in the banks' provisions for credit losses⁸. In other words, the bank should ensure in its pricing that its recurring income compensates for an expected loss. Expected loss is also deducted in the calculation of the bank's own funds⁹.

In a capital adequacy context, however, expected loss can be considered a more conservative measure than average historical losses. The measures for LGD and conversion factors (see the explanations for these terms in section 2.2.3) that are used shall refer to economic downturns and not historical averages. Therefore, expected loss in a capital adequacy context can exceed the banks' own expectations for loss levels and as a result expected loss can also be greater than the levels the banks are allowing for when setting prices. It is the Capital Requirements Regulation's more conservative specification of expected loss that is deducted in the own funds calculation.

Unexpected loss, as the term is used in the IRB approach, refers to the risk for losses that significantly exceed the long-term average and are not covered by operational income. In contrast to expected loss, the banks do not estimate unexpected loss themselves. Unexpected loss is given by the risk weight formula, as prescribed in the regulations, although it is based on the banks' estimates of expected loss. This relationship between unexpected and expected loss is due to the risk in the credit portfolio. Therefore, for exposures with low PD, unexpected loss, and thus the risk weights, is proportionately higher in relation to the exposure's expected loss than what would be the case for exposures with higher PD.¹⁰ The Capital Requirements Regulation's minimum capital requirements, i.e.

⁸ With the implementation of IFRS 9 Phase 2, which is intended to enter into force on 1 January 2018, expected credit loss will be taken into consideration to a larger extent in the banks' provisions. Normally, provisions will take into account expected credit losses that are likely to occur during the next year without an actual loss event having occurred. If the credit risk has increased significantly, the provision shall be made for an expected loss over the life of the exposure.

⁹ Deductions are made for the part of the expected loss that are not already taken into consideration in the banks' reserves. See Modifications to the capital treatment for expected and unexpected credit losses in the New Basel Accord, BCBS, 30 January 2004 (<http://www.bis.org/publ/bcbs104.pdf>).

¹⁰ For example, the risk weight formula gives an unexpected loss that is 37 times larger than expected loss for an exposure with PD of 0.25%, LGD of 20% and a maturity of 2.5 years, while

eight per cent of the risk-weighted exposure amount, is calibrated such that the sum of expected loss, which is deducted from the own funds, and unexpected loss, which is covered by the minimum capital requirement, shall correspond to a loss that a creditor can expect to incur during the second-worst year in 1,000 years. The result is a conservative calibration of the minimum capital requirements. This conservativeness is intended to allow for the unavoidable sensitivity and uncertainty of estimates and assumptions as well as other uncertainties in the banks' models.¹¹

2.2.2 *Foundation and advanced method*

There are two versions of the IRB approach in the regulations: a foundation approach for banks that are only authorised to use their own estimates for PD and an advanced approach for banks that are authorised to use their own estimates for PD, LGD, conversion factors and maturity.¹² In the foundation approach, standardised values are used for LGD, conversion factors and maturity. Only the advanced approach is applied to household exposures, and then without consideration for maturity. In Sweden, Handelsbanken, Nordea, SEB and Swedbank have authorisation to use the advanced IRB approach for exposures to corporates and Landshypotek, LF Bank, SBAB, SEK, Volvofinans and a small number of savings banks have authorisation to use the foundation IRB approach for exposures to corporates. The components of the risk weight formula are described in more detail below.

2.2.3 *The risk weight formula and its components in brief*

The risk weight formula was developed by the Basel Committee and has remained more or less unchanged since the implementation of the Basel 2 agreement in 2007. The risk weight formula generates a risk weight for each individual exposure that is based on the bank's estimation of the exposure's expected loss. The expected loss is then used in the risk weight formula to generate a value for unexpected loss.

As described in section 2.2.1, the risk weight formula allows for a conservative calibration of unexpected loss. It does this through a given probability distribution of the extent to which the risk of the different exposures correlate with (is impacted by) what is referred to as a "systemic risk factor". The systemic risk factor can be viewed as an expression for the general economic development. Adjustment for such co-variation is made using different correlation adjustments¹³

unexpected loss corresponds to 17 times the expected loss for an otherwise equal exposure with a PD of 1%.

¹¹ See BCBS, July 2005 (<http://www.bis.org/bcbs/irbriskweight.pdf>), page 11.

¹² The terms "advanced" and "foundation" are used in the Basel Agreement. The Capital Requirements Regulation distinguishes between banks that use their own estimates of LGD values and conversion factors (i.e. advanced approach according to the Basel terminology) and those that do not (i.e. the banks that use the foundation method according to Basel terminology).

¹³ The correlation adjustments are based on the exposures' probability of default and, for exposures to corporates, the size of the borrower. The correlation assumptions are higher, and thus the diversification effects lower, for exposures with lower PD and, in terms of exposures to

in the risk weight formula, which are defined in the Capital Requirements Regulation and are not estimated by the banks themselves. For a more detailed description of the risk weight formula, please refer to the Base Committee's document, An Explanatory Note on the Basel II IRB Risk Weight Function¹⁴. The different risk parameters of the risk weight formula and their use are described briefly in Table 1 below.

Table 1. Components of the risk weight formula that are estimated by the banks

English name	Swedish name	Content	Application
Probability of Default (PD)	Sannolikhet för fallissemang	PD for the coming year ¹⁵ , which corresponds to the percentage of exposures in each risk class that are expected to default every year. The banks estimate expected PD while the risk weight formula re-calibrates PD to a level that corresponds to the IRB approach's general assumption about unexpected loss.	Advanced and foundation approach.
Loss Given Default (LGD)	Förlust givet fallissemang	Loss incurred by the lender upon default (after taking into consideration any collateral and expected recovery after default) during economic downturns, as a per cent of the exposure value.	Estimated only by banks that are authorised to use the advanced approach.
Exposure At Default (EAD)	Exponeringsbeloppet	Exposure at default, adjusted for a conversion factor.	
CCF Credit Conversion Factor	Konverteringsfaktor	Factor that reflects any unutilised credit lines that a borrower can be expected to utilise in the course of a default during economic downturns.	
Maturity	Löptid	Residual maturity of the exposure in years. ¹⁶	

2.2.4 Risk weights

If risk-weighted exposure amounts are fair, the amounts should be larger for exposures with higher risk and smaller for exposures with lower risk, although the relationship is not linear. The IRB approach is intended to measure the risk in the specific portfolio that is being modelled, which is in contrast to the standardised approach, which is based on a globally standardised portfolio. This means that the risk-weighted exposure amounts can vary to a greater extent between different banks and exposure types when the IRB approach is used than what would be the

corporates, for exposures to corporates with higher turnover. Simplified (fixed) correlation assumptions are also specified for household exposures to, for example, mortgages.

¹⁴ BCBS, July 2005 (<http://www.bis.org/bcbs/irbriskweight.pdf>)

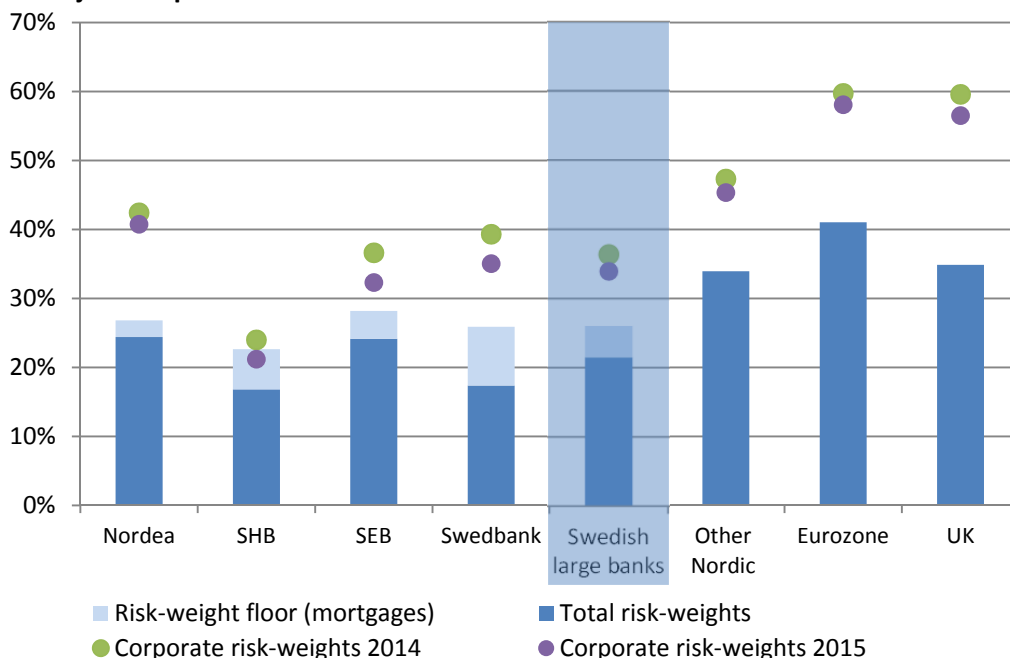
¹⁵ Note that PD shall refer to the long-term average of PD and not the current PD for the coming year.

¹⁶ For a description of the maturity assumptions in the IRB approach, and their rules, see FI's memorandum, *Capital requirements under Pillar 2 for maturity assumptions* (FI Dnr 16-2703).

case with the standardised approach, but these risk-weighted exposure amounts are also meant to be a fairer representation of the actual underlying risk when the IRB approach is used. This also means that the risk weights, i.e. the relationship between the risk-weighted and non-risk-weighted exposure amounts, can vary to a greater extent when the IRB approach is used than when the standardised approach is used. To the extent these differences are attributable to differences in underlying risk, they can be considered intentional and appropriate.

Diagram 1 below shows the major Swedish banks’ average risk weights for their total credit exposures, with and without adjustment for the risk weight floor for mortgages under Pillar 2 as if it was implemented under Pillar 1 (blue bars) and their average risk weights for exposures to corporates in isolation (dots). The Swedish banks’ overall risk weights compared to equivalent risk weights of major European banks. As is shown in the diagram, the Swedish banks’ risk weights, both overall at 25 per cent (including the risk weight floor for mortgages) and separately for exposures to corporates at 37 per cent, are substantially lower than the corresponding risk weights for European banks. At the end of 2015, the average risk weights for the major Swedish banks’ exposures decreased even further to an average of 35 per cent. As described in section 8.2, the Swedish risk-weighted exposure amounts are relatively high in relation to historical actual credit losses.

Diagram 1. Major Swedish banks’ overall risk weights for credit exposures, with and without risk weight floor for Swedish mortgages, and corporate risk weights compared with major European banks



Source: Annual reports of the banks and Pillar 3 reports. Other Nordic banks include Danske Bank and DNB. UK consists of Barclays, Lloyds Bank and RBS. The Euro zone consists of Deutsche Bank, BNP Paribas, Société Générale, Intesa, Unicredit, BBVA and Santander. Handelsbanken’s and Swedbank’s risk weights for exposures to corporates exclude exposures to tenant-owner associations, while the risk weights for Handelsbanken, Nordea and SEB include them.

2.3 Banks' internal risk controls

The banks' own controls and validations of the internal models are a crucial and integral part of the IRB approach and subject to extensive supervision by FI. The control and validation processes and the decision and responsibility structure to which they are subject, are also regulated in detail. EBA's draft technical standards for the assessment of the IRB approach¹⁷, which are described in more detail in sections 3.2 and 4.2, specify the different requirements for internal governance and the internal audit in respect of the IRB approach.

In general, the banks' internal models and the results generated by them shall be subject to extensive validation by an independent control function. The control function must be neither part of a bank's credit department nor dependent on it. It shall report directly to senior management¹⁸. The internal audit shall as a minimum conduct an annual review of the risk systems and the estimation processes¹⁹. Rules for the three "lines of defence" (the operating business, including the credit department, the independent risk control, including the validation function, and the independent internal audit function) are issued by, for example, FI, EBA and the Basel Committee.²⁰

3 FI's assessment method for appropriate PD estimates

3.1 Introduction

FI's supervision of the banks' internal models is primarily based on the Special Supervision Act and the requirements regarding the IRB approach, and the supervision thereof, as set out in the Special Supervision Act, the Capital Requirements Regulation and EBA's technical standards and guidelines. See section 4 for a description of the legal basis.

FI elaborates in this section on the considerations it will take in the future for the assessment of the banks' methods for estimating PD to ensure that the banks' PD calculations to a sufficient extent take into consideration reasonable assumptions about the economic cycle. FI's method takes into account, for example, EBA's proposed technical standards on assessment methodology for the IRB approach.

¹⁷ See CP on Draft RTS on Assessment Methodology for IRB Approach, Eba, 12 november 2014 ([https://www.eba.europa.eu/documents/10180/891573/EBA-CP-2014-36+\(CP+on+RTS+on+Assessment+Methodology+for+IRB+Approach\).pdf](https://www.eba.europa.eu/documents/10180/891573/EBA-CP-2014-36+(CP+on+RTS+on+Assessment+Methodology+for+IRB+Approach).pdf)).

¹⁸ Capital Requirements Regulation, Article 190.

¹⁹ Capital Requirements Regulation, Article 191.

²⁰ See FI's regulations and general guidelines (FFFS 2014:1) regarding governance, risk management and controls in credit institutions, EBA Guidelines on Internal Governance (GL 44), 27 September 2011, and Review of the Principles for the Sound Management of Operational Risk, BCBS, 6 October 2014.

3.2 Regulatory requirements on PD estimation: default assumptions and economic cycles

Appropriate and relevant PD estimates are a fundamental precondition for the IRB approach to generate accurate results. As set out in section 3.3, the Capital Requirements Regulation places extensive qualitative requirements on banks' PD estimates. However, it does not regulate in detail the methods and assumptions that the banks shall use. As a result, this introduces a risk that differences in the banks' implementation and the methods that they choose will lead to unjustified differences in their risk weights and capital requirements.

As mentioned in section 3.3, the Capital Requirements Regulation states that banks shall estimate PD as per obligor grade from long-run averages of default rates over a one-year period²¹. EBA's draft technical standards state that the supervisory authorities shall ensure this by, for example, determining if the downturn period that the bank uses is sufficient and covers a complete economic cycle and if the bank's method for reaching this determination is relevant. In this assessment, the authority, among other things, shall consider the cyclicity of major economic factors.

EBA's draft technical standards also state that authorities shall assess whether the banks are using reconstruction methods under which defaults are estimated for years when no such defaults are observed or if supplemental periods have been constructed, and whether the results of such reconstruction methods have been added to the PD estimation. In the event reconstruction methods have not been used, the authority shall assess whether the bank used requisite conservative adjustments in their PD estimation.

3.3 FI's position with regard to appropriate estimation methods for long-term PD

3.3.1 Introduction

Swedish banks have relatively limited experiences when it comes to credit losses, both in terms of the number of downturn periods and the number of defaults. This is in part due to the relatively good credit quality of the banks' portfolios but also because the Swedish economy – and to an even larger extent the Swedish credit portfolios of the banks – has suffered fewer and less severe downturn periods than what has been the case in other developed economies since the banking crisis in the 1990s.

The supervisory methods outlined in EBA's technical standards, which FI is now implementing in its supervision, need to be supplemented and adapted to Swedish conditions while still aiming to fulfil the purpose of the standard, i.e. to ensure that the banks' methods for PD estimation are relevant, appropriate and include

²¹ Capital Requirements Regulation, Article 180.1(a).

representative assumptions regarding defaults for a complete economic cycle or required conservative adjustments. This is accounted for in the following section.

3.3.2 *FI's position*

FI intends to take the following into account in its assessment of a bank's calculation of long-term PD estimates to determine if the method used is appropriate and reasonably identifies relevant risks:

- If downturn periods constitute less than 20 per cent of the observations that serve as a basis for the PD estimation, the weight of the downturn periods will be considered insufficient.
- In the supervision of the banks, FI plans to evaluate the banks' assumed default levels during economic downturn periods at a portfolio level. FI will ensure that banks' assumptions in these regards are sufficiently conservative and, in material aspects, comparable between banks.
- PD estimates for Swedish exposures should take into account relevant experiences which include the banking crisis in the 1990's. To the extent adjustments of data as regards, among other things, default rates from the banking crisis are deemed necessary in order to make estimates more representative for expected future conditions, such adjustments will need to be justified.
- A similar assessment is required for exposures outside of Sweden of the extent to which the duration and severity of historical downturn periods represent appropriate starting points for the estimation of long-term PD under the IRB approach. Adjustments may be required also for such exposures.
- The PD assumptions may require reconstruction methods, whereby foreign and Swedish default data are used to reach an estimate that can be judged to be representative of a complete economic cycle.
- In its assessments, FI intends to treat PD assumptions for exposures outside of Sweden in the same manner as it treats PD assumptions for exposures in Sweden, if the historical data on which the assumptions regarding exposures outside of Sweden are based on can be expected to underestimate probable future economic cycles and thus the exposures' actual risk.
- FI intends to apply this position to all exposure classes, even if it will focus in particular on exposures to corporates.

3.3.3 *Consultation feedback on FI's position*

FI has received views from the Swedish Federation of Business Owners (Företagarna), Handelsbanken, Nordea, the Board of Swedish Industry and Commerce for Better Regulation (Näringslivets Regelnämnd), SEB, Swedbank,

the Riksbank, the Swedish National Debt Office (Riksgälden) and the Confederation of Swedish Enterprise (Svenskt Näringsliv). Dessa redovisas nedan. Sparbankernas Riksförbund har inget att erinra mot förslaget. Bokföringsnämnden, Revisorsnämnden och Svenska Bankföreningen har valt att inte yttra sig i frågan.

The Riksbank supports FI's proposal and shares FI's assessment that current PD estimates are based on a long period during which the Swedish economy has developed relatively well and during which growth has been higher than in many other countries. The Riksbank raises further issues around the banks' internal model, among others the Riksbank's view that these do not capture structural vulnerabilities or systemic risks.

The Swedish National Debt Office (Riksgälden) supports FI's proposed measures and shares FI's principal view that risk-based capital requirements – founded in banks' own estimates of risks in their business – are essentially positive for financial stability and the effective functioning of financial markets. The Swedish National Debt Office emphasises that this presupposes that the banks' estimates are carried out based on prudent principles and that they are based on well-founded and realistic assessments of actual risks.

The Swedish Federation of Business Owners (Företagarna) rejects the proposal and takes the view that increased capital requirements reduce the profitability of corporate lending, which risks reinforcing the trend towards declining lending to corporates. In the view of the Swedish Federation of Business Owners, with continued growth in lending to households, the proposed measures lead to lower diversification for Swedish banks and, thereby, greater systemic risk. The interest group considers that historical data is the best predictor for future defaults and questions whether (its interpretation of) FI's assessment that the economic development during the last 15 years is "temporary" is a sufficient reason to adopt the proposed measures. The group believes there will be unnecessary and unmotivated changes in Sweden if Swedish regulatory developments precede upcoming changes to the IRB approach at European and international level. The group also requests a more comprehensive impact assessment.

Handelsbanken, Nordea, SEB and Swedbank (in this paragraph collectively referred to as "the banks") raise similar views in their responses. The banks are generally supportive of transparent criteria and principles for FI's assessment of banks' PD estimates. The banks request clarification about what FI considers to be a "bad" or "downturn" year and, in this context, present the view that the banking crisis during the 1990's was too extreme to represent a reasonable starting point for representative, recurring prospective downturn periods. The banks also question why FI proposes to implement an assessment method which differs from the Basel Committee proposal²².

²² Baselkommittén föreslår i ett konsultationsdokument att skattning av PD-värden åtminstone ska baseras på att ett år av tio utgör ett så kallat nedgångsår. Se Baselkommitténs

Handelsbanken considers that FI's proposal mainly raises the capital requirements for banks with demonstrably low historical risks which the bank considers counter-productive. Handelsbanken also states its view that, to the extent PD estimates for large corporates are based on external data, such estimates already take into account the cyclical variation FI explicitly requests. Consequently, in Handelsbanken's view, in such circumstances no further adjustments for business cycle factors are necessary.

Nordea considers it inappropriate that FI precedes international developments as regards capital regulation and rejects the proposal on this basis. According to Nordea, changes in assessment criteria and supervisory methods, and more generally changes in regulatory methodologies, should be undertaken in a synchronised way between supervisory authorities within the European Union. Nordea notes that the proposal has considerable implications on the banks' capital requirements and finds it remarkable that such significant changes are undertaken without changes in the applicable regulation as such. Nordea presents the argument that FI's analysis about the frequency and depth of periods of economic downturn solely reflects Swedish experience and therefore questions the basis for the proposal and the conclusions it is based on. Nordea also requests a full impact assessment and an explanation as to why FI considers it necessary to precede international developments as regards the IRB approach.

SEB presents the view that different and stricter capital requirements for Swedish banks can lead to a situation where Swedish enterprise becomes dependent on financing from international banks, non-regulated entities, and market-based funding. Such a development may, in turn, have negative consequences for financial stability and for the economy more broadly. SEB further considers that FI's proposed supervisory method does not sufficiently take international factors into account and believes FI should await forthcoming technical standards for PD estimation.

Swedbank presents its view that the new assessment method for PD estimation entails a need to review and lower the capital requirements for systemic risk relating to Swedish household lending, given that the capital requirements partly cover the same risk, in Swedbank's view. Swedbank also believes that FI's proposal does not sufficiently reflect international conditions.

The Board of Swedish Industry and Commerce for Better Regulation (Näringslivets Regelnämnd, NNR) rejects the proposal. NNR questions the fact that FI proposes stricter supervisory criteria in the absence of changes in the applicable regulation. NNR further considers that the applicable legislation does not provide FI with the power to issue regulations and believes FI therefore has opted to issue "indirect rules" in the form of stricter assessment criteria. NNR also criticises the fact that FI is not awaiting international regulatory changes and

considers that the proposal disfavors Swedish banks and impacts their competitive positions adversely. NNR further questions the relevance of the banking crisis during the 1990's in the context of PD estimation and requests a more comprehensive impact assessment.

The Confederation of Swedish Enterprise (Svenskt Näringsliv) disagrees with FI's assessment that Swedish experience as regards defaults does not represent a fair representation of risk in the banks' corporate exposures or that the reasons why the Swedish economy has been stable are difficult to determine. According to the Confederation of Swedish Enterprise, the factors which have contributed to a benign historical economic development are likely to remain important also in the future, meaning historical developments are relevant for the future. The interest group further states that FI has not separately identified credit losses for Swedish corporate exposures and states that only one third of Swedish corporate entities have borrowed from banks. As a consequence, default frequencies among the aggregate of the Swedish corporate sector is not necessarily comparable to the default frequencies in the corporate exposures of Swedish banks. The group further questions whether Standard & Poor's corporate portfolio is representative given that it includes a higher proportion of exposures with BBB or lower rating than is the case for Swedish banks, and requests a more elaborate analysis in this regard. Finally the group requests a more comprehensive impact assessment.

3.3.4 *Reasons for FI's position*

Swedish historical experience of defaults and credit losses has been very different than the international experience for a long time, which is described in more detail in the next section. Given this background, FI believes that the banks' PD estimates for Swedish exposures should be based on higher frequencies of default than what has been actually recorded in their Swedish exposures.

The underlying reasons for why the default rates in Sweden have not been significantly affected by the international downturn periods that have occurred since the 1990's are difficult to clearly identify. In FI's view several factors may have contributed to the relatively favourable development in Sweden. These include fewer and less severe downturn periods, lower risk in the exposures of Swedish banks and potentially also greater resilience among Swedish non-financial companies relative to comparable companies in other countries. These, in turn, may have been positively impacted by both financial policy and foreign exchange policy. However, it cannot be completely ruled out that Swedish credit losses could have been quite different – and significantly higher – if the Swedish economy had developed more in line with what has been the case in other comparable countries since the middle of the 1990s.

FI notes that several consultative bodies present the view that there is no reason to expect that the positive factors which are likely to have contributed to a benign experience as regard Swedish default rates will not continue to do so. In FI's view such arguments are based on a view that PD estimates should be determined on a best estimate basis. As is described in further detail in section 4 the applicable

regulation requires that uncertainty in estimation is reflected in conservatism in estimates and margins of conservatism.²³ In other words, it is not sufficient that estimates only take into account best estimate predictions. A marginal which reflects uncertainty must be added above the best estimate prediction.

As described in section 4, the Special Supervision Act²⁴ requires that FI review the internal model's ability to identify relevant risks. The Capital Requirements Regulation requires that the information on which estimates of long-term PD are based must be relevant for the current and foreseeable conditions, and that estimates are more conservative the lower the relevancy of the data available to the bank.

As described in the following section, FI believes that the banks' internal models to a greater extent need to allow for more extensive fluctuations in default levels, and thus include a greater representation of downturn periods. This does not necessarily mean that the PD assumptions will be same for Swedish exposures and foreign exposures – significant differences in underlying risk can exist and Swedish exposures often have relatively low risk. Greater representation of downturn periods results in higher average PD levels, in particular for Swedish corporate exposures, compared to the levels used by the banks today.

The corresponding argument can be made for exposures outside of Sweden. In other words, if the data material available to the banks regarding international exposures is limited as regards the frequency and severity, FI will use the same assessment method for PD as is described in this document. The assessment method will take into account relevant differences in domestic conditions. However, the need for adjustments can be proportionately lower for exposures to regions and sectors with greater representation of credit losses. In these cases, historical experience can be fairer and more reasonable for the estimation.

As described in the following section, Sweden has only suffered one significant economic downturn since 1990, while other developed economies have suffered three. The Swedish banking crisis of the 1990s, however, was deeper and more drawn out than the corresponding downturn internationally. During the period 1990-2014, downturn periods in Sweden represented 16 per cent of the historical period compared to the international equivalent of 24 per cent. FI therefore believes that an appropriate estimation of PD should allow for downturn periods corresponding to at least 20 per cent of the total data set that is used to estimate PD. Currently, Swedish banks are already taking the 1990s crisis into consideration in their calculations, but they do so to varying degrees and FI believes that the weight of the downturn periods in the calculations must be significantly higher.

²³ As is further described in section 4 this particularly applies to uncertainty which results from limited data and the expected range of estimation errors. The lack of significant economic downturns as regards default levels since the banking crisis during the 1990's means that the data material regarding defaults during such periods is more limited and that the range of estimation errors is therefore wider.

²⁴ Credit Institutions and Securities Companies (Special Supervision) Act (2014:968).

FI's assessment method represents a “through the cycle”-based perspective (TTC) to PD estimation. An alternative to TTC is “point in time” (PIT), which takes into consideration the current risk of default at any given point in time. TTC estimates are more stable over time, while PIT estimates vary more and are more sensitive to downturn periods. Two consequences of the TTC estimate is that the banks' risk weights become more stable over time and that the risk weights do not increase as sharply during downturn periods. The reverse applies in normal situations, which is the reason why the risk weights can be expected to increase following the changes to the methodology and supervision described in this memorandum. TTC can thus be expected to stabilise the banks' capital positions to a certain extent. Further methodology changes may be necessary to achieve TTC estimates²⁵ in the portfolios, which FI intends to discuss with the banks as part of its supervisory activities.

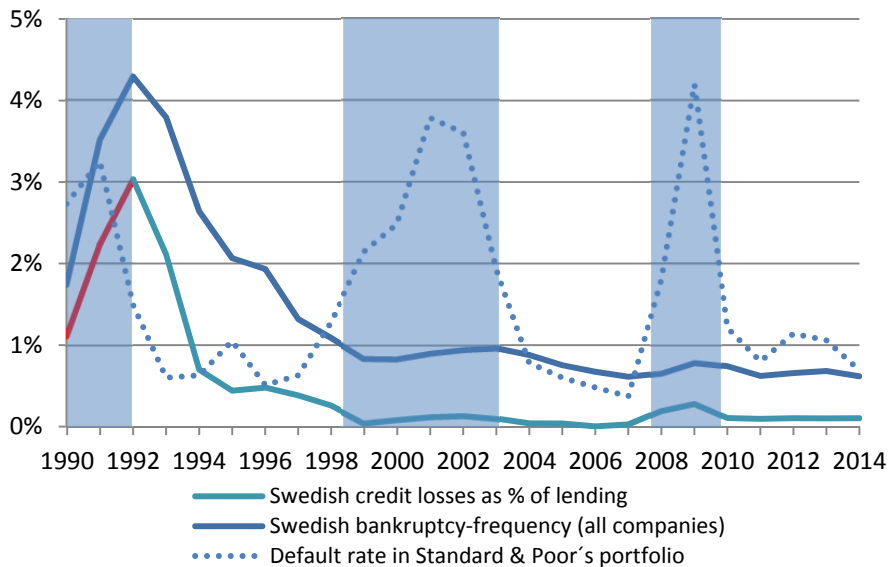
3.3.5 *International and Swedish experiences in terms of credit losses and default levels during the period 1990-2014*

Diagram 2 below shows the *bankruptcy frequency* in the Swedish business sector (dark blue solid line), the Swedish banking system's average *credit losses* (light blue solid line) and the *default frequency*²⁶ for Standard & Poor's aggregate database, which at the end of 2014 included around 6,500 companies (blue dotted line) for the period 1990 to 2014. The graph shows that, internationally, there have been three significant downturn periods since 1990 with regard to company defaults: the first at the beginning of the 1990s, the second at the beginning of the 2000s and the third during the financial crisis (the shadowed area). During the same period, there has only been one downturn period in Sweden.

²⁵ The Basel Committee proposes in its consultation document *Reducing variation in credit risk-weighted assets – constraints on the use of internal model approaches* (BCBS, March 2016) that banks' rating systems shall be stable across normal credit cycles and that rating changes primarily shall reflect idiosyncratic or sector specific factors rather than normal business cycle factors (see <http://www.bis.org/bcbs/publ/d362.pdf>).

²⁶ The terms “bankruptcy” and “default” do not share the same meaning. Default is a more conservative term and “default frequency” can thus be expected to be higher than the bankruptcy frequency. Over time, however, they can be expected to be similar to one another, even if at different levels.

Diagram 2. Swedish banks' credit losses compared to bankruptcy levels for the Swedish business sector and international company default frequencies 1990-2014



Credit losses refer to all exposure types as a percentage of lending to the general public and refer to Swedish banks' domestic companies and foreign branches (but not foreign subsidiaries) and foreign banks' Swedish branches. Data for Swedish credit losses for the years 1990 and 1991 have been extrapolated based on the relationship between credit loss percentages and bankruptcy frequencies in 1992 and 1993. The bankruptcy frequency refers to the number of bankruptcies as a percentage of the total number of registered companies in Sweden. International default frequencies are based on Standard & Poor's global portfolio of companies that had a rating that in 2014, which included around 6,500 companies. Source: SCB and Standard & Poor's.

As presented in the diagram above, the bankruptcy levels for the Swedish business sector have been relatively low and stable for the past fifteen years at around 0.75 per cent, in other words less than half of the average default level in Standard & Poor's total portfolio during the corresponding period. The Swedish banking system's credit losses have been significantly lower than this. During the corresponding period, actual Swedish credit losses were around 0.1 per cent of lending (based on all exposure classes). The diagram also shows the significant difference in cycles between the Swedish bankruptcy and credit losses and the international experience. Swedish banks, in terms of company bankruptcy levels and the banks' credit losses, have avoided two out of the three downturn periods observed internationally since the 1980s.

The relatively low level of credit losses for Swedish banks after the 1990s crisis is naturally a positive for both the Swedish financial sector and Swedish financial stability. However, the above diagram shows that the downturn during the 1990s was significantly stronger and more drawn out in Sweden than was the case internationally.

The diagram also shows that the difference in Swedish credit losses between the 1990s crisis and the following period was proportionately much larger than the corresponding difference in the bankruptcy frequency. A corresponding historical time series for Swedish defaults is not available. Poorer LGD outcomes during the 1990s crisis contributed to such a development, and improvements in risk management and regulations may also have been influential in decreasing credit

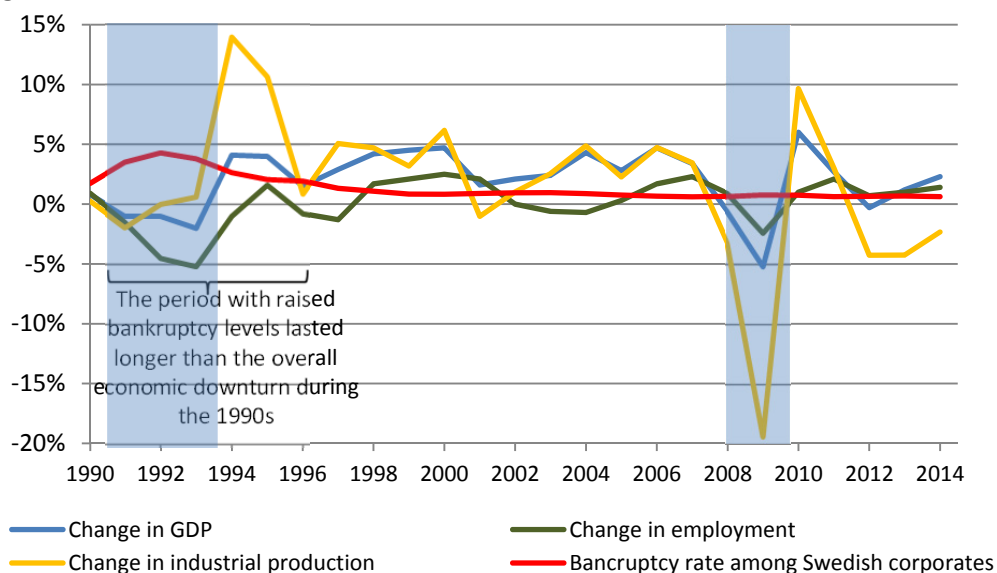
losses over time. Swedish experience could also indicate that the banks' risk classification procedures have not functioned as well in a severe economic downturn like the 1990s crisis as they did under more normal conditions. However, extensive conclusions about the 1990s crisis should not be drawn given the changes and improvements, in terms of the banks' risk management, regulations and supervision, that have been implemented since then.

3.3.6 Swedish and international economic cycles during the period 1990–2014

The Swedish economic development since the 1980s has been characterised by two periods of significant economic downturn: at the beginning of the 1990s ("the 1990s crisis" or "the banking crisis") and the period 2008–2009 ("the financial crisis"). See Diagram 3 below. Sweden suffered a significant contraction in its GDP during the financial crisis (the blue line in the following diagram). The contraction of more than five per cent in 2009 was larger than the contraction during the 1990s crisis. Aggregate industrial production simultaneously fell by one-fifth (yellow line). Compared to the 1990s crisis, however, the GDP contraction during the financial crisis was much shorter.

The Swedish credit market, however, has undergone significantly more beneficial development after the financial crisis, and after the difficult years during the banking crisis of the 1990s, than was the case for the Swedish economy in general. Despite the sharp economic downturn in 2009, Swedish company bankruptcies (the red line in the following diagram), remained at a low, stable level for at least fifteen years.

Diagram 3. Swedish historical macroeconomic indicators 1990–2014



Source: SCB

Diagram 4 below shows that Sweden has had relatively good and stable economic growth after the banking crisis at the beginning of the 1990s compared to Great Britain, the USA and the Euro zone (for which data is only available since 1996). As described above, Sweden suffered a sharp fall in GDP in 2009 following a

relatively mild downturn in 2008. However, this was followed by even stronger expansion in 2010 with GDP growth of 6 per cent. Recovery in Sweden was faster than, for example, in Great Britain, the USA or the Euro zone.

Diagram 4. Annual GDP changes 1990–2014

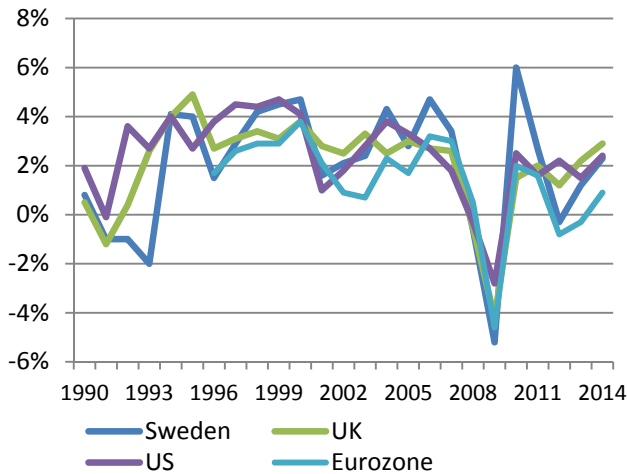
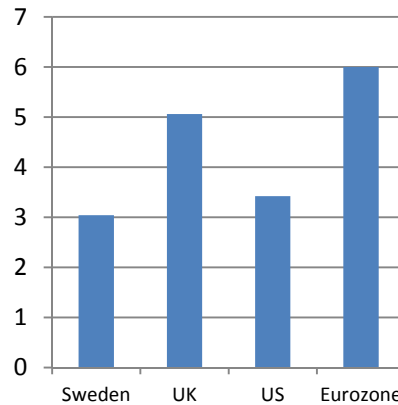


Diagram 5. Recovery period in years during/after the crisis



Source: SCB and OECD

As a result of the strong growth in 2010, Sweden, as shown in Diagram 5 above, demonstrated the fastest recovery after the financial crisis; Sweden reached its 2007 GDP level three years after the downturn while the corresponding period was more than five years in Great Britain, just under 3.5 years in the USA and more than six years in the Euro zone. The default risk among the banks’ borrowers can be expected to be dependent on both the depth and length of a downturn period. There is therefore reason to assume that the default levels in the banks’ Swedish exposures, and thereby the banks’ Swedish credit losses, would have been significantly higher if Sweden had had a crisis in line with what happened in other developed countries.

3.3.7 Summary of the assessment basis for FI’s position

Table 2 below shows the length of the downturn periods’ expressed as a percentage of the number of years since the measurement period began, based on historical data for Swedish company bankruptcies and Swedish credit losses and international company defaults (based on the same data as in the diagram above). The table also shows the average default, bankruptcy and loss levels during the downturn periods and the relationship between these and the levels during other years. The period covers 25 years and refers to 1990-2014. The credit losses for the years 1990 and 1991 have been extrapolated.

As presented in the table, the downturn periods represent a significant percentage even in Sweden since the 1990s crisis in Sweden was significantly more drawn out than what was the case in other developed economies. With the cut-off point for downturn periods that is used here, the 1990s crisis represented 16 per cent of

the period since 1990. The corresponding percentage based on international default rates is 24 per cent. Certain consultative bodies have put forward the view that Standard & Poor's aggregate portfolio is not representative for Swedish banks; in this regard FI notes that the proportion of economic downturn periods is identical (at 24 per cent) for the part of the portfolio representing corporates with a rating of BBB or stronger.

Table 2. Percentage and degree of severity of downturn periods during the period 1990-2014

Time series	Economic downturn's percentage of the length of the period	Average values during the downturn	Average values during the downturn relative to other years
Swedish credit experience (data from SCB)			
Company bankruptcies as a percentage of all Swedish companies	16%	3.6%	3.7x
Credit losses as a percentage of Swedish lending	16%	2.1%	11.6x
International default frequency (data from Standard & Poor's)			
All companies with a rating by Standard & Poor's	24%	3.3%	3.3x
Credit-worthy companies (with BBB or higher rating)	24%	0.3%	7.3x

Due to the significant differences between the Swedish and international experiences, and the significantly larger impact of downturn periods in other comparable countries, FI will assess in particular in its supervision of the internal models whether the significance of the downturn periods is sufficient for the banks' PD estimates. FI's point of departure will be that PD estimates based on downturn period weighted at less than 20 per cent, or less than one year out of five, will be considered non-representative of a complete economic cycle. A share of downturn periods of 20 per cent, or one year out of five, for downturn periods is higher than the Swedish experience, but is not quite as high as the levels observed internationally.

Several consultation bodies have criticised the fact that FI's assessment method precedes developments at the Basel Committee (among other bodies), and that the assessment method entails significant changes for the bank which does not reflect changes in the applicable regulation. FI notes in this regard that the reasons why the assessment method is required, and why it can be expected to have material implications for the banks, are due to methodological choices and assumptions by the banks which cannot be considered consistent with the present regulatory requirements.

As is noted by several consultative bodies, the Basel Committee has proposed, as part of its proposal for changes to the IRB approach, that PD estimation shall be

based on the assumption that at least one year in ten is a so called “bad” or “downturn” year. This is a proposal for a global minimum rule; banks shall primarily base their estimates on actual experience, insofar as other requirements are not applicable. Given that FI’s assessment methodology entails a higher proportion than one year in ten it is consistent with the Basel Committee’s proposal for a global minimum requirement. FI notes that international experience as regards default levels include an even greater proportion of downturn years compared to FI’s method.

It is worth noting, and as is also evident in the above diagram, that the banks’ credit losses were significantly more sensitive to the downturn period in the 1990s than the total bankruptcy and default levels were. The bankruptcy frequency among Swedish companies was between three and four times higher during the 1990s crisis than during the other years, while the credit loss levels have been between eleven and twelve times higher. A correspondingly higher cyclicity also applies to default levels in portfolios with better creditworthiness. The diagram shows that the default levels in the part of Standard & Poor’s portfolio that refers to creditworthy companies (i.e. companies with a rating of BBB or higher, which are not reported separately in the previous diagram) were more than seven times higher during the downturn periods than during other years while the default levels for the total portfolio was “only” three times higher than during the downturn periods. FI, in its supervision of the banks’ internal models, will assess the banks’ assumptions regarding both the scope of the downturn periods and their degree of difficulty.

To some extent FI shares the consultative bodies’ view that the banking crisis during the 1990’s was so severe, across the banks’ portfolios, with a regulatory and risk management context which was significantly different from what applies today, that experiences from the banking crisis cannot necessarily be used for PD estimation without adjustments. On the other hand, it is essential that banks use the experience that is available to them, and make necessary changes to it. FI will assess such assumptions as part of its supervision to ensure that banks’ PD estimates are based on reasonably prudent and comparable assumptions.

4 Supervision of internal models

4.1 General legal framework for supervision

This memorandum primarily describes FI’s method for assessing the banks’ estimation of PD within the framework of their authorisation to use the IRB approach for calculating risk-weighted exposure amounts.

FI’s supervision of internal models is regulated in particular by Chapter 5 of the Special Supervision Act. Section 1 states that FI shall review on an ongoing basis how a bank fulfils the Capital Requirements Regulation’s requirements on internal models (Articles 92-386). Section 2 states that if a bank’s internal models in accordance with section 1 are significantly deficient in their ability to identify risks, FI shall ensure that the bank adjusts the models or takes necessary measures

to decrease the the consequences of the deficiencies. Section 3 states that if a bank that has been granted authorisation to use a model as referred to in section 1 no longer fulfils the requirements for using the model, FI shall require that the bank

1. demonstrate that the consequences of non-compliance with the regulations are negligible, or
2. present an action plan in order to promptly re-comply with the requirements and provide a timetable within which the action plan shall be carried out.

The objective of the supervision is to compare the banks' internal models against relevant provisions in the Capital Requirements Regulation and, depending on how well the internal models comply with the provisions in this regulation, also take different measures. The obligation for FI to make sure that the bank adjusts its models in accordance with section 2 arises already at the point when the models demonstrate significant deficiencies in identifying risks, which does not necessarily mean that the models do not live up to the requirements in the regulation in the manner set out in section 3.

The provisions of the Capital Requirements Regulation are in many respects qualitative, which means that the assessments that are made during supervisory activities will also need to be qualitative. The considerations that FI will make in its supervision and the reasons for these considerations are described in section 3.3. The measures that FI may need to take if a model is judged to be deficient in its ability to identify risks or if the model is judged to be non-compliant with the requirements of the Capital Requirements Regulation are discussed in section 5.2.

4.1.1 Joint EU supervision methods

Article 144.2 of the Capital Requirements Regulation states that EBA shall prepare technical standards for supervision in order to specify the assessment methodology that the competent authorities shall follow when assessing whether a bank fulfils the requirements with regard to using the IRB approach. Article 173.3 also states that EBA shall propose technical standards for the methodology of the supervision to assess the integrity of the risk assignment and regular and independent assessment of the banks' risks. Finally, Article 180.3b states that corresponding standards shall be prepared for the methodology to assess a bank's method for estimating PD.

In accordance with the requirements set out in the Capital Requirements Regulation, EBA has prepared technical standards²⁷ that specify how competent authorities shall assess, for example, applications for authorisation to use the IRB approach and modifications to the method, but also how the authority shall conduct ongoing assessments of how the internal models, and more generally the

²⁷ See CP on Draft RTS on Assessment Methodology for IRB Approach, Eba, 12 november 2014 ([https://www.eba.europa.eu/documents/10180/891573/EBA-CP-2014-36+\(CP+on+RTS+on+Assessment+Methodology+for+IRB+Approach\).pdf](https://www.eba.europa.eu/documents/10180/891573/EBA-CP-2014-36+(CP+on+RTS+on+Assessment+Methodology+for+IRB+Approach).pdf)).

banks' implementation of the IRB approach, fulfil the requirements in the Capital Requirements Regulation. At the time this memorandum was published, the technical standards had not yet been sent to the European Commission for a motion to adopt, but this is expected to happen during 2016²⁸. This proposal to the technical standards nonetheless provides a shared view from the European supervision collective of how supervision of the IRB approaches should be conducted in several respects. The technical standards are not supposed to add new regulatory concepts or rules to the Capital Requirements Regulation, but rather discuss how the supervisory authorities shall assess compliance with the existing framework with regard to certain areas. Nor do the standards introduce any limitations on the authorities' choice of methodology for assessing internal models, but rather specify the considerations the authorities shall take into account within the framework of its supervision.

The preamble to the standards states that the purpose of the supervision is not only to ensure compliance with the provisions of the Capital Requirements Regulation but also to allow the supervisory authorities to assess the banks' solutions, systems and approaches in order to ensure that their quality is sufficient and that they are in line with the requirements placed on the IRB approach and its objective, which is to appropriately identify risk. The changes in supervisory methods regarding internal models described in this memorandum fall within FI's tasks as provided by Chapter 5 of the Special Supervision Act. FI therefore makes the assessment that the principles stated in the technical standards should form the basis for all future supervision of the internal models, even with respect to the considerations that are in focus in this memorandum.

In addition, it should be mentioned that EBA is preparing a number of additional regulations and guidelines as a result of the Capital Requirements Regulation that can be expected to introduce even more precise specifications of the requirements in the regulation, and even more harmonisation of the application of the regulation, for example regarding how defaults are defined, how estimates for PD should be calculated based on historic experience and how downward-adjusted LGD should be estimated²⁹.

4.2 Requirements regarding estimation in the Capital Requirements Regulation, with a focus on PD

The banks' estimation of the risk parameters are regulated primarily by Articles 179–184 of the Capital Requirements Regulation. These include general requirements for the estimation (article 178) and specific requirements with regard to the estimation of PD, LGD and conversion factors (articles 180, 181 and 182, respectively).

²⁸ <http://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-01+Opinion+on+IRB+implementation.pdf>

²⁹ See The Future of the IRB Approach, Eba, 4 March 2015, pp. 15 and 16 (<https://www.eba.europa.eu/documents/10180/1003460/EBA-DP-2015-01+DP+on+the+future+of+IRB+approach.pdf>)

In general, the estimation of the risk parameters shall be based on historical experience and take into account all relevant data, disclosures and methods. The less data a bank has, the more conservative its estimates. Furthermore, estimates shall be plausible and intuitive (Article 179.1(a)) and reflect long run experience (Article 179.1(b)). All changes in lending practice or the process for pursuing recoveries during the observation period shall be taken into account, and the effects of technical advances and new information shall be reflected (Article 179.1(c)). Estimates shall be reviewed once a year.

The relevance of the data is regulated in Article 179.1(d), which requires that the data's population and the guidelines that are used be comparable to the banks' criteria for exposures, and the economic and market conditions that underlie the data shall be relevant to current and foreseeable conditions. The regulation also requires that margins of conservatism be added to the estimate for different types of expected estimation errors, and where methods and information that are used can be considered to be less satisfactory, the margins of conservatism shall be larger (Article 179.1(f)).

The banks' PD estimates are expressly regulated in Article 180. In addition to the general requirements on estimates set out in Article 179, PD estimates shall reflect long run averages (Article 180.1(a)), PD estimation techniques shall be supplemented with supporting analysis (Article 180.1(d)) and banks, when using their own experiences, shall take into account previous lending principles and all changes to the risk rating system that occurred during the period in question. If changes have occurred, the margin of conservatism shall be larger (Article 180.1(e)).

5 Implementation

5.1 FI's expectations with regard to the banks' internal models and risk weights

FI expects banks to take into account the considerations related to the appropriate choice of the methodology for estimating PD as described in this memorandum during 2016 and to quickly carry out the necessary changes in their internal models. FI conducts a dialogue with the banks, as part of its supervision, as regards the implementation and will review the banks' choice of method and estimations in this regard. This also includes any need for changes in the banks' overall choice of method and estimations, as a potential consequence of the considerations expressed in this document, and the consequences resulting from these changes.

If FI makes the assessment that the banks do not make in their internal models sufficiently appropriate choices of methods, FI will need to consider whether to take measures. These measures may be in the form of an intervention or additional Pillar 2 capital requirements (or a combination of such measures). FI's assessment will impact the supervisory review and evaluation process, and thus the supervisory capital assessment, during the autumn of 2016.

5.2 FI's possibilities for intervention

5.2.1 *Measures in accordance with Chapter 5, section 2 of the Special Supervision Act*

As set out in section 4.1, FI shall ensure that a bank using internal models that demonstrate significant deficiencies in their ability to identify risks modifies the models or takes other measures to reduce the consequences of these deficiencies. If the bank does not modify the models in a manner that FI considers sufficient, FI may need to require that the bank take such measures.

Even if the matter is not related to observed breaches, any requirement of this nature would constitute a restriction to the bank's approved models. If the banks do not elect to implement the changes on their own accord, this instruction would need to be issued in the form of an order.

5.2.2 *Measures in accordance with Chapter 5, sections 3 and 4 of the Special Supervision Act*

In the event a model no longer is considered to fulfil the requirements set out in the Capital Requirements Regulation for use in the IRB approach, and the consequences are not proven to be insignificant, FI is obligated to require that the bank present an action plan to promptly fulfil the requirements and state the timetable within which the plan shall be carried out (Chapter 5, section 3).

If it is deemed to be improbable that the action plan as presented will result in the requirements being fulfilled or if the timetable for the implementation is not satisfactory, FI shall require improvements to the plan. If it is improbable that the bank within a reasonable period of time will once again fulfil applicable requirements or if the bank does not satisfactorily demonstrate that the consequences of observed deficiencies are insignificant, its authorisation to use the IRB approach shall either be limited to the areas where the requirements can be fulfilled within a reasonable period of time or withdrawn (Chapter 5, section 4).

5.2.3 *Additional Pillar 2 capital requirements*

As mentioned above, any deficiencies in the internal models shall be remedied. Until the point in time when FI makes the assessment that the banks' internal models fulfil the requirements of the regulations, FI will need to assess whether there is a need for additional Pillar 2 capital requirements. Such capital requirements would be temporary and would be required until the deficiencies are remedied. Any increases to the Pillar 2 capital requirements in such cases can be expected to correspond as a minimum to the increases to the capital requirements that would have occurred had the banks implemented in full FI's identified need for changes to the internal models and thereby under Pillar 1.

Any additional increases to the Pillar 2 capital requirements may also need to take into account the additional risk that results from the internal models, (without appropriate adjustments) no longer being considered sufficiently reliable. Additional model uncertainty can be a separate and additional risk factor in addition to the effect that would have arisen if the changes had been implemented by the banks themselves under Pillar 1.

6 Other model aspects

The regulations governing the IRB approach take into account different sources of uncertainty and model risk both in the overall calibration of unexpected loss that is described in section 2.1.1. and the Capital Requirements Regulation's specific requirements on prudence and margins of conservatism in several cases³⁰. As described in the previous section, the relatively beneficial Swedish default levels represent special challenges, for example for the estimation of risk parameters, since there is limited data related to Swedish downturn periods.

The banks' application of the IRB approach has long been a focus area for FI in its supervision, and it will continue to be so. The more conservative approach to the assessment of the banks' internal models that FI will introduce in 2016 may also have consequences for parts of the IRB approach that are not related to PD estimation, including the banks' risk classification systems, internal control and estimation of LGD parameters. Even if there are consequences from the supervision in other model areas for some banks, FI does not expect that these together will have as large of an impact on the banks' risk-weighted exposure amounts and risk weights as FI's new method for the assessment of appropriate PD estimation.

FI believes additional risks and capital requirements arise as a result of its view that the banks' maturity assumptions under the IRB approach, which are based on contractual maturities, underestimate actual maturities. This is discussed in this memorandum, but rather in a separate memorandum, *Pillar 2 capital requirements regarding maturity assumptions* (FI Dnr 16-2703), that was published on 1 March 2016.

7 Probable consequences

7.1 Introduction

FI has assessed the probable consequences for the banks of the assumptions and method review that are described in this memorandum. Exact calculations are not possible until the changes to the approach are implemented in the banks' internal

³⁰ The Capital Requirements Regulation requires, for example, specific buffers for expected estimation errors, when methods and information are used that can be considered less than satisfactory (Article 179.1(f)) and when lending principles or risk rating processes have been changed (Article 180.1(e)). The less information a bank has, the more conservative it should be (Article 171.2). The less data a bank has for estimation, the more conservative the estimation should be (Article 179.1(a)).

models and FI has completed its review of the IRB approach. FI has also made certain estimates of the implications for the economy and the banks' corporate customers.

7.2 Consequences for society and the banks' customers

Capital requirements have social benefits as a consequence of reduced risk of financial crises which, when they occur, entail considerable costs for society. This, in turn, can justify the costs in the form of higher interest margins and other charges the capital requirements may result in. Studies of "optimal" levels of capital requirements often suggest lower capital requirements than those applicable in Sweden today³¹. These studies however are predicated on the risk weights being sufficiently prudent. Several studies are also based on risk weights under previously applicable regulation (the so-called Basel 1- and Basel 2-agreements), with substantially higher risk weights compared to the ones reported by the banks today (especially in the case of Sweden). The assessment method described in this document is required to resolve shortcomings in the calculation of risk weights. The risk weights for Swedish banks can be expected to continue to be lower than those resulting from methodologies used previously (the standardised approach or Foundation IRB).

The costs for corporates in the form of increased overall costs for funding and capital are by necessity based on several assumptions. Assessments which are based on the assumption that higher capital requirements only entail a greater need of capital relative to other forms of funding but which do not assume that the cost of such capital and funding decline, as a result of the higher capital requirements, can be considered as conservative given that higher levels of capital reduce the risk, not least for banks' creditors, which should lead to lower funding costs for banks.

With the conservative assumption that increased capital requirements do not reduce banks' costs for either funding or capital and that banks fully reflect such higher costs in their pricing to customers, FI estimates that an assumed increase in average risk weights of three percentage points will result in an increase in the banks' gross margins on loans of around 0.05 percentage points before tax. This corresponds to the highest expected impact on the financing costs of corporate borrowers. Given that the capital requirements relating to household mortgages will continue to be driven by the risk weight floor there is no reason to expect any impact on the cost for households related to mortgage borrowing.

³¹ This is however not the case for the substantially higher capital requirements proposed by, for example, Admati and Hellwig. The higher capital requirements proposed by Admati and Hellwig are however not based on assessments of the underlying risk in the respective banks (see Admati, Anat & Hellwig, Martin, *The Bankers' New Clothes: What's Wrong with Banking and What to Do about It*, Princeton University Press, November 2013. For further description of appropriate levels of capital requirements for banks, see for example FI's document *Capital requirements for Swedish banks*, FI Dnr 14-6258 (http://www.fi.se/upload/90_English/20_Publications/20_Miscellaneous/2014/kapitalkrav-svenska-banker-140910enNY.pdf).

It is however important to note that this, in itself limited and conservatively calculated, cost increase only arises under normal credit conditions. During economic downturns, FI's assessment method means that banks' PD levels, and thereby their capital requirements, will be more stable than would otherwise have been the case. As a result, the method will entail lower costs during downturn periods than would be the case with banks' current methodologies. In addition, more stable capital requirements, which do not increase to the same extent as with current methodologies when borrowers' credit worthiness deteriorates as a consequence of a deteriorating business cycle, should improve the likelihood that companies' credit applications will be approved during economic downturns.

7.3 Consequences for the banks

FI expects measurable consequences on the banks' capital requirements of the assessment method regarding PD estimation and more generally the overview of the internal models described in this memorandum. Exact calculations are however very difficult to make before the changes have been fully implemented in the banks' internal models. Based on FI's calculations the following observations can be made:

- All banks using the IRB approach are expected to report higher risk weights at least for exposures to corporates as a result of FI's changes to the approach and review. The increase to the risk weights for exposures to corporates is expected to be at least a few percentage points.
- FI's calculations also indicate that the differences in the risk weights between banks for comparable exposures, primarily in Sweden, will decrease and that the average risk weights for exposures to corporates for all major banks will amount to at least about 30 per cent after the changes have been implemented. It should be noted that these calculations allow for both changes in the methodology for PD estimation and the implications of current supervisory activities as part of the ongoing supervision of banks' internal models.
- Differences in underlying risk will continue to lead to changes in risk weights between different exposures and different banks. FI emphasises that the assessment method does not represent a floor on risk weights for corporate exposures. Future changes in risk profiles in corporate exposures may mean risk weights increase or decrease compared to the level FI's current impact assessment reflects.
- FI's change in method for its assessment of the banks' PD estimation is the single most important reason behind the expected changes in risk weights in 2016.
- More conservative estimates of probability of default will also make the banks' risk weights more stable over time. As a result the risk weights will be less, or not at all, affected by economic downturns going forward than

what would be the case with the banks' current methods. In turn this will lead to smaller fluctuations in the banks' capital positions and therefore, at least to some extent, to smaller fluctuations in credit supply across business cycles.

Banks that already today to a large extent allow for the considerations that FI expresses in this memorandum will be affected less than other banks. However, FI expects that all banks that have authorisation to use the IRB approach will need to recalibrate their PD levels upward to some extent.

In addition to the consequences in the form of additional capital requirements the methodological changes described in this document can also entail a need for model development, which in turn can entail additional costs for the banks. FI considers that such costs normally will have to be viewed as necessary in order to ensure reasonable and appropriate risk assessment and -management.

8 Final comments regarding internal models and risk weights

8.1 Introduction

As described in section 1.2, FI believes that the IRB approach is an important and effective method for achieving sound incentives for the financial sector and that the increasing use of internal models primarily provide a fairer presentation of the risks of the Swedish banks. At the same time, FI has observed that the banks have implemented the IRB approach in such a manner that in some respects the risk weight assigned to a certain exposure is not sufficient when taking into account the underlying risks. It is FI's view that the positions presented in this memorandum currently can be considered sufficient to rectify situations where Swedish banks' risk weights in some cases can be too low.

The complexity of the IRB approach creates a greater need for transparency, both in terms of the approach's fundamental assumptions and its consequences, which are discussed in the opening sections of this memorandum. Section 8.2 below shows an alternative way to demonstrate how reported risk weights relate to actual risk, in this case reported credit losses. Section 8.3 briefly describes some of the important studies conducted by the Basel Committee and EBA on banks' risk weights. Finally, section 8.3 describes several of the initiatives that the Basel Committee is planning and that can have an impact on the banks' risk weights and capital requirements in the future.

8.2 Risk weights in relation to alternative risk measurements

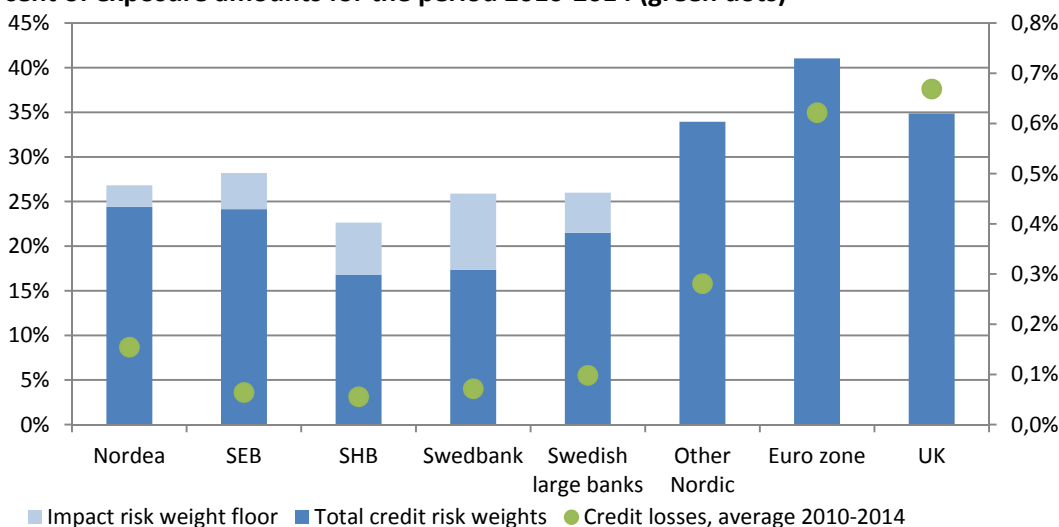
As described in section 2, banks' risk weights are dependent on their unexpected loss. Unexpected loss is based in turn on a prescribed risk-weight formula and the banks' estimates of expected loss. Reported risk weights vary widely between

banks, which primarily is a reflection of their differences in underlying risks.³² A simplified overview of the relationship between the risk weights and underlying risks can be achieved by comparing the banks' risk weights to their actual historical credit losses. It should be mentioned, however, that expected loss, as described in section 2.2.1, normally is a more conservative measure than actual loss, but expected loss can also fall below actual loss during periods of severe economic downturn.

Diagram 6 below shows the four major Swedish banks' total risk weights for credit risk for 2014 and their average credit losses during the period 2010-2014. Both measures are expressed as a percentage of the total exposure amount for credit risk. The diagram also shows the corresponding figures for a few other Nordic banks (Danske Bank and DNB), a number of banks in the Euro zone (BBVA, BNP Paribas, Deutsche Bank, Santander, Société Générale and UniCredit) and three British banks (Barclays, Lloyds and RBS).

As presented in the diagram, the major Swedish banks' reported risk weights on average are 22 per cent (26% if the risk weight floor for mortgages is added). This is lower than for other Nordic banks (34 per cent), banks in the Euro zone (41 per cent) and British banks (35 per cent), in line with what is described in section 2.2.4. However, the relative credit losses of Swedish banks have been even lower, as shown in the diagram. Credit losses over the five-year period 2010-2014 were on average 0.10 per cent of the exposure amounts for credit risk for the major Swedish banks and between 0.3 and 0.7 per cent on average for the banks outside of Sweden.

Diagram 6. Total risk weights in 2014 (blue bars, with and without risk weight floor for mortgages as if they were introduced under Pillar 1) and average credit losses as a per cent of exposure amounts for the period 2010-2014 (green dots)

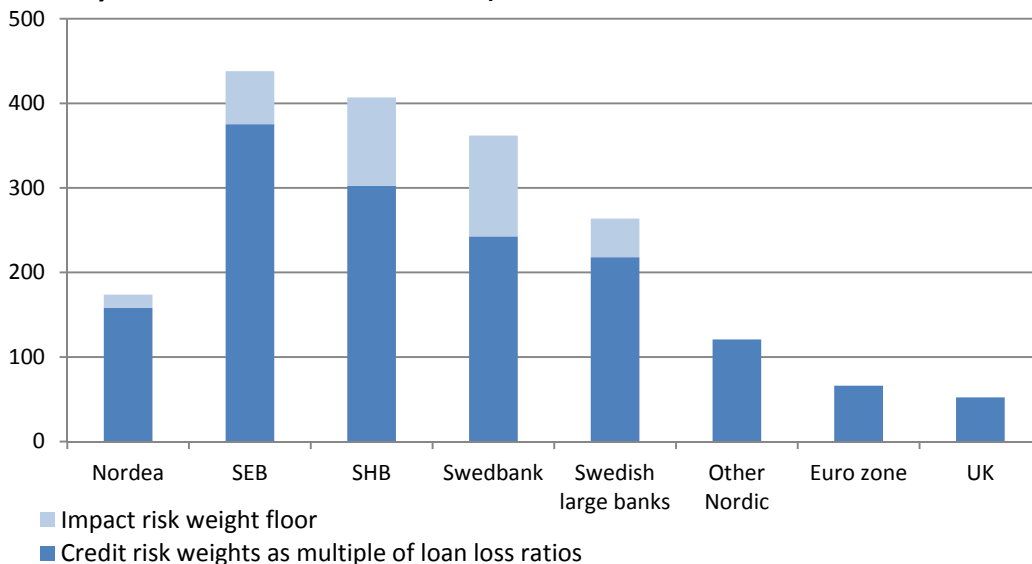


Source: Annual reports of the banks and Pillar 3 reports.

³² As described in section 8.3, EBA and the Basel Committee have determined that the difference in risk weights between banks can primarily be explained by differences in underlying risk. Other possible explanations include differences in rules and authority requirements between Member States as well as crucial differences in how the banks implement the IRB approach.

Diagram 7 below shows the relationship between risk weights and credit losses as multiples, where the total risk weights have been divided by the average historical credit losses (expressed as a share of non-risk-weighted exposure amounts for credit risk). As presented in the diagram, the Swedish banks’ risk weights for credit exposures are relatively high in relation to the banks’ actual reported credit losses. On average, the Swedish banks’ risk weights and risk-weighted exposures amounts are more than 200 times larger than the Swedish banks’ average historical credit loss levels (more than 250 times larger if the risk weight floor for mortgages is added), while corresponding relationships between risk weights and credit loss levels are on average between 50 and 120 times larger for banks outside of Sweden.

Diagram 7. Relationship between risk weights for 2014 and average credit losses for the period 2010–2014 as multiples (with and without risk weight floor for mortgages as if they were introduced under Pillar 1)



Source: Annual reports of the banks and Pillar 3 reports.

As mentioned above there is no formal, direct relationship between actual credit loss levels and risk weights. The actual relationship is between risk weights and expected loss. However, the relationships between risk weights and actual credit losses in the diagram above, which show lower multiples for banks with higher historical loss levels than what has been the case in Sweden, is consistent with the IRB approach’s fundamental assumptions and inherent conservativeness in two respects. First, Swedish banks, as described in more detail in section 3, have benefited from low historical loss levels, which means that expected loss is normally higher than actual loss for Swedish banks. In turn this results in relatively higher risk weights in relation to actual historical loss levels for Swedish banks than for banks whose historical losses have not been as low in relation to expected loss. Second, the risk weight formula has a higher degree of conservatism for exposures with low PDs, which raises the risk weights in relation to expected loss for such exposures. Since Swedish banks have relatively low

PDs, this means in turn that the differences between risk weights and actual loss, as shown in the diagram above, are even greater for Swedish banks.

8.3 International analysis of differences in reported risk weights

Significant differences in risk weights between different banks, and between banks in different countries, have led to a discussion about whether these are reasonable and to what extent the risk weights are affected by factors not related to underlying risks.

A number of studies have been conducted by the Basel Committee³³ and EBA³⁴ with the aim of comparing banks' reported risk weights and identifying and analysing any discrepancies in their calculation. Both the Basel Committee's first study and EBA's studies include two separate models, in part comparisons of banks' risk parameters for actual portfolios of exposures and in part comparisons of how different banks calculate capital requirements with their internal models for identical, hypothetical portfolios of underlying exposures. The Basel Committee published in March 2016 a follow-up report which compared banks' assumptions as regards PD, LGD and EAD with their actual experience over (in most cases) a five-year period.

These studies found that the differences in risk weights are primarily due to differences in portfolio compilation and underlying risk, both of which can be considered natural explanations. However, the remaining differences are significant, and can be derived from both differences in banks' own methods for estimation and factors that the banks themselves do not control, such as differences in authority requirements and legislation between countries. The Basel Committee's follow-up study shows that banks' PD estimates exceed their actual default experience in two thirds of cases, and that situations of deviations where PD is lower than actual default levels primarily reflect stress periods. As regards LGD and EAD, where the IRB approach requires banks to base their estimates on downturn conditions, assumptions are generally significantly higher than actual outcomes, as is required by the regulation. The results generally suggest the IRB approach is implemented as intended, even though the Basel Committee's follow-up study also reveals significant differences in implementation. Further harmonisation in the application of the regulations could reduce the impact of the remaining differences.

³³ See, for example, Regulatory Consistency Assessment Programme (RCAP) Analysis of risk-weighted assets for credit risk in the banking book, BCBS July 2013 (<http://www.bis.org/publ/bcbs256.pdf>)

³⁴ See, for example, Summary report on the comparability and pro-cyclicality of capital requirements under the Internal Ratings Based Approach in accordance with Article 502 of the Capital Requirements Regulation, EBA 17 December 2013 (<https://www.eba.europa.eu/documents/10180/15947/20131217+Summary+report+on+comparability+and+pro-cyclicality+of+the+IRB+Approach.pdf>).

8.4 Future requirements on the internal models

Regulations that govern the internal models, and thus the banks' capital requirements, are facing extensive changes primarily due to initiatives by the Basel Committee but also due to initiatives from the EU.

The Basel Committee published for consultation in March 2016 its proposal for a number of changes in the IRB approach, both as regards advanced and foundation approaches. The design of these changes is not finalised and the consequences are currently difficult to assess. However, it is probable that the Basel Committee's changes in particular will lead to both higher and less risk-based risk weights compared to the current regulations. This could have significant consequences for Swedish banks in particular since the risks, and the reported risk weights, are relatively low in Sweden. This can be expected to be the case even after FI's method for assessment of appropriate PD estimation is implemented.

The Basel Committee proposes in its consultation document several changes to the IRB approach. Changes relevant to credit risk can be summarised as follows:

- The IRB approach is proposed to be constrained, or replaced by the standardised approach, for certain exposure types where the modelling basis is not deemed sufficient³⁵.
- So-called input floors are proposed for different parameters on an exposure level. Among others, a higher PD-floor is proposed as well as LGD floors for both secured and unsecured exposures (the former floor depending on type of security) and EAD floors.
- The Committee is also considering a so-called output floor based on the new standardised approaches for all exposure types as a replacement for the current so-called Basel 1-floor.

None of these measures has been finally determined, and this also applies to the proposed new standardised approach which in different ways will have more prominence going forward. The final changes will be decided with consideration of a comprehensive quantitative impact study, and the objective of the Committee is that capital requirements, on a global level, shall not increase significantly as a consequence of the new proposals. Given that Swedish banks represent a relatively small share of the global banking sector the changes can nevertheless be significant for Swedish banks in isolation, not least given that Swedish banks have comparatively low risk weights currently.

³⁵ As regards credit risk the IRB approach is proposed to be replaced by the standardised approach for exposures to institutions and large corporates with consolidated assets in excess of € 50 billion. Only the standardised approach or so-called slotting is proposed for special lending. The advanced approach is proposed to be replaced by the foundation approach for exposures to corporates with consolidated revenue in excess of € 200 million.